

## 1. COVER SHEET

### STORMWATER QUALITY MANAGEMENT PLAN

2290 Old Ranch Road,  
Colorado Springs, Colorado CO 80908

For:

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November 2, 2023

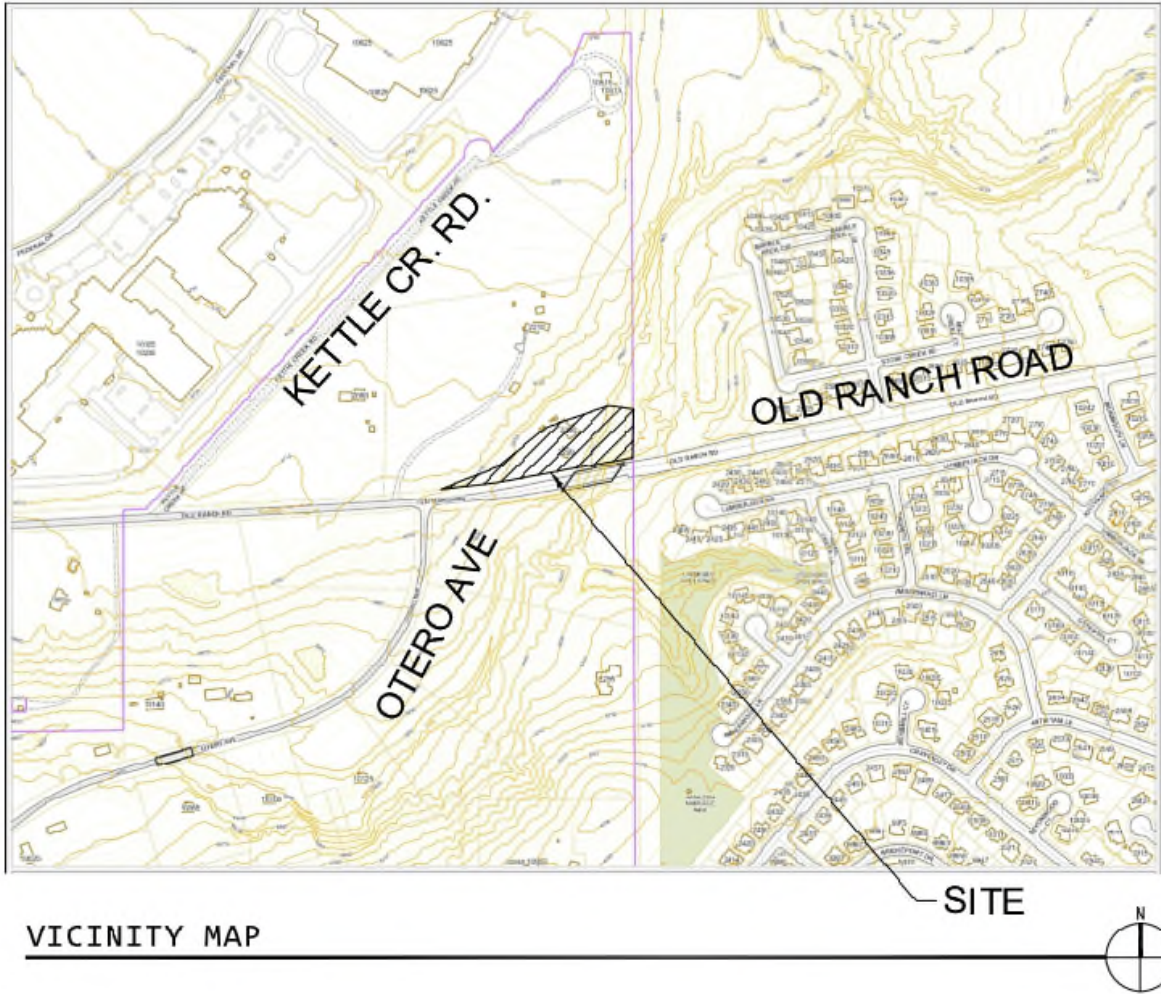
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### 3. SITE DESCRIPTION AND LOCATION

Site Vicinity Map



An existing two-car garage will remain on the site, and a new residence with large attached garage behind will be constructed behind it, within approximately the same area as a previous residence.

The site is a roughly triangular area north of Old Ranch Road, approximately 0.6 miles west of Voyager Parkway and one mile east of N. Powers Boulevard. Kettle Creek forms the southeast side of the site.

### 4. CONSTRUCTION ACTIVITIES PROPOSED.

The site will be developed from the vacant lot as a single-family residence, with drives, landscaping and a separate pool house. Provision has been made for a future separate barn. Proposed land use is low-density residential

The land will be cleared, grubbed (topsoil stockpiled), and graded. Utility service lines will be installed, the buildings will be constructed, then paving, final grading and landscaping will occur.

**5. PHASING PLAN**

N/A

SWMP Checklist Item 5. Clearly define which construction tasks correspond to each phase of BMPs (initial, interim, and final) and/or phase of the project (pre-disturbance, site clearing, grading, etc) so it's clear when each BMP will be installed. See Table CP-1 in MHFD detail SM-1.

**6. PROPOSED SEQUENCE FOR MAJOR ACTIVITIES:**

Schedule:

November, 2023	Prior to the start of any construction, perimeter controls such as silt fence, vehicle tracking control, and inlet protection will be installed
December, 2023 to January 2024	Clearing and grubbing, grading
February, 2024 to July, 2024	Building and utility construction
August, 2024 to September, 2024	Driveway installation, removal of temporary BMPs

**7. ESTIMATE OF SITE AREA AND AREA TO UNDERGO DISTURBANCE.**

Site contains 2.19 acres. The area to be disturbed will be approximately 0.9 acres.

**8. SOIL EROSION POTENTIAL AND IMPACTS ON DISCHARGE**

SWMP Checklist Item 8 - discuss the soil erosion potential and impacts on discharge for site soils

According to the Natural Resources Conservation Service soil mapping the soil is sandy loam and clay. Onsite soil testing found sandy clay and silt throughout the 18' test depth.

**9. DESCRIPTION OF EXISTING VEGETATION**

The existing vegetation on the site, determined by visual survey is approximately 40-50 percent (native grasses and weeds). The northern and western edges of the site have a few existing trees and shrubs, which will be left undisturbed as much as possible.

**10. LOCATION AND DESCRIPTION OF ALL POTENTIAL POLLUTION SOURCES**

Verify this percentage, this should not be the percentage of the site with vegetation, but the percent ground cover in pervious, undisturbed vegetated areas on-site

<b>Potential Pollutant</b>	<b>Potential with this Project?</b>	<b>Description of Activities</b>	<b>BMPs Selected to Control Source</b>
All disturbed and stored soils	Yes	During grading activities, site construction, and until final stabilizaton	Sediment Control Log, Surface roughening and Seeding
Vehicle Tracking of Sediments	Yes	During grading activities, site construction, and until final stabilizaton	Existing entrance drive is gravel.
Loading and Unloading Operations	Yes	During all aspects of construction	Employ proper practices when unloading construction materials that may be a potential pollutant
Outdoor storage activities	Yes	During all aspects of construction	Employ proper practices when storing construction materials that may be a potential pollutant
Vehicle and equipment maintenance and refueling	No	During any construction where maintenance of vehicles or refueling is necessary	Refueling to be done offsite. Only emergency maintenance to be done onsite. Contractor shall have personnel present to detect and maintain spills
On site waste management practices	Yes	During all aspects of construction	Portable sanitary facilities, and dumpsters when needed.
Concrete truck/equipment washing	Yes	During site construction when concrete is being poured on-site	Concrete Washout- not needed

No non-stormwater discharges are anticipated.

## **11. MATERIAL HANDLING**

Spill prevention measures:

- Storage of hazardous materials, chemicals, fuels, and oils and fueling of construction equipment will not be performed within 150 feet of a definitive stormwater drainage.
- An effort will be made to store only enough product required to do the job.
- Materials will be stored in a neat, orderly manner, in appropriate closed containers, in secondary containment and, if possible, under a roof or other enclosure.
- Products will be kept in their original containers with the original manufacturer's label.
- Substances will not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of the product will be used up before disposing of the container.
- Manufacturer's recommendations for proper use of a product will be followed.
- If surplus product must be disposed of, local and state recommended methods for proper disposal will be followed.

#### Spill response

- Spills will be contained and cleaned up immediately after discovery. Spill kits are located in the construction trailer, in the stabilized staging area.
- Onsite employees have been instructed by a State Stormwater Inspector on the proper procedures for chemical spill containment.
- Manufacturer's methods for spill cleanup of a material will be followed as described on the material's MSDS.
- Materials and equipment needed for cleanup procedures will be kept readily available on the site, either at an equipment storage area or on contractor's trucks. Equipment to be kept on the site may include but is not limited to brooms, dust pans, shovels, granular absorbents, sand, sawdust, absorbent pads and socks, plastic and metal trash containers, gloves, and goggles.
- Drums containing used clean up materials will be labeled with the contents and date.
- Personnel on the site will be made aware of cleanup procedures and the location of spill cleanup equipment.

The contractor will be responsible for all cleanup activities in accordance with applicable local, state, and federal regulations

## **12. SPILL PREVENTION AND POLLUTION CONTROLS FOR DEDICATED BATCH PLANTS.**

Dedicated batch plant will not be used.

Portable toilets will be located a minimum of 10ft from stormwater inlets and 50ft from state waters. They will be secured at all four corners to prevent overturning and cleaned on a weekly basis. They will be inspected daily for spills.

SWMP Checklist Item 13. Discuss inspection procedure for checking waste disposal bins for leaks and overflowing capacity. And discuss frequency that they will be emptied (or at what level of capacity would trigger the need to be emptied).

### **13. OTHER SW POLLUTANT CONTROL MEASURES**

Portable sanitary facilities, and dumpsters when needed, will be used and regularly maintained/serviced. The existing driveway serves as vehicle tracking control, as it is gravel.

### **14. LOCATION AND DESCRIPTION OF ANY ANTICIPATED ALLOWABLE NON-STORMWATER DISCHARGE**

Not expected on this site.

### **15. ULTIMATE RECEIVING WATERS**

Receiving water for Kettle Creek: Monument Creek, Fountain Creek, Arkansas River, approximately 55 miles south in Pueblo, Colorado.

### **16. STREAM CROSSINGS LOCATED WITHIN THE PROJECT AREA**

Kettle Creek forms the southeast side of the site. Approximately 0.5 acres along Kettle Creek is in the Zone AE floodplain (floodplain base flood elevation at 6671 adjacent to buildings, at least 10' below the finished floor elevations.)

### **17. SWMP Map:**

See attached.

### **18. ~~NON~~-STRUCTURAL CONTROL MEASURES**

None proposed. Not required for development area less than one acre.

### **19. NON-STRUCTURAL CONTROL MEASURES**

Perimeter control, in the form of sediment control logs, serves as erosion and sediment control. At downgradient locations, perimeter controls will be installed where overland sheet flow has the potential to leave the site. Perimeter control will remain in place until areas up-gradient of controls are stabilized.

Seeded areas will be surface-roughened before seeding. If needed, grass will be truck-watered, or if available, well-watered, until 70% coverage is achieved.

Existing trees in erosion control blanket slopes will be protected from being filled in over (no more than 1-2" of soil within drip line.)

SWMP Checklist Item 21. Add text stating that the SWMP should be viewed as a "living document" that is continuously being reviewed and modified as a part of the overall process of evaluating and managing SW quality issues at the site. The QSM shall amend the SWMP when there is a change in design, construction, O&M of the site which would require the implementation of new or revised BMPs or if the SWMP proves to be ineffective in achieving the general objectives of controlling pollutants in SW discharges associated with construction activity or when BMPs are no longer necessary and are removed.

## **20. TECHNICAL DETAILS FOR NON-STRUCTURAL CONTROL MEASURES**

See details attached after SWMP Map.

## **21. HOW SWMP IS TO BE REVISED**

Changes to be appended to the report, and kept in the construction trailer.

## **22. DESCRIPTION OF FINAL STABILIZATION AND LONG-TERM STORMWATER MANAGEMENT**

Final stabilization will occur by the installation of any permanent landscaping, including permanent seeding and mulching in any areas to be left in a natural state, that had been disturbed during construction.

## **23. VEGETATIVE COVER STATEMENT**

Final vegetative cover density is to be 70% of pre-disturbed levels.

To satisfy SWMP Checklist Item 24 - Add more discussion and provide an outline of how the permit holder will install, maintain, and effectively operate control measures to manage erosion and sediment.

## **24. OUTLINE OF PERMIT HOLDER INSPECTION PROCEDURES TO INSTALL, MAINTAIN, AND EFFECTIVELY OPERATE CONTROL MEASURES**

See attached BMP inspection checklist, to be performed every 14 days, or after a major precipitation event. Add "or snowmelt event that causes surface erosion."

## **25. RECORD-KEEPING PROCEDURES.**

Record keeping procedures to include signature on inspection logs. SWMP records to be kept in construction trailer.

## **26. OUTSIDE CONTROL MEASURES OWNED OR OPERATED BY ANOTHER ENTITY.**

N/A

SWMP Checklist Item 26. Add a note stating that this project does not rely on control measures owned or operated by another entity. Simply stating N/A will not satisfy CDPHE requirement of explanation.



## **APPENDIX**

# Appendix C Inspection Checklist – Grading Erosion, and Stormwater Quality Controls

## CITY OF COLORADO SPRINGS

DATE/TIME:
INSPECTOR:
TYPE OF INSPECTION: Self-Monitoring_____
Initial _____ Compliance_____ Follow-Up_____
Reconnaissance_____ Complaint_____ Final_____

SITE:	DATE OF PERMIT:
ADDRESS:	
CONTRACTOR:	OWNER/OWNER'S REPRESENTATIVE:
CONTACT:	CONTACT:
PHONE:	PHONE:
STAGE OF CONSTRUCTION: Initial BMP Installation/Prior to Construction_____ Clearing & Grubbing_____	
Rough Grading_____ Finish Grading_____ Utility Construction_____ Building Construction_____	
Final Stabilization_____	

OVERALL SITE INSPECTION	YES/NO/N.A.	REMARKS/ACTIONS
Is there any evidence of sediment leaving the construction site? If so, note areas.		
Have any adverse impacts such as flooding, structural damage, erosion, spillage, or accumulation of sediment, debris or litter occurred on or within public or private property, wetlands or surface waters –to include intermittent drainageways and the City's stormwater system (storm sewers, gutters, ditches, etc.)?		
Are the BMPs properly installed and maintained?		
Have the BMPs been placed as shown on approved plans?		
Are the BMPs functioning as intended?		
Is work being done according to approved plans and any phased construction schedule?		
Is the construction schedule on track?		
Are drainage channels and outlets adequately stabilized?		
Is there any evidence of discharges or spills of fuels, lubricants, chemicals, etc.?		

BMP MAINTENANCE CHECKLIST	YES/NO/N.A.	REMARKS/ACTIONS NECESSARY
<p>CHECK DAM</p> <p>Has accumulated sediment and debris been removed per maintenance requirements?</p>		
<p>EROSION CONTROL BLANKET</p> <p>Is fabric damaged, loose or in need of repairs?</p>		
<p>INLET PROTECTION</p> <p>Is the inlet protection damaged, ineffective or in need of repairs?</p> <p>Has sediment been removed per maintenance requirements?</p>		
<p>MULCHING</p> <p>Distributed uniformly on all disturbed areas?</p> <p>Is the application rate adequate?</p> <p>Any evidence of mulch being blown or washed away?</p> <p>Has the mulched area been seeded, if necessary?</p>		
<p>SEDIMENT BASIN</p> <p>Is the sediment basin properly constructed and operational?</p> <p>Has sediment and debris been cleaned out of the basin?</p>		
<p><del>SILT FENCE</del> <b>SCL</b> Sediment Control Logs</p> <p>Is the <del>fence</del> <b>SCL</b> damaged, collapsed, unentrenched or ineffective?</p> <p>Has sediment been removed per maintenance requirements?</p> <p><del>SILT FENCE</del> <b>SCL</b></p> <p>Is the <del>silt fence</del> <b>SCL</b> properly located?</p>		
<p>SLOPE DRAIN</p> <p>Is water bypassing or undercutting the inlet or pipe?</p> <p>Is erosion occurring at the outlet of the pipe?</p>		
<p>STRAW BALE BARRIER</p> <p>Are the straw bales damaged, ineffective or unentrenched?</p> <p>Has sediment been removed per maintenance requirements?</p> <p>Are the bales installed and positioned correctly?</p>		

BMP MAINTENANCE CHECKLIST	YES/NO/N.A.	REMARKS/ACTIONS NECESSARY
<p>SURFACE ROUGHENING</p> <p>Is the roughening consistent/uniform on slopes??</p> <p>Any evidence of erosion?</p>		
<p>TEMPORARY SEEDING</p> <p>Are the seedbeds protected by mulch?</p> <p>Has any erosion occurred in the seeded area?</p> <p>Any evidence of vehicle tracking on seeded areas?</p>		
<p>TEMPORARY SWALES</p> <p>Has any sediment or debris been deposited within the swales?</p> <p>Have the slopes of the swale eroded or has damage occurred to the lining?</p> <p><del>Are the swales properly located?</del></p>		
<p>VEHICLE TRACKING (Existing gravel drive)</p> <p>Is gravel surface clogged with mud or sediment?</p> <p>Is the gravel surface sinking into the ground?</p> <p>Has sediment been tracked onto any roads and has it been cleaned up?</p> <p>Is inlet protection placed around curb inlets near construction entrance?</p>		
<p>OTHER</p>		

FINAL INSPECTION CHECKLIST	YES/NO/N.A.	REMARKS/ACTIONS NECESSARY
Has all grading been completed in compliance with the approved Plan, and all stabilization completed, including vegetation, retaining walls or other approved measures?		
Has final stabilization been achieved – uniform vegetative cover with a density of at least 70 percent of pre-disturbance levels, and cover capable of adequately controlling soil erosion; or permanent, physical erosion methods?		
Have all temporary measures been removed?		
Have all stockpiles, construction materials and construction equipment been removed?		
Are all paved surfaces clean (on-site and off-site)?		
Has sediment and debris been removed from drainage facilities (on-site and off-site) and other off-site property, including proper restoration of any damaged property?		
Have all permanent stormwater quality BMPs been installed and completed?		

ADDITIONAL COMMENTS:          
--

The items noted as needing action must be remedied no later than \_\_\_\_\_.

The contractor shall notify the inspector when all the items noted above have been addressed.

By signing this inspection form, the owner/owner's representative and the contractor acknowledge that they have received a copy of the inspection report and are aware it is their responsibility to take corrective actions by the date noted above. Failure to sign does not relieve the contractor and owner/owner's representative of their responsibility to take the necessary corrective action and of their liability for any damages that have occurred or may occur.

INSPECTOR'S SIGNATURE:	DATE:
OWNER/OWNER'S REPRESENTATIVE SIGNATURE:	DATE:
CONTRACTOR'S SIGNATURE:	DATE:







# Inlet Protection

## What it is

Inlet protection is a sediment control barrier formed around a storm drain inlet. A number of alternative inlet protection designs are available, including:

- Silt Fence Inlet Protection.
- Straw Bale Barrier Inlet Protection.
- Block and Gravel Bag Inlet Protection.
- Curb Socks Inlet Protection.



## When and Where to use it

Application of inlet protection differs by design.

- Filter fabric and straw bale inlet protection are used for area inlets (not located within streets).
- Block and gravel bag curb inlet protection is used for street inlets in sumps.
- Curb sock protection is used for street inlets in sumps or on continuous grade.

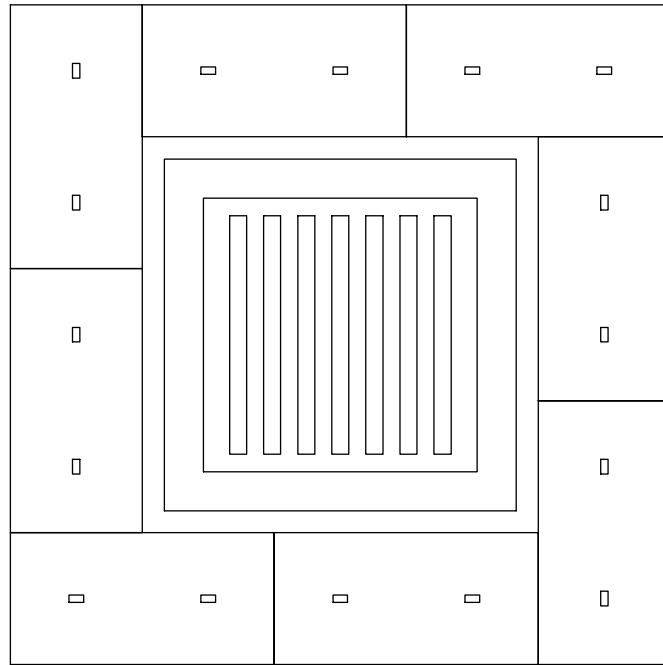


## When and Where NOT to use it

- Filter fabric and straw bale inlet protection cannot be used for drain inlets that are paved because these designs require excavation and/or staking of materials.
- Block and gravel bag inlet protection is not recommended for continuous grade inlets due to concerns about damage from bypassed flow.

## Construction Detail and Maintenance Requirements

Figures IP-1 through IP-4 provide a construction detail and maintenance requirements for each inlet protection design alternative.



STRAW BALE  
(SEE FIG. SBB-2  
FOR INSTALLATION  
REQUIREMENTS)

## STRAW BALE INLET PROTECTION

NTS

### STRAW BALE INLET PROTECTION NOTES

#### INSTALLATION REQUIREMENTS

1. INLET PROTECTION SHALL BE INSTALLED IMMEDIATELY AFTER CONSTRUCTION OF INLET.
2. BALES ARE TO BE PLACED IN A SINGLE ROW AROUND THE INLET WITH THE END OF THE BALES TIGHTLY ABUTTING ONE ANOTHER.
3. SEE STRAW BALE BARRIER FIGURE SBB-2 FOR INSTALLATION REQUIREMENTS.

#### MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT STRAW BALE INLET PROTECTION IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS NO RAINFALL.
2. DAMAGED OR INEFFECTIVE INLET PROTECTION SHALL PROMPTLY BE REPAIRED, REPLACING BALES IF NECESSARY, AND UNENTRENCHED BALES NEED TO BE REPAIRED WITH COMPACTED BACKFILL MATERIAL.
3. SEDIMENT SHALL BE REMOVED FROM BEHIND STRAW BALES WHEN IT ACCUMULATES TO APPROXIMATELY 1/3 THE HEIGHT OF THE BARRIER.
4. INLET PROTECTION SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED WITHIN THE DRAINAGE AREA AS APPROVED BY THE CITY.



## Description

A sediment control log is a linear roll made of natural materials such as straw, coconut fiber, or compost. The most common type of sediment control log has straw filling and is often referred to as a "straw wattle." All sediment control logs are used as a sediment barrier to intercept sheet flow runoff from disturbed areas.



## Appropriate Uses

Sediment control logs can be used in the following applications to trap sediment:

- As perimeter control for stockpiles and the site.
- As part of inlet protection designs.
- As check dams in small drainage ditches. (Sediment control logs are not intended for use in channels with high flow velocities.)
- On disturbed slopes to shorten flow lengths (as an erosion control).
- As part of multi-layered perimeter control along a receiving water such as a stream, pond or wetland.



**Photographs SCL-1 and SCL-2.** Sediment control logs used as 1) a perimeter control around a soil stockpile; and, 2) as a "J-hook" perimeter control at the corner of a construction site.

Sediment control logs work well in combination with other layers of erosion and sediment controls.

## Design and Installation

Sediment control logs should be installed along the contour to avoid concentrating flows. The maximum allowable tributary drainage area per 100 lineal feet of sediment control log, installed along the contour, is approximately 0.25 acres with a disturbed slope length of up to 150 feet and a tributary slope gradient no steeper than 3:1. Longer and steeper slopes require additional measures. This recommendation only applies to sediment control logs installed along the contour. When installed for other uses, such as perimeter control, it should be installed in a way that will not produce concentrated flows. For example, a "J-hook" installation may be appropriate to force runoff to pond and evaporate or infiltrate in multiple areas rather than concentrate and cause erosive conditions parallel to the BMP.

Sediment Control Log	
Functions	
Erosion Control	Moderate
Sediment Control	Yes
Site/Material Management	No

Although sediment control logs initially allow runoff to flow through the BMP, they can quickly become a barrier and should be installed as if they are impermeable.

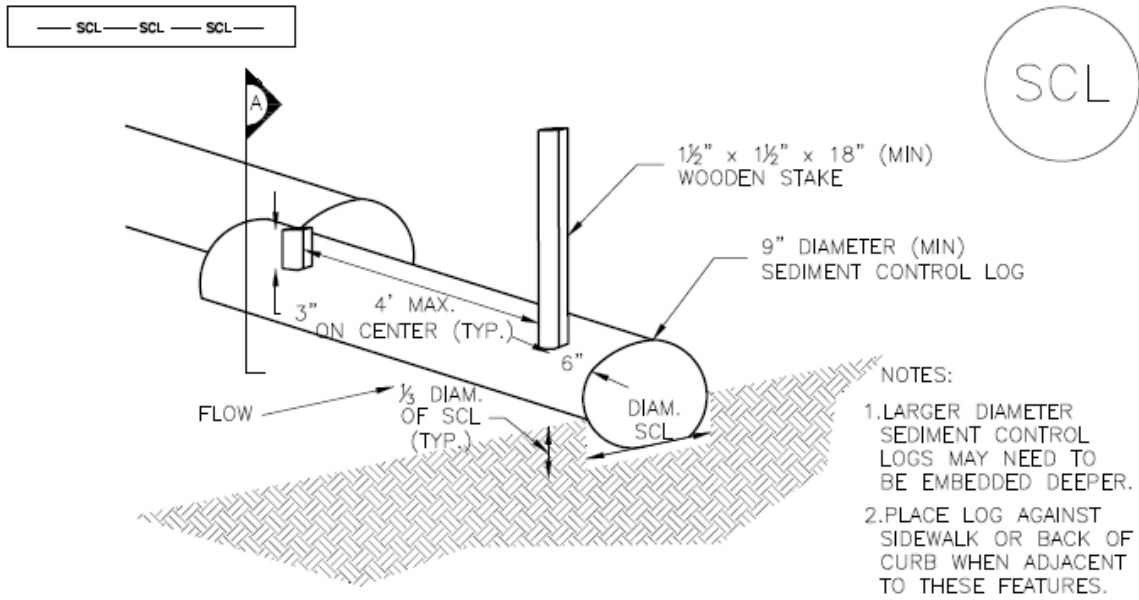
Design details and notes for sediment control logs are provided in the following details. Sediment logs must be properly installed per the detail to prevent undercutting, bypassing and displacement. When installed on slopes, sediment control logs should be installed along the contours (i.e., perpendicular to flow).

Improper installation can lead to poor performance. Be sure that sediment control logs are properly trenched (if lighter than 8 lb/foot), anchored and tightly jointed.

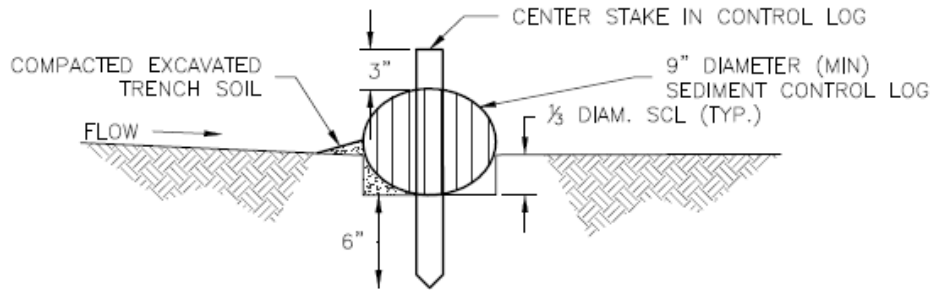
## **Maintenance and Removal**

Be aware that sediment control logs will eventually degrade. Remove accumulated sediment before the depth is one-half the height of the sediment log and repair damage to the sediment log, typically by replacing the damaged section.

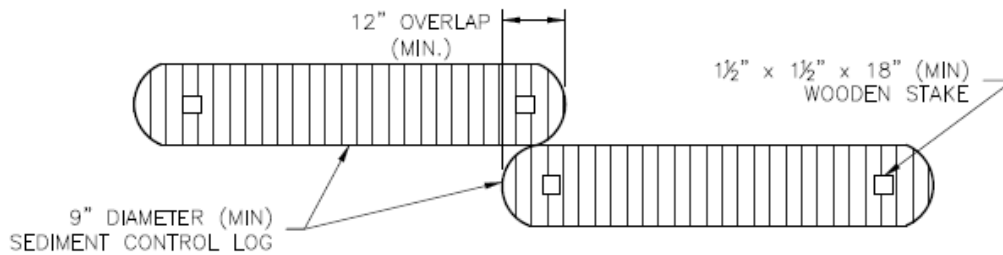
Once the upstream area is stabilized, remove and properly dispose of the logs. Areas disturbed beneath the logs may need to be seeded and mulched. Sediment control logs that are biodegradable may occasionally be left in place (e.g., when logs are used in conjunction with erosion control blankets as permanent slope breaks). However, removal of sediment control logs after final stabilization is typically appropriate when used in perimeter control, inlet protection and check dam applications. Compost from compost sediment control logs may be spread over the area and seeded as long as this does not cover newly established vegetation.



## TRENCHED SEDIMENT CONTROL LOG

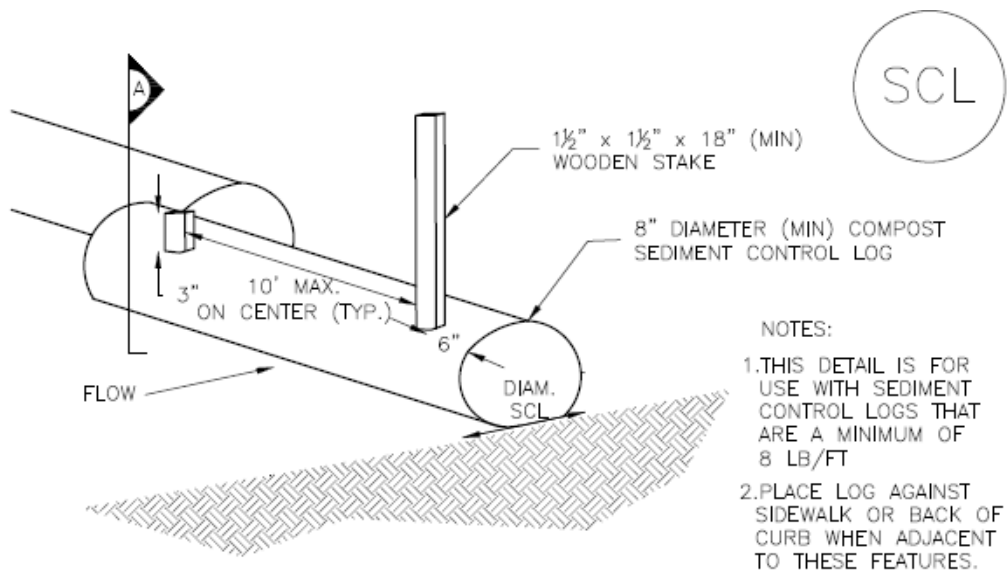


## SECTION A TRENCHED SEDIMENT CONTROL LOG

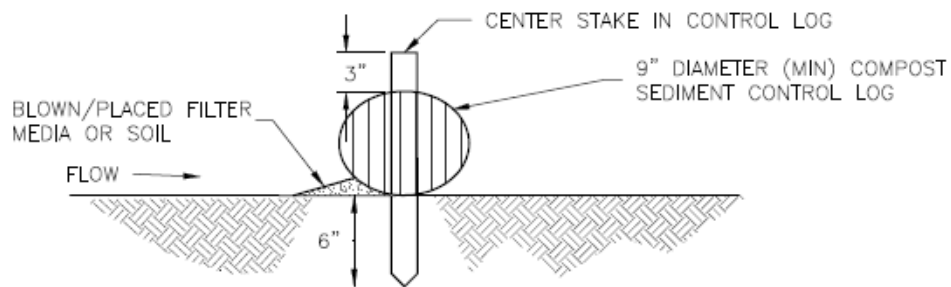


## LOG JOINTS

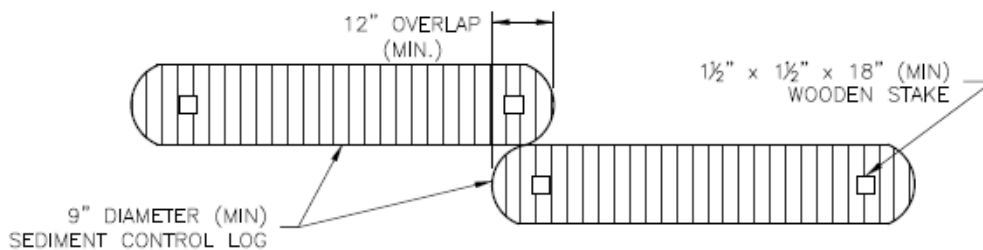
## SCL-1. TRENCHED SEDIMENT CONTROL LOG



COMPOST SEDIMENT CONTROL LOG (WEIGHTED)

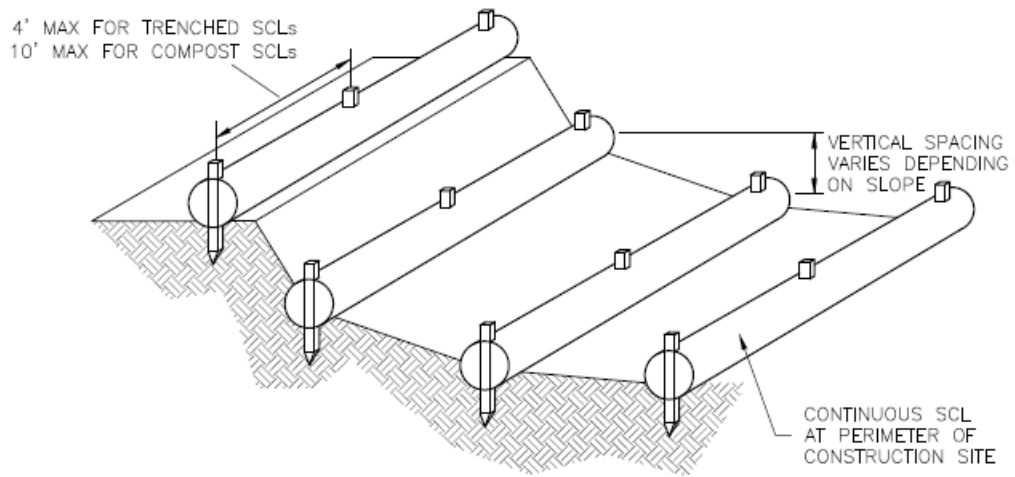


SECTION A  
COMPOST SEDIMENT CONTROL LOG (A)



LOG JOINTS

SCL-2. COMPOST SEDIMENT CONTROL LOG (WEIGHTED)



SCL-3. SEDIMENT CONTROL LOGS TO CONTROL SLOPE LENGTH

SEDIMENT CONTROL LOG INSTALLATION NOTES

1. SEE PLAN VIEW FOR LOCATION AND LENGTH OF SEDIMENT CONTROL LOGS.
2. SEDIMENT CONTROL LOGS THAT ACT AS A PERIMETER CONTROL SHALL BE INSTALLED PRIOR TO ANY UPGRADIENT LAND-DISTURBING ACTIVITIES.
3. SEDIMENT CONTROL LOGS SHALL CONSIST OF STRAW, COMPOST, EXCELSIOR OR COCONUT FIBER, AND SHALL BE FREE OF ANY NOXIOUS WEED SEEDS OR DEFECTS INCLUDING RIPS, HOLES AND OBVIOUS WEAR.
4. SEDIMENT CONTROL LOGS MAY BE USED AS SMALL CHECK DAMS IN DITCHES AND SWALES. HOWEVER, THEY SHOULD NOT BE USED IN PERENNIAL STREAMS.
5. IT IS RECOMMENDED THAT SEDIMENT CONTROL LOGS BE TRENCHED INTO THE GROUND TO A DEPTH OF APPROXIMATELY  $\frac{1}{3}$  OF THE DIAMETER OF THE LOG. IF TRENCHING TO THIS DEPTH IS NOT FEASIBLE AND/OR DESIRABLE (SHORT TERM INSTALLATION WITH DESIRE NOT TO DAMAGE LANDSCAPE) A LESSER TRENCHING DEPTH MAY BE ACCEPTABLE WITH MORE ROBUST STAKING. COMPOST LOGS THAT ARE 8 LB/FT DO NOT NEED TO BE TRENCHED.
6. THE UPHILL SIDE OF THE SEDIMENT CONTROL LOG SHALL BE BACKFILLED WITH SOIL OR FILTER MATERIAL THAT IS FREE OF ROCKS AND DEBRIS. THE SOIL SHALL BE TIGHTLY COMPACTED INTO THE SHAPE OF A RIGHT TRIANGLE USING A SHOVEL OR WEIGHTED LAWN ROLLER OR BLOWN IN PLACE.
7. FOLLOW MANUFACTURERS' GUIDANCE FOR STAKING. IF MANUFACTURERS' INSTRUCTIONS DO NOT SPECIFY SPACING, STAKES SHALL BE PLACED ON 4' CENTERS AND EMBEDDED A MINIMUM OF 6" INTO THE GROUND. 3" OF THE STAKE SHALL PROTRUDE FROM THE TOP OF THE LOG. STAKES THAT ARE BROKEN PRIOR TO INSTALLATION SHALL BE REPLACED. COMPOST LOGS SHOULD BE STAKED 10' ON CENTER.

SEDIMENT CONTROL LOG MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. SEDIMENT ACCUMULATED UPSTREAM OF SEDIMENT CONTROL LOG SHALL BE REMOVED AS NEEDED TO MAINTAIN FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY  $\frac{1}{2}$  OF THE HEIGHT OF THE SEDIMENT CONTROL LOG.
5. SEDIMENT CONTROL LOG SHALL BE REMOVED AT THE END OF CONSTRUCTION. COMPOST FROM COMPOST LOGS MAY BE LEFT IN PLACE AS LONG AS BAGS ARE REMOVED AND THE AREA SEEDED. IF DISTURBED AREAS EXIST AFTER REMOVAL, THEY SHALL BE COVERED WITH TOP SOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(DETAILS ADAPTED FROM TOWN OF PARKER, COLORADO, JEFFERSON COUNTY, COLORADO, DOUGLAS COUNTY, COLORADO, AND CITY OF AURORA, COLORADO, NOT AVAILABLE IN AUTOCAD)

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

# Erosion Control Blankets

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## What it is

Erosion control blankets are geotextiles or filter fabrics that are used to stabilize soils, steep slopes and drainage channels.

### TYPES OF EROSION CONTROL BLANKETS

- WOVEN OR BONDED SYNTHETIC MATERIALS SUCH AS POLYPROPYLENE, POLYESTER, POLYETHYLENE, NYLON, POLYVINYL CHLORIDE, GLASS AND VARIOUS MIXTURES OF THESE.
- MULCH MATTING MADE FROM JUTE OR OTHER WOOD FIBER THAT HAS BEEN FORMED INTO SHEETS.
- NETTING MADE FROM JUTE OR OTHER WOOD FIBER, PLASTIC, PAPER, OR COTTON USED TO HOLD MULCH AND MATTING TO THE GROUND.
- BLANKETS OF WOVEN STRAW MULCH WITH A SYNTHETIC LAYER OR NET.



## When and Where to use it

- In temporary and permanent swales.
- To protect recently seeded slopes.
- In drainageway channels.

## When and Where NOT to use it

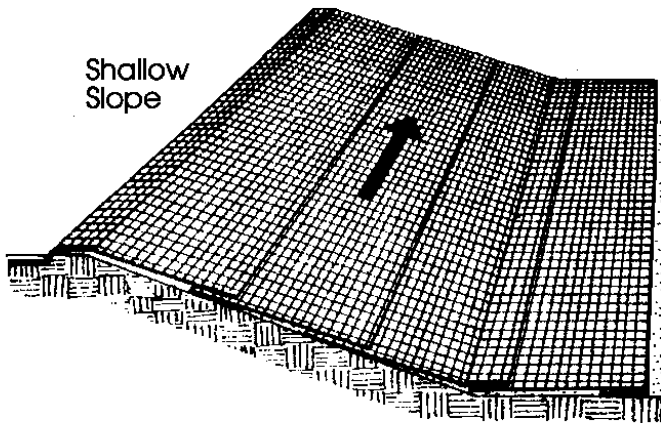
- In swales with slopes greater than 5 percent or with stormwater velocities > 8 feet per second.

## Installation and Maintenance Requirements

Installation requirements are provided in Figures ECB-1 and ECB-2.

Maintenance requirements include regular inspections to determine if fabric is damaged or has come loose, and appropriate repairs or replacement of damaged materials.

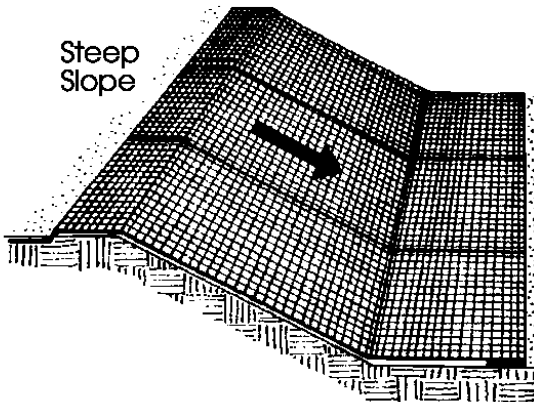




Shallow Slope

On shallow slopes, strips of netting may be applied across the slope.

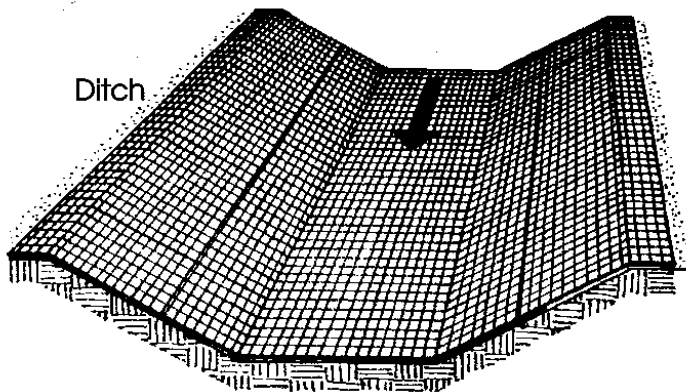
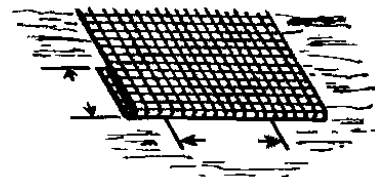
Where there is a berm at the top of the slope, bring the netting over the berm and anchor it behind the berm.



Steep Slope

On steep slopes, apply strips of netting parallel to the direction of flow and anchor securely.

Bring netting down to a level area before terminating the installation. Turn the end under 6" and staple at 12" intervals.

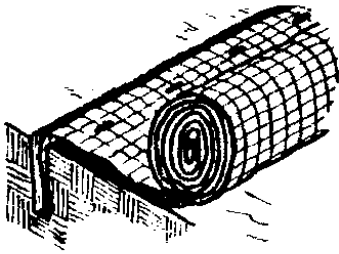


Ditch

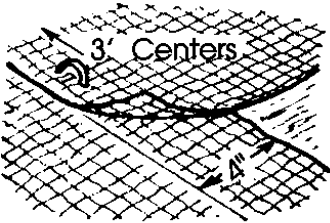
In ditches, apply netting parallel to the direction of flow. Use check slots every 15 feet. Do not join strips in the center of the ditch.

From: Virginia Soil and Water Conservation Commission, 1985

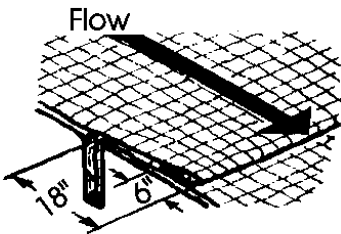
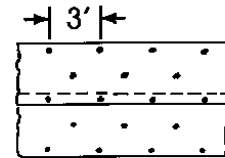




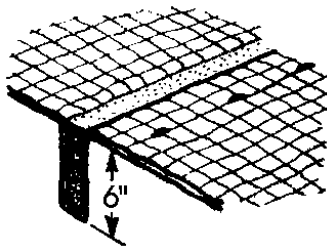
**Anchor Slot:** Bury the up-channel end of the net in a 6" deep trench. Tamp the soil firmly. Staple at 12" intervals across the net.



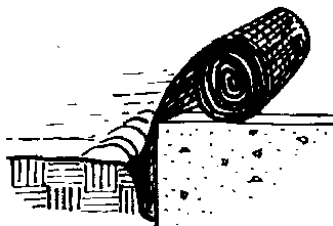
**Overlap:** Overlap edges of the strips at least 4". Staple every 3 feet down the center of the strip.



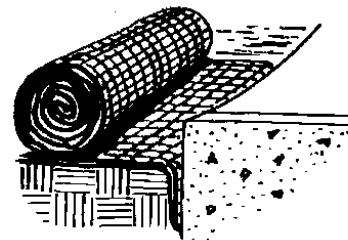
**Joining Strips:** Insert the new roll of net in a trench, as with the Anchor Slot. Overlap the up-channel end of the previous roll 18" and turn the end under 6". Staple the end of the previous roll just below the anchor slot and at the end at 12" intervals.



**Check Slots:** On erodible soils or steep slopes, check slots should be made every 15 feet. Insert a fold of the net into a 6" trench and tamp firmly. Staple at 12" intervals across the net. Lay the net smoothly on the surface of the soil - do not stretch the net, and do not allow wrinkles.



**Anchoring Ends At Structures:** Place the end of the net in a 6" slot on the up-channel side of the structure. Fill the trench and tamp firmly. Roll the net up the channel. Place staples at 12" intervals along the anchor end of the net.



From: Virginia Soil and Water Conservation Commission, 1985

City of Colorado Springs  
Storm Water Quality

Figure ECB-2  
Erosion Control Blanket  
Installation Requirements

# Surface Roughening

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## What it is

Surface roughening is a temporary erosion control practice where the soil surface is roughened by the creation of grooves, depressions, or steps that run parallel to the contour of the land.

## When and Where to use it

- Surface roughening is appropriate for all slopes and should be performed immediately after rough grades have been established in an area.
- Surface roughening can also be used to help establish vegetative cover by reducing runoff velocity and giving seed an opportunity to take hold and grow.
- Surface roughening can be used in combination with other erosion control measures such as mulching and seeding.

## When and Where NOT to use it

- Slopes that are not smooth-graded and are left sufficiently rough after final grading do not need further roughening to control erosion.
- Surface roughening alone is not sufficient to stabilize a slope for long periods of times, further stabilization measures should be implemented within two weeks of grading.
- Extremely sandy or rocky soils are not well suited for surface roughening.

## Application Techniques and Maintenance Requirements

Figure SR-1 provides application techniques and maintenance requirements for surface roughening.

# **SURFACE ROUGHENING NOTES**

## **APPLICATION TECHNIQUES**

1. STAIR STEP GRADING – USED ON SLOPES WITH GRADIENTS BETWEEN 3:1 AND 2:1 AND FOR SOIL CONTAINING A LARGE AMOUNT OF SMALL ROCKS. STAIRS ARE TO BE WIDE ENOUGH TO WORK WITH STANDARD EARTH MOVING EQUIPMENT.
2. GROOVE CUTTING – USED ON SLOPES WITH GRADIENTS BETWEEN 3:1 AND 2:1. GROOVES ARE TO BE AT LEAST 3 INCHES DEEP AND NO MORE THAN 15 INCHES APART.
3. TRACKING – USED ON SOILS WITH HIGHER SAND CONTENT DUE TO COMPACTION BY HEAVY MACHINERY.

## **MAINTENANCE REQUIREMENTS**

1. REGULAR INSPECTIONS ARE TO BE MADE OF ALL SURFACE ROUGHENED AREAS.
2. SURFACE ROUGHENING IS TO BE REPEATED AS OFTEN AS NECESSARY.
3. VEHICLES OR EQUIPMENT IS NOT TO BE DRIVEN OVER AREAS THAT HAVE BEEN ROUGHENED.
4. AS SURFACE ROUGHENING IS ONLY A TEMPORARY CONTROL, ADDITIONAL TREATMENTS MAY BE NECESSARY TO MAINTAIN THE SOIL SURFACE IN A ROUGHENED CONDITION.

# Temporary Seeding

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## What it is

Temporary seeding is the use of quickly germinating vegetative cover on disturbed areas to stabilize soils and control erosion.

## When and Where to use it

- On any disturbed areas that are to remain in an interim state for more than 60 days, but less than one year.

## When and Where NOT to use it

- Temporary seeding shall not be used in areas that receive construction traffic; granular material shall be used to stabilize high traffic areas (see Vehicle Tracking Fact Sheet).
- Temporary seeding is not to be used on disturbed areas left in an interim state for more than 1 year. Permanent seeding is then required.



## Application Techniques and Maintenance Requirements

Figure TS-1 provides application techniques and maintenance requirements for temporary seeding.

## RECOMMENDED ANNUAL GRASSES

SPECIES (COMMON NAME)	GROWTH SEASON	SEEDING DATE	POUNDS OF PURE LIVE SEED (PLS) (PLS/ACRE)	PLANTING DEPTH (INCHES)
1. OATS	COOL	MARCH 16 - APRIL 30	35-50	1-2
2. SPRING WHEAT	COOL	MARCH 16 - APRIL 30	25-35	1-2
3. SPRING BARLEY	COOL	MARCH 16 - APRIL 30	25-35	1-2
4. ANNUAL RYEGRASS	COOL	MARCH 16 - JUNE 30	10-15	1/2
5. MILLET	WARM	MAY 16 - JULY 15	3-15	1/2-3/4
6. SUDANGRASS	WARM	MAY 16 - JULY 15	5-10	1/2-3/4
7. SORGHUM	WARM	MAY 16 - JULY 15	5-10	1/2-3/4
8. WINTER WHEAT	COOL	SEPTEMBER 1 - 30	20-35	1-2
9. WINTER BARLEY	COOL	SEPTEMBER 1 - 30	20-35	1-2
10. WINTER RYE	COOL	SEPTEMBER 1 - 30	20-35	1-2
11. TRITICALE	COOL	SEPTEMBER 1 - 30	25-40	1-2

THIS TABLE WAS TAKEN FROM UDFCD FOR RECOMMENDED ANNUAL GRASSES FOR THE DENVER METROPOLITAN AREA. THIS TABLE MAY BE USED UNLESS A SITE-SPECIFIC SEED MIX IS REQUESTED AND APPROVED.

TABLE TS-1

## TEMPORARY SEEDING NOTES

### INSTALLATION REQUIREMENTS

1. DISTURBED AREAS ARE TO BE SEEDED WITHIN 21 DAYS AFTER CONSTRUCTION ACTIVITY OR GRADING ENDS IF SEASON ALLOWS.
2. IF NECESSARY, SOIL IS TO BE CONDITIONED FOR PLANT GROWTH BY APPLYING TOPSOIL, FERTILIZER, OR LIME.
3. SOIL IS TO BE TILLED IMMEDIATELY PRIOR TO APPLYING SEEDS. COMPACT SOILS ESPECIALLY NEED TO BE LOOSENED.
4. SEEDBED DEPTH IS TO BE 4 INCHES FOR SLOPES FLATTER THAN 2:1, AND 1 INCH FOR SLOPES STEEPER THAN 2:1.
5. ANNUAL GRASSES LISTED IN TABLE TS-1 ARE TO BE USED FOR TEMPORARY SEEDING. SEED MIXES ARE NOT TO CONTAIN ANY NOXIOUS WEED SEEDS INCLUDING RUSSIAN OR CANADIAN THISTLE, KNAPWEED, PURPLE LOOSESTRIFE, EUROPEAN BINDWEED, JOHNSON GRASS, AND LEAFY SPURGE.
6. TABLE TS-1 ALSO PROVIDES REQUIREMENTS FOR SEEDING RATES, SEEDING DATES, AND PLANTING DEPTHS FOR THE APPROVED TYPES OF ANNUAL GRASSES.
7. SEEDING IS TO BE APPLIED USING MECHANICAL TYPE DRILLS EXCEPT WHERE SLOPES ARE STEEP OR ACCESS IS LIMITED THEN HYDRAULIC SEEDING MAY BE USED.
8. ALL SEEDED AREAS ARE TO BE MULCHED (SEE FACTSHEET ON MULCHING).
9. IF HYDRAULIC SEEDING IS USED THEN HYDRAULIC MULCHING SHALL BE DONE SEPARATELY TO AVOID SEEDS BECOMING ENCAPSULATED IN THE MULCH.

### MAINTENANCE REQUIREMENTS

1. REGULAR INSPECTIONS ARE TO BE MADE OF ALL SEEDED AREAS TO ENSURE GROWTH.
2. AREAS WHERE GROWTH IS NOT OCCURRING QUICKLY OR THE MULCH HAS BEEN REMOVED SHALL BE RE-SEEDED AS SOON AS POSSIBLE AND RE-MULCHED IF NEEDED.
3. SEEDED AREAS ARE NOT TO BE DRIVEN OVER WITH CONSTRUCTION EQUIPMENT OR VEHICLES.

# Spill Containment And Control

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## Description

Spill containment within industrial and some commercial sites consists of berming and gates that allow for the control of spilled material. Berming consists of temporary or permanent curbs or dikes that surround a potential spill site preventing spilled material from entering surface waters or storm sewer systems. The berm may be made concrete, earthen material, metal, synthetic liners, or any material that will safely contain the spill. A potential spill site is one that allows the storage or transfer of potential spill material. Spill material is that which is not allowed into surface waters or storm sewer systems according to local, state, or federal regulations. Spill control devices include valves, slide gates, or any other device which can contain material when required and then release the spilled material in a controlled fashion.

## General Application

Two methods of berming can be used: 1) containment berming that contains an entire spill and 2) curbing that routes spill material to a collection basin. Containment berming should be of sufficient size to safely contain a spill from the largest storage tank, rail car, tank truck, or other containment device located inside the possible spill area. A small collection basin should be provided for removal of storm water and leaked material.

Curbing is used to route spill material to a large collection basin. The curb should be of sufficient size to safely route a spill from the largest storage tank, rail car, tank truck, or other containment device located inside the possible spill area. A containment device must be provided to safely store the spilled material until removal is possible.

If the capacity of the containment berming or the collection basin are exceeded, a spill control device must be used. The spill control device ideally would convey flow into a portable containment device for removal of the material. However, if material is escaping the berming area through the spill control device, two available means of controlling a spill

are to use sorbents (adsorption and absorption through chemical processes) or gelling agents (physically or chemically gel the spill material; solidification eventually occurs).

## **Advantages/Disadvantages**

### **General**

The spill containment berm is an effective means to prevent spill material from entering surface waters or storm sewer systems. In some cases, the spill material may be collected and recycled. The cost of installation and maintenance will be a function of the type of berm used.

### **Physical Site Suitability**

The spill area must have an impermeable floor (asphalt or concrete) so that contamination of groundwater does not occur. If the existing conditions are insufficient to prevent seepage, an impermeable floor or liner must be installed.

### **Pollutant Removal**

In the event of a spill, a method of removal must be provided, such as application of sorbent materials and the use of a pump or vacuum truck. Any material removed from the spill site must be disposed of according to local, state, and federal standards. Recycling of the spill material may be possible if contact or uptake of foreign material is minimal. Water that collects within the berming due to rainfall or snowmelt must be treated to meet standards before release from the spill area.