

Fact Sheet 2
Introduction to Erosion and Sedimentation

Erosion is removal of soil by water, wind, ice or gravity.

Types of water erosion

- raindrop erosion
- sheet erosion
- rill erosion
- gully erosion
- channel erosion

Areas sensitive to erosion

- all bare and exposed soil
- steep slopes
- areas impacted by fast moving water
- long slope lengths
- all disturbed ground

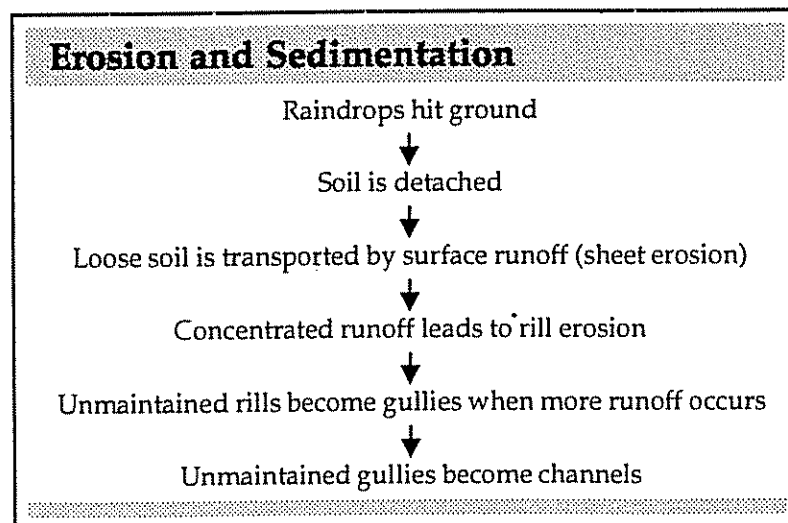
Sedimentation is the process by which soil suspended in runoff is deposited in waterways.

Sediment can be deposited in

- storm sewer bottoms
- reservoirs, lakes, ponds
- culverts, ditches, drainage systems
- streams and rivers

Results of sedimentation

- damage to aquatic life
- damage to aquatic habitats
- costly maintenance for sediment removal
- human health risks
- impaired recreational uses
- damage to water supply systems
- water quality degradation



Fact Sheet 8

Overlot Grading and Associated BMPs

Overlot grading marks the beginning of most construction processes. However, initial BMPs should first be in place before overlot grading begins. "Containing the site first" assures that any sediment that may be eroded will not leave the site during the first phase of construction.

Many people surround a construction site with silt fence, erroneously believing they have done all the erosion control necessary. In an informal survey of state and city inspectors, educators, and construction professionals, silt fence was determined to be the most overused BMP. Silt fence is often installed incorrectly, being either in the wrong location on the site, or not being entrenched.

BMPs that should be installed early in the process include detention or retention ponds and vehicle tracking controls. Silt fence and other detention structures may also be useful early in construction, but only if they are correctly installed. In different ways, these BMPs help keep soil on site.

As overlot grading begins, drainageway protection should be considered, if appropriate. Any natural drainageway leaving the site should be evaluated for the use of sediment traps or small detention structures. In smaller drainages, silt fence and straw bale barriers can be used, unless this drainage could receive heavy runoff.

Overlot grading is a very invasive procedure. All the protection the soil has from rain, snow and wind is removed. In the Rocky Mountain region, soil is a valuable resource and must be protected from erosion. Likewise, water is in great demand in the western United States. Protecting even an intermittent stream from heavy sediment loads can help protect the water quality.

After the site is graded, stabilizing the exposed soil must be a priority. Mulching and/or surface roughening should be used on areas that will be disturbed further within two weeks. Temporary revegetation should be used on the other parts of the site that will not be immediately included in construction activities.

There is more to BMPs than sediment (or silt) fences

- Surrounding a site with sediment (silt) fences is not a good erosion control plan.
- Silt fence is the most overused and abused BMP.

Fact Sheet 14
Think about these BMPs...

Instead of silt fence around a site, try

Diversion dikes and sediment basins - used together, these BMPs reduce the amount of sediment that is carried off your site. Diversion dikes can redirect stormwater running onto your site to stabilized ponds where the sediment can settle. The only tricky part of using diversion dikes and sediment basins is to install them in the correct location on your site.

Instead of numerous sediment traps, try

Establishing ground cover - covering exposed ground stops erosion. Using straw or rock mulch to cover the ground for short periods of time reduces the need to use sediment traps. Temporary revegetation using natural vegetation is an inexpensive and efficient method of keeping soil on site.

Instead of reapplying mulch to a slope numerous times, try

Slope drains or erosion control blankets - slope drains direct runoff down a contained pipe to a stabilized outlet, reducing rill and gully erosion on the slope. Erosion control blankets prevent raindrop and sheet flow erosion and have the added benefit of helping establish vegetation.

Instead of straw bale barriers in ditches, try

Erosion control blankets on the disturbed area - instead of trapping sediment, erosion control blankets stop erosion, making sediment traps such as straw bale barriers unnecessary.

BMP Sheet 12

Maintenance and Inspections

One of the main problems with BMPs on construction sites is a lack of maintenance. All BMPs require regular inspection and maintenance. Detention traps need sediment removed so they will continue functioning. Structures such as straw bale barriers and silt fences need regular inspection and periodic sediment removal. A general guideline for maintenance of BMPs is to inspect all BMPs once a week and after every storm. Repair any damage immediately.

State inspectors from the Colorado Department of Public Health and Environment are looking for several things when they visit a stormwater permitted site. BMPs are evaluated based on their maintenance and function. State inspectors are usually willing to work with contractors who want to explore other options if the BMPs in place are not functioning. The stormwater permit requires that you keep a copy of the Stormwater Management Plan on site. In most cases, you can make changes in your erosion and sediment controls without contacting state or local officials.

All BMPs require regular inspection and maintenance

- weekly or biweekly
- after every runoff event
- repair any damage immediately
- evaluate if BMPs are functioning as designed
- fix any problem
- keep a log of inspection activities
- follow your SWMP

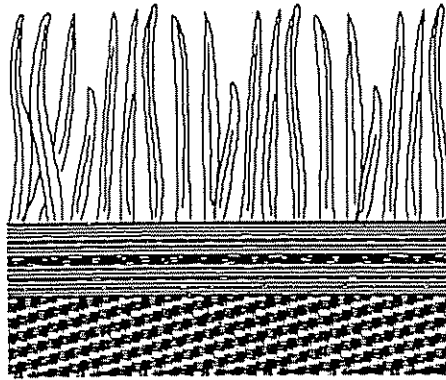
Two things to remember

- Make sure the jurisdiction(s) you are working in does not require notification and approval of changes to stormwater plans.
- Make sure changes are evident both on the site and in the plan.

BMP Sheet P *Revegetation*

Description and Goal

Revegetation is the establishment of vegetative cover on soil left bare by construction activities. This process includes seedbed preparation, temporary revegetation, and permanent revegetation.



Function and Installation

Revegetation limits erosion and sedimentation by preventing raindrop and sheet flow erosion. The importance of permanent revegetation is well known and often part of a final stabilization plan. Temporary revegetation is important for some areas, such as soil stockpiles and drainageways, which will be left undeveloped or unstabilized until later in the construction process.

Timing

Revegetation should occur continuously on construction sites. Temporarily stabilize all areas that will not be a part of immediate construction. Mulching and surface roughening are useful for areas that will be not be disturbed for a couple of weeks. Any area that will be left idle for longer than two weeks should be temporarily revegetated.

Maintenance

Maintenance for this BMP is simple - check for growth and re-seed areas where the coverage is not complete. Vegetation is considered established when ground cover is achieved which is sufficiently mature to control soil erosion and can survive severe weather conditions.

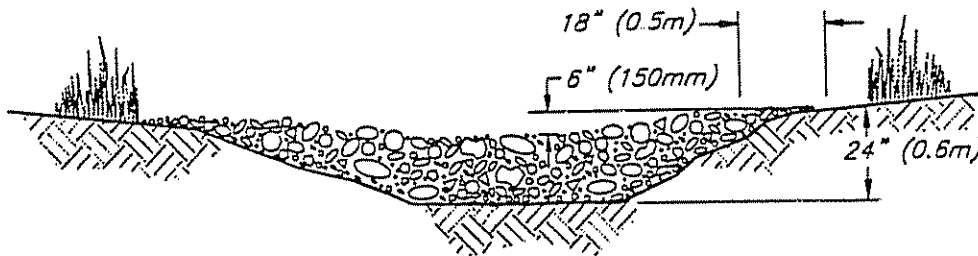
Alternatives

Using native vegetation is always preferable to using ground cover from other parts of the country. The Urban Drainage and Flood Control District's *Urban Storm Drainage Criteria Manual* includes lists of various plant species adapted to different soil types found in the Rocky Mountain region (Table 3-3, Minimum Drill Seeding Rates for Perennial Grasses). Please consult this source or your local jurisdiction to determine what ground cover would be best for your site.

BMP Sheet D *Sediment Traps*

Description and Goal

Sediment traps are temporary structures which allow water to pool long enough for sediment to settle. Also known as check dams, sediment traps can be converted into permanent stormwater management structures. The goal of sediment traps is to capture sediment from limited runoff areas.



Function and Installation

Sediment traps are used where there is a discrete erosion-sensitive area on a construction site. These traps should be installed as soon as the need becomes apparent. Sediment traps can be installed either by excavating below a grade or building an embankment across a swale. Excavated traps are less prone to failure.

Timing

There is no one best time to install sediment traps. They should be installed and removed as needed throughout the construction process.

Maintenance

- Check sediment levels after rain.
- Clean out once basin is half full of sediment.
- Repair embankments as needed.
- Check spillways for debris.
- Maintain daily.

Alternatives

Sediment traps are easily adaptable to many conditions, including thin soils and steep slopes. The size of sediment traps can vary, making this BMP fairly flexible.

Check Dams

Description and Goal

Check dams are often constructed across drainage ditches or swales to decrease the velocity of concentrated flow. The goal of check dams is to reduce erosion and gullyng in the channel and pool water long enough for sediment to settle.

Installation/Design Guidelines

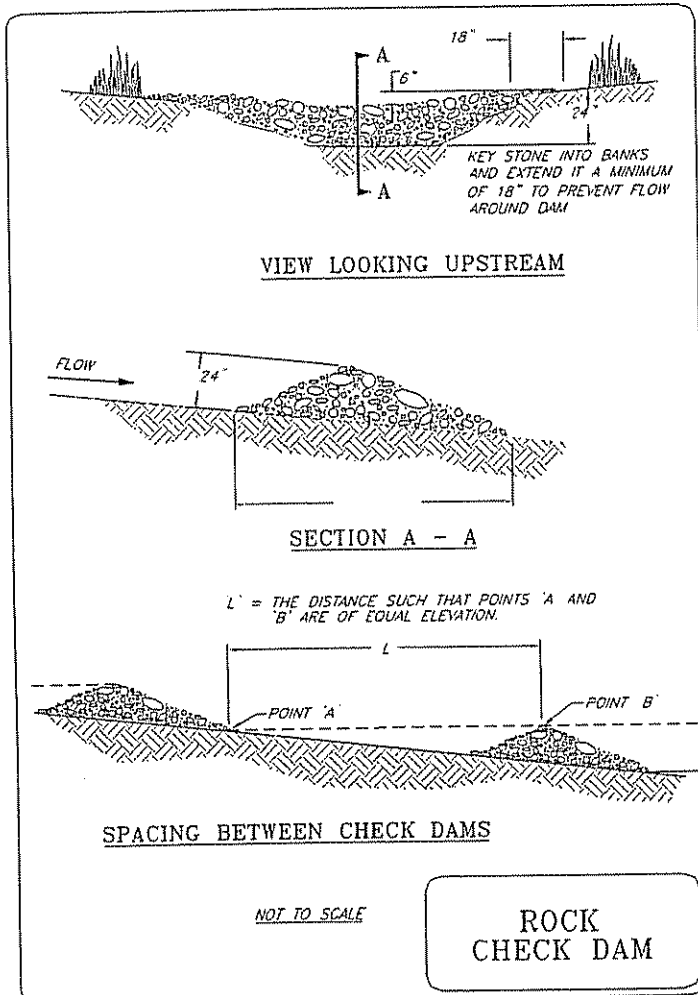
1. Install check dams in swales or in ditches as temporary sediment control measures or where adequate vegetation cannot be established
2. Check dams can be built from mixed stone and gravel, logs, or sandbags
3. The maximum height of the check dam at the center should not exceed two feet. The center of the check dam should be at least six inches lower than the outer edges.
4. Ensure that the drainage area above the check dam does not exceed two acres
5. The maximum spacing between dams should place the toe of the upstream dam at the same elevation as the crest of the next dam downstream (see diagram).
6. Do not place check dams in live or intermittent streams

Special Considerations in Mountain Areas

- This BMP is appropriate where thin soils or shallow bedrock exist.
- Check dams can be used where it is not possible to divert flows away from the channel or otherwise stabilize the channel
- Installation of a foundation of filter fabric below the check dam will minimize the undercutting of embankments
- Rock or fabric lining is preferable in channels where adequate vegetation cannot be established

Maintenance

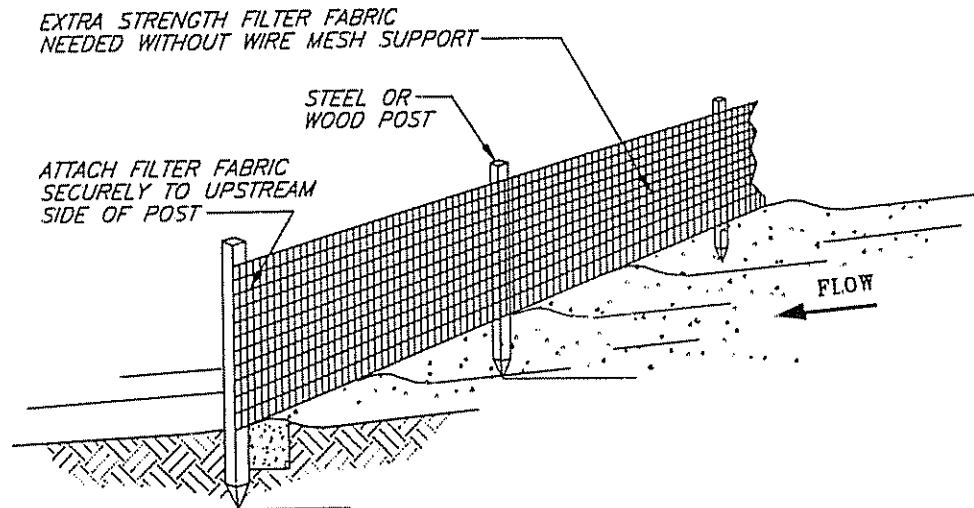
- Maintain dams on a regular basis. Check sediment levels after storms, and clean out the sediment once the trap is half full
- Check for evidence of water moving around or under the embankment and repair embankments as needed
- Check and remove debris from around dams
- Dispose of collected sediment in stable locations where they will not be reintroduced to the system.
- Remove temporary check dams when no longer useful. Stabilize permanent check dams with vegetation.



BMP Sheet F *Silt Fences*

Description and Goal

Silt fences are temporary barriers constructed of woven synthetic material attached to posts. The goal of this BMP is to pool water from an eroding area, allowing the sediment to settle.



Function and Installation

Silt fences pool runoff, allowing sediment to settle. Silt fence can be used along the base of slopes, around stockpiles and at other discrete areas where erosion is likely to occur. Do not use silt fence in high flow channels. Be sure to entrench the silt fence at least six (6) inches into the ground.

Timing

Silt fence should be installed whenever the need arises throughout construction. More likely than not, silt fence should be installed several times during construction, due to the changing slopes and hydrology of the site.

Maintenance

- Make sure the silt fence is standing and properly staked.
- Ensure silt fence remains entrenched and anchored.
- Replace torn sections of the silt fence.
- Remove excess sediment.
- Check weekly and after rain.

Alternatives

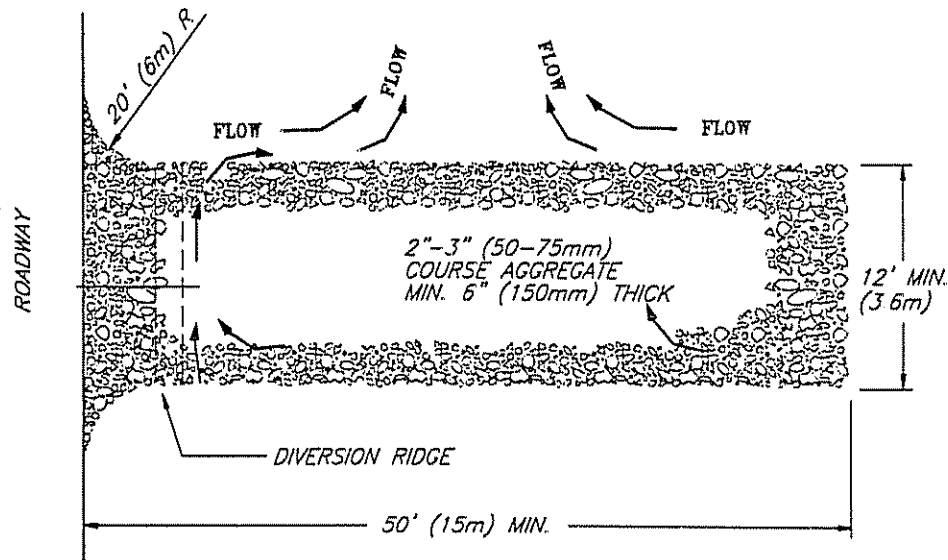
Silt fence works well in situations it is designed to handle (i.e., as a barrier at the bottom of a gentle slope). However, silt fence is used in many situations where diversion dikes and sediment ponds would be more effective. Sediment traps can also be used in place of silt fence.

BMP Sheet A

Vehicle Tracking Controls

Description and Goals

Vehicle tracking controls stabilize construction entrances. The controls typically consist of either an asphalt or rock bed at least 50 feet long separating construction areas from public roads. The goal of this BMP is to prevent the transport of sediment by runoff or by vehicles tracking it onto paved surfaces.



Function and Installation

Vehicle tracking controls provide a surface that removes loose sediment from tires of construction vehicles. For this BMP to function correctly, the control must be maintained daily.

Timing

Vehicle tracking controls should be installed before overlot grading begins, with more controls added as more entrances are added.

Maintenance

- Clean paved surfaces by shoveling or sweeping.
- Properly dispose of collected sediment.
- Add rock to tracking pad as necessary.
- Maintain on a daily basis.

Alternatives

Using diversion dikes and sediment basins may work if the entrance is very steep. Keeping the public street clear and installation of protection for any existing storm sewers in the street may also be necessary.