Temporary Check Dam Standard

This standard is intended to guide stormwater professionals on the purpose, design, selection, installation, and maintenance of check dams when used as a temporary runoff control practice during construction to reduce channel velocity and shear stress acting on a channel boundary to minimize erosion.

Keywords: check dam, ditch check, silt check, runoff control, stormwater management

1 DEFINITION

1.1 A temporary barrier placed across a conveyance, typically constructed of porous materials such as rock or riprap, wattles, silt fence, sandbags, logs, compost filter sock, or other natural materials or manufactured products.

2 PURPOSE

2.1 To impound channelized flow for the purpose of velocity reduction by flattening the flow gradient and reducing shear stress within the channel.

2.2 Benefits include: reduction in channel erosion, sedimentation of coarse particles, and to a lesser degree filtration of stormwater runoff.

3 DESIGN

3.1 Check dam performance is dependent on receiving drainage area, flow rate, volume, velocity, soil erosivity, channel grade, channel geometry, and impoundment created.

3.2 Install check dams where flow characteristics will exceed allowable velocity and shear stress of the channel boundary.

3.3 Check dams should be used in conjunction with upstream and downstream best management practices (i.e., communication, structural, nonstructural, management controls, etc.).

3.4 Channel linings may be installed to stabilize the channel boundary and can be used in conjunction with check dams to minimize channel erosion.

3.5 Adequate velocity reduction, resulting in subcritical flow conditions and impoundment, is necessary to protect channel boundary.

3.6 Temporary check dams shall not be placed within an intermittent or perennial (live) stream.

3.7 Stabilize the outer flow areas along the channel to resist erosion.

3.8 Space check dams so the elevation at the top of the downstream check dam is the same as the toe elevation of the upstream check dam.

3.9 Check dam materials with high flow through rates may need to be spaced closer together to achieve intended reductions in velocity and shear stress.

4 HYDROLOGY & CAPACITY

4.1 Check dams should allow for flow conveyance at or above the design capacity of the channel without creating flooding or bypass outside the channel boundaries.

4.2 The design flow rate is equivalent to the peak flow from a 2-yr storm or a regulatory prescribed design storm event.

4.3 The check dam should reduce the effective shear stress to a non-erosive flow.

4.4 An overflow mechanism should be incorporated into the check dam that directs flow along the centerline of the channel without restricting flow capacity of the channel.

4.5 The duration of impoundment following a runoff event should be minimized to promote vegetative establishment within the channel.

5 PLACEMENT & SITE CONSIDERATIONS

5.1 Check dams installed in ditches should completely cross the conveyance perpendicular to the flow, extending up the side slopes forcing flows over the center of the check dam and not around the ends.

5.2 Place the ditch check in a concave shape to direct flow towards a low point along the centerline of the channel and prevent bypass.

5.3 Minimize disturbance and stabilize areas and channels upslope of the check dam to minimize sediment load.

5.4 Drainage area and the channel upslope of the check dam must be stabilized prior to removing the practice.

6 MATERIALS

6.1 Installation materials may include: wattles, sand or gravel bags, geotextiles, reinforcement, support posts, staking, stapling, aggregate, and other proprietary materials.

6.2 Consider check dam material selection based on expected flow rate, velocity, shear stress, soil conditions, channel geometry, channel lining, allowable impoundment, filtration design, and dewatering mechanisms. The materials should be durable, easily available, and cost-effective.Installation

6.3 The ditch check should be installed to withstand sediment and hydrostatic loads without failure due to buckling, dislodgement, sagging, or undermining. Anchors may include the weight of the material, stakes, sod staples, sandbags, or other load-bearing structures.

6.4 Check dams should be installed immediately after the rough grading is completed in an area.

6.5 Ensure any overlapping of materials is adequate to minimize flow bypass between seams.

6.6 The soil around the installation area should be cleared of any debris or other material that could interfere with compaction of underlying soil and construction of the check dam.

6.7 Consider an underlay where flows may cause undermining and/or scour on the downstream side of the check dam.

6.8 If using a proprietary product, following manufacturer's guidelines for installation is recommended.

7 INSPECTION AND MAINTENANCE

7.1 At a minimum, inspect check dams weekly and after each qualifying runoff-producing event.

7.2 Accumulated sediment should be removed and properly disposed of during construction when sediment depth reaches half the height of the ditch check and at completion of the project when the ditch check is removed.

7.3 Each time sediment is removed, check dams shall be restored to a good working condition, including repair of washouts, compaction of materials, ensuring proper anchoring is still achieved, and any associated handwork.

7.4 If significant erosion occurs between check dams, a channel lining should be installed.

7.5 Properly dispose of sediment; never wash sediment into storm drain inlets.

7.6 Replace materials as needed to maintain design height and cross-sectional area to ensure the continued performance and effectiveness of the check dam.

7.7 Repair or replace check dams as needed to ensure designed function.

7.8 Check dams should be removed from the project when no longer needed unless materials can naturally decompose.

7.9 Vegetate and stabilize the footprint area immediately after check dam removal with seeding, mulching, or matting.

8 SAFETY

8.1 Avoid using practices that extend into active roadways.

8.2 Ensure impoundment created by check dam will not jeopardize public safety by encroaching into the traveled way or neighboring structures.

9 DISCLAIMER

9.1 These criteria are essential to ensure proper performance and effectiveness of a temporary check dam. It is important to consult with a qualified designer or contractor, and the product manufacturer specifications to ensure that these criteria are met and that the check dam is properly installed to meet the specific needs of the site.

10 ACKNOWLEDGEMENTS

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11 REFERENCES

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