

**ABC SUPPLY CO  
STORMWATER MANAGEMENT PLAN  
Lot 8, Akers Acres**

**October 10, 2018  
Revised May 22, 2019**

**El Paso County**

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Add PCD File No. PPR1848

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## SITE DESCRIPTION AND LOCATION

The proposed Lot 8 Akers Acres is approximately 9.33 acres in total and is located within Section 32, Township 13 South, Range 65 West of the 6th Principal Meridian.

The proposed site is zoned in the El Paso County as "M"-Industrial (obsolete).

The topography of the surrounding area is typical of a high desert, short prairie grass with slopes generally at 1% to 3%. The area generally sheet flows to the east or south across the vacant site to the edges of the site where the slopes become steeper. From there the runoff is directed into roadway drainage systems along Marksheffel and Constitution. At its closest point, Sand Creek East Fork Subtributary is approximately 700' from the site.

The Lot 8 Akers Acres is located in the East Fork Sand Creek Street Drainage Basin. This basin has not been studied.

Sand Creek is a studied basin.  
Please revise statement.

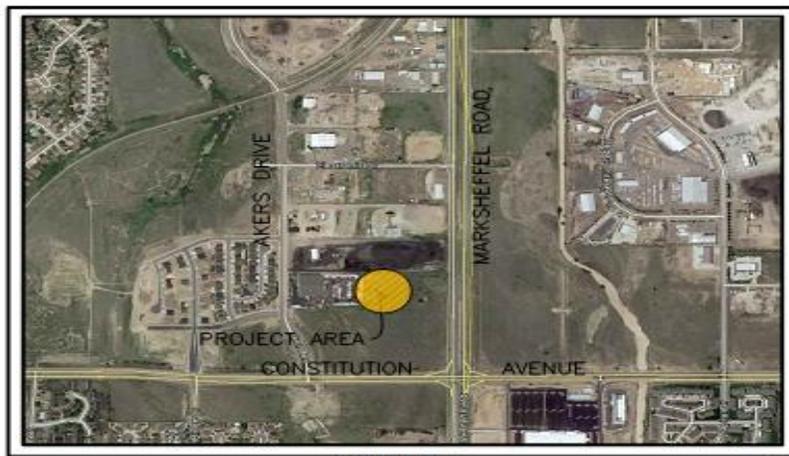
The development area is located in El Paso County, Colorado along the west side of Marksheffel Road, north of Constitution Avenue and east of Akers Drive. Specifically, the area of study is bounded by Asphalt Recovery Specialists to the north, Akers Drive to the west, vacant land and Constitution Avenue to the south and Marksheffel Road to the east.

Please update the  
FEMA FIRM# and date

The Flood Insurance Rate Map (FIRM No. 08041CO756-F (effective date March 17, 1997)) indicates that there is not a floodplain on the proposed site. The closest floodplain shown is approximately 700' to the east of the site. This floodplain is designated as "Zone X", which identifies the area as an area of a 500-year flood, area of 100-year flooding with an average depth less than 1 foot or a drainage area less than 1 square mile, or an area protected by levees from a 100-year flood. FEMA does not require any modifications to the floodplain maps when construction is located in this zone area.

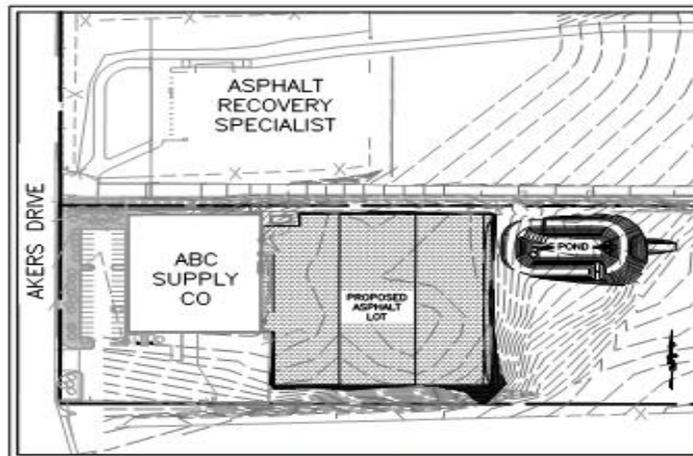
Soil Conservation Service soil survey records indicate the project area is covered by soils classified in the Blakeland loamy sand, 1 to 9 percent slopes and the Blendon sandy loam, 0 to 3 percent slopes series, which are categorized in the Hydrological Group A and B, respectively. Please see the attached Soil Report for more information.

VICINITY MAP



VICINITY MAP

NTS



LOCATION MAP

NTS

VICINITY AND LOCATION MAPS

## **CONSTRUCTION ACTIVITIES PROPOSED**

The goal of the project is to add an approximate 300' x 300' asphalt yard directly to the east of the existing building. The purpose of the yard is for outdoor storage of building supplies. The yard will be screened by a six-foot high fence. In addition to the asphalt storage yard, an extended detention pond will be constructed adjacent to it to the east.

Site work will include the following: demolition, clearing and grubbing, grading, construction of the stormwater pond, asphalt paving, drainage improvements, and the installation of privacy-chain link fence.

To accomplish the site work, the following construction activities will be undertaken:

- Clearing and grubbing
- Removal of structures and obstructions
- Temporary stabilization including installation of perimeter controls to control construction erosion and sedimentation
- Storage area and pond grading
- Asphalt paving, curb and gutter and storm drainage pipes and structures
- Final stabilization including permanent erosion control measures
- Removal of temporary control measures

## **PHASING PLAN**

A phasing plan is not required for this project because it is of short duration (less than a year) and it is a small area.

## **PROPOSED SEQUENCE FOR MAJOR ACTIVITIES**

The following schedule is anticipated for land-disturbing activities:

Please update the schedule accordingly as some of these dates have passed.

Temporary stabilization	10	06/01/19	06/11/19	Perimeter controls including silt fence and construction entrances
Storage lot and pond grading	30	06/11/19	07/11/19	
Installation of storm pipes and structures	15	07/11/19	07/26/19	Inlet and outlet protections.
Installation of curb & gutter, storage lot paving	20	07/26/19	08/15/19	
Final stabilization	240	08/15/19	04/11/20	Seeding, mulching, soil retention blanket

## **ESTIMATES OF THE TOTAL AND DISTURBED SITE AREAS**

Estimates of Disturbed Area	3.1 AC
Total Area	9.33 AC
Percent Disturbed	33.2%

## ESTIMATE OF RUNOFF COEFFICIENTS

The following are Rational Coefficients applying to the drainage area of the current project. Please see the Final Drainage Report associated with this project for further information.

Condition	C5	C100
Existing	0.08	0.35
Proposed	0.90	0.96

## SOIL EROSION POTENTIAL

Per the USDA NRCS, Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. "Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments. The K Factor for Akers Acres Lot 8 (in the project area) is a low 0.10, indicating low soil erosion potential.

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	.10	13.2	81.1%
10	Blendon sandy loam, 0 to 3 percent slopes	.20	3.1	18.9%
<b>Totals for Area of Interest</b>			<b>16.3</b>	<b>100.0%</b>

### **EXISTING VEGETATION**

The vegetation is typical eastern Colorado prairie grass.

Please provide existing percent ground cover

### **OTHER POTENTIAL POLLUTION SOURCES**

There will be no chemical or fuel storage or major fueling on-site. Minor fueling operations such as that required for landscape maintenance will be performed on site.

### **MATERIAL HANDLING**

There will be no material handling procedures requiring spill prevention and response procedures.

### **SPILL PREVENTION AND POLLUTION CONTROLS**

There will be no batch plants requiring spill prevention and pollution controls.

### **STORMWATER POLLUTANT CONTROL MEASURES**

During construction and until the storage lot and pond are complete, vehicle tracking will remain in place. Waste will be disposed in approved containers or by approved methods.

### **NON-STORMWATER COMPONENTS OF DISCHARGE**

There are no known springs on the property. There is no plan for irrigation at this time.

### **ULTIMATE RECEIVING WATERS**

The site will discharge through the proposed pond and converted to sheet flow as it passes through the large riprap apron. From there it flows east toward Marksheffel Road and gets conveyed via improved drainage facilities to the East Fork of Sand Creek. From there the East

Fork converges with Sand Creek, which converges with Fountain Creek, then flows south to Arkansas River, then the Arkansas River flows east to Mississippi River, then the Mississippi River flows south to Gulf of Mexico.

### **SWMP MAP**

Please see the Grading and Erosion Control Plan as part of the *Site Development Plan Drawings* for this document.

### **STRUCTURAL BMPS**

The following structural BMP's will be used on the project:

- Erosion control blankets are geotextiles or filter fabrics that are used to stabilize soils, steep slopes and drainage channels.
- Inlet protection is a sediment control barrier formed around a storm drain inlet.
- A silt fence is a temporary sediment barrier constructed of filter fabric stretched across supporting posts. The bottom edge of the fabric is entrenched and covered with backfill.
- A straw bale barrier is a temporary sediment barrier consisting of a row of entrenched and anchored straw bales used to retain sediment from runoff in small drainage areas of disturbed soil
- Vehicle tracking refers to the stabilization of construction entrances, roads, parking areas, and staging areas to prevent the tracking of sediment from the construction site.

### **NON-STRUCTURAL BMPS**

The following non-structural BMP's will be used on the project.

- Mulching is used to temporarily stabilize soils by securely applying materials such as grass, hay, woodchips or wood fibers to the soil's surface. Mulching protects the soil from raindrop impact and reduces the velocity of overland runoff. Mulch also aids in the growth of temporary seeding by holding seeds and topsoil in place, retaining moisture, and insulating against extreme temperatures.

### **TECHNICAL DRAWING DETAILS**

The following pages contain Technical drawing details for BMP installation and maintenance.

## Description

An extended detention basin (EDB) is a sedimentation basin designed to detain stormwater for many hours after storm runoff ends. This BMP is similar to a detention basin used for flood control, however; the EDB uses a much smaller outlet that extends the emptying time of the more frequently occurring runoff events to facilitate pollutant removal. The EDB's 40-hour drain time for the water quality capture volume (WQCV) is recommended to remove a significant portion of total suspended solids (TSS). Soluble pollutant removal is enhanced by providing a small wetland marsh or "micropool" at the outlet to promote biological uptake. The basins are sometimes called "dry ponds" because they are designed not to have a significant permanent pool of water remaining between storm runoff events.



**Photograph EDB-1:** This EDB includes a concrete trickle channel and a micropool with a concrete bottom and grouted boulder sideslopes. The vegetation growing in the sediment of the micropool adds to the natural look of this facility and ties into the surrounding landscape.

## Site Selection

EDBs are well suited for watersheds with at least five impervious acres up to approximately one square mile of watershed. Smaller watersheds can result in an orifice size prone to clogging. Larger watersheds and watersheds with baseflows can complicate the design and reduce the level of treatment provided. EDBs are also well suited where flood detention is incorporated into the same basin. The depth of groundwater should be investigated. Groundwater depth should be 2 or more feet below the bottom of the basin in order to keep this area dry and maintainable.

Extended Detention Basin	
<b>Functions</b>	
LID/Volume Red.	Somewhat
WQCV Capture	Yes
WQCV+Flood Control	Yes
Fact Sheet Includes EURV Guidance	Yes
<b>Typical Effectiveness for Targeted Pollutants<sup>3</sup></b>	
Sediment/Solids	Good
Nutrients	Moderate
Total Metals	Moderate
Bacteria	Poor
<b>Other Considerations</b>	
Life-cycle Costs <sup>4</sup>	Moderate
<sup>3</sup> Based primarily on data from the International Stormwater BMP Database ( <a href="http://www.bmpdatabase.org">www.bmpdatabase.org</a> ).	
<sup>4</sup> Based primarily on BMP-REALCOST available at <a href="http://www.udfcd.org">www.udfcd.org</a> . Analysis based on a single installation (not based on the maximum recommended watershed tributary to each BMP).	

## Designing for Maintenance

Recommended maintenance practices for all BMPs are provided in the BMP Maintenance chapter of this manual. During design, the following should be considered to ensure ease of maintenance over the long-term:

- Always provide a micropool (see step 7).
- Provide a design slope of at least 3% in the vegetated bottom of the basin (either toward the trickle channel or toward the micropool). This will help maintain the appearance of the turf grass in the bottom of the basin and reduce the possibility of saturated areas that may produce unwanted species of vegetation and mosquito breeding conditions. Verify slopes during construction, prior to vegetation.
- Follow trash rack sizing recommendations to determine the minimum area for the trash rack (see design step 9).
- Provide adequate initial surcharge volume for frequent inundation (see design step 3).
- Provide stabilized access to the forebay, outlet, spillway, and micropool for maintenance purposes.
- Provide access to the well screen. The well screen requires maintenance more often than any other EDB component. Ensure that the screen can be reached from a point outside of the micropool. When the well screen is located inside the outlet structure, provide an access port within the trash rack or use a sloped trash rack that consists of bearing bars (not horizontal) that create openings no more than five inches clear.
- Provide a hard-bottom forebay that allows for removal of sediment.
- Where baseflows are anticipated, consider providing a flow-measuring device (e.g. weir or flume with staff gage and rating curve) at the forebay to assist with future modifications of the water quality plate. Typically, the baseflow will increase as the watershed develops. It is important that the water quality plate continue to function, passing the baseflow while draining the WQCV over approximately 40 hours. Measuring the actual baseflow can be helpful in determining if and when the orifice plate should be replaced.

## Benefits

- The relatively simple design can make EDBs less expensive to construct than other BMPs, especially for larger basins.
- Maintenance requirements are straightforward.
- The facility can be designed for multiple uses.

## Limitations

- Ponding time and depths may generate safety concerns.
- Best suited for tributary areas of 5 impervious acres or more. EDBs are not recommended for sites less than 2 impervious acres.
- Although ponds do not require more total area compared to other BMPs, they typically require a relatively large continuous area.

EDBs providing combined water quality and flood control functions can serve multiple uses such as playing fields or picnic areas. These uses are best located at higher elevation within the basin, above the WQCV pool level.

# 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.

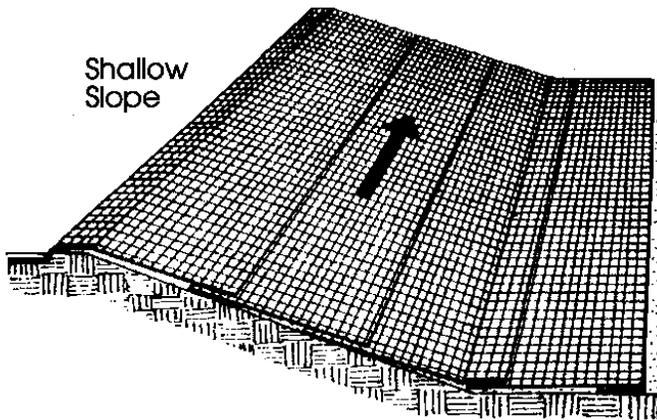
## When and Where NOT to use it

- 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.

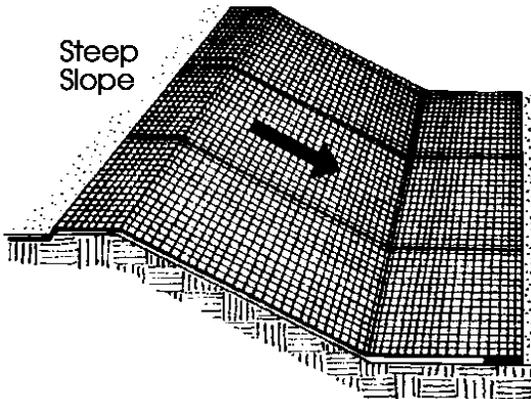
Maintenance requirements include regular inspections to determine if fabric is damaged or has come loose, and appropriate repairs or replacement of damaged materials.



Shallow Slope

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

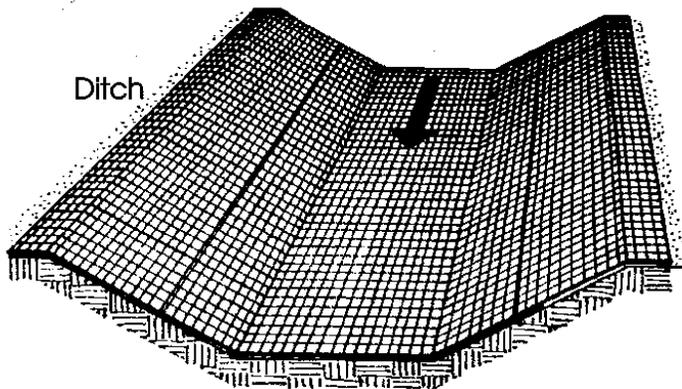
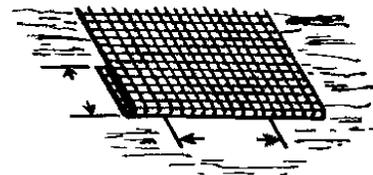
Where there is a berm at the top of the slope, bring the netting over the berm and anchor it behind the berm.



Steep Slope

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

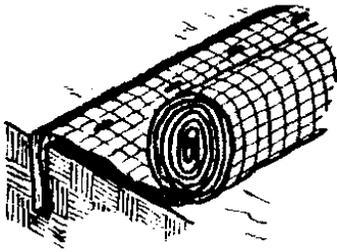
Bring netting down to a level area before terminating the installation. Turn the end under 6" and staple at 12" intervals.



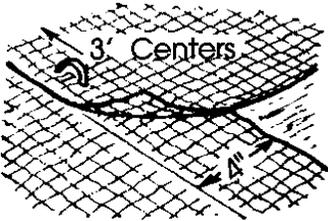
Ditch

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.

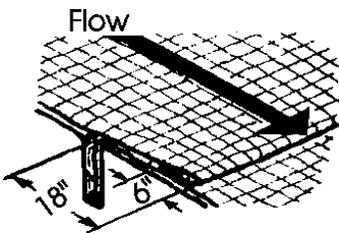
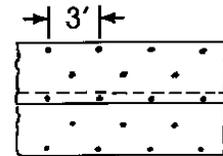
From: Virginia Soil and Water Conservation Commission, 1985



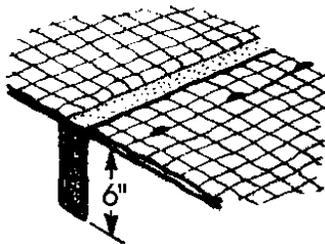
**Anchor Slot:** Bury the up-channel end of the net in a 6" deep trench. Tamp the soil firmly. Staple at 12" intervals across the net.



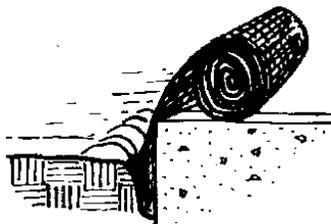
**Overlap:** Overlap edges of the strips at least 4". Staple every 3 feet down the center of the strip.



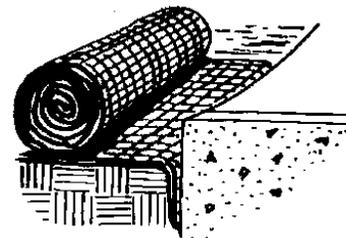
**Joining Strips:** Insert the new roll of net in a trench, as with the Anchor Slot. Overlap the up-channel end of the previous roll 18" and turn the end under 6". Staple the end of the previous roll just below the anchor slot and at the end at 12" intervals.



**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

# 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.

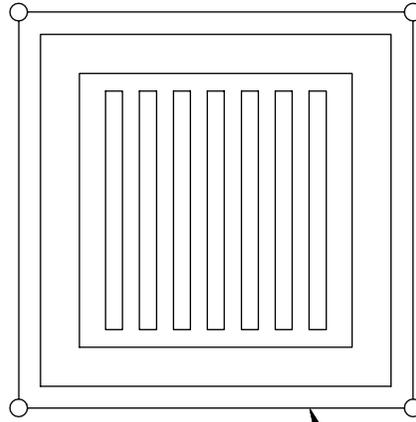


## When and Where NOT to use it

- 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.



FILTER FABRIC  
(SEE FIG. SF-2 FOR  
INSTALLATION  
REQUIREMENTS)

## FILTER FABRIC INLET PROTECTION

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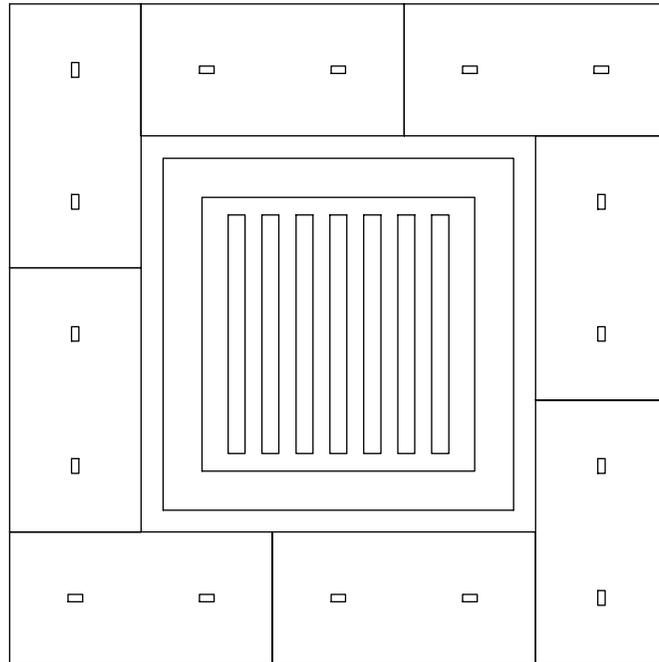
### FILTER FABRIC INLET PROTECTION NOTES

#### INSTALLATION REQUIREMENTS

1. INLET PROTECTION SHALL BE INSTALLED IMMEDIATELY AFTER CONSTRUCTION OF INLET.
2. SEE SILT FENCE FIGURE SF-2 FOR INSTALLATION REQUIREMENTS.
3. POSTS ARE TO BE PLACED AT EACH CORNER OF THE INLET AND AROUND THE EDGES AT A MAXIMUM SPACING OF 3 FEET.

#### MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT INLET PROTECTION IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS NO RAINFALL.
2. DAMAGED, COLLAPSED, UNENTRENCHED OR INEFFECTIVE INLET PROTECTION SHALL BE PROMPTLY REPAIRED OR REPLACED.
3. SEDIMENT SHALL BE REMOVED FROM BEHIND FILTER FABRIC WHEN IT ACCUMULATES TO HALF THE EXPOSED GEOTEXTILE HEIGHT.
4. FILTER FABRIC PROTECTION SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED IN THE DRAINAGE AREA AS APPROVED BY THE CITY.



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

## STRAW BALE INLET PROTECTION

NTS

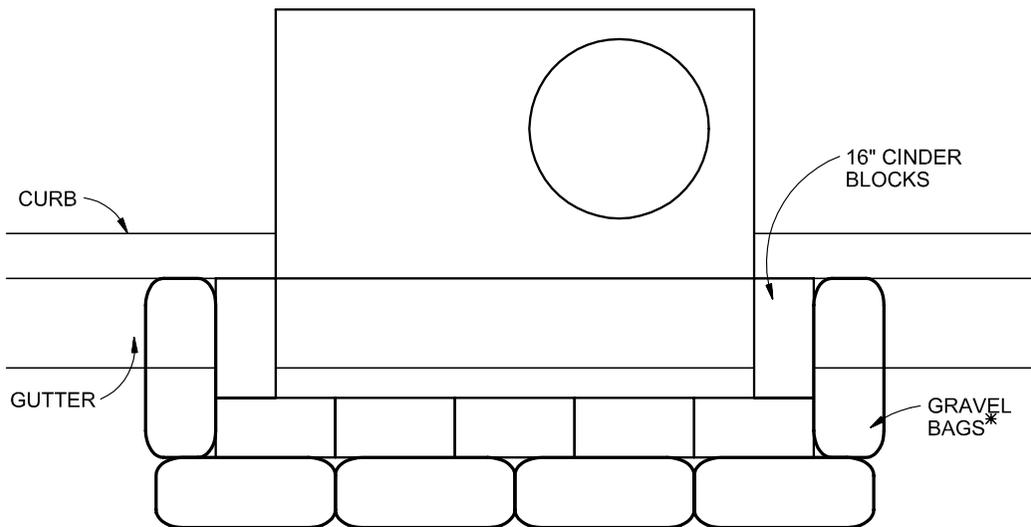
### STRAW BALE INLET PROTECTION NOTES

#### INSTALLATION REQUIREMENTS

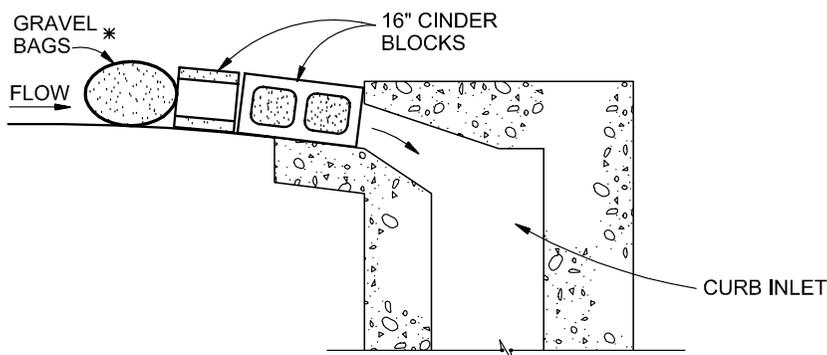
1. INLET PROTECTION SHALL BE INSTALLED IMMEDIATELY AFTER CONSTRUCTION OF INLET.
2. BALES ARE TO BE PLACED IN A SINGLE ROW AROUND THE INLET WITH THE END OF THE BALES TIGHTLY ABUTTING ONE ANOTHER.
3. SEE STRAW BALE BARRIER FIGURE SBB-2 FOR INSTALLATION REQUIREMENTS.

#### 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.



**PLAN**



**SECTION**

## BLOCK AND GRAVEL BAG\*CURB INLET PROTECTION

NTS

### BLOCK AND GRAVEL BAG\*CURB INLET PROTECTION NOTES

#### INSTALLATION REQUIREMENTS

1. INLET PROTECTION SHALL BE INSTALLED IMMEDIATELY AFTER CONSTRUCTION OF INLET.
2. CONCRETE BLOCKS ARE TO BE LAID AROUND THE INLET IN A SINGLE ROW ON THEIR SIDES, ABUTTING ONE ANOTHER WITH THE OPEN ENDS OF THE BLOCK FACING OUTWARD.
3. GRAVEL BAGS ARE TO BE PLACED AROUND THE CONCRETE BLOCKS CLOSELY ABUTTING ONE ANOTHER SO THERE ARE NO GAPS.
4. GRAVEL BAGS ARE TO CONTAIN WASHED SAND OR GRAVEL APPROXIMATELY 3/4 INCH IN DIAMETER.
5. BAGS ARE TO BE MADE OF 1/4" INCH WIRE MESH (USED WITH GRAVEL ONLY) OR GEOTEXTILE.

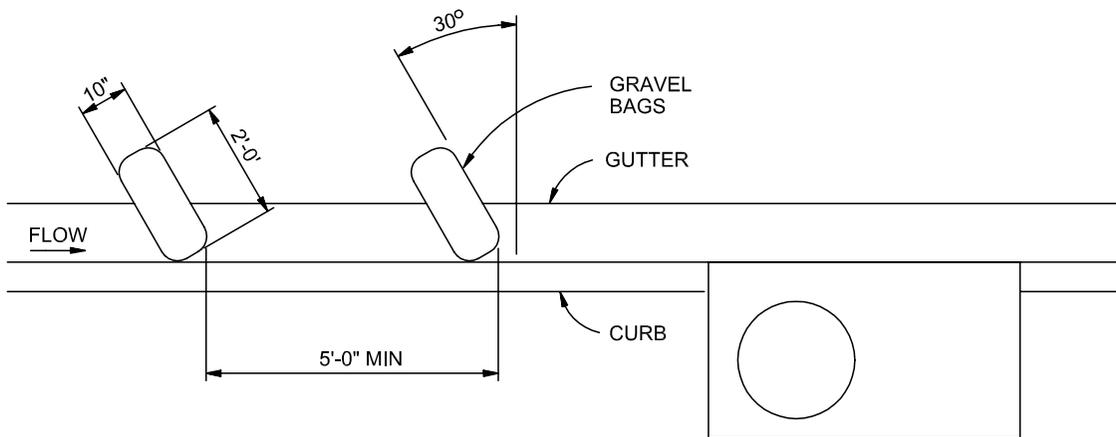
\* AN ALTERNATE 3/4" TO 1" GRAVEL FILTER OVER A WIRE SCREEN MAY BE USED IN PLACE OF GRAVEL BAGS. THE WIRE MESH SHALL EXTEND ABOVE THE TOP OF THE CONCRETE BLOCKS AND THE GRAVEL PLACED OVER THE WIRE SCREEN TO THE TOP OF THE CONCRETE BLOCKS.

#### MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT 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 OR REPLACED.
3. SEDIMENT SHALL BE REMOVED WHEN SEDIMENT HAS ACCUMULATED TO APPROXIMATELY 1/2 THE DESIGN DEPTH OF THE TRAP.
4. INLET PROTECTION SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED WITHIN THE DRAINAGE AREA AS APPROVED BY THE CITY.

City of Colorado Springs  
Stormwater Quality

Figure IP-3  
Block & Gravel Bag Curb Inlet Protection  
Construction Detail and Maintenance  
Requirements



## CURB SOCK INLET PROTECTION

NTS

### CURB SOCK INLET PROTECTION NOTES

#### INSTALLATION REQUIREMENTS

1. INLET PROTECTION SHALL BE INSTALLED IMMEDIATELY AFTER CONSTRUCTION OF INLET.
2. SOCK IS TO BE MADE OF 1/4 INCH WIRE MESH (USED WITH GRAVEL ONLY) OR GEOTEXTILE.
3. WASHED SAND OR GRAVEL 3/4 INCH TO 4 INCHES IN DIAMETER IS PLACED INSIDE THE SOCK.
4. PLACEMENT OF THE SOCK IS TO BE 30 DEGREES FROM PERPENDICULAR IN THE OPPOSITE DIRECTION OF FLOW.
5. SOCKS ARE TO BE FLUSH WITH THE CURB AND SPACED AT A MINIMUM 5 FEET APART.
6. AT LEAST 2 CURB SOCKS IN SERIES IS REQUIRED.

#### MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT 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 OR REPLACED.
3. SEDIMENT SHALL BE REMOVED FROM BEHIND THE SOCK WHEN GUTTER WIDTH IS FILLED.
4. INLET PROTECTION SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED WITHIN THE DRAINAGE AREA AS APPROVED BY THE CITY.

# Mulching

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## What it is

Mulching is used to temporarily stabilize soils by securely applying materials such as grass, hay, woodchips or wood fibers to the soil's surface. Mulching protects the soil from raindrop impact and reduces the velocity of overland runoff. Mulch also aids in the growth of temporary seeding by holding seeds and topsoil in place, retaining moisture, and insulating against extreme temperatures.



## When and Where to use it

- All disturbed areas and stockpiles shall be mulched within 21 days after final grade is reached.
- Disturbed areas and stockpiles which are not at final grade but will remain dormant for longer than 30 days shall also be mulched within 21 days after interim grading.
- An area that is going to remain in an interim state for more than 60 days shall also be seeded.
- Mulching is always to be used when applying temporary or permanent seeding.
- Mulching is often used when temporary seeding cannot be used due to the season or climate.

## When and Where NOT to use it

- In areas that will involve paving, building, or utility construction within 21 days after final grade is reached.

## Application Techniques and Maintenance Requirements

Figure MU-1 provides application techniques and maintenance requirements for mulching.

# MULCHING NOTES

## INSTALLATION REQUIREMENTS

1. ALL DISTURBED AREAS MUST BE MULCHED WITHIN 21 DAYS AFTER FINAL GRADE AND SEEDED AREAS ARE TO BE MULCHED WITHIN 24 HOURS AFTER SEEDING.
2. MATERIAL USED FOR MULCH CAN BE CERTIFIED CLEAN, WEED- AND SEED-FREE LONG STEMMED FIELD OR MARSH HAY, OR STRAW OF OATS, BARLEY, WHEAT, RYE, OR TRITICALE CERTIFIED BY THE COLORADO DEPARTMENT OF AGRICULTURE WEED FREE FORAGE CERTIFICATION PROGRAM.
3. HYDRAULIC MULCHING MATERIAL SHALL CONSIST OF VIRGIN WOOD FIBER MANUFACTURED FROM CLEAN WHOLE WOOD CHIPS. WOOD CHIPS CANNOT CONTAIN ANY GROWTH OR GERMINATION INHIBITORS OR BE PRODUCED FROM RECYCLED MATERIAL. GRAVEL CAN ALSO BE USED.
4. MULCH IS TO BE APPLIED EVENLY AT A RATE OF 2 TONS PER ACRE.
5. MULCH IS TO BE ANCHORED EITHER BY CRIMPING (TUCKING MULCH FIBERS 4 INCHES INTO THE SOIL), USING NETTING (USED ON SMALL AREAS WITH STEEP SLOPES), OR WITH A TACKIFIER.
6. HYDRAULIC MULCHING AND TACKIFIERS ARE NOT TO BE USED IN THE PRESENCE OF FREE SURFACE WATER.

## MAINTENANCE REQUIREMENTS

1. REGULAR INSPECTIONS ARE TO BE MADE OF ALL MULCHED AREAS.
2. MULCH IS TO BE REPLACED IMMEDIATELY IN THOSE AREAS IT HAS BEEN REMOVED, AND IF NECESSARY THE AREA SHOULD BE RESEDED.

# Silt Fence

## What it is

A silt fence is a temporary sediment barrier constructed of filter fabric stretched across supporting posts. The bottom edge of the fabric is entrenched and covered with backfill.



## When and Where to use it

- On the down gradient perimeters of a construction site.
- On a contour to control overland sheet flow.
- At the top or toe of a steep slope.
- As a form of inlet protection (see inlet protection factsheet).

Figure SF-1 depicts five cases where the use of silt fence is appropriate.

## When and Where NOT to use it

- In areas of concentrated flows such as in ditches, swales or channels that drain areas greater than 1.0 acre.
- At the top of a slope or at high points which do not receive any drainage flows.



This photo reveals a silt fence that has become unentrenched because it was not securely installed.



This photo illustrates what will happen to a silt fence if it is installed in an area of concentrated flow.

## Construction Detail and Maintenance Requirements

Figure SF-2 provides a construction detail and maintenance requirements for a silt fence.

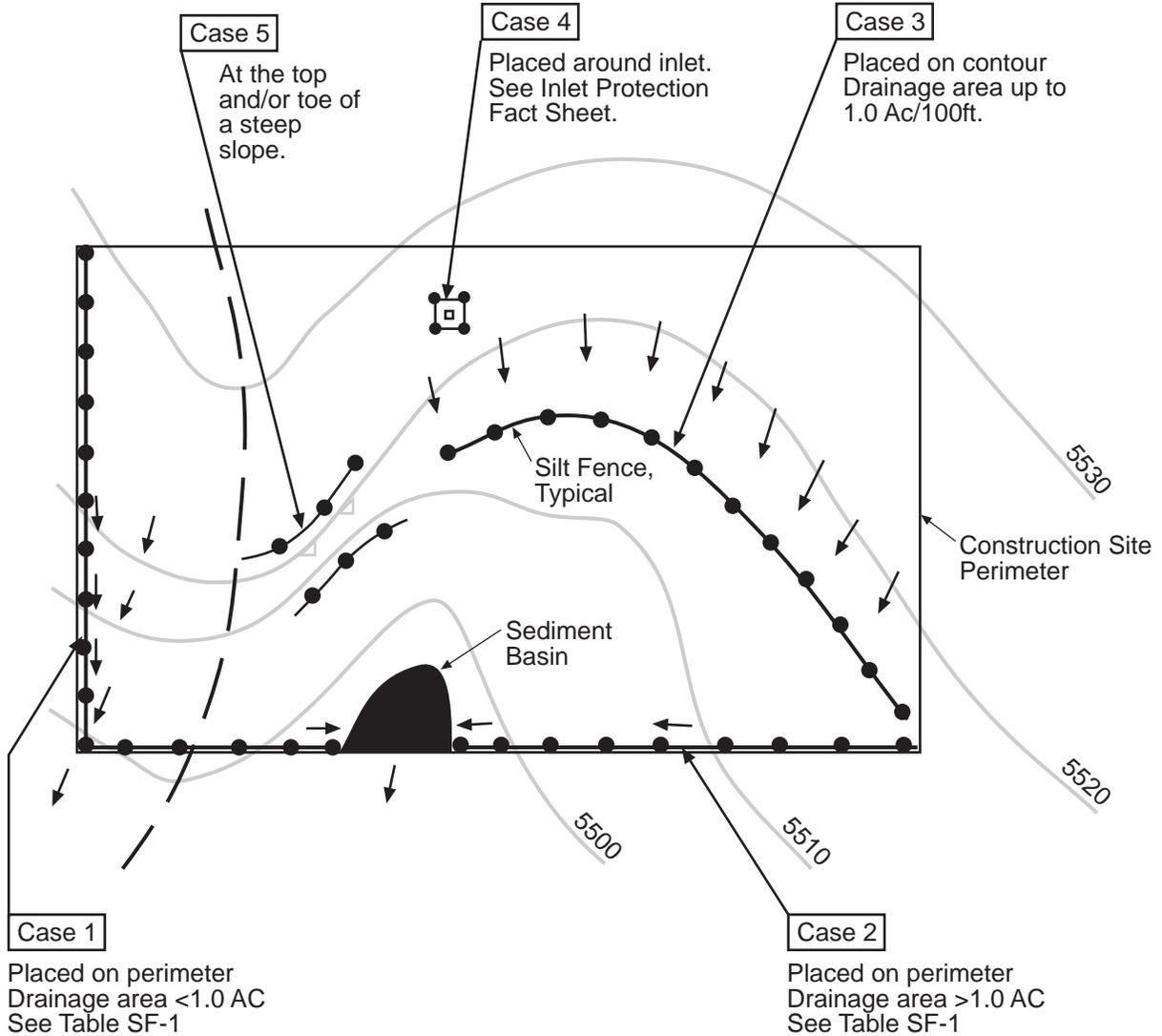


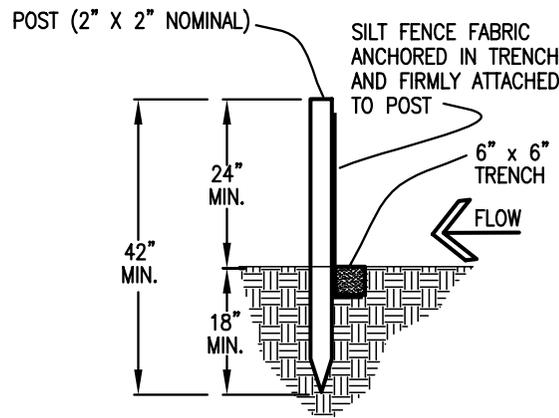
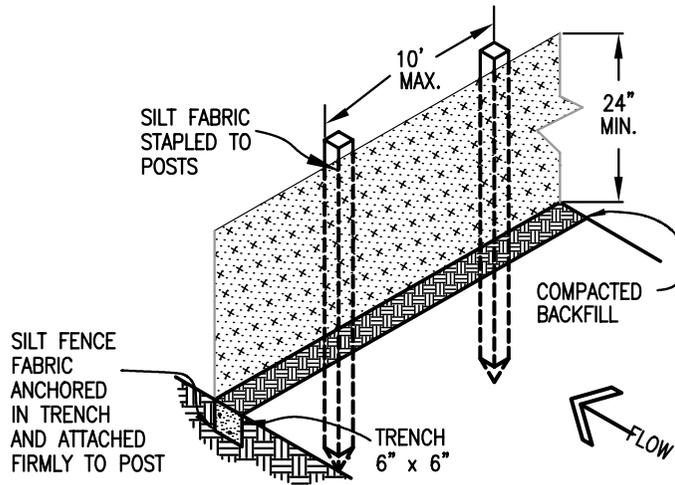
Table SF-1

Silt Fence Used as Perimeter Control	Case 1		Case 2 DA > 1.0 AC
	DA < 0.25 AC	0.25 < DA < 1 AC	
Continuous Grade	OK <sup>(1)</sup>	OK <sup>(1)</sup>	OK <sup>(1)</sup>
Area of Concentrated Flow	OK	NO <sup>(2)</sup>	NO <sup>(3)</sup>

(1) Temporary Swale or Straw Bale Barrier may be used as alternative to a Silt Fence.

(2) Check Dam may also be used as alternative to Silt Fence at low point.

(3) Sediment Basin is required for concentrated flow from drainage areas > 1.0 AC.



SILT FENCE

## SILT FENCE NOTES

### INSTALLATION REQUIREMENTS

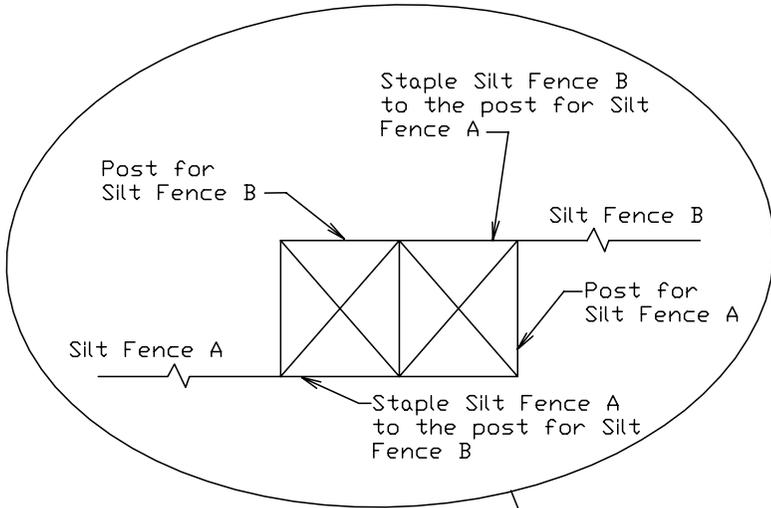
1. SILT FENCES SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.
2. WHEN JOINTS ARE NECESSARY, SILT FENCE GEOTEXTILE SHALL BE SPLICED TOGETHER ONLY AT SUPPORT POST AND SECURELY SEALED.
3. METAL POSTS SHALL BE "STUDDED TEE" OR "U" TYPE WITH MINIMUM WEIGHT OF 1.33 POUNDS PER LINEAR FOOT. WOOD POSTS SHALL HAVE A MINIMUM DIAMETER OR CROSS SECTION DIMENSION OF 2 INCHES.
4. THE FILTER MATERIAL SHALL BE FASTENED SECURELY TO METAL OR WOOD POSTS USING WIRE TIES, OR TO WOOD POSTS WITH 3/4" LONG #9 HEAVY-DUTY STAPLES. THE SILT FENCE GEOTEXTILE SHALL NOT BE STAPLED TO EXISTING TREES.
5. WHILE NOT REQUIRED, WIRE MESH FENCE MAY BE USED TO SUPPORT THE GEOTEXTILE. WIRE FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY-DUTY WIRE STAPLES AT LEAST 3/4" LONG, TIE WIRES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 6" AND SHALL NOT EXTEND MORE THAN 3' ABOVE THE ORIGINAL GROUND SURFACE.

6. ALONG THE TOE OF FILLS, INSTALL THE SILT FENCE ALONG A LEVEL CONTOUR AND PROVIDE AN AREA BEHIND THE FENCE FOR RUNOFF TO POND AND SEDIMENT TO SETTLE. A MINIMUM DISTANCE OF 5 FEET FROM THE TOE OF THE FILL IS RECOMMENDED.
7. THE HEIGHT OF THE SILT FENCE FROM THE GROUND SURFACE SHALL BE MINIMUM OF 24 INCHES AND SHALL NOT EXCEED 36 INCHES; HIGHER FENCES MAY INPOUND VOLUMES OF WATER SUFFICIENT TO CAUSE FAILURE OF THE STRUCTURE.

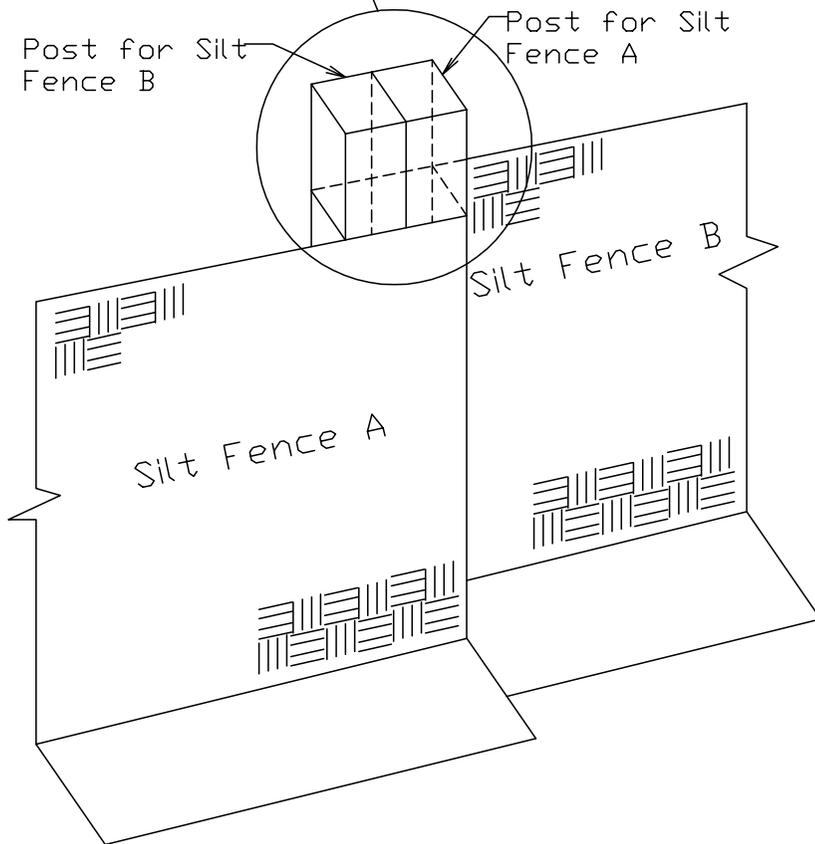
### MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT SILT FENCES IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS OF NO RAINFALL. DAMAGED, COLLAPSED, UNENTRENCHED OR INEFFECTIVE SILT FENCES SHALL BE PROMPTLY REPAIRED OR REPLACED.
2. SEDIMENT SHALL BE REMOVED FROM BEHIND SILT FENCE WHEN IT ACCUMULATES TO HALF THE EXPOSED GEOTEXTILE HEIGHT.
3. SILT FENCES SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED AS APPROVED BY THE CITY.

# Top View of Silt Fence Posts Detail



Refer to "Top View of Silt Fence Posts Detail"



# Straw Bale Barriers

## What it is

A straw bale barrier is a temporary sediment barrier consisting of a row of entrenched and anchored straw bales used to retain sediment from runoff in small drainage areas of disturbed soil.

## When and Where to use it

- At the base of a slope.
- On the down gradient perimeters of a construction site.
- On a contour to control overland sheet flow.
- As a form of check dam (see check dam factsheet).
- As a form of inlet protection (see inlet protection factsheet).



Figure SBB-1 depicts six cases where the use of Straw Bale Barriers is appropriate.

## When and Where NOT to use it

- In areas of concentrated flows such as in ditches, swales, or channels that drain areas greater than 1.0 acre (unless used as a form of check dam).
- At the top of a slope or at high points which do not receive any drainage flows.



This straw bale barrier was not installed properly because runoff is able to flow around the barrier.

## Construction Detail and Maintenance Requirements

Figure SBB-2 provides a construction detail and maintenance requirements for a straw bale barrier.

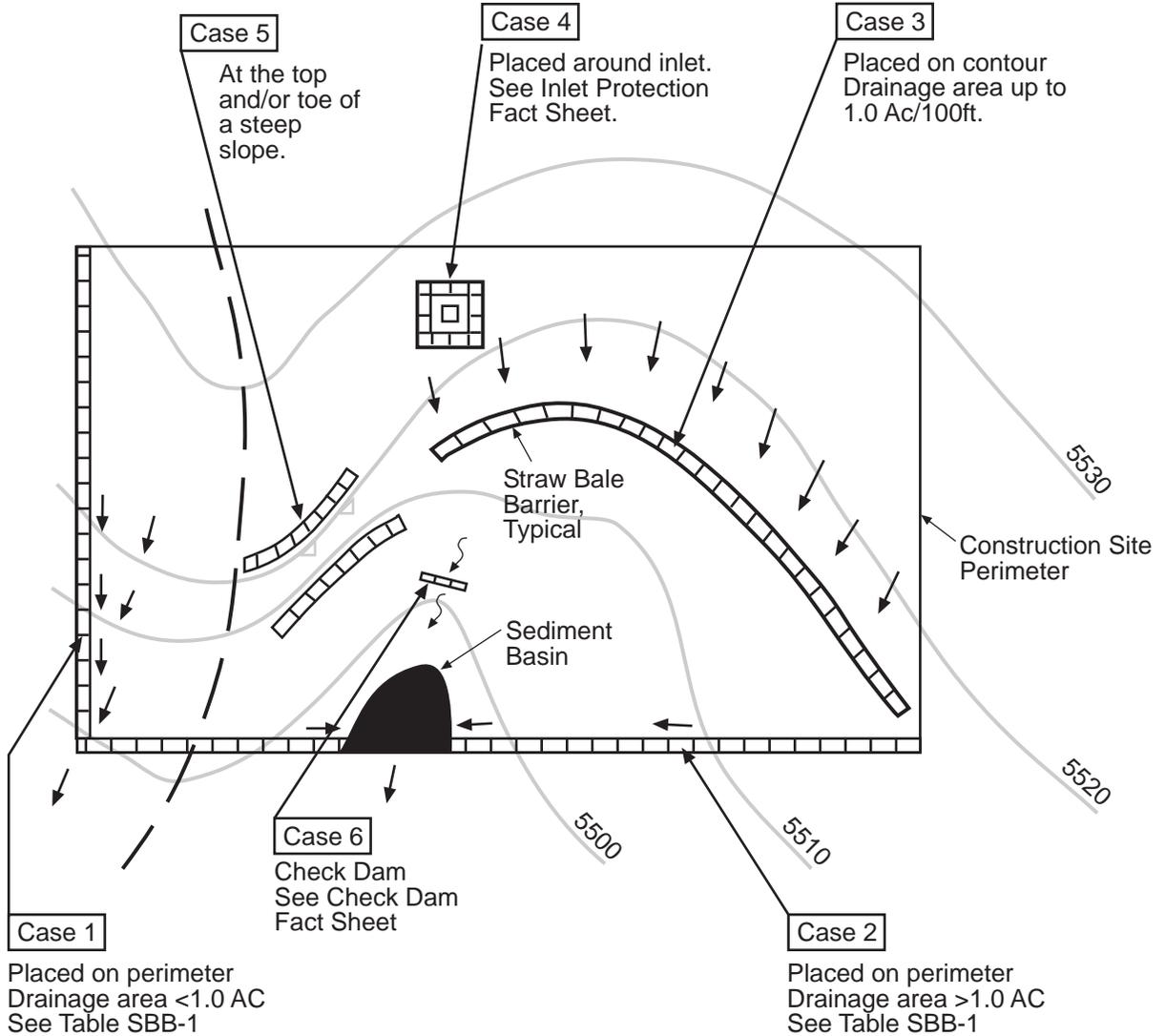


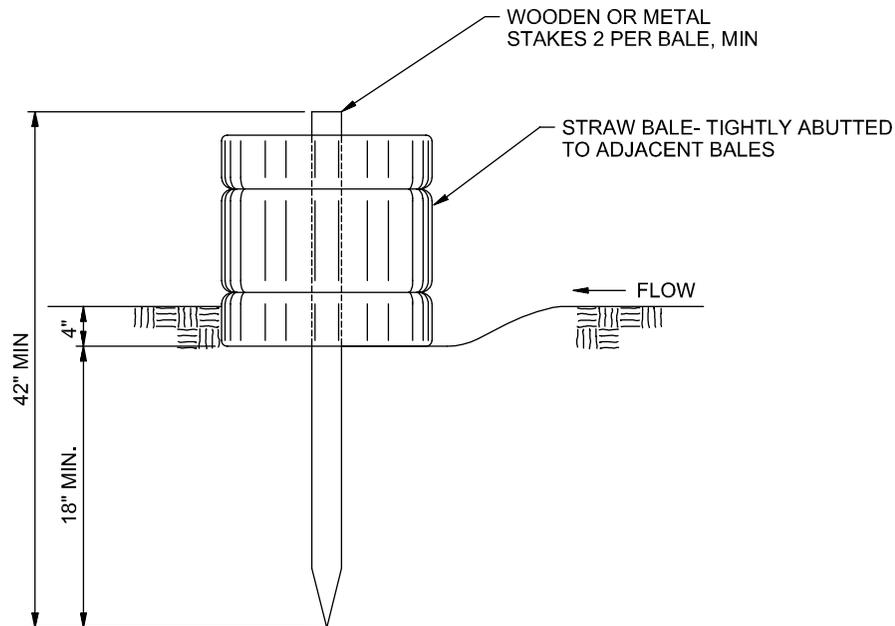
Table SBB-1

Straw Bale Barrier Used as Perimeter Control	Case 1 DA < 1.0 AC	Case 2 DA > 1.0 AC
Continuous Grade	OK <sup>(1)</sup>	OK <sup>(1)</sup>
Area of Concentrated Flow	OK <sup>(2)</sup>	NO <sup>(3)</sup>

(1) Temporary Swale or Silt Fence may be used as alternative to a Straw Bale Barrier.

(2) Straw Bale Check Dam may be used at low points.

(3) Sediment Basin is required for concentrated flow from drainage areas > 1.0 AC.



## STRAW BALE BARRIER

NTS

### STRAW BALE BARRIER NOTES

#### INSTALLATION REQUIREMENTS

1. STRAW BALE BARRIERS SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.
2. BALES SHALL CONSIST OF APPROXIMATELY 5 CUBIC FEET OF CERTIFIED WEED FREE HAY OR STRAW AND WEIGH NOT LESS THAN 35 POUNDS.
3. BALES ARE TO BE PLACED IN A SINGLE ROW WITH THE END OF THE BALES TIGHTLY ABUTTING ONE ANOTHER.
4. EACH BALE IS TO BE SECURELY ANCHORED WITH AT LEAST TWO STAKES AND THE FIRST STAKE IS TO BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE TO FORCE THE BALES TOGETHER.
5. STAKES ARE TO BE A MINIMUM OF 42 INCHES LONG. METAL STAKES SHALL BE STANDARD "T" OR "U" TYPE WITH MINIMUM WEIGHT OF 1.33 POUNDS PER LINEAR FOOT. WOOD STAKES SHALL HAVE A MINIMUM DIAMETER OR CROSS SECTION DIMENSION OF 2 INCHES.
6. BALES ARE TO BE BOUND WITH EITHER WIRE OR STRING AND ORIENTED SUCH THAT THE BINDINGS ARE AROUND THE SIDES AND NOT ALONG THE TOPS AND BOTTOMS OF THE BALE.
7. GAPS BETWEEN BALES ARE TO BE CHINKED (FILLED BY WEDGING) WITH STRAW OR THE SAME MATERIAL OF THE BALE.
8. END BALES ARE TO EXTEND UPSLOPE SO THE TRAPPED RUNOFF CANNOT FLOW AROUND THE ENDS OF THE BARRIER.

#### MAINTENANCE REQUIREMENTS

1. CONTRACTOR SHALL INSPECT STRAW BALE BARRIERS IMMEDIATELY AFTER EACH RAINFALL, AT LEAST DAILY DURING PROLONGED RAINFALL, AND WEEKLY DURING PERIODS NO RAINFALL.
2. DAMAGED OR INEFFECTIVE BARRIERS 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 BALE BARRIERS WHEN IT ACCUMULATES TO APPROXIMATELY 1/2 THE HEIGHT OF THE BARRIER.
4. STRAW BALE BARRIERS SHALL BE REMOVED WHEN ADEQUATE VEGETATIVE COVER IS ATTAINED AS APPROVED BY THE CITY.

City of Colorado Springs  
Stormwater Quality

Figure SBB-2  
Straw Bale Barrier  
Construction Detail and Maintenance  
Requirements

# Vehicle Tracking

## What it is

Vehicle tracking refers to the stabilization of construction entrances, roads, parking areas, and staging areas to prevent the tracking of sediment from the construction site.



## When and Where to use it

- All points where vehicles exit the construction site onto a public road.
- Construction entrance/exit should be located at permanent access locations if at all possible.
- Construction roads and parking areas.
- Loading and unloading areas.
- Storage and staging areas.
- Where trailers are parked.
- Any construction area that receives high vehicular traffic.

## When and Where NOT to use it

- The vehicle tracking area should not be located in areas that are wet or where soils erode easily.



This picture shows an unstabilized entrance where dirt is being tracked onto a public road.

## Construction Details and Maintenance Requirements

Figure VT-1 and VT-2 provide construction details and maintenance requirements for vehicle tracking.

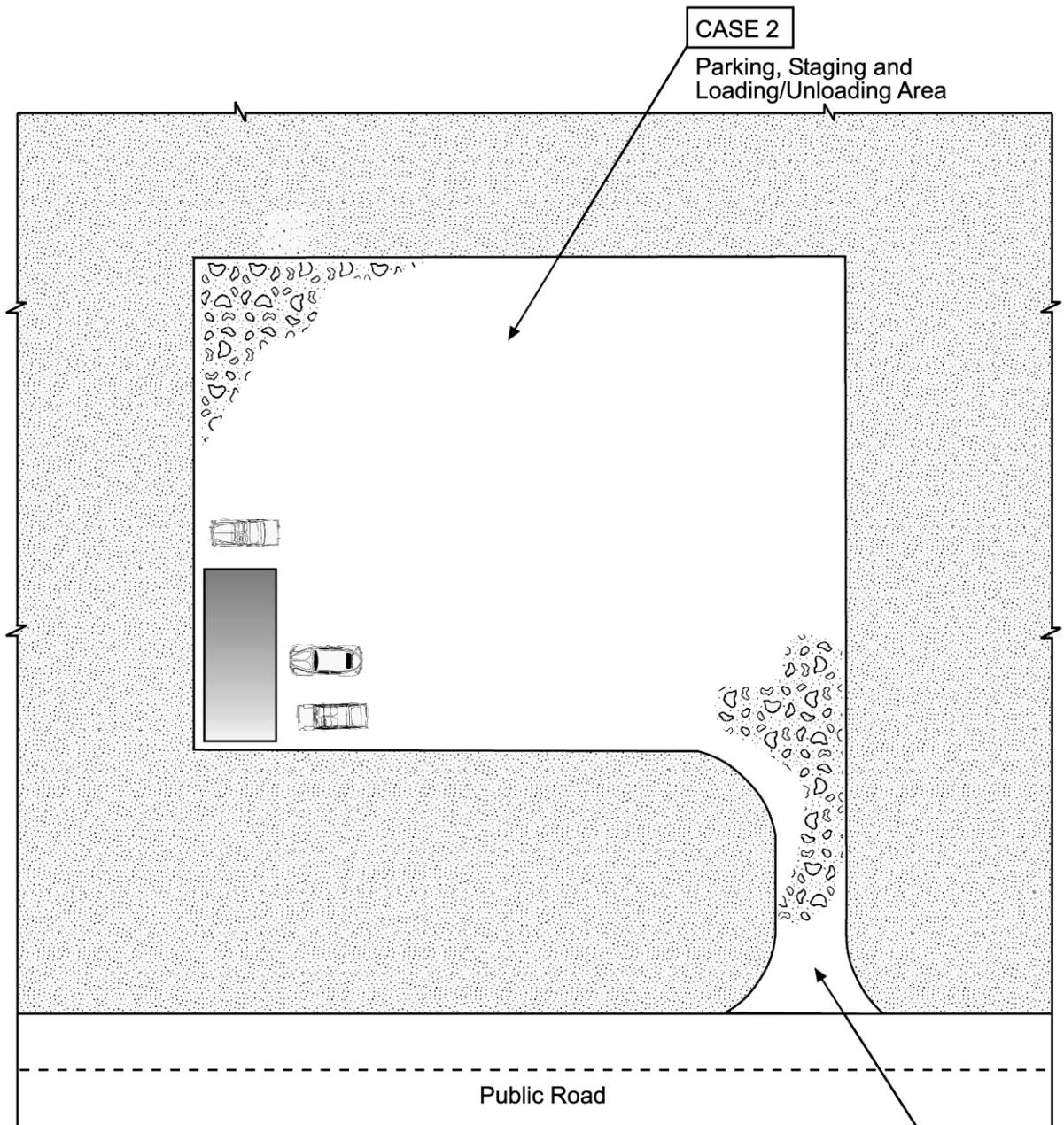
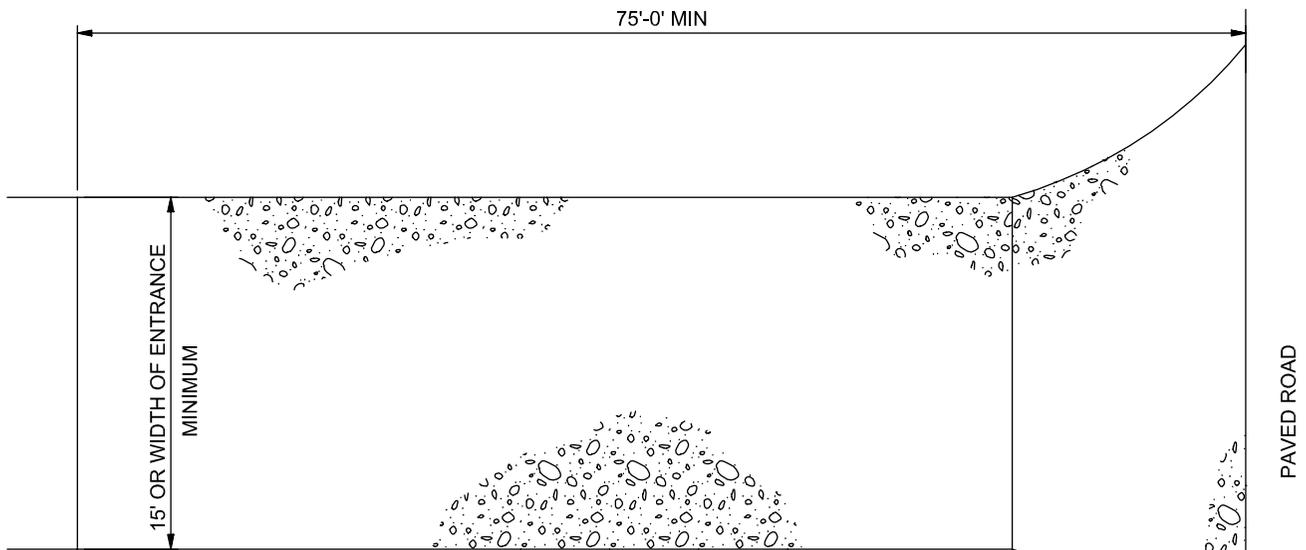


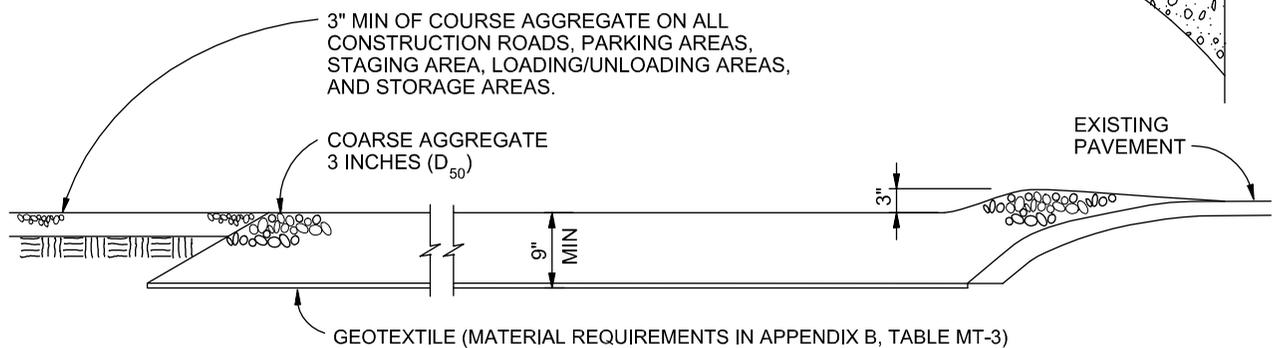
Table VT-1

	Case 1	Case 2
Gravel Thickness	9"	3"
Filter Fabric	YES	NO

CASE 1  
Construction  
Entrance



**PLAN**



**SECTION**

## VEHICLE TRACKING

NTS

### VEHICLE TRACKING NOTES

#### INSTALLATION REQUIREMENTS

1. ALL ENTRANCES TO THE CONSTRUCTION SITE ARE TO BE STABILIZED PRIOR TO CONSTRUCTION BEGINNING.
2. CONSTRUCTION ENTRANCES ARE TO BE BUILT WITH AN APRON TO ALLOW FOR TURNING TRAFFIC, BUT SHOULD NOT BE BUILT OVER EXISTING PAVEMENT EXCEPT FOR A SLIGHT OVERLAP.
3. AREAS TO BE STABILIZED ARE TO BE PROPERLY GRADED AND COMPACTED PRIOR TO LAYING DOWN GEOTEXTILE AND STONE.
4. CONSTRUCTION ROADS, PARKING AREAS, LOADING/UNLOADING ZONES, STORAGE AREAS, AND STAGING AREAS ARE TO BE STABILIZED.
5. CONSTRUCTION ROADS ARE TO BE BUILT TO CONFORM TO SITE GRADES, BUT SHOULD NOT HAVE SIDE SLOPES OR ROAD GRADES THAT ARE EXCESSIVELY STEEP.

#### MAINTENANCE REQUIREMENTS

1. REGULAR INSPECTIONS ARE TO BE MADE OF ALL STABILIZED AREAS, ESPECIALLY AFTER STORM EVENTS.
2. STONES ARE TO BE REAPPLIED PERIODICALLY AND WHEN REPAIR IS NECESSARY.
3. SEDIMENT TRACKED ONTO PAVED ROADS IS TO BE REMOVED DAILY BY SHOVELING OR SWEEPING. SEDIMENT IS NOT TO BE WASHED DOWN STORM SEWER DRAINS.
4. STORM SEWER INLET PROTECTION IS TO BE IN PLACE, INSPECTED, AND CLEANED IF NECESSARY.
5. OTHER ASSOCIATED SEDIMENT CONTROL MEASURES ARE TO BE INSPECTED TO ENSURE GOOD WORKING CONDITION.

City of Colorado Springs  
Stormwater Quality

Figure VT-2  
Vehicle Tracking

Application Examples

## **SWMP REVISION PROCEDURE**

Requirements are per section 208.03, *Project Review, Schedule, and Erosion Control Supervisor, Colorado Department of Transportation Standard Specifications for Road And Bridge Construction* .

## **FINAL STABILIZATION AND LONG-TERM STORMWATER QUALITY**

Upon final site stabilization, permanent BMP measures will be in place to control stormwater pollutants. These will include an Extended Detention Basin.

- An extended detention basin (EDB) is a sedimentation basin designed to detain stormwater for many hours after storm runoff ends. This BMP is similar to a detention basin used for flood control, however; the EDB uses a much smaller outlet that extends the emptying time of the more frequently occurring runoff events to facilitate pollutant removal.

See the following technical drawing detail for more information.

## **VEGETATIVE COVER**

As the existing site is sparsely grassed and treed, there is not substantial grass coverage. After final site stabilization, those regraded areas (with the exception of the asphalt storage area) will be revegetated with grass coverage.

## **PERMIT HOLDER INSPECTION PROCEDURES**

Requirements are per section 208.03, *Project Review, Schedule, and Erosion Control Supervisor, Colorado Department of Transportation Standard Specifications for Road And Bridge Construction* .

## **RECORD KEEPING PROCEDURES**

Requirements are per section 208.03, *Project Review, Schedule, and Erosion Control Supervisor, Colorado Department of Transportation Standard Specifications for Road And Bridge Construction* .

