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PREVENTING POLLUTION WITH SEDIMENT BARRIERS

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Perimeter sediment controls are among the most used erosion and sediment control best management practices (BMPs) on construction sites. The most recognizable of these are sediment barriers, which include compost filter sock, silt fence, and straw bales.

Although commonly used, sediment barriers are often incorrectly applied or installed. This tech sheet reviews the purpose of these barriers, explores the most popular types, and offers advice on their proper placement and installation.

The Purpose of Sediment Barriers

Sediment barriers capture sediment that has been mobilized by stormwater runoff from areas of earth disturbance. These barriers have limitations on where they can be installed to function properly. They should not be placed in the path of concentrated flow, such as in drainage channels and across pipe outfalls.

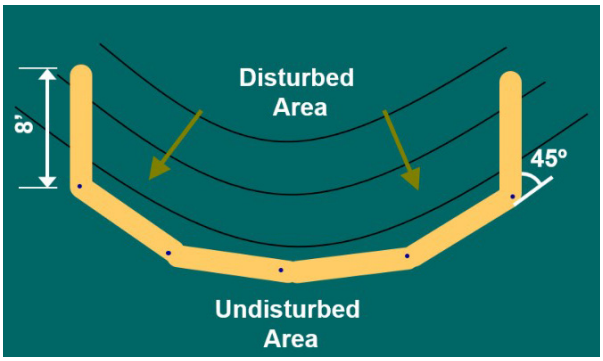

Illustration of proper sediment barrier placement

They are designed to intercept shallow, slow-moving runoff, commonly referred to as sheet flow. As water backs up behind the barrier, sediment settles out and water seeps through the barrier filter medium. When sediment barriers are placed in areas of concentrated flow, they often fail because the force of flow causes undermining and the volume of water results in overtopping.

Sediment barriers need to be placed in areas that will provide sufficient room to intercept sheet flow. To allow for water to temporarily pool behind it, the barrier should be offset from the bottom of a slope or the edge of earth disturbance, and it should always be placed on a stabilized surface (i.e., not bare earth). The sediment barrier must be placed on a level grade, meaning not sloping from end to end, and each end must be extended at least 8 feet upslope at an approximate 45-degree angle to form an enclosure.

Types of Barriers

Compost Filter Sock – At the turn of the millennium, compost filter sock (CFS) began to replace silt fence as the industry standard for sediment barriers.

CFS is a permeable fabric casing filled with organic compost. It comes in a variety of sizes, from 8 to 32 inches in diameter. What size to use depends on the slope and drainage area upslope of the CFS. In general, the steeper the slope and larger the area, the greater the size of the CFS.

Typically, CFS is purchased from a specialized vendor who installs it at the construction site, using a blower truck to fill the sock with compost. Smaller sized socks (up to 12 inches) can be purchased prefilled with compost and be used for smaller areas and shorter-term applications.

CFS can be installed on just about any terrain, including soil, rock, and pavement. The compost material inside of the sock is heavy, which allows the CFS to conform to the surface it is placed on. When placed on stabilized (i.e., vegetated) soil, the CFS is secured to the ground with wooden stakes. When placed on hard surfaces, loose compost is laid at the sock-surface interface to help create a seal and prevent undermining.

Compost filter sock

Silt Fence – Silt fence is a commonly used sediment barrier. The advantages it has over CFS include that it can be installed manually with ordinary equipment and it is easy to stock and deploy whenever needed.

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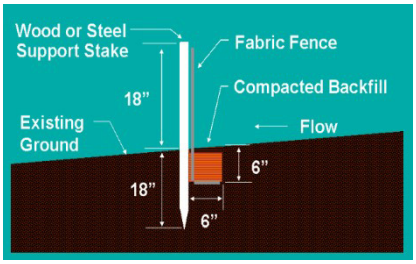
In the most basic silt fence, a geotextile fabric is attached to either wood or metal posts that are spaced a maximum of 8 feet apart. Silt fence must be installed in soil. Some excavation is required as the fabric must be anchored in a 6-by 6-inch trench on the upslope side of the fence. The fabric is 30 inches wide, and 18 inches of fabric width is placed aboveground to form a barrier with the remaining 12 inches buried in the trench.

Silt fence properly placed at an even elevation (York County Conservation District)

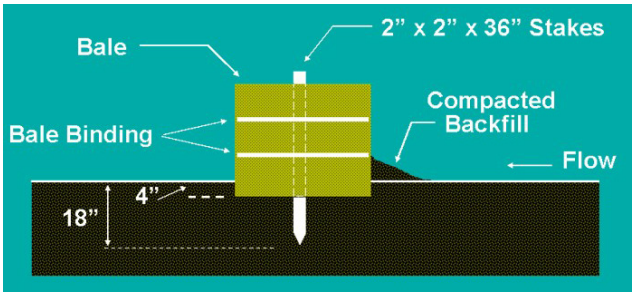
"Heavy duty" silt fence options exist for intercepting runoff from larger upslope areas and steeper slopes. A 30-inch-high reinforced silt fence has mesh backing and guy wires to help support the fence. Another option is a "super" silt fence, which is basically a 33-inch-high chain-link fence with fabric attached to it. Both variations require significantly more materials and labor compared to the basic silt fence, which only uses fabric and stakes.



Detail of a basic silt fence installation

Straw Bale Barrier – Straw bale barriers are comprised of straw bales and wooden stakes, which are readily available products in most parts of the state, including rural municipalities. Like silt fence, straw bale barriers can be manually installed with ordinary equipment and minimal experience. However, because they are more susceptible to damage and degradation, straw bale barriers are best employed for shorter-duration applications

What is often neglected when installing these barriers is that they must be trenched into the ground. The excavated soil from trenching should then be compacted on the upslope side of the straw bales to further reduce the potential for undermining.



Detail of a straw bale barrier installation

Installation Pitfalls

Compost filter sock, silt fence, and straw bale barriers are relatively simple measures for capturing sediment at construction sites, but if not installed properly, they will not be successful.

For example, sediment barriers are sometimes placed as a continuous "string" around an area of disturbance or at the property boundary without regard to elevations. It is critical, however, that barrier sections be installed at a level elevation. When looking at a topographic map of a set of engineering drawings, the barrier should be placed parallel to a contour line, except at the ends, which should be turned upslope to enclose the containment area.

A compost filter sock is improperly placed downhill along an access road.

When using both silt fence and straw bale barriers, a portion of these devices must be trenched into the ground. If not done properly, runoff will undermine the barrier by preventing water from pooling above the barrier and bypassing its treatment.

Sediment barriers should also never be placed in the path of concentrated stormwater flow. The barriers are designed to withstand moderate hydrostatic forces from pooled water behind it. However, concentrated flow can create thrust forces against the barrier and generate vortices that accelerate erosion at the ground interface and eventually undermine the barrier.

A silt fence fails after being placed across an area of concentrated flow.

Keeping sediment barriers maintained during construction is important, too. Excessive sediment accumulation can result in future failures from undermining or overtopping. Erosion and sediment (E&S) plans must include inspection, maintenance, and repair information for BMPs that are used during construction. Following these steps helps to ensure that E&S BMPs remain functional throughout any earth disturbance that they are designed to treat.

Additional information about sediment barriers can be found in the *Pennsylvania Erosion and Sediment Pollution Control Program Manual* (2012).