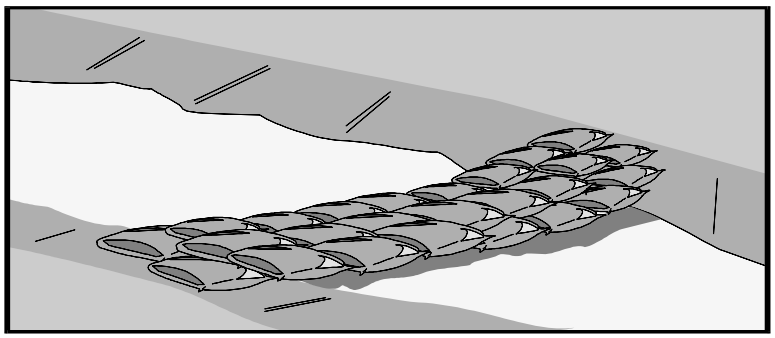
ACTIVITY: Sand Bag Barrier

TCP – 15



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

Stacking sand bags along a level contour creates a barrier which detains sediment-laden water, ponding water upstream of the barrier and promoting sedimentation. A sand bag barrier does not filter the water it slows it down enough for the sediment to settle out of the runoff water. This management practice is likely to create a significant reduction in sediment.

Sand bag barriers, while more effective than straw bales, silt fences and brush barriers are not as effective as rock filters (especially continuous berms). The difference in effectiveness is due to the durability and maintenance requirements.

Suitable Applications

- When extended construction period limits the use of either silt fences or straw bale barriers.
- Along the perimeter of the site.
- Check dams across streams and channels.
- Along streams and channels.
- Across swales with small catchments.
- Division dike or berm.
- Below the toe of a cleared slope.
- Create a temporary sediment trap.
- Around temporary spoil areas.
- Below other small cleared areas.

- May be used in drainage areas up to 5 acres (2 ha).
- Across channels to serve as a barrier for utility trenches or provide a temporary channel crossing for construction equipment, to reduce stream impacts, provided appropriate permits have been received from TDEC.
- Parallel to a roadway to keep sediment off paved areas.
- To divert or direct flow or create a temporary sediment basin.
- When site conditions or construction sequencing require adjustments or relocation of the barrier to meet changing field conditions and needs during construction.

Installation/ Application Criteria

- Install along a level contour with ends angled uphill at least 6 linear feet (1.9 m) to prevent wash around scour.
- Height of Berm – 18 inches (45.7 cm) minimum height, measured from the top of the existing ground at the upslope toe to the top of the barrier.
- Width of Berm – 48 inches (1.3 m) minimum width measured at the bottom of the barrier; 18 inches (45.7 cm) at the top.
- Sand bag Size – Length 24 to 30 inches (70 to 76.2 cm), width 16 to 18 inches (40.6 to 45.7 cm) and thickness 6 to 8 inches (15.2 to 20.3 cm). Weight 90 to 125 pounds (41.5 to 57.6 kg).
- Sand bag Material – Polypropylene, polyethylene or polyamide woven fabric, minimum unit weight four (4) ounces (0.25 lb.) per square yard (0.8 square meter), mullen burst strength exceeding 300 psi and ultraviolet stability exceeding 70 percent. Use of burlap is not intended since it rots and deteriorates easily.
- Grade of Sand – Coarse sand, gravel.
- Runoff water should be allowed to flow over the tops of the sand bags or through 4-inch (10.2-cm) polyvinyl chloride pipes embedded below the top layer of bags.
- Area behind the sand bag barrier should be established according to sizing criteria for sediment trap BMP.
- Provide area behind barrier for runoff to pond and sediment to settle, size according to sediment trap BMP criteria.
- Use sand bags large enough and sturdy enough to withstand major flooding.
- When used as a linear control for sediment removal:
  - Install along a level contour.
  - Turn ends of sand bag row up slope to prevent flow around the Ends
  - Generally, should be used in conjunction with erosion source controls up slope to provide effective control.

- When used for concentrated flows:
  - Stack sand bags to required height using a pyramid approach.
  - Upper rows of sand bags should overlap joints in lower rows.

Maintenance

- Reshape or replace damaged sand bags immediately.
- Inspect sand bag barriers before and after each rainfall event, and weekly throughout the rainy season.
- Repair washouts or other damages as needed.
- Inspect sand bag barriers for sediment accumulations and remove sediments when depth reaches one-third the barrier height. Sediment removed shall be disposed of properly.
- Remove sand bags when no longer needed. Remove sediment accumulation, and clean, regrade, and stabilize the area.

Limitations

- Sand bag barriers are more costly, but typically have a longer useful life than straw bales, silt fences, or brush filters.
- Sand bag barriers may be used for sediment trapping in locations where silt fences and straw bale barriers are not strong enough. In addition, sand bag barriers are appropriate to use when construction of check dams or sumps in a stream is undesirable. The sand bag berms can provide the same function as a check dam without disturbing the stream or vegetation. The sand bag berm will also allow a small sediment retention area to be created prior to construction of final detention basins. They also provide a semi-permeable barrier in potentially wet areas, are more permanent than silt fences or straw bales and allow for easy relocation on site to meet changing needs during construction.
- Burlap should not be used for sand bags.
- Limit the drainage area upstream of the barrier to 5 acres (2 ha).
- Degraded sand bags may rupture when removed, spilling sand.
- Installation can be labor intensive compared to continuous berms or silt fences.
- When used to detain concentrated flows, maintenance requirements significantly increase.

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.

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

Inspection Checklist

- Does the barrier follow a contour?
- Are the ends of the barrier turned uphill for the last 6 ft. (1.8 m)?
- Has sediment accumulated behind the barrier by more than ⅓ the height of the barrier? If yes, then clear it.
- Does any 100 feet (30.5 m) of barrier serve more than 5 acres (2 ha) of exposed area?
- Is there any indication of wash around or under wash? If yes, then reset the barrier and determine if it is overloaded (i.e. another barrier or type of practice should be installed upstream).