

2024 Texas Regional Stormwater Conference, San Marcos, Texas, USA

Construction Phase Sediment Management:

Techniques for Dry and Wet Spells

January 11, 2024

MEET THE TEAM

Halff is an employee-owned engineering and architecture firm based in Richardson, TX which boasts a diverse professional staff. The company started as a one-man consulting firm founded by Dr. Albert H. Halff and now provides full-service engineering, architecture, environmental, planning, landscape architecture, right of way, surveying and construction engineering and inspection services.



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Water Sustainability Leader

“We improve lives and communities by turning ideas into reality.”

Construction Phase Sediment Management



Agenda

- Local Practices
- Sediment Control Options
- Regulation and Inspection



LOCAL PRACTICES









SEDIMENT CONTROL BMPS

SEDIMENT CONTROL OPTIONS

Available Methods for Sediment Control include:

1. Silt Fence
2. Non-vegetative Ground Cover
3. Wattles
4. Rock Filter Dams
5. Vegetative Ground Cover
6. Sediment Basins

HOW TO CHOOSE SEDIMENT CONTROL MEASURES

Factors to consider when choosing the appropriate sediment control measures include:

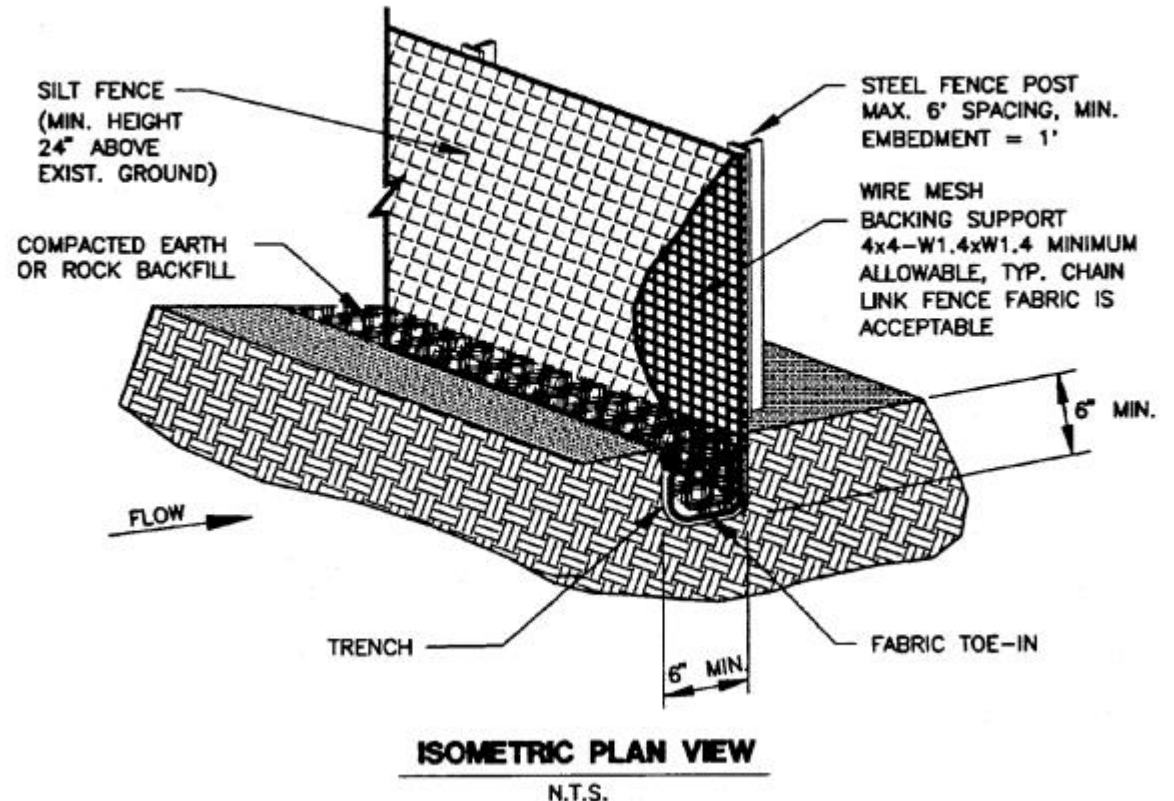
- Expected timeline of sediment producing conditions
 - Some sediment control methods are more suitable for long term implementation but may impede constructability on the site while in use.
 - *All de-stabilized surfaces that do not see construction activities for 14 days must be stabilized by the owner using one or multiple of the available sediment control BMPs.*
- Type of sediment producing source and sediment particle size
 - Sediment sources that are being actively worked with large equipment (ex: site grading activities) may be better suited to sediment control methods with a shorter effective time. Sediment sources that are not being actively worked, such as stockpiles, may be better suited to long term sediment control BMPs.
 - Sediment sources with fine clays may not be effectively controlled with filtering.
- Existing site features
 - Sites with existing vegetative cover or healthy soil may provide opportunities for natural sediment control methods and should be preserved as part of site planning and construction phasing.`

SILT FENCE

A silt fence is a barrier consisting of geotextile fabric supported by metal posts to prevent soil and sediment loss from a site. When properly used, silt fences can be highly effective at controlling sediment from disturbed areas.

Silt fence is used during the period of construction near the perimeter of a disturbed area to intercept sediment while allowing water to percolate through. This fence should remain in place until the disturbed area is permanently stabilized.

Improper use of silt fence in areas of concentrated flow and not installing along the contour causing water to concentrate and flow over the fence. Fabric not seated securely to ground and fence not installed perpendicular to flow line are common issues.



NON-VEGETATIVE GROUND COVER

Mulching/ Bonded-Fiber Matrices

Non-vegetative ground covers use mulch materials (i.e. gravel, rocks, wood chips/bark, etc.) Cleared vegetation can be mulched and reused on site to assist with stabilization.

This practice is only applicable to inactive areas within the construction site. Mulching is generally used as an efficient method of controlling erosion in recently disturbed areas.

Areas utilizing non-vegetative ground cover for sediment control should cover a minimum of 80% of the sediment sources.

The type of ground cover used will impact overall effectiveness for sediment control. Lighter mulch is not a preferable method in areas with concentrated flows or on steep slopes.



WATTLES (NOT WHAT A DUCK DOES)

Manufactured wattles

Natural plant materials such as coir, rice or wheat straw, or flax encased in tubes of netting and placed securely on the slope, generally on contour, to break a longer slope into a series of shorter slopes.

Retains seeds and soil, slows runoff.

Improves conditions for plant establishment immediately upslope of wattle.

Use for temporary 2-3 year protection until plants are established.

Use for quick, relatively easy installation.

Use on gentle or steep slopes (up to 1H:1V).

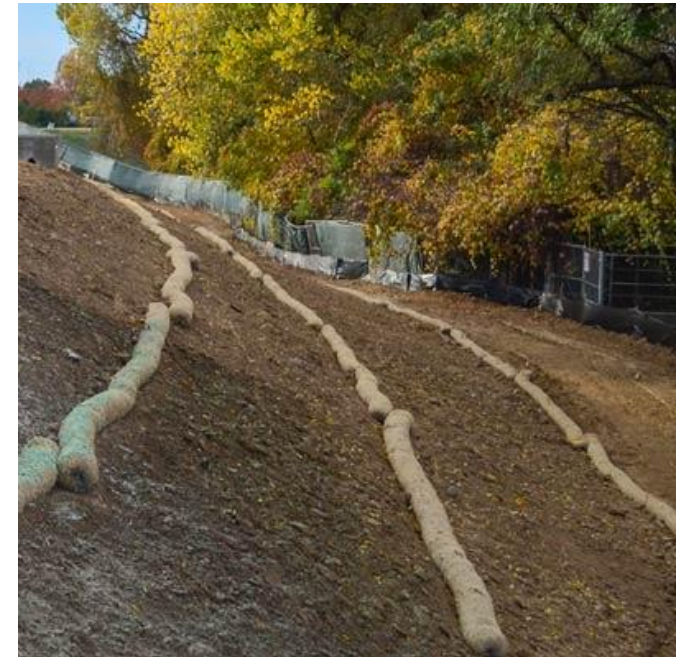
Requires good contact with ground.

Has limited sediment capture capability.

Should not be used on creeping or slumping soils or for high flows.

Constructed wattles

A constructed linear feature placed in contact with the soil surface, generally on contour, that breaks a longer slope into a series of shorter slopes, such as small rock walls, woven wooden fences, or logs.



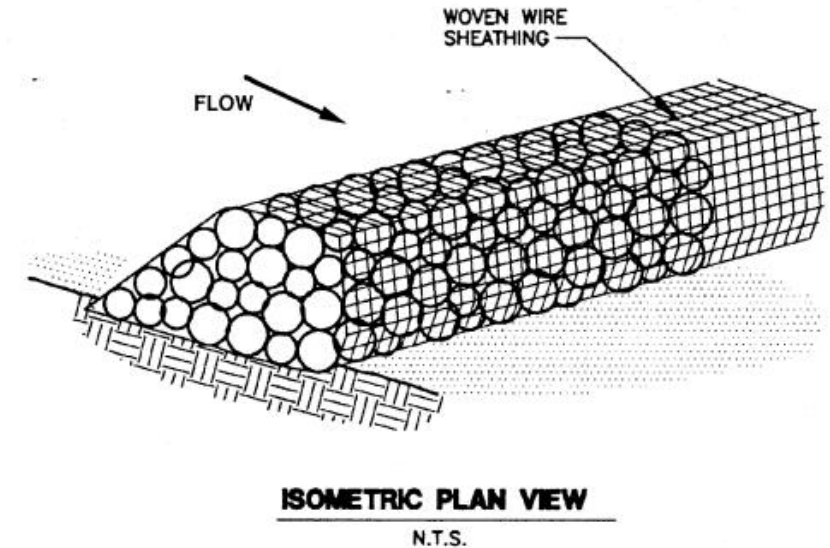
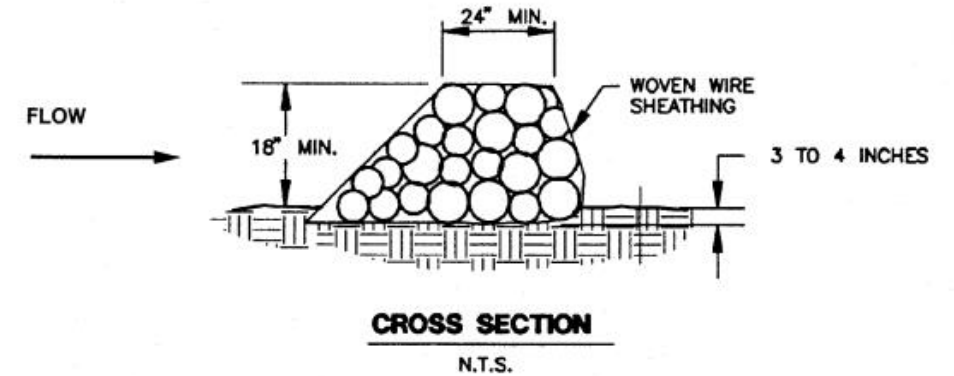
ROCK FILTER DAMS

Rock filter dams consist of 4-6 inch angular rock wrapped in a heavy wire screen. They should be staked in at regular intervals to prevent overturning and sliding.

Typically used in areas of concentrated flows to screen out floating debris and larger sediment. May not capture fines that turn water chalky or brown from clay sized particles.

Rock filter dams should be spaced more frequently on steeper slopes and just downstream of culvert outlets, concrete chutes, and other concentrated flows.

Rock filter dams are effective at reducing erosive velocity but should be removed after construction and site stabilization is complete.



VEGETATIVE GROUND COVER

In locations that remain undisturbed during construction, vegetative cover can absorb water and hold soil in place.

Construction activities should minimize clearing of existing vegetation to the maximum extent possible. Re-vegetate cleared areas as soon as possible after grading activities are completed. Disturbed areas must be stabilized within 14 days of last activity.

Establishing new vegetative cover is a long term effort and less likely to be used in situations of acute need. Moreover, semiarid environments tend to be less conducive to vegetation due to a lack of water.

Maintenance of existing vegetation incurs no additional direct materials cost but may require construction phase planning to optimize construction activities.

SEDIMENT BASINS

The purpose of a sediment basin is to intercept sediment-laden runoff and trap the sediment in order to protect drainage ways, properties and rights of way below the sediment basin from sedimentation. A sediment basin is usually installed at points of discharge from disturbed areas.

Inspection should be made weekly and after each rainfall. Check the embankment, spillways, and outlet for erosion damage, and inspect the embankment for piping and settlement. Accumulated silt should be removed and the basin should be regraded to its original dimensions at such point that the capacity of the impoundment has been reduced to 75% of its original storage capacity.

A sediment basin can be created where a permanent pond BMP is being constructed. Guidelines for construction of the permanent BMP should be followed, but revegetation, placement of underdrain piping, and installation of sand or other filter media should not be carried out until the site construction phase is complete.



DUST CONTROL OPTIONS

Available Methods for Dust Control include:

1. Sprinkling / Irrigation
2. Surface Roughening
3. Wind Breaks
4. Vegetative Ground Cover
5. Non-vegetative Ground Cover



HOW TO CHOOSE APPROPRIATE DUST CONTROL MEASURES

Factors to consider when choosing the appropriate dust control measures include:

- Expected timeline of dust producing conditions
 - Some dust control methods are more suitable for long term implementation but may impede constructability on the site while in use.
 - *All disturbed surfaces that do not see construction activities for 14 days must be stabilized by the owner using one or multiple of the available dust control BMPs.*
- Type of dust producing source
 - Dust producing surfaces that are being actively worked with large equipment (ex: site grading activities) may be better suited to dust control methods with a shorter effective time (watering). Dust producing surfaces that are not being actively worked, such as stockpiles, may be better suited to long term dust suppression BMPs.
- Existing site features
 - Sites with existing vegetative cover or windbreaks may provide opportunities for natural dust control methods and should be preserved as part of site planning and construction phasing.

WET SUPPRESSION

Wet Suppression is the most common form of dust control used on construction sites. Water sprinkling moistens fine sediment and causes it to aggregate and densify.

*Areas utilizing wet suppression for dust control should apply water to the entire area at a rate between 150 and 7000 gallons per acre at least twice per day, or as necessary to prevent blowing dust. Rain showers may supplement application of water for dust suppression. Watering for dust suppression **should not create any runoff** that leaves the site.*

While the cost of water is relatively low, the need for frequent reapplication may result in an increased total cost. It is important to consider that hot and dry weather will require more frequent reapplication. Where water trucks are present for other activities, the cost of wet suppression for dust is reduced.

Dust suppression with plain water is not unique to water application for other grading and density purposes, and therefore incurs similar unit costs.



■ | SURFACE ROUGHENING

Surface roughening is an action taken to bring large chunks of earth to the surface which mechanically stabilize the fine sediments that are prone to becoming airborne in windy conditions.

Areas utilizing surface roughening for dust control should use a form of plowing to a minimum depth of 6-inches to bring large chunks of soil to the surface for the entire dust producing surface. Larger chunks are preferred, and plowing perpendicular to the general wind direction when possible, increases effect.

Surface roughing is a relatively low cost dust suppression method due to the lack of necessary materials. Construction sites where tilling equipment is already present will see a reduced implementation cost.



VEGETATIVE COVER

WIND BREAKS

Wind breaks for dust suppression are physical barriers which aim to disrupt incoming wind that can cause dust to become airborne. The common prevailing wind direction should be considered when installing wind breaks on a site.

Areas utilizing constructed wind breaks for dust control should include a vertical wind barrier of 1 unit height for every 8 units of protected area perpendicular to the prevailing wind direction

Natural wind breaks that can be utilized and maintained provide a very low-cost dust suppression method. On-site stormwater pollution prevention silt fence material may be able to be used for low height wind fencing for protection of some small areas.

Ground Cover

In locations that remain undisturbed during construction, vegetative cover can reduce wind speed at the ground surface.

Construction activities should minimize clearing of existing vegetation to the maximum extent possible. Re-vegetate cleared areas as soon as possible after grading activities are completed. Disturbed areas must be stabilized within 14 days of last activity.

This is a long term effort and less likely to be used in situations of acute need. Moreover, semiarid environments tend to be less conducive to vegetation due to a lack of water. Maintenance of existing vegetation incurs no additional direct materials cost but may require construction phase planning to optimize construction activities

NON-VEGETATIVE GROUND COVER

Mulching

Non-vegetative ground covers use mulch materials (i.e. gravel, rocks, wood chips/bark, rubber, etc.) The common prevailing wind direction should be considered when installing wind breaks on a site.

This practice is only applicable to inactive areas within the construction site. Mulching is generally used as an efficient method of controlling fugitive dust in recently disturbed areas.

Areas utilizing non-vegetative ground cover for dust suppression should cover a minimum of 80% of the dust producing surfaces

The type of ground cover used will impact overall effectiveness for dust suppression. Lighter mulch is not a preferable method in areas with high wind speeds.





WAYS TO REDUCE SEDIMENT SOURCES

SEDIMENT MINIMIZING WORK STRATEGIES

Minimize Disturbed Areas

This refers to reducing as much exposed area as possible. This can be implemented by working in phases and clearing areas pertinent to a specific phase; while the inactive areas can remain undisturbed until completion of the prior phase (U.S EPA 1991, U.S. EPA 1992). [Low Impact Design, Conservation Subdivision Design,](#)

Project Timing

Work staging can be done by scheduling out phases of the project. [Construction Phasing Plans](#)

Maintenance and Training

Training and education of construction and maintenance personnel on sediments and dust suppression BMPs will encourage proper use of these strategies. Maintenance actions such as tarping, grading, and vehicle washing help to control both dust and contamination (U.S EPA 1991, U.S. EPA 1992). Proper installation, inspection, and maintenance of sediment control BMPs help to limit washoff of silt and clays that discolor runoff and create nuisance issues offsite.

[Inspection and Maintenance](#)

SEDIMENT MINIMIZING WORK STRATEGIES - RUNOFF

Grading

Use dikes, diversions, and waterways to interrupt runoff and divert it away from cut-and-fill slopes or other disturbed areas. To reduce on-site erosion, install these measures before clearing and grading.

Avoid Steep Slopes

Steep slopes, areas subject to flooding, and highly erodible soils severely limit a site's use. Avoid disturbing vegetation on steep slopes or other critical areas. Practical ways to reduce velocities include conveying stormwater runoff away from steep slopes to stabilized outlets

Break up slopes

Benches, terraces, or ditches break up a slope by providing areas of low slope in the reverse direction. This keeps water from proceeding down the slope at increasing volume and velocity. Instead, the flow is directed to a suitable outlet, such as a sediment basin or trap. The frequency of benches, terraces, or ditches will depend on the erodibility of the soils, steepness and length of the slope, and rock outcrops.

SEDIMENT MINIMIZING WORK STRATEGIES - DUST

Limit Vehicle Speed & Restrict Site Vehicle Access

Reducing vehicle speed will lessen the amount of fine sediment kicked up during travel.

High Wind Restriction

During high winds, actions that may disturb soil, like earthmoving, should be avoided (U.S. EPA 1992).

Limit Stockpile Height

Limiting stockpile size will help reduce wind exposure and surface area (U.S EPA 1991).



REGULATION AND ENFORCEMENT

REGULATION AND INSPECTION

Cities and counties that are not already MS4 permittees can require installation of and enforce proper maintenance of BMPs

Regulatory requirements should encourage proper construction stormwater controls including non-structural and phasing approaches to reduce sediment by limited total disturbed area at any given phase.

Permanent BMPs should not be installed until the site is stabilized and pollutants of concern are being generated. May need to delay permanent BMPs until a portion of the homes are built and the site is stabilized.

If a subdivider does not comply fully with an approved erosion control and construction sequencing plan, or violates the restrictions on land clearance in the preceding subsection, the City Manager shall notify the subdivider in writing that **the City may correct the violation and revegetate the disturbed area at the subdivider's expense** unless, within 30 days after the date of the notice, the subdivider complies, corrects the violation, provides the required erosion and sedimentation controls and provides continuing maintenance thereof acceptable to the City Manager.

GET IN TOUCH



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