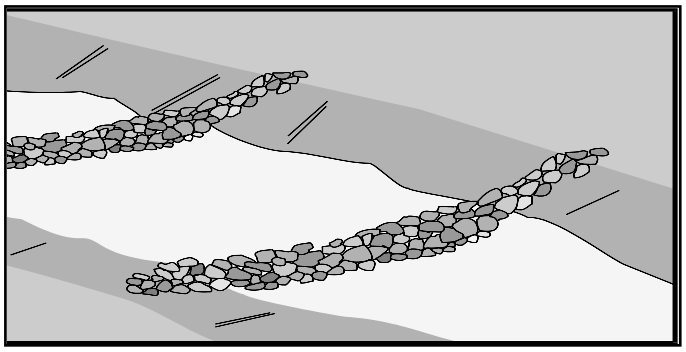
ACTIVITY: Check Dams

ES – 13



CITY OF KNOXVILLE

Targeted Constituents				
● Significant Benefit	◗ Partial Benefit	○ Low or Unknown Benefit		
● Sediment	○ Heavy Metals	○ Floatable Materials	○ Oxygen Demanding Substances	
○ Nutrients	○ Toxic Materials	○ Oil & Grease	○ Bacteria & Viruses	○ Construction Wastes

Description

Small temporary dams, constructed across a swale or drainage ditch, reduce the velocity of concentrated stormwater flows. This reduces erosion of the swale or ditch, and also promotes sedimentation behind the dam. Check dams are usually constructed from large rocks or stones, but other materials can also be used. This practice is likely to create a significant reduction in sediment.

Suitable Applications

- Temporary erosion and sediment control in small open channels that typically drain 5 acres or less.
- During the establishment of permanent vegetation in drainage ditches or channels.
- On steep channels where stormwater runoff velocities must be reduced.

Approach

Check dams are used to prevent erosion by reducing the velocity of channel flow in small drainage channels and swales. Check dams control sediment by allowing sediment to settle out above the check dam, and by allowing stormwater to flow through a rock filter. Check dams are primarily used in small, steep channels where runoff velocities need to be reduced.

Check dams must be sized and constructed correctly and maintained properly, in order to prevent material from washing out. Check dams are usually constructed from large aggregate or riprap. Other materials may be used, such as natural logs or sandbags filled with gravel, which can withstand the stormwater flow velocities and forces. Do not use creosote railroad ties or telephone poles. Check dams in drainage channels are not usually constructed from straw bales or silt fences, since concentrated flows quickly wash out these materials.

Check dams should be placed at a distance and height to allow small pools 2 feet deep to form between each check dam. See typical spacing diagram in Figure ES-13-1. Backwater from a downstream check dam should not exceed the toe of the upstream check dam. The center section of the dam should be lower than the edge sections so that the check dam will act like a weir during major floods. The dam must completely span the ditch or swale to prevent washout.

Since check dams are for temporary installation only, the designer or contractor should make provision for safe and expedient removal of check dams when no longer needed.

Rock Check Dam

Rock check dams are constructed from large aggregate (such as TDOT #1 or #2 with minimum stone size of ¾ inch) for small drainage areas up to 1 acre. Rock check dams can also be constructed from small riprap (such as TDOT Class A-1 with stone sizes from 2 to 15 inches) for drainage areas up to 5 acres, with an upstream layer of smaller aggregate for filtering. Rock can be placed by hand or by mechanical methods (no dumping of rock) to achieve complete ditch or swale coverage. Provide a minimum slope of 2:1 (H:V) on upstream and downstream faces, as shown in Figure ES-13-1.

Rock check dams may be keyed into the swale or channel bottom, typically a distance of 6 inches. Advantages of keying into the channel bottom are that the check dam will be more stable and less likely to slip or slide. A disadvantage of keying into the channel bottom is that the channel will have to be repaired and reshaped whenever the rock check dam is removed. Geotextile filter fabric should be placed beneath a rock check dam to assist in removal when the check dam is no longer needed.

Log Check Dam

Do not use creosote railroad ties or telephone poles; the creosote soaks into stormwater to become a pollution source. Check dams built of natural logs or wood must be secured against floating away during floods; floating logs can be a source of significant damage to bridges and structures. Height and spacing should generally be less than for rock check dams. Log check dams are usually constructed of 4 to 6-inch diameter natural wood logs. Drive logs vertically into soil at least 18 inches, staked, and tied together. A horizontal log, to reinforce the driven logs, is embedded into channel sides for increased stability. Provide overflow weir to prevent erosion to channel banks.

Sandbag Check Dam

Sandbags filled with either aggregate or sand may also be used as a check dam. Sandbags should be staked and tied together, after being placed in a staggered fashion. Provide overflow weir in the center of channel similar to check dam in Figure ES-13-1.

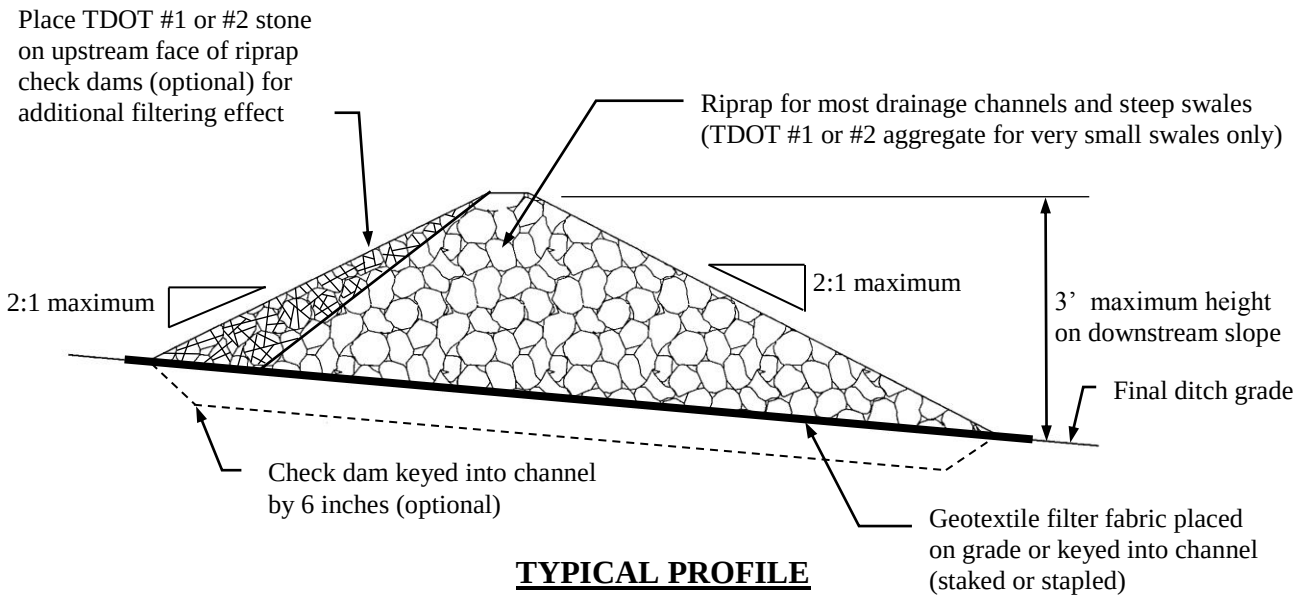
Maintenance

- Inspect for sediment buildup behind the check dam and signs of erosion around the check dam after each rain. Remove accumulated sediment whenever it reaches one-third of the upstream check dam height. Shovel by hand to prevent damage to the filter fabric and check dam. Dispose of accumulated sediment onsite in a manner that prevents additional movement of sediment.

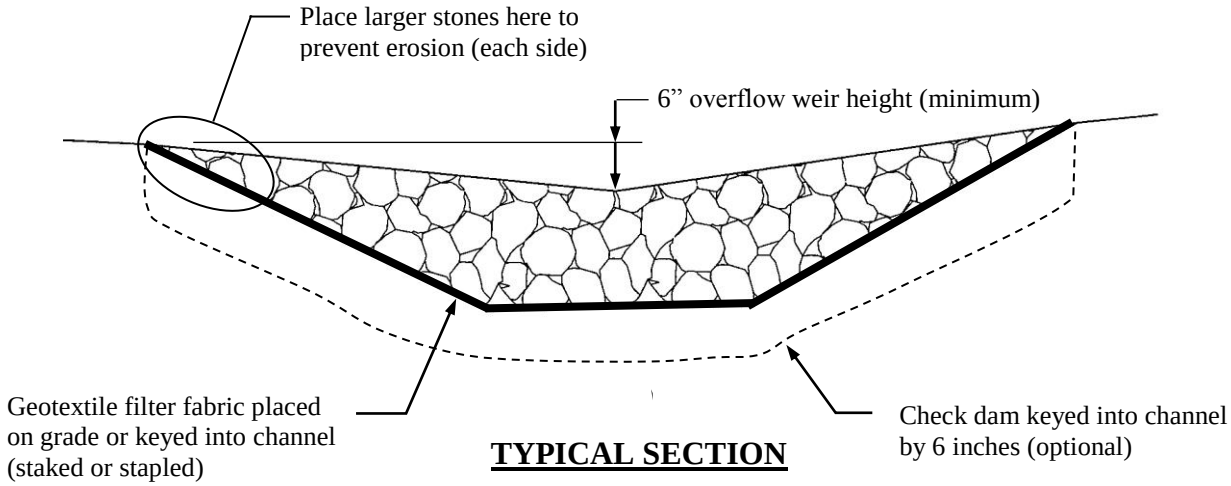
Limitations

- Do not use this BMP for permanent placement without sufficient design for larger storms and additional controls for retaining rocks. Permanent placement must also include guaranteed provisions for sediment removal.
- Not to be used in live or continuously-flowing streams. Generally not used in drainage channels which drain areas greater than 5 acres, but conditions may depend upon the channel slope and velocities versus the size of rock proposed.
- Installation and removal may damage vegetation and channel grades. Do not place in grass-lined channels unless erosion and sediment are expected. Check dams may kill vegetation by excessive sediment or by long periods of submergence.

References **8, 30, 31, 32, 33, 34, 35, 41, 114, 115, 136, 141, 144, 172, 179**
(see BMP Manual Chapter 10 for list)

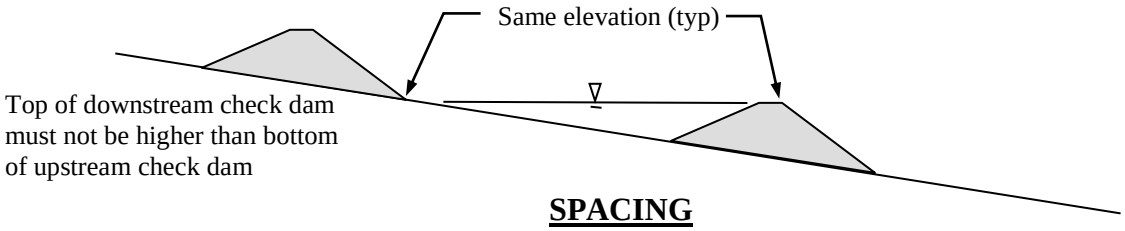


TYPICAL PROFILE



TYPICAL SECTION

NOT TO SCALE



SPACING

Figure ES-13-1
Rock Check Dams