Check Dams

Check dams are used to reduce the energy of stormwater to prevent erosion

Description

Check dams are relatively small, temporary structures constructed across a swale or channel. They are used to slow the velocity of concentrated water flows, a practice that helps reduce erosion. As stormwater runoff flows through the structure, the check dam catches sediment from the channel itself or from the contributing drainage area. However, check dams should not be used as a substitute for other sediment-trapping and erosion-control measures. Check dams are typically constructed out of gravel, rock, sandbags, logs or treated lumber, or straw bales. They are most effective when used with other stormwater, erosion, and sediment-control measures.

Applicability

Check dams are temporary measures used in swales or channels where it is impractical to implement other flow-control practices (such as lining the channel) (USEPA, 1993).

Check dams are effective in small channels with a contributing drainage area of two to 10 acres. Multiple check dams, spaced at appropriate intervals, can be effective. Dams used in a series should be spaced so that the base of the upstream dam is at the same elevation as the top of the next downstream dam (VDCR, 1995).

Siting and Design Considerations

Check dams can be made of a variety of materials. They are most commonly made of rock, logs, or sandbags. When using rock, the material diameter should be two to 15-inches. Logs should have a diameter of six to eight-inches. Regardless of the material used, build the check dam carefully to ensure its effectiveness. That is, do not simply dump the material into the channel. That would be inappropriate, and it might actually increase erosion.

A check dam should not be more than three-feet high, and the center of the dam should be at least six-inches lower than its edges. This design creates a weir effect that helps to channel flows away from the banks and prevent further erosion. Dams can be made more stable by implanting the material approximately six-inches into the sides and bottom of the channel (VDCR, 1995). When installing a series of check dams in a channel, install outlet stabilization measures below the final dam in the series. Because this area is likely to be vulnerable to further erosion, the use of other stabilization measures like riprap or geotextile lining is highly recommended.

Limitations

Do not build check dams in live, flowing streams unless approved by an appropriate regulatory agency (USEPA, 1992; VDCR, 1995). The primary function of check dams is to slow runoff in a channel. Do not use them as a standalone substitute for other sediment-trapping devices. Also, fallen leaves can clog check dams, so in the fall it may be necessary to increase inspections and maintenance.

Maintenance Considerations

Inspect check dams after each storm event to ensure their structural integrity. The center of a check dam should always be lower than its edges. Additional stone may have to be added to maintain the correct height. During inspection, remove large debris, trash, and leaves. When the sediment has reached a height of approximately one-half the original height of the dam (measured at the center), remove accumulated sediment from the upstream side of the dam. When check dams are removed, care must be taken to remove all dam materials to ensure proper flow within the channel. If erosion or heavy flows cause the edges of a dam to fall to a height equal to or below the height of the center, repair it immediately. In addition, before removing a check dam, remove all accumulated sediment. Remove a check dam only after the contributing drainage area has been completely stabilized. Use permanent vegetation to stabilize the area from which the dam material is removed.

Effectiveness

Field experience has shown that rock check dams are more effective than silt fences or straw bales to stabilize wet-weather ditches (VDCR, 1995). For long channels, check dams are most effective when used in a series, creating multiple barriers to sediment-laden runoff.

Cost Considerations

The cost of check dams varies according to the material they are made of and the width of the channel to be dammed. EPA (1992) estimated that check dams constructed of rock cost about $100 per dam, although Brown and Schueler (CWP, 1997) estimated that rock check dams cost approximately $62 per installation, including the cost for filter fabric bedding. Logs and sandbags may be less expensive alternatives to install, but their use may result in higher maintenance costs.

References

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