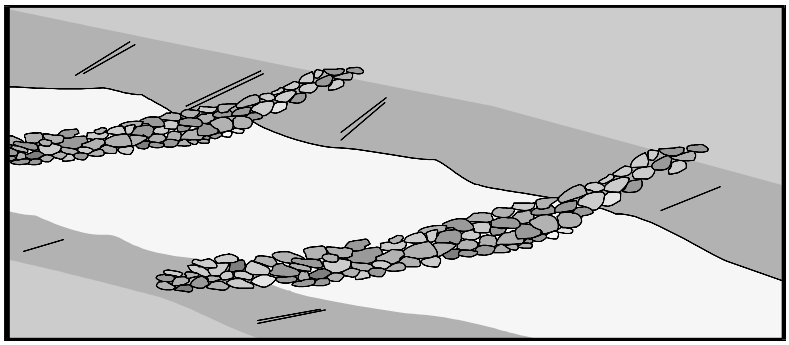
ACTIVITY: Check Dams

TCP – 12



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

Implementation Requirements				
● High	◗ Medium	○ Low		
◗ Capital Costs	○ O & M Costs	◗ Maintenance	○ Suitability for Slopes >5%	○ Training

Description

Small temporary dams constructed across a swale or drainage ditch. Check dams reduce the velocity of concentrated stormwater flows, thereby reducing erosion of the swale or ditch, and promoting sedimentation behind the dam. This management practice is likely to create a significant reduction in sediment.

Suitable Applications

- Used to prevent erosion by reducing the velocity of channel flow in small intermittent channels and temporary swales.
- They will promote sedimentation behind the dam. Maintenance of collected materials is recommended weekly to avoid scour and resuspension.
- Should be used with filter fabric on upstream end.
- In small open channels which drain 10 ac (4 ha) or less.
- In steep channels where stormwater runoff velocities must be reduced to protect against erosion.
- During the establishment of grass linings in drainage ditches or channels.
- In temporary ditches or channels where the short length of service does not allow or warrant erosion-resistant lining installation.

Installation/ Application Criteria

Check dams must be sized and constructed correctly and maintained properly, or they will be either washed out or cause flooding. Check dams can be constructed of either rock or logs. Use of other natural materials available on-site that can withstand the stormwater flow velocities is acceptable, such as sand bags filled with pea gravel. Check dams should not be 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 1 to 2 ft. (0.3 to 0.61 m) deep to form between each one.
- Rock check dams are usually constructed of approximately 1”-3” (2.5-7.6 cm) rock. The rock is placed either by hand or mechanically, but never just dumped into the channel.
- Backwater from a downstream check dam should reach but not exceed the toe of the upstream check dam.
- Check dams should be keyed into, or inset into, the swale/channel bottom.
- Filter fabric should be placed on the upstream face.
- Major floods (2-year storm or larger) should safely flow over the check dam without an increase in upstream flooding or destruction of the check dam.
- Primarily used in small, steep channels where velocities exceeding 2 ft/s (0.61 m/s) need to be reduced.
- A sump may be provided immediately upstream of the check dam to capture sediment.
- Check dams may be built of stone or logs, which are secured against damage during significant floods.
- Rock shall be individually placed by hand or by mechanical methods (no dumping of rock) to achieve complete ditch or swale coverage.
- If grass is planted to stabilize the ditch or swale, the check dam should be removed when the grass has matured (unless the slope of the swale/ditch is greater than 4 percent).

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 half the sump depth by lifting the filter fabric and hand shoveling or backhoeing the silt.

Limitations

- Do not use this BMP for permanent placement unless life-cycle maintenance including sediment removal is guaranteed.
- Not to be used in live or continuously flowing streams.
- Not appropriate in channels which drain areas greater than 10 ac. (4 ha).
- Installation may damage vegetation. Do not place in channels which are already grass lined unless erosion is expected.
- Require extensive maintenance following high velocity flows.

- Promotes sediment trapping which can be resuspended during subsequent storms or removal of the check dam.
- Not to be constructed from straw bales or silt fences.
- Check dams should not be placed in swales/ditches with a base flow during some or all of the year.

Additional Information

Check dams create small detention pools in swales and ditches which drain 10 acres (4 ha) or less. These pools reduce the velocity of stormwater flows, thus reducing erosion of the swale/ditch. Sedimentation also occurs in these small pools.

Maximum velocity reduction is achieved if the toe of the upstream dam is at the same elevation as the top of the downstream 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. The rock used must be large enough to stay in place given the expected design flow through the channel. Log check dams are usually constructed of 4 to 6-inch (10.2 cm to 15.2 cm) diameter logs. The logs should be embedded into the soil at least 18 inches (45.7 cm).

Primary References

California Storm Water Best Management Practice Handbooks, CDM et.al. for the California SWQTF, 1993.

Caltrans Storm Water Quality Handbooks, CDM et.al. for the California Department of Transportation, 1997.

Subordinate References

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

"Draft – Sedimentation and Erosion Control, An Inventory of Current Practices", U.S.E.P.A., April, 1990.

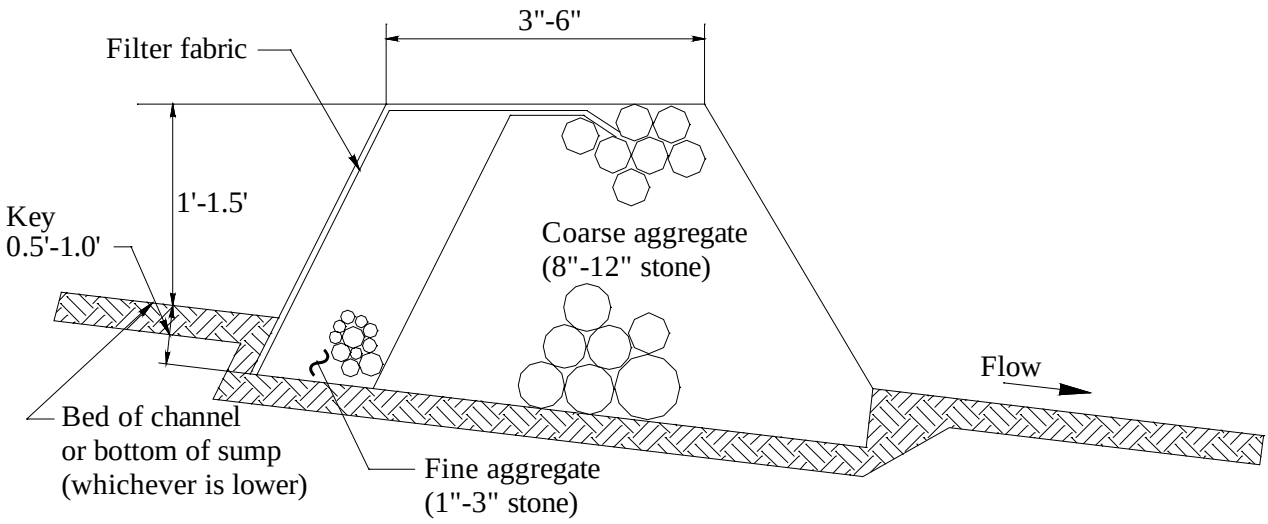
Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, June 1981.

Stormwater Management Water for the Puget Sound Basin, Washington State Department of Ecology, The Technical Manual – February 1992, Publication #91-75.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency – November 1988.

Inspection Checklist

- Is crushed stone used at least 1" to 3" (2.5 cm to 7.6 cm) in diameter?
- Does the check dam span the entire channel width?
- Does this channel contain dry-weather flow?
- Is the sump at least 12-inches (30.5-cm) deep?
- What provisions have been made for sediment removal? Filter fabric?
- Has filter fabric on upstream face been keyed into the bed?
- Are there provisions made to remove the check dam(s)? If no, refer to previous question to check for dam lifecycle.



CROSS-SECTION
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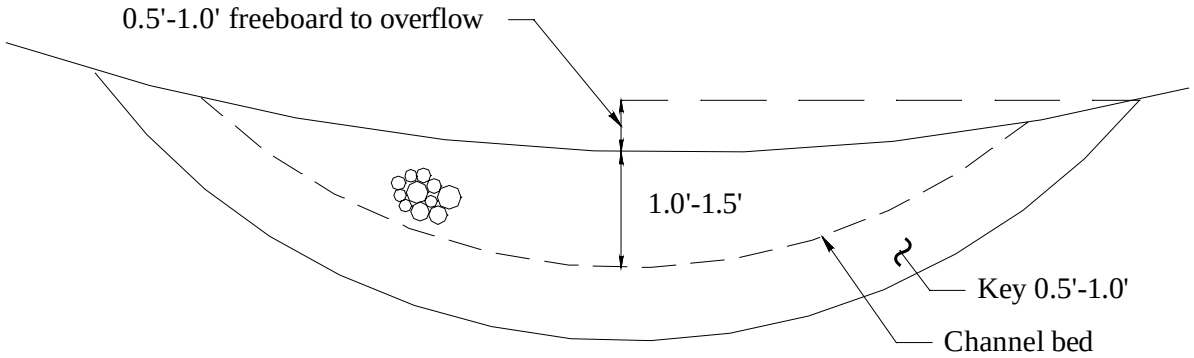

ELEVATION
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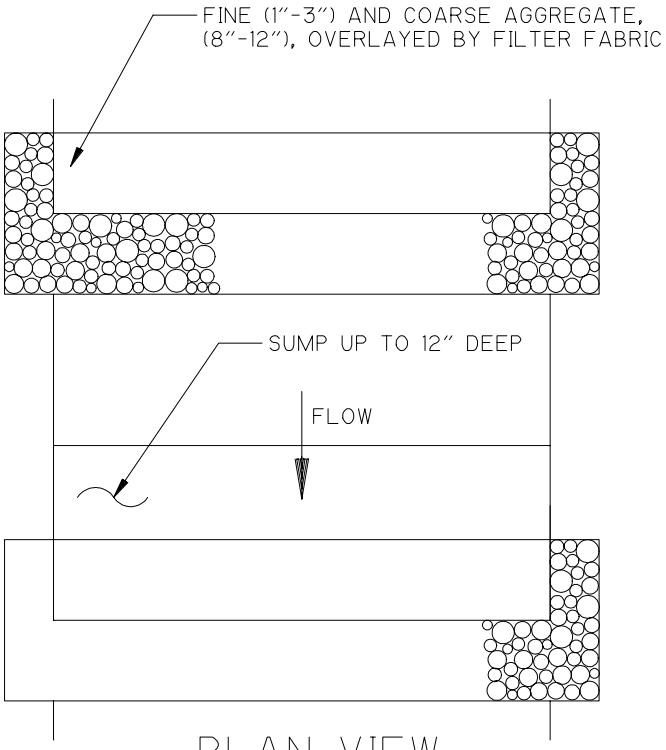
Figure TCP-12-1
Stone Check Dam Construction



PLAN VIEW
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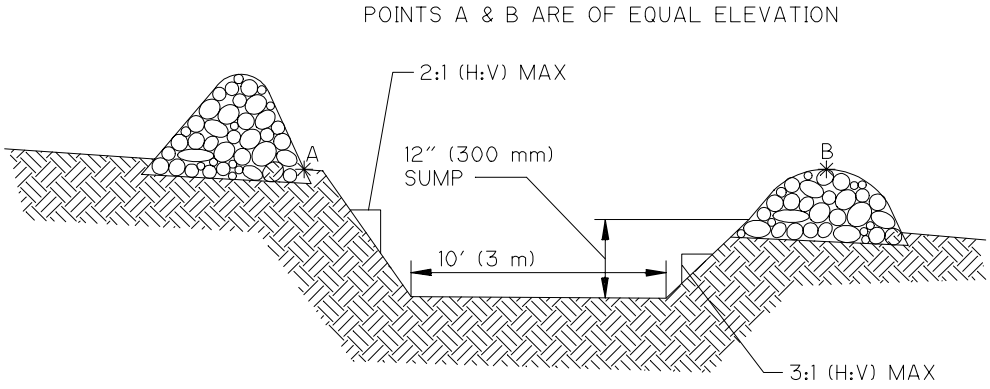

TYPICAL SPACING BETWEEN CHECK DAMS
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Figure TCP-12-2
Stone Check Dam Spacing