

# F.16 Pretreatment

## F.16.1 Filter Strip Design and Material Standards

1. Verify that the plans include an appropriate sequence of construction that is specific to the construction of the filter strip. Refer to Section 4.10.2 for guidance. [Section 2.3.1]
2. If discharge of concentrated flow to the filter strip is proposed, verify that a level spreading device is proposed to provide uniform sheet flow. [Section 4.10.2, 2]
3. If filter strips are proposed in high-use areas, verify that precautions are taken to minimize disturbance of the filter strip, such as signage fences, and placement of sidewalks or paths to minimize pedestrian or vehicular traffic. [Section 4.10.2, 3]
4. If energy dissipaters and/or flow spreaders are not proposed to be installed with the filter strip, verify that the flow path to the filter strip does not exceed 75 feet for impervious ground cover or 150 feet for pervious ground cover. [Section 4.10.2, 4]
5. Verify that the contributing drainage area does not exceed five acres and does not exceed a drainage area to filter strip area ratio of 6:1. [Section 4.10.2, 5]
6. If no energy dissipaters and/or flow spreaders are provided up-gradient of the filter strip, verify that the slope of the contributing drainage area to the filter strip does not exceed 5%. [Section 4.10.2, 6]
7. Verify that the slope of the filter strip does not exceed 8%. Slopes less than 5% are generally preferred. Filter strips with slopes that exceed 5% should implement check dams to encourage ponding and prevent scour and erosion of the filter strip area. [Section 4.10.2, 7]
8. Verify that the slope (parallel to the flow path) of the top of the filter strip, after a flow spreading device, is less than 1% and gradually increases to the designed value to protect from erosion and undermining of the device. [Section 4.10.2, 8]
9. Verify that the plans indicate that plants must be established at the time of filter strip completion (at least three months after seeding), and that runoff must not be allowed to flow across the filter strip until the vegetation is established. [Section 4.10.2, 9]
10. Verify that the filter strip length is in accordance with Table 4.10-2 of the Manual. [Section 4.10.2, 10]
11. For contributing flow paths less than 30 feet in length, verify that the filter strip length is in accordance with Figure 4.10-1 of the Manual. [Section 4.10.2, 11]
12. For contributing flow paths greater than 30 feet in length, verify that the filter strip meets the required flow characteristics for maximum velocity and depth listed in Table 4.10-3 of the Manual. [Section 4.10.2, 12]

## F.16.2 Forebay Design and Material Standards

1. Verify that the plans include an appropriate sequence of construction that is specific to the construction of the forebay. Refer to Section 4.10.3 for guidance. [Section 2.3.1]
2. For forebays within large SMPs such as ponds and wet basins, verify that the forebay contains 10% to 15% of the total permanent pool volume of the larger SMP. [Section 4.10.3, 1]
3. For forebays within smaller SMPs such as bioinfiltration/bioretention basins, verify that the storage volume is sized to retain 0.25 inches of runoff per acre of contributing directly connected impervious area (DCIA), with an absolute minimum of 0.1 inch per impervious acre. [Section 4.10.3, 2]
4. Verify that the plans include a stone berm to physically separate the forebay from its associated SMP. The berm should span the entire width of the basin. [Section 4.10.3, 3]
5. Verify that the plans include inlet controls for the forebay, including riprap aprons, stone placed in concrete, or some other type of energy dissipation device to rapidly reduce the inflow velocity for erosion/scour protection and to encourage settlement of suspended solids. [Section 4.10.3, 4]
6. Verify that the plans indicate that permanent vertical markers constructed of durable materials are to be installed within the forebay area to indicate the sediment depth. [Section 4.10.3, 5]
7. Verify that adequate inspection and maintenance access is provided to allow for periodic sediment removal; this is most commonly provided via stabilized and mildly sloping graded areas that can be accessed by heavy equipment. [Section 4.10.3, 6]
8. Verify that exit velocities from the forebay are non-erosive. Refer to the latest edition of the *Pennsylvania Department of Environmental Protection (PA DEP) Erosion and Sediment Pollution Control Program Manual* for information on design standards for erosion and sedimentation control practices. [Section 4.10.3, 7]

## F.16.3 Swale Design and Material Standards

1. Verify that the plans include an appropriate sequence of construction that is specific to the construction of the swale. Refer to Section 4.10.4 for guidance. [Section 2.3.1]
2. If a swale is designed as a primary SMP, verify that the swale meets all Design Guidance Checklist design standards noted in Appendix F.7, Bioinfiltration/Bioretention, as well as all applicable swale Design Guidance Checklist design standards below. [Section 4.10.4, 1]
3. Verify that the swale can convey the ten-year, 24-hour storm event with a minimum of six inches of freeboard and a maximum depth of 18 inches. Flow over check dams may be estimated using a weir equation. [Section 4.10.4, 2]
4. Verify that the swale is designed to resist erosion. It is recommended that the swale convey the two-year, 24-hour storm event without erosion. The latest edition of the *PA DEP Erosion and Sediment Pollution Control Program Manual* is recommended as a reference for these calculations. Verify that soil mix, vegetation, and temporary or permanent stabilization measures are adjusted as needed. [Section 4.10.4, 3]
5. Verify that the plans indicate that plants must be established at the time of swale completion (at least three months after seeding). [Section 4.10.4, 4]
6. Verify that energy dissipaters are provided at points of concentrated inflow into the swale. [Section 4.10.4, 5]

7. Verify that the side slopes for all parabolic channel swales do not exceed 2(H):1(V) (the recommended side slope is 3(H):1(V)), and that the side slopes of all mowed areas do not exceed 4(H): 1(V) to avoid “scalping” by mower blades. [Section 4.10.4, 7]
8. Verify that check dams intended to provide ponding in swale SMP designs are not porous, as water should be ponded behind each check dam and forced to infiltrate. If the swales are only being used for conveyance or to increase time of concentration, etc., check dams may be porous. [Section 4.10.4, 8]