Storm Drain Inlet Protection for Construction Sites

(1060)

Wisconsin Department of Natural Resources
Conservation Practice Standard

I. Definition

A temporary device installed in or around a storm drain inlet, drop inlet, or curb inlet.

II. Purposes

This practice is intended to minimize sediment from entering storm drainage systems in areas where the contributing drainage area is temporarily disturbed.

III. Conditions Where Practice Applies

This practice applies where runoff from construction sites enters conveyance system structures, such as drain inlets, drop inlets, and curb inlets. Inlet protection devices are for drainage areas of one acre or less. Runoff from areas larger than one acre shall be routed through a properly designed sediment trapping or settling practice upstream of the inlet.

IV. Federal, State, and Local Laws

Users of this standard shall be aware of applicable federal, state and local laws, rules, regulations, or permit requirements governing the use and placement of storm drain inlet protection. This standard does not contain the text of federal, state, or local laws.

V. Design Criteria

This section establishes the minimum standards for design, installation, and performance requirements.

The appropriate type of inlet protection shall be installed prior to drain, drop, or curb inlet receiving runoff. The device shall remain in place and be maintained until the disturbed area is stabilized.

A. General Criteria Applicable to All Inlet Protection Devices

1. Ponding water to settle sediment is encouraged; however ponding shall not interfere with the flow of traffic, create a safety hazard, or cause property damage. All devices shall have provisions such as overflow holes or "emergency spillways" to safely pass water if the device becomes clogged.

2. The contributing drainage area to the inlet protection device shall be one acre or less. In instances where a larger contributing drainage area exists, runoff shall be routed through a properly designed sediment trapping or settling practice upstream of the inlet.

3. No gaps shall be left in the material that would allow the flow of water to bypass the inlet protection device, except for overflow holes.

4. All fabrics used as part of Type A, B, C, D, D-M and D-HR inlet protection devices must meet WisDOT specifications for the selected fabric.

5. Type FF geotextile fabric shall be used for Type, A, B, C or D inlet protection.

6. Type D-M inlet protection fabric shall be Type FF for both the upper section and the outer lower sections of the device. The replaceable interior filter fabric type shall be based according to the particle size trapped. Refer to Table 1 for the filter fabric type and exposed soil particle diameter where the device is appropriate.

7. Type D-HR inlet protection fabric shall be Type FF for the upper half of the device. Type HR fabric shall be used in the lower half of the device. Refer to Table 1 for filter fabric type and exposed soil texture and particle diameter where the device is appropriate.

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Table 1			
Exposed Soil Texture	**Exposed Soil Particle Diameter (average) (mm)**	**Filtering Fabric Type***	**Recommended Inlet Protection Device Type**
Course (Sand)	≥ 0.0625	FF	D, D-M
Medium (Silt Loam)	0.0624 – 0.005	DF	D-M
Fine (Clay)	≤ 0.004	R	D-M
		HR	D-HR

* DF, R or HR filters may be used where FF is the required minimum standard. R or HR filers may be used where DF is the required minimum standard.

B. Criteria Applicable to Inlet Protection Devices for Unpaved Areas or the Pre-Paving Phase of Construction

1. Inlet protection (all device types) - See Figures 1-3.

   a. Type A devices shall be utilized around inlets in unpaved areas and should be maintained until permanent stabilization has been established. Type A devices shall be utilized on inlets prior to installation of curb and gutter or pavement and where safety considerations are not compromised on the site.

   b. Type B and C devices shall be utilized after the casting and grate are in place and may only be utilized when sufficient depth is not available to use Type D, D-M, or D-HR devices.

   c. Inlet protection Type D-M and D-HR devices shall only be used after castings are in place on top of the inlet boxes.

      Type D, D-M, and D-HR devices shall conform to the standard drawings as shown in the plans. To prevent the filter bag from blocking overflow water, there shall be threeinches of clearance between the bag and the sides of the inlet. Type D, D-M and D-HR devices when used in inlets less than 30 inches in depth shall have the filter bag cinched to provide the required clearance for overflow.

2. Other inlet protection devices include, but are not limited to: straw bales, rock bags and stone weepers. These devices can be used to settle sediment or divert flow. Note: these devices are not applicable to areas adjacent to traffic.

C. Criteria Applicable to Inlet Protection Devices for the Post-Paving / Curbing Phase of Construction

1. Inlet protection Types B, C, D, D-M, and D-HR are applicable to post-paving construction. See Figures 1-3.

   a. Type B devices shall be utilized on inlets without a curb box when Type D inlet devices cannot be used.

   b. Type C devices shall be utilized on street inlets with curb heads. A 2-inch by 4-inch (minimum) piece of wood shall be wrapped and secured in the fabric and placed in front of the curb head, as shown in the figures. The wood shall not block the entire opening of the curb box and shall be secured to the grate with wire or plastic ties. Use Type C devices when Type D devices cannot be used.

   c. Utilize Type D, D-M, and D-HR devices when the depth from the top of the grate to the bottom of the inlet is 30 inches or greater. Note: Type D style devices can be modified by cinching the filter bag to fit inlet structures that are less than 30 inches in depth.

   d. Utilize Type D, D-M, and D-HR devices where street flooding or ponding water and the associated traffic safety issues are a concern, or where more effective inlet filtering is needed.

2 Other inlet protection devices are applicable to post paving construction; these devices include but are not limited to: rock bags, manufactured bags, and stone weepers. These devices can be used to either settle sediment or divert flow. Note: other than for internal to the inlet type filters these devices are not applicable to areas adjacent to traffic.

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a. Manufactured rock bags shall conform to the WisDOT standard for rock bag material, including fill material.

b. Straw bale installation shall conform to the criteria outlined in the WDNR Conservation Practice Standard (1062) Ditch Check.

c. Stone weeper installation shall conform to the criteria in WDNR Conservation Practice Standard (1063) Sediment Trap.

VI. Considerations

A. Inlet protection is only one element in an erosion control plan. Other practices, including temporary stabilization and area clean up, should also be utilized upstream of the inlet.

B. Inlets should be temporarily closed or sealed to prevent entrance of runoff and sediment when site conditions allow.

C. The disturbed area should be stabilized as quickly as possible. Timely stabilization is the most effective method to control sediment entering the storm sewer.

D. Storm drain inlet protection consists of several different types of inlet filters and sediment traps. Inlet protection is only one element in an erosion control plan. Each type differs in application with selection dependent upon site conditions and inlet type. Not all designs are appropriate in all cases. The user must carefully select a design suitable for the needs and site conditions.

E. Inlet protection is only as effective as the filter or device used around the inlet. Effectiveness decreases rapidly if the inlet protection is not properly maintained. In general, inlet protection provides relatively good removal of coarse and medium-sized soil particles from runoff; however, to effectively trap fine soil particles, other practices such as the use of polyacramides, may be required. (See DNR technical standard 1050)

F. Inlet protection requires routine inspection and maintenance. Field inspections have shown where inlet protection causes excessive ponding that the device is removed, punctured, or bypassed. In such situations, a structure with an adequate overflow mechanism should be utilized instead of simply removing the inlet protection device.

G. The effectiveness of inlet protection devices in unpaved areas can be enhanced by additional excavation to increase the storage capacity around the inlet.

H. Good construction site housekeeping measures, such as maintaining clean gutters and street sweeping, are important.

I. The use of fabric intended for a finer soil type on a construction site with coarser soil may increase the required maintenance frequency due to faster clogging.

J. Consider using Type D-M and D-HR inlet protection rather than Type B, C, or D in areas with fine soils.

VII. Plans and Specifications

Plans and specifications for installing inlet protection shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose:

A. Locations and types of inlet protection.

B. Material specification conforming to this standard.

C. All construction documents shall identify the responsible party and include a schedule for installation, inspection, and maintenance requirements.

VIII. Operation and Maintenance

A. Remove inlet protection devices once the contributing drainage area is stabilized with appropriate vegetation or impervious surface.

B. Inlet protection shall be at a minimum inspected weekly and within 24 hours after every precipitation event that produces 0.5 inches of rain or more during a 24-hour period.

C. For Type A, B or C inlet protection:

1. Remove sediment deposits when sediment has accumulated between ⅓ to

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½ of the design depth or the device is no longer functioning as designed.

2. Inspect the device routinely, and repair (if necessary) and restore to original dimension.
3. Sediment removed from the device shall be deposited in a suitable area and stabilized.

D. For Type D and D-M inlet protection;

1. Remove sediment when it accumulates to within 6 inches of the bottom of the overflow holes.
2. If standing water remains within 6 inches of the bottom of the overflow holes 24 hours after a runoff event, accumulated sediment shall be removed and the filtering capacity of the fabric shall be restored.
3. Holes in the Type FF fabric less than 2 inches in length may be repaired by stitching. The bag must be replaced if holes greater than 2 inches are observed in the Type FF fabric.
4. The insert filter fabric shall be replaced if any holes are observed in the fabric.
5. The filter must be replaced if the flap pockets sustain damage that compromises the integrity of the filter or the ability to perform maintenance.

E. For Type D-HR inlet protection:

1. Remove sediment when it has accumulated to within 6 inches of the bottom of the overflow holes.
2. If standing water remains within 6 inches of the bottom of the overflow holes 24 hours after a runoff event, accumulated sediment shall be removed and the filtering capacity of the fabric shall be restored.
3. Holes in the Type FF fabric less than 2 inches in length may be repaired by stitching.
4. The filter shall be replaced if any holes are observed in the Type HR fabric or holes greater than 2 inches are observed in the Type FF fabric.
5. The filter must be replaced if the flap pockets sustain damage that compromises the integrity of the filter or the ability to perform maintenance.

F. Due care shall be taken to minimize sediment falling into the inlet. Any material falling into the inlet shall be removed.

IX. References

WisDOT "Standard Specifications for Highway and Structures Construction" is available at: http://roadwaystandards.dot.wi.gov/standards/stndspec/index.htm

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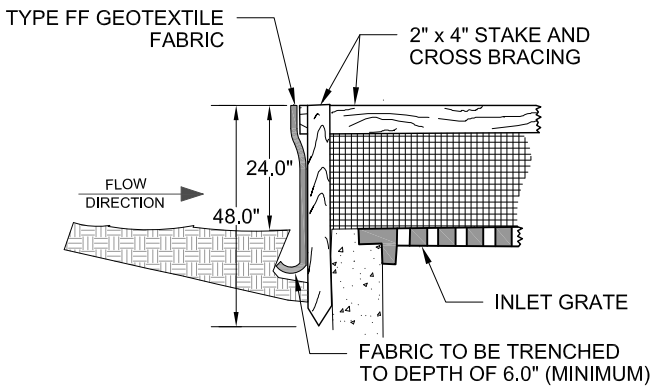
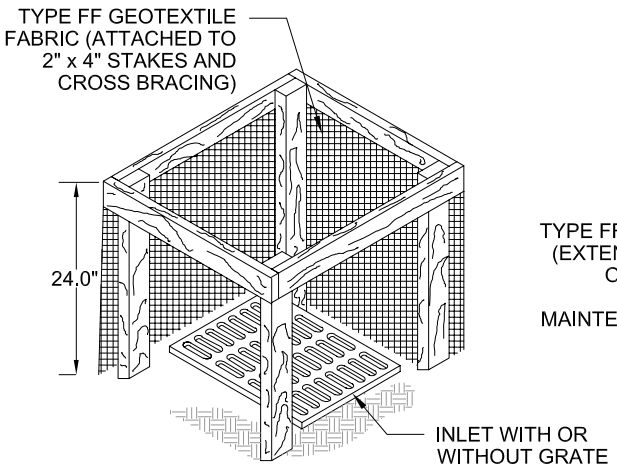
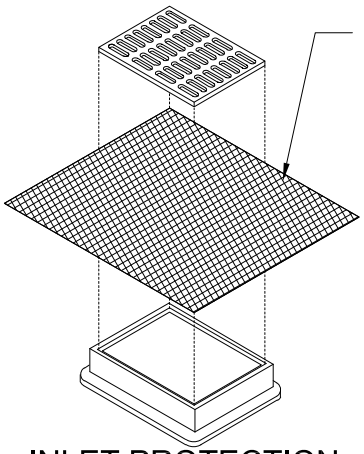
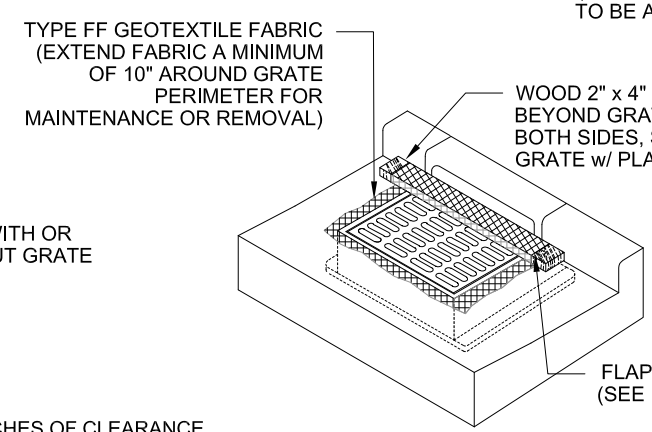




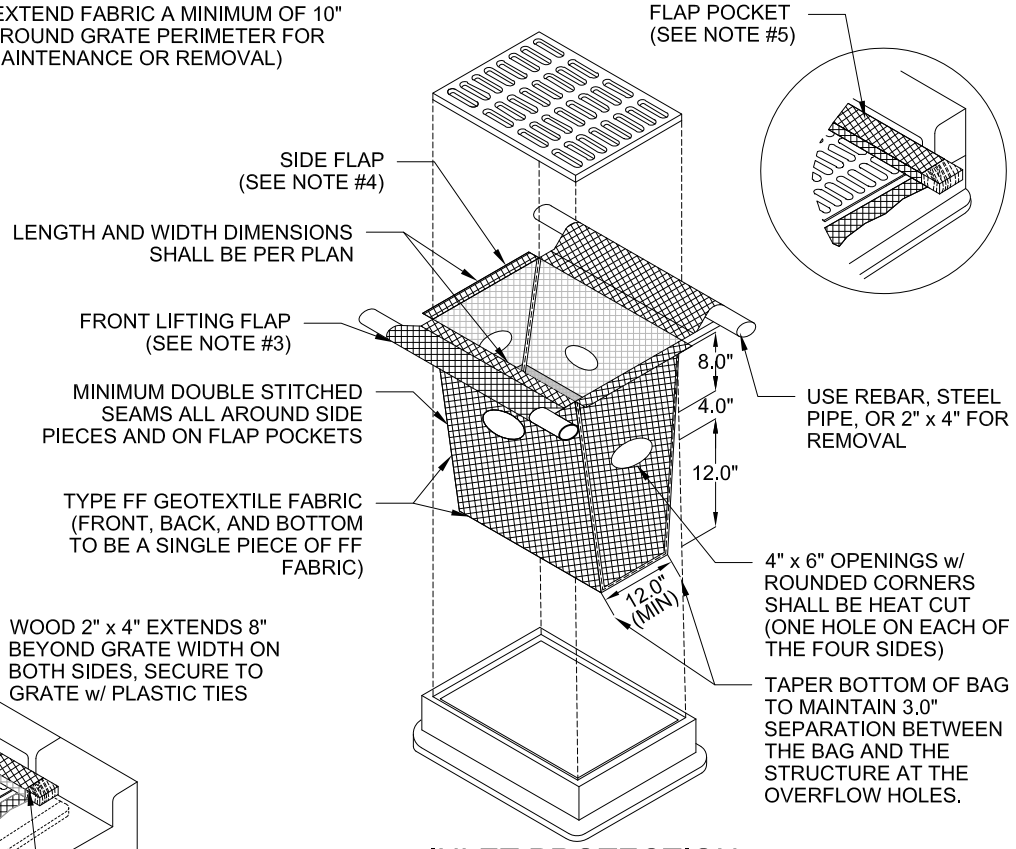
INLET PROTECTION TYPE A



INLET PROTECTION TYPE B
WITHOUT CURB BOX



INLET PROTECTION TYPE C
WITH CURB BOX



INLET PROTECTION TYPE D
CAN BE INSTALLED IN INLETS WITH OR WITHOUT CURB BOXES

NOTES:

1. TAPER BOTTOM OF BAG TO MAINTAIN THREE INCHES OF CLEARANCE BETWEEN THE BAG AND THE STRUCTURE, MEASURED FROM THE BOTTOM OF THE OVERFLOW OPENINGS TO THE STRUCTURE WALL.
2. GEOTEXTILE FABRIC TYPE FF FOR FLAPS, TOP AND BOTTOM OF OUTSIDE OF FILTER BAG. FRONT, BACK, AND BOTTOM OF FILTER BAG BEING ONE PIECE.
3. FRONT LIFTING FLAP IS TO BE USED WHEN REMOVING AND MAINTAINING FILTER BAG.
4. SIDE FLAPS SHALL BE A MAXIMUM OF TWO INCHES LONG. FOLD THE FABRIC OVER AND REINFORCE WITH MULTIPLE STITCHES.
5. FLAP POCKETS SHALL BE LARGE ENOUGH TO ACCEPT WOOD 2" x 4". THE REBAR, STEEL PIPE, OR WOOD SHALL BE INSTALLED IN THE REAR FLAP AND SHALL NOT BLOCK THE TOP HALF OF THE CURB FACE OPENING.

MAINTENANCE NOTES:

1. WHEN REMOVING OR MAINTAINING INLET PROTECTION, CARE SHALL BE TAKEN SO THAT THE SEDIMENT TRAPPED IN THE FABRIC DOES NOT FALL INTO THE STRUCTURE. MATERIAL THAT HAS FALLEN INTO THE INLET SHALL BE IMMEDIATELY REMOVED.

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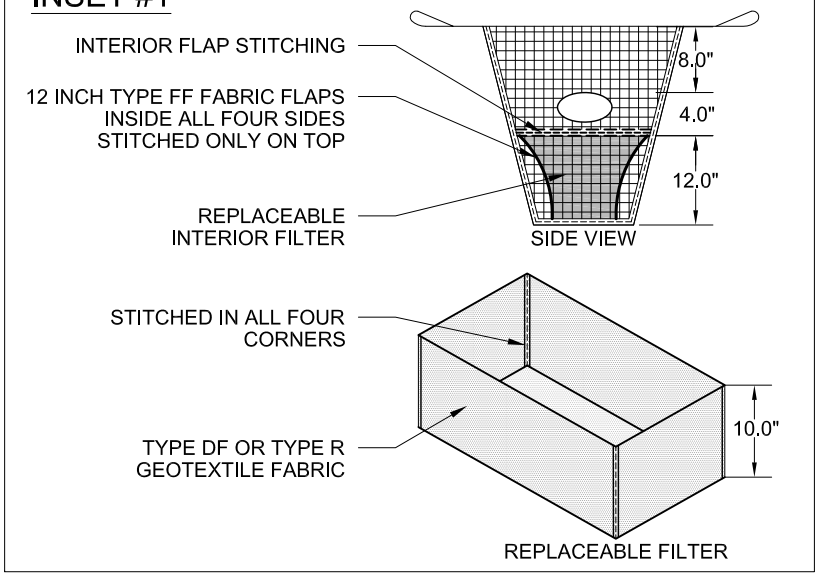
DRAFT FIGURE 2. INLET PROTECTION TYPE D-M

INSET #1



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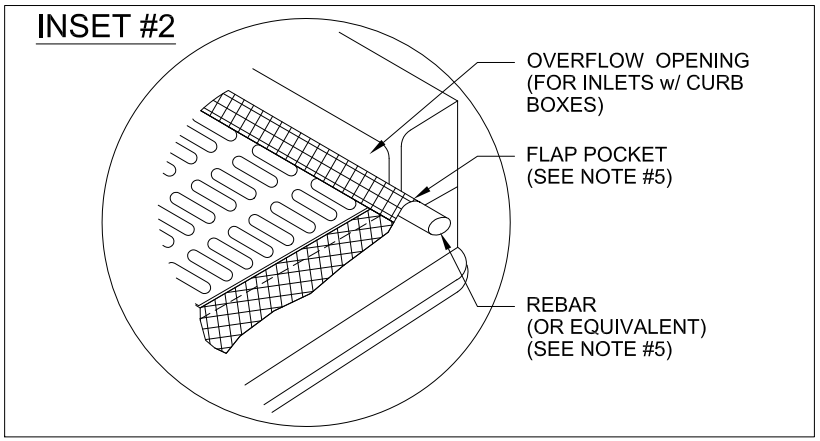

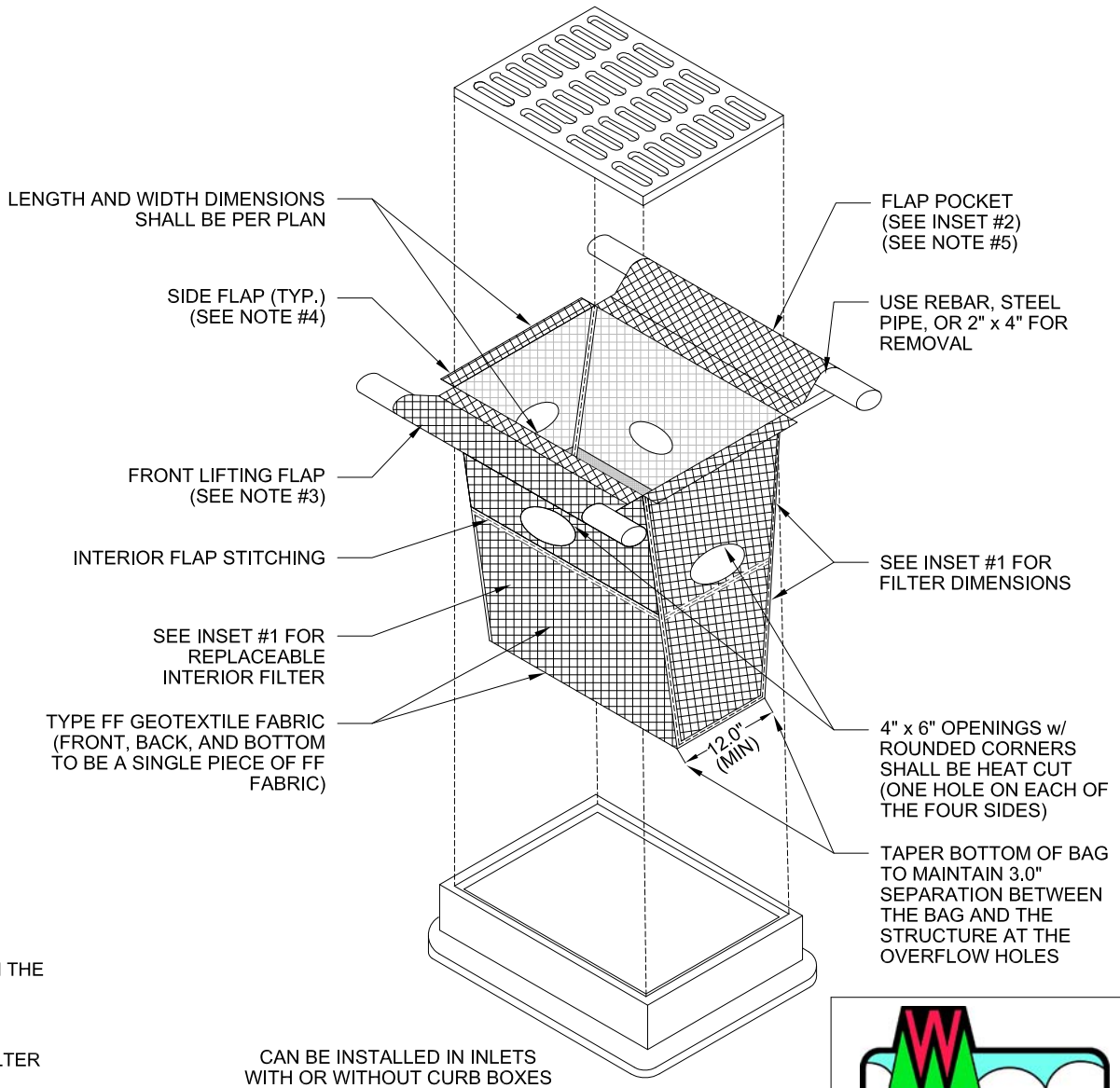

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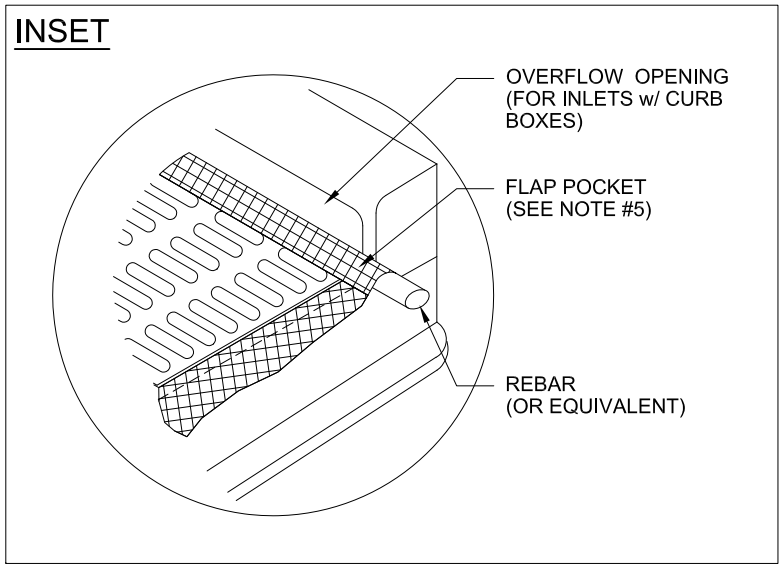
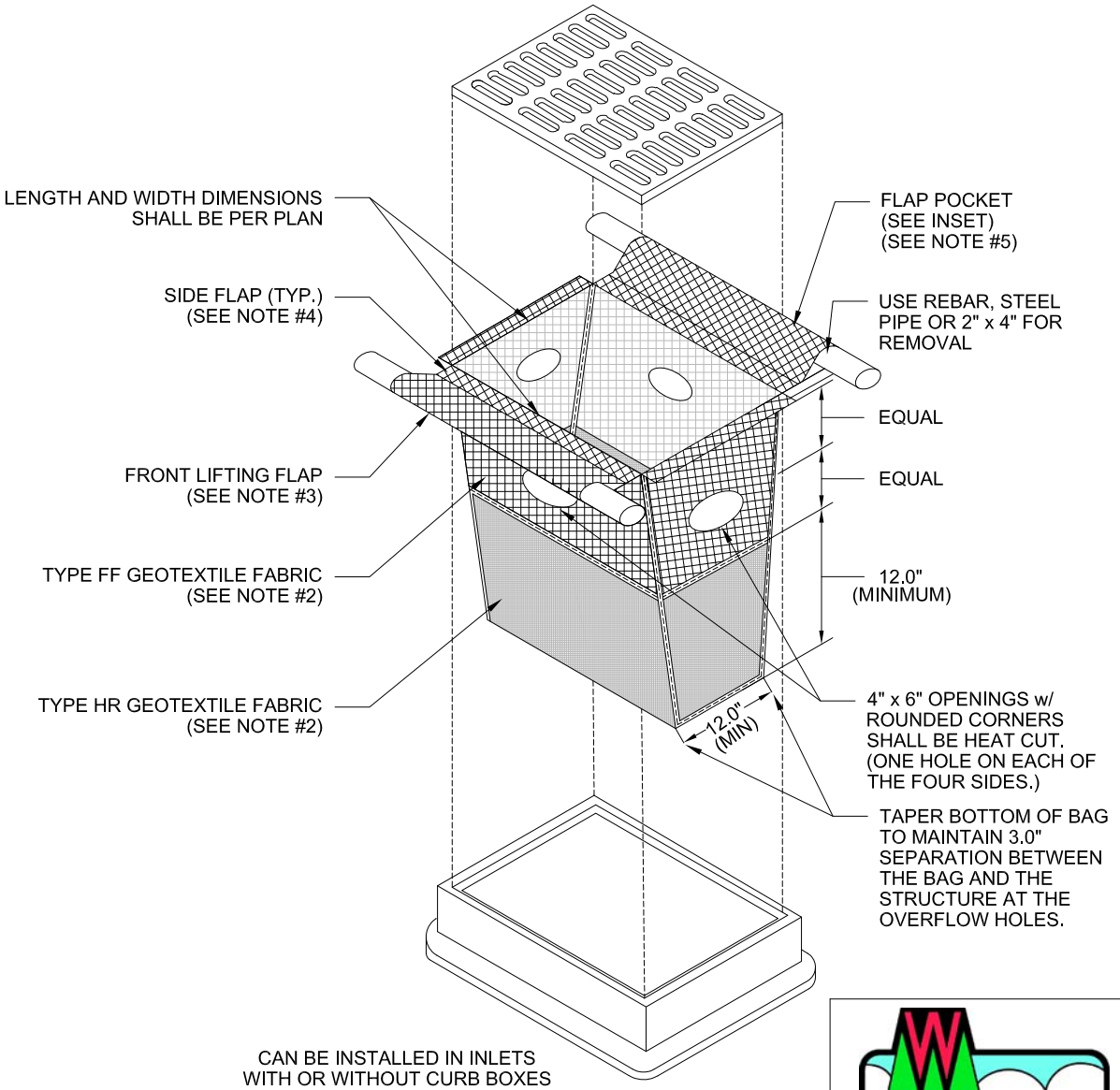
DRAFT FIGURE 3. INLET PROTECTION TYPE D-HR





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