5.1 Check Dams

Description

Check dams are shaped rock dams constructed in swales, grassed waterways or diversions. They reduce the velocity of concentrated flows, thereby reducing erosion within the swale or waterway. While a rock check dam may trap sediment, its trapping efficiency is extremely poor, therefore it should not be used as the primary sediment-trapping practice.

As an alternative to rock, high flow compost filter socks may be used as check dams. While the primary use of compost socks as check dams is still to reduce flow velocity and subsequent channel erosion, these will have improved sediment removal.

Condition Where Practice Applies

This practice is limited to use in small channels where it is necessary to slow the velocity of flow in order to prevent gully erosion. Applications include grassed lined conveyances that need protection from gully erosion during the vegetative establishment or temporary swales (which due to short time of service do not practically lend themselves to a non-erodible lining). See other specifications for rock lined channels, gravel riffles and practices (chapter 4) that are more appropriate for larger channels and streams.

This practice is limited to small open channels with a drainage area less than 10 acres (5 ac. for filter socks) with the objective of limiting erosion and subsequent sedimentation in downstream areas. Examples include:

1. Ditches or swales that cannot receive a non-erodible lining and still need protection to reduce erosion.
2. Use during the interim period while the grassed lining is being established.
3. Use as an aid (not a substitute) to trap sediment from construction activity.

Planning Considerations

Rock check dams and filter sock check dams are superior to straw bale dams based on their reduced maintenance and increased effectiveness and because straw bale check dams are not a specified practice in this manual.

Rock check dams and filter sock check dams shall be placed where standing water or excessive siltation will be minimized or where damage to vegetative lining will be insignificant.

Rock check dams should be considered where the ditch or swale will not be mowed until after construction is complete.

Design Criteria

See the specifications below for design guidelines. For increased sediment control of rock check dams, smaller aggregate and or filter fabric on the upstream side may be used. It should be noted that increased ponding and the subsequent increase in the height of water behind a check dam raises the potential for erosion if overtopping occurs.

Table 5.1.1 Sock materials (The Sustainable Site, 2010)

Material	5 mil HDPE	5 mil HDPE / Cotton	Multi-Filament Polypropylene (A)	Multi-Filament Polypropylene (B)
Material characteristic	Photodegradable	Biodegradable	Photodegradable	Photodegradable
Mesh Opening	3/8" (10mm)	3/8" (10mm)	3/8" (10mm)	1/8" (3mm)
Tensile Strength	26 psi (1.83 kg/cm$^{2)}$	26 psi (1.83 kg/cm$^{2)}$	44 psi (1.83 kg/cm$^{2)}$	202 psi (1.83 kg/cm$^{2)}$
% Original Strength from UV Exposure	23% at 1000 hr	ND	100% at 1000 hr	100% at 1000 hr
Functional Longevity	9 mo. -3 year	6-12 months	1-4 years	2-5 years

Maintenance

Sediment shall be removed from behind check dam once it accumulates to one-half the original height of the check dam.

Removal

Depending upon the size and type, removal of check dams may be performed by hand or mechanical means. Stone and sediment should be removed and the area graded and seeded. Sediment accumulated behind filter socks shall be removed and then these may be cut open, and the filler material dispersed or incorporated into existing soil in order to aid vegetative establishment and reduce mowing safety concerns.

Filler material shall not be spread within the flow area of the channel or where shear stresses will mobilize sediment and compost before it can be incorporated into dense vegetation. Additionally filler material shall not be spread if it will retard or reduce the existing vegetation. Mesh netting and stakes shall be removed entirely and disposed of in the proper waste or recycling facility.

Common Problems/Concerns

If the check dam materials are not entirely removed, maintenance issues or safety concerns may be created. Removal of check dams is necessary in order to allow complete vegetative establishment.

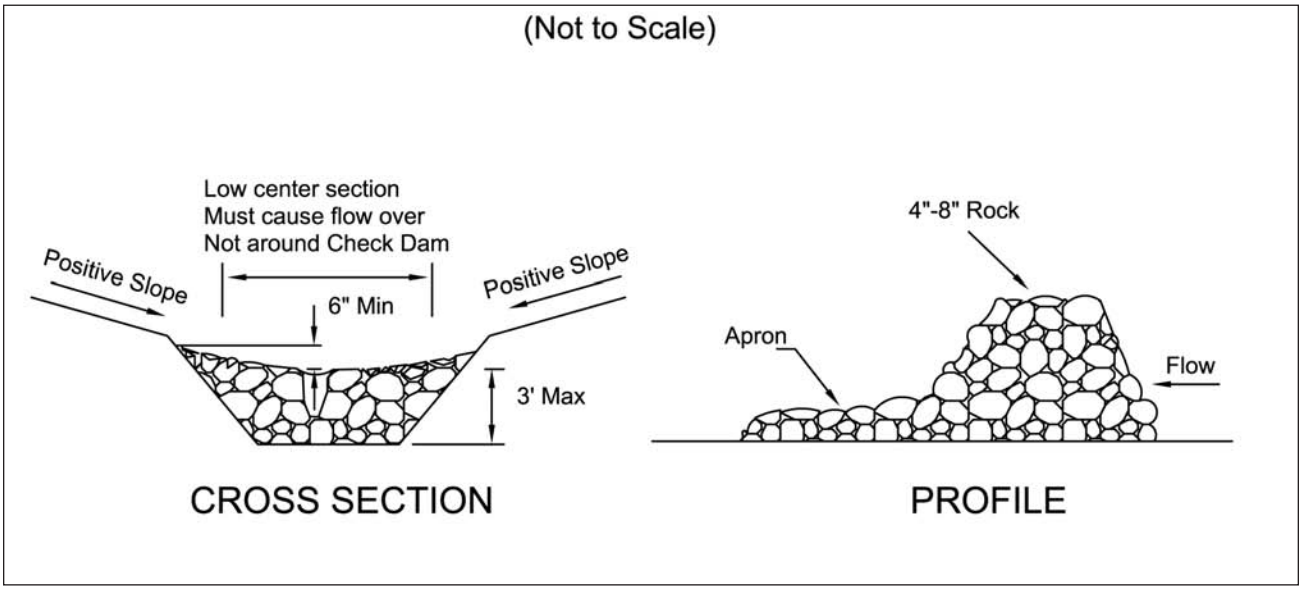
References

Tyler, R., A. Marks, B. Faucette. 2010. The Sustainable Site: Design Manual for Green Infrastructure and Low Impact Development Forester Press, Santa Barbara, CA.

Maryland Department of Environment, 2011. Maryland Standards and Specifications for Soil Erosion and Sediment Control. Filter Log. Water Management Administration, Baltimore, MD.

Specifications
for

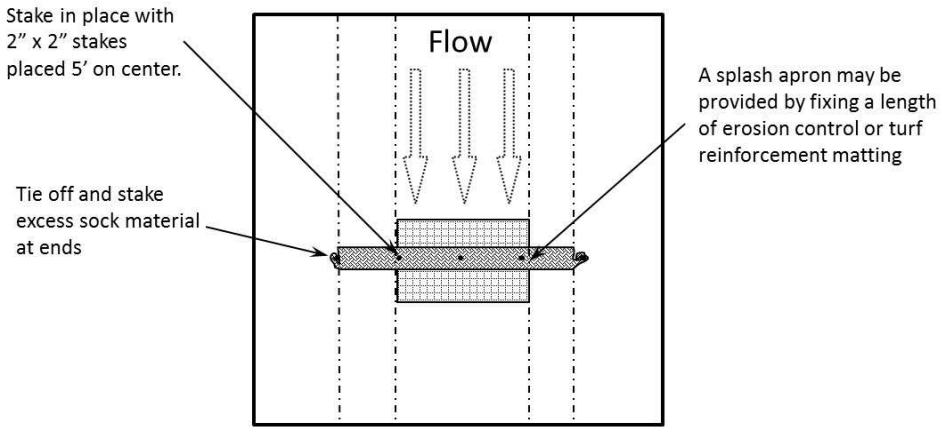
Rock Check Dam



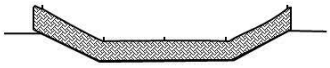
1. The check dam shall be constructed of 4-8 inch diameter stone, placed so that it completely covers the width of the channel. ODOT Type D stone is acceptable, but should be underlain with a gravel filter consisting of ODOT No. 3 or 4 or suitable filter fabric.
2. Maximum height of check dam shall not exceed 3.0 feet.
3. The midpoint of the rock check dam shall be a minimum of 6 inches lower than the sides in order to direct across the center and away from the channel sides.
4. The base of the check dam shall be entrenched approximately 6 inches.
5. Spacing of check dams shall be in a manner such that the toe of the upstream dam is at the same elevation as the top of the downstream dam.
6. A Splash Apron shall be constructed where check dams are expected to be in use for an extended period of time, a stone apron shall be constructed immediately downstream of the check dam to prevent flows from undercutting the structure. The apron should be 6 in. thick and its length two times the height of the dam.
7. Stone placement shall be performed either by hand or mechanically as long as the center of check dam is lower than the sides and extends across entire channel.
8. Side slopes shall be a minimum of 2:1.

Specifications
for

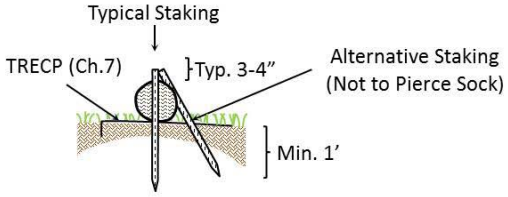
Compost Sock Check Dam



Plan View



Cross Section View



Staking

1. Compost sock netting shall use a knitted mesh fabric with 1/8-3/8 inch openings, and compost media with particle sizes 99% < 3 inches, and 60% > 3/8 inches (conforming to media described in Chapter 6 Filter Sock).
2. Compost sock check dams shall be used in areas that drain 5 acres or less.
3. Sediment shall be removed from behind the sock when it reaches ½ the height of the check dam.
4. Compost sock check dams shall be constructed with 12, 18, or 24 in diameter compost socks, and shall completely cover the width of the channel. The midpoint of the compost sock check dam shall be a minimum of 6 inches lower than the sides in order to direct flow across the center and away from the channel sides. Filter sock check dams shall be filled to a density such that they shall reach their intended height (diameter). After installation and use, they shall be considered unsuitable and in need of replacement after falling below 80% of their minimum required height (diameter).
5. Although no trenching is necessary, compost sock check dams shall be placed on a graded surface where consistent contact with the soil surface is made without bridging over gaps, rills, gullies, stones or other irregularities.
6. Place compost sock check dams so that the ends extend to the top of bank. Staking for compost sock check dams shall use 2 inch x 2 inch wooden stakes, placed 5 foot on center. Stake length shall allow them to be driven 12 inches into existing soil and allow at least 2 inches above the sock.
7. Space compost sock check dams so that the toe of the upstream dam is at the same elevation or lower elevation as the top of the downstream compost sock check dam (at the center of the channel). This will be influenced by the height of the sock and gradient of the waterway.
8. A splash apron may be needed where flows over the sock may erode the channel and undercut the compost sock check dam. Create the apron by fixing a length of Temporary Rolled Erosion Control Product (Erosion Control Matting) or Turf Reinforcement Matting starting upstream of the sock a distance equal to the sock height and extending a length two times the height of the compost sock check dam. See Chapter 7 for information regarding these materials. Materials used should be able to be left in place (e.g. biodedegradable/photodegradable TRECP) without creating problems for future mowing or maintanance of the channel.

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