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Grand Camp Commercial

STORMWATER MANAGEMENT PLAN (SWMP)

GRAND COUNTY, COLORADO

June 2009

PREPARED FOR:

(Owner/ Developer)
Mr. Morris King
PO Box 374
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PREPARED BY:

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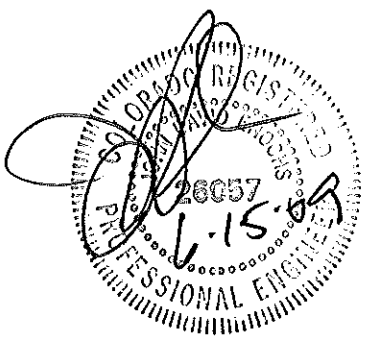
John Enochs, P.E.



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GENERAL INFORMATION AND SITE DESCRIPTION

This report represents a Stormwater Management Plan for the Grand Camp Commercial project part of Tract A, Block 4, Shadow Park West Subdivision. It was prepared meeting the regulatory requirements and guidelines set forth by the State of Colorado Department of Health, Water Quality Control Division as well as appropriate provisions of the Colorado Water Control Act and the Federal Water Pollution Control Act.

The proposed project is located in the Northwest Quarter of Section 6, Township 3 North, Range 75 West of the 6th P.M., Town of Grand Lake, Grand County, Colorado (see the Vicinity Map located in the Appendix). The site is located adjacent to the west right-of-way of US Highway 34 just south of the entrance to the Town of Grand Lake.

Description

The proposed project is to construct approximately 15,000 sf of commercial/ retail space with associated parking and a stormwater quality and detention pond. The westerly roadside ditch of US Highway 34 along the property frontage and the easterly right-of-way of Mary Drive will be re-graded to provide access into the proposed site. In addition, a culvert will be constructed beneath the US Highway 34 access and the westerly roadside ditch of US Highway 34 will be established to an existing storm sewer inlet in the public right-of-way.

The proposed site is approximately 1.13 acres in size and the entire site is expected to be disturbed. Off-site disturbance includes the westerly right-of-way of US Highway 34 (0.55 acres) and the easterly right-of –way of Mary Drive (0.06 acres). This results in a total disturbed area of 1.74 acres as part of this project.

Adjacent Areas

Adjacent areas which may be affected by this land disturbance include US Highway 34 east of this site and Mary Drive as they provide access to the site for construction activities in addition to receiving stormwater runoff from the site.

There are no irrigation facilities on or adjacent to this site which will be disturbed during construction activities.

Soils Information

On site soils are predominantly Gateway Loam, 15% to 50% as determined by U.S. Department of Agriculture Soil Conservation Service. These soils exhibit properties of slow to moderate permeability and have moderate to high wind and erosion potential, characteristic of Hydrologic Type C soils. Refer to the SCS map located in the Appendix of this report.

The runoff coefficient for the existing site in the major 100-year storm event is approximately 0.50 as undeveloped ground. Upon completion of the proposed improvements, the anticipated 100-year runoff coefficient is anticipated to be 0.69 and 72% impervious.

Existing Site Conditions/ Receiving Waters

The existing site is currently undeveloped. Fill material has been brought in to raise the existing site to its current elevation and is covered with fill material, native weeds, grasses, and Lodge Pole Pine trees. The site slopes from northwest to southeast varying in slope from 2% - 25%.

Runoff from this site drains southeast to the existing roadside ditch of US Highway 34 and is conveyed beneath the highway by means of an existing 36" culvert. Flows from the culvert are routed overland and across Marina Drive to Shadow Mountain Lake. According to a representative of Northern Colorado Water Conservancy District, Shadow Mountain Reservoir has been modeled to handle the 100-year storm event.

Shadow Mountain Reservoir is the ultimate receiving waters for the proposed project site. The site is not located within the 100-year flood plain as indicated by FEMA FIRM Map No. 08049C0527C dated January 2, 2008. Refer to the FEMA FIRM Map located in the Appendix of this report.

There are not any existing wetlands located on this site. Additionally, there are not any springs or non-stormwater related components of off-site discharge located on this site.

Areas and Volumes

Based on existing site topography coupled with the characteristics of the proposed project, the earthwork for the proposed site is expected to be in a fill condition. Proposed cut is estimated at 1,266 cubic yards with 17,063 cubic yards of fill utilizing a 10% compaction factor. Based on

site conditions during construction, there will be approximately 15,797 cubic yards of import necessary to balance the site earthwork.

Potential Pollution Sources

Potential pollution sources anticipated from the site may be those associated with fueling activities during construction, chemical and fertilizers. Please refer to the Materials Handling section of this report regarding minimization of the impacts of these potential pollutants.

No dedicated concrete or asphalt batch plants shall exist on this site.

Project Phasing

The anticipated start of construction will begin in June 2009 with a completion date in August 2010. Construction of activities will occur overlapping but will generally follow the sequence below.

Project mobilization – June 2009
Installation of initial erosion control methods – June 2009
Overlot grading activities – June-July 2009
Installation of Temporary Erosion Control Measures – July 2009
Wet Utility construction (Sanitary Sewer, Storm Sewer and Water) – August – September 2009
Building Construction – July 2009 – August 2010
Dry utility construction – September 2009
Detailed Grading/ curb and gutter – May 2010
Asphalt Placement – June 2010
Permanent Landscaping – June 2010
Removal of erosion control methods – August 2010

EROSION AND SEDIMENT CONTROL PLAN

Narrative

The entire site shall be paved or landscaped to minimize wind and water erosion. The methods used to control erosion and sediment during development of the subject property will comply with local Regulations and the non-structural and structural Best Management Practices (BMP's)

described in Volume 3 of the Urban Storm Drainage Criteria Manual. The predominant pollution expected at the site during construction and under permanent conditions is sediment in stormwater runoff.

For a site of this size and level of disturbance, all proposed structural BMP erosion and sediment control measures will be implemented prior to construction and maintained throughout construction until final stabilization is achieved. The only exception will be straw bale barriers and inlet protection which will be installed upon completion of grading and storm sewer construction activities respectively.

Certain non-structural BMP's including watering to control wind erosion and dust, will occur as need throughout the entire construction process. Surface roughening and seeding and mulching shall occur upon completion of the overlot grading phase of construction.

Proposed erosion control measures and details are shown on the Erosion and Sediment Control plans accompanying this report. The following are descriptions of specific BMP's utilized during construction and additional BMP that may be used if necessary depending on effectiveness of the designated BMP's.

Structural and Non-Structural BMP Descriptions

Construction Fence (CF)

An orange fence used to delineate disturbance boundaries, protect disturbed areas and to prevent public access onto the construction site. Install at commencement of construction. Remove at completion of construction.

Concrete Washout Area (CWA)

A concrete washout area is a shallow excavation with a small perimeter berm used to isolate concrete truck washout operations. The washout area shall be used in conjunction with a vehicle tracing control pad to control tracking of mud. Install prior to concrete work on-site construction. Remove at completion of concrete activities on-site.

Inlet Protection (IP)

A reinforced rock berm placed in front of, but not blocking a curb-opening inlet or around an area inlet to reduce sediment in runoff approaching the inlet. Install upon completion of Storm Sewer

Construction.

Seeding and Mulching (SM)

Drill seeding disturbed areas with grasses and crimping in straw mulch to provide immediate protection against raindrop and wind erosion and as grass cover becomes established, provide long-term stabilization of exposed soils. Install upon completion of land disturbance.

Sediment Control Log or Wattle (SCL) (W)

A sediment control log or wattle consists of rolled straw, compost, coconut or excelsior fiber. The sediment control log is placed in a trench (minimum 2" deep) and staked to the ground to prevent movement. A sediment control log is used to filter sediment as runoff passes through the rolled fibers. Install at commencement of construction. Remove at final stabilization of site.

Silt Fence (SF)

A temporary sediment barrier constructed of woven fabrics stretched across supporting posts. The bottom edge of the fabric is placed in an anchor trench that is backfilled with compacted soils. Silt fence is used to filter sediment as runoff passes through the woven fabric. Install at commencement of construction. Remove at final stabilization of site.

Stabilized Staging Area (SSA)

The stabilized area consists of stripping topsoil and spreading a layer of granular material in the area to be used for trailer, parking, storage, loading and unloading. The stabilized staging area reduces likelihood of vehicles that most frequently enter the site from coming into contact with mud. Install at commencement of construction. Remove at final stabilization of the staging area.

Straw Bale Barrier (STB)

A straw bale barrier consists of straw bales placed adjacent to one another and staked to the ground to prevent movement. A straw bale barrier is used to filter sediment as runoff passes through the straw. Install at commencement of construction at existing culverts and swales to be protected and at the completion of overlot grading activities for proposed swales. Remove at final stabilization of site.

Surface Roughening (SR)

Creating a series of grooves or furrows perpendicular to the slope along the contour in all

disturbed, graded areas to trap rainfall, reduce the formation of rill, and gully formation. Install upon completion of land disturbance prior to seeding/ mulching.

Vehicle Tracking Control (VTC)

Consists of a pad of 3" to 6" rock at all entrance/exit points for a site that is intended to help strip mud from tires prior to vehicles leaving the construction site. Install at commencement of construction. Remove at final stabilization.

OTHER CONTROLS

Materials Handling/ Storage and Waste Management

Materials handled on-site shall be done in such a manner to prevent pollutants from entering runoff or water sources. Exposed storage of building materials shall be completed at a location way from any sources of concentrated flow.

Fuel tanks, if necessary, shall be at a yet to be determined designated area in the project and within a lined fuel storage berm minimum 12-inch high capable of retaining potential spills. It is at this location that fueling of equipment shall occur. It shall be the responsibility of the heavy equipment contractor to designate this fueling area and take appropriate actions to ensure pollution of stormwater does not occur. Fueling areas shall be at least 100 feet from drainage channels and/or storm sewer systems. The heavy equipment contractor shall be responsible for protecting the soil from contamination due to any hydrocarbon and other hazardous spills associated with his contractual obligations.

Chemicals and fertilizers which may be utilized on-site must be stored in clean dry locations or covered outdoors. If these materials are stored outdoors, these pollutant sources shall be located a minimum 100' away from any sources of concentrated flow.

Typical BMP's for material storage and waste management are described as follows.

1. Construct an enclosure, container or dike located around the perimeter of toxic materials or petroleum products storage areas.
2. Store materials or chemicals in a covered area to protect them from rainfall or wind.
3. Locate material storage and construction staging as far away from drainage courses as

possible.

4. Perform wash out of concrete trucks and materials off-site or in designated wash out areas on-site.

Spill Prevention, Control and Countermeasure Plan

A Spill, Prevention, Control and Countermeasure (SPCC) plan shall be prepared for any areas where potential spills can occur. This plan shall be prepared prior to the introduction of potential spill sources to the site and completed per State regulations addressing spill prevention measures, secondary containment and response procedures in the event of a spill.

FINAL STABILIZATION AND LONG-TERM STORMWATER MANAGEMENT

Final Stabilization

Final stabilization shall be achieved by installation of permanent erosion control methods. Permanent erosion control for this project shall include one or more of the following methods.

- Paving
- Landscaping
- Establishing dry land vegetation
- Placing riprap

Vegetative stabilization shall be considered complete when a cover of at least 70% *of* the historic cover exists.

Stormwater management

During construction, stormwater will be diverted to the sediment basin prior to discharge into W. 52nd Avenue ditch throughout the construction process.

Upon final stabilization the proposed site will have some built-in erosion and sediment control by means of a water quality pond located in the proposed detention pond.

INSPECTION AND MAINTENANCE

Inspections of erosion and sediment control measures shall occur after any significant wind, precipitation or snowmelt event that may cause erosion. Inspections must include observation of

the entire construction site perimeter, discharge points, all disturbed areas, areas of material storage, erosion and sediment control measures and any other BMP's that may require maintenance. As a minimum, inspection of all sediment and erosion control facilities shall be conducted at least every 7 days from March 15 through October 31 (i.e. during the rainfall season) and at least twice a month the remaining portion of the year. In either case all facilities should be inspected whenever storm events cause runoff. Mitigation measures shall be inspected for at least the following.

- Accumulation of excess sediment and determination of the effectiveness of each structure is significantly reduced. Removal of accumulated sediment shall occur once a 50% reduction of the design storage capacity becomes evident.
- Damage to structures that need repairing to ensure their effectiveness.
- Addition or elimination of sediment and/or erosion control measures that are designed to control the movement of soil particles in a practical and effective manner.
- Immediate repair and/or replacement of necessary mitigation measures when total failures are found.
- Maintenance of BMP's that are found to no longer function as needed and/ or designed.

Upon completion of site inspection, new BMP's shall be installed in areas where erosion and sediment control is evident and existing BMP's are undersized, inadequate or non-existent. Please note that the SWMP must be modified as necessary based on additions or deletions of erosion and sediment measures based on site inspection.

Results of each inspection shall be recorded on the reporting form located in the Appendix of this report including, at a minimum the information described in the Record Keeping section of this report. Additional information on inspection and maintenance can also be found in the Appendix.

RECORD KEEPING

The project owner shall retain a copy of the approved SWMP and CDPS Stormwater Construction Permit Approval Letter and Certification from CDHPE. Additionally, the owner shall retain a copy of any and all inspection documents completed on-site including those required by the CPDS Stormwater Permit from the date of project initiation to the date of final inspection at the construction site.

In addition to the inspection reporting form in the appendix of the report, the following information must also be included in all inspection reports.

1. Date of Inspection.
2. Incidences of non-compliance.
3. Measures taken to remediate problems.
4. After measures have been taken to correct problems recorded in the report, or in the event a report does not identify incidence(s) of non-compliance, a signed certification indicating that the site is in compliance must be included in the report.
5. Notes on the need for and performance of preventative maintenance and repairs.

OPERATION AND MAINTENANCE ASSURANCE

Opinion of Probable Cost

An estimated cost for erosion and sediment control measures including replacement and maintenance of BMP's has been included in the appendix of this report.

Financial Assurance

Financial assurance will be provided to the governing authority in an amount to install and maintain the temporary and permanent erosion and sediment control measures described in this plan.

CALCULATIONS

There are not any Structural BMP's utilized on site that require sizing calculations.

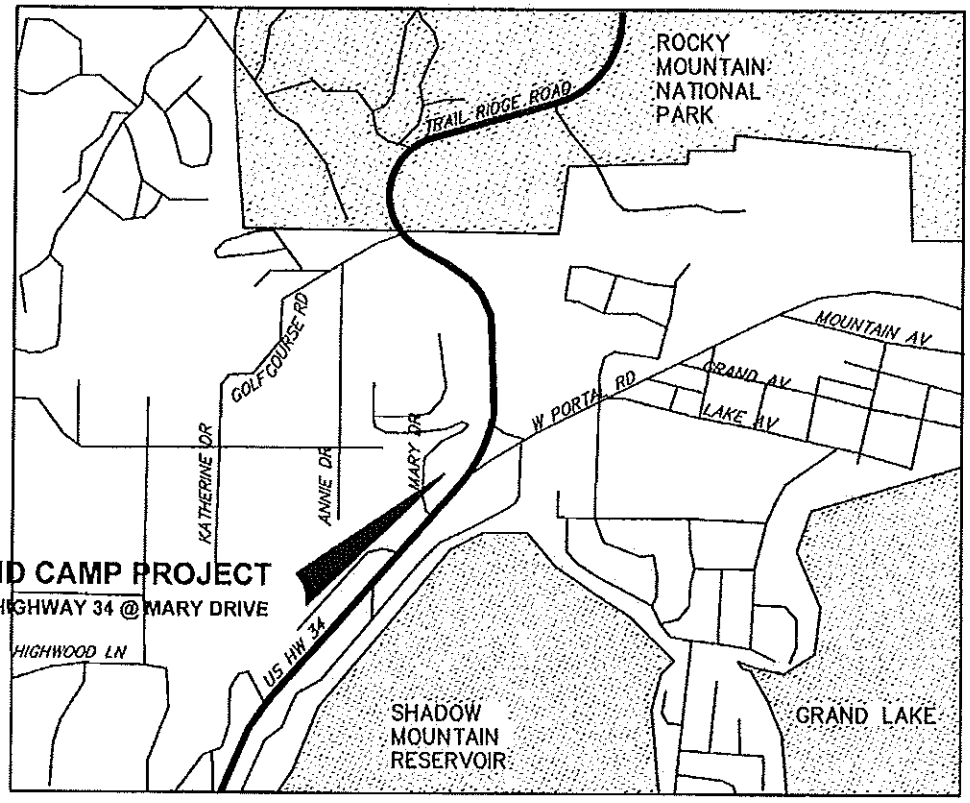
REFERENCES

1. Grand County Storm Drainage and Technical Criteria Manual, Grand County, Colorado, August 1, 2006.

2. Urban Storm Drainage Criteria Manual, Urban Drainage and Flood Control District (latest edition).

3. FEMA FIRM Flood Insurance Rate Map, Map No 08049C0527 C, January 2, 2008.

4. Soil Map – Grand County Area, Colorado, US Department of Agriculture NRCS.



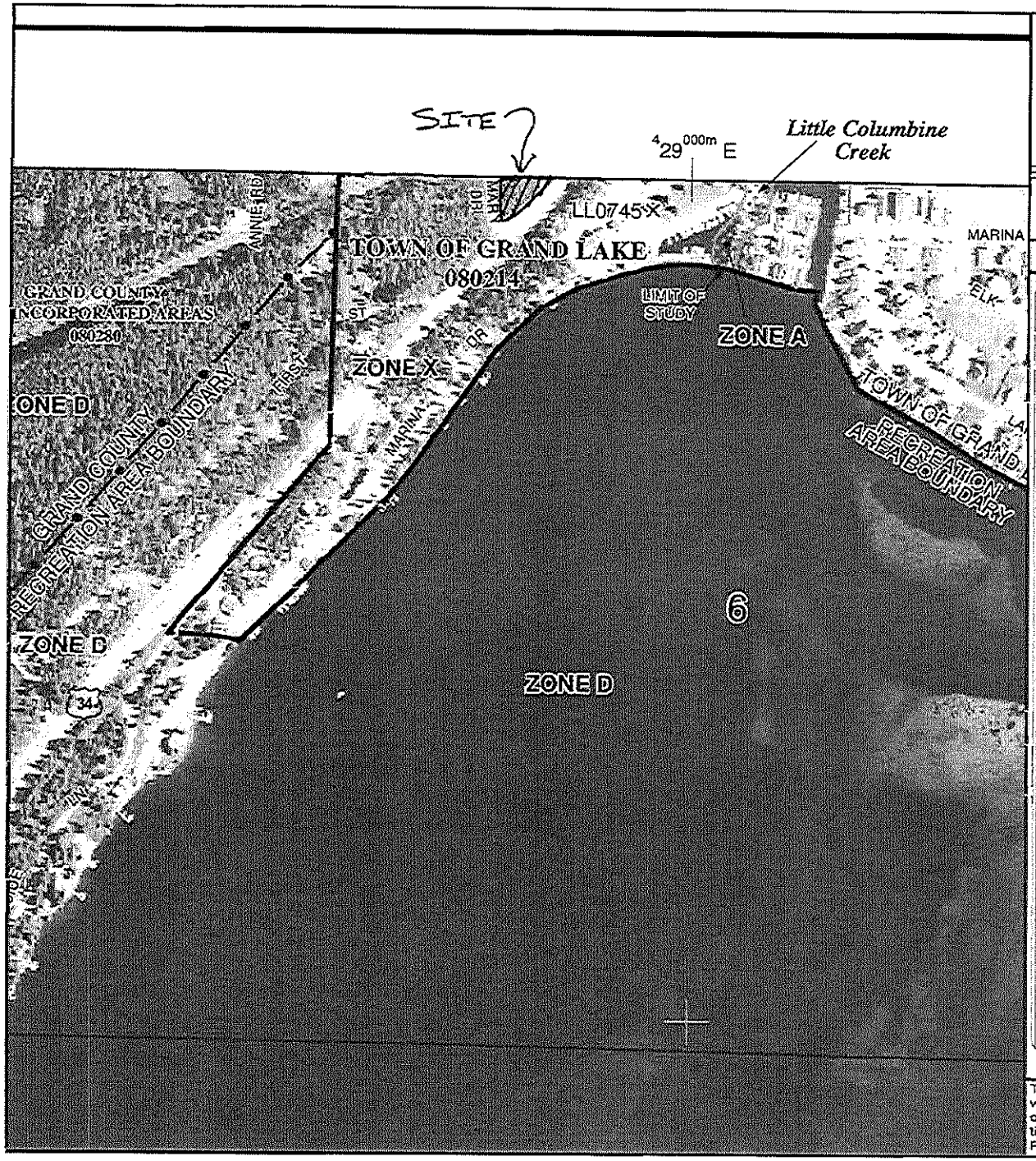
GRAND CAMP PROJECT

U.S. HIGHWAY 34 @ MARY DRIVE

N

VICINITY MAP

NO SCALE



MAP SCALE 1" = 500'

250 0 500 1000 FEET

0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0527C

FIRM

FLOOD INSURANCE RATE MAP

GRAND COUNTY, COLORADO

AND INCORPORATED AREAS

PANEL 527 OF 1200

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

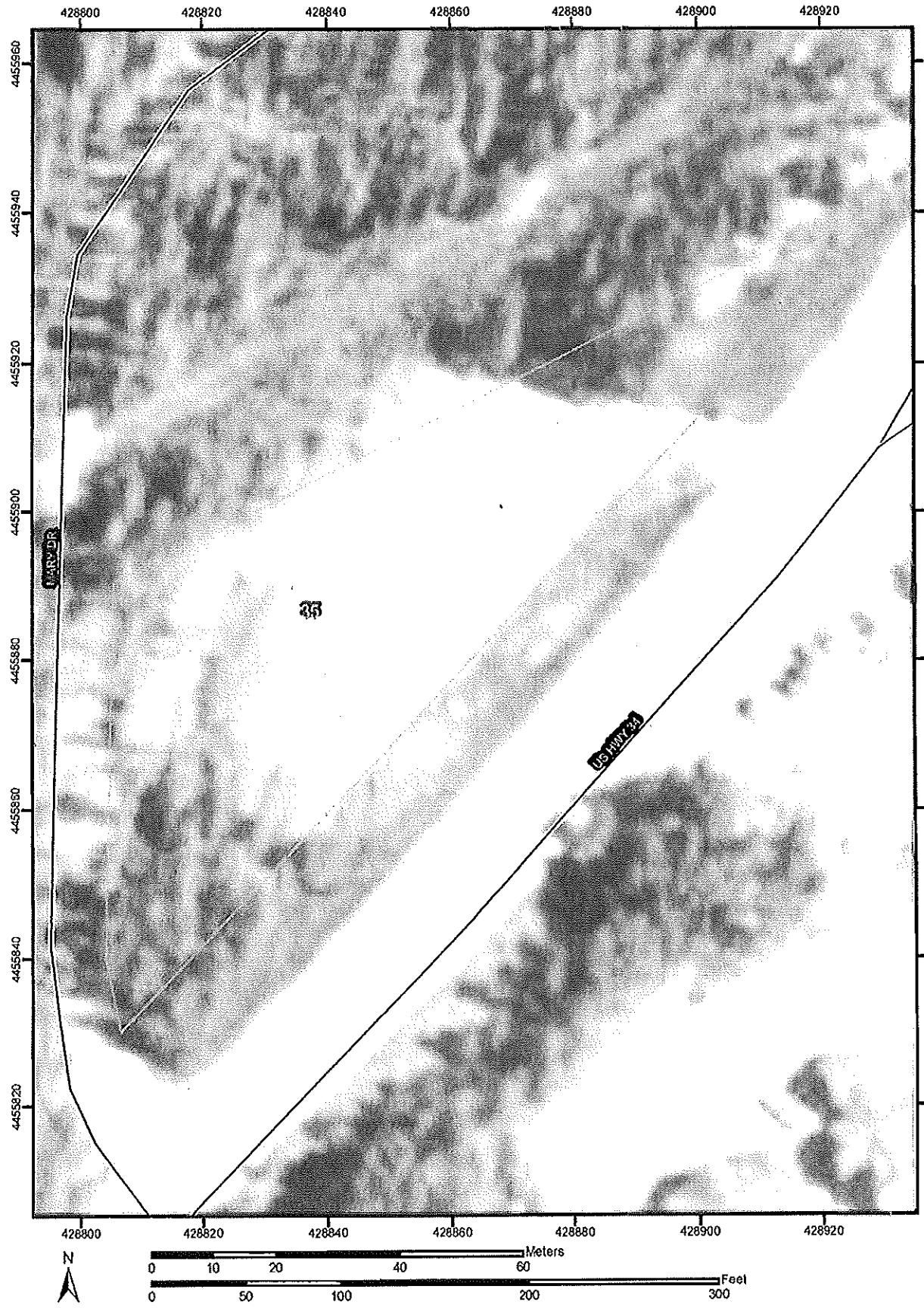
COMMUNITY	NUMBER	PANEL	SUFFIX
GRAND COUNTY	080280	0527	C
GRAND LAKE, TOWN OF	080214	0527	C

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
08049C0527C

EFFECTIVE DATE
JANUARY 2, 2008

Federal Emergency Management Agency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428880
428900
428920
4455960
4455940
4455920
4455900
4455880
4455860
4455840
4455820
MARY DR
35
US HWY 34
N
Meters
0
10
20
40
60
Feet
0
50
100
200
300

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features

Municipalities
- Cities
- Urban Areas

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails

Roads
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 13N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Grand County Area, Colorado
Survey Area Data: Version 7, Jul 14, 2008

Date(s) aerial images were photographed: 1990

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Grand County Area, Colorado (CO649)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
35	Gateway loam, 15 to 50 percent slopes	1.2	100.0%
Totals for Area of Interest (AOI)		1.2	100.0%

Project: Grand Camp
Location: US Hwy 34/ Mary Drive
Subject: Grading/ Erosion Control Improvements
Client: Morris King

Date: 6/10/2009
Job No.:
Prep. By: JC
Ckd. By: JE

Note: Any opinions of price, probable project costs or construction costs rendered by Diamondback Engineering and Surveying Inc represent its best judgment and are furnished for general guidance. Dimaondback Engineering and Surveying Inc makes no warranty of guarantee, either expressed or implied as to the accuracy of such opinions as compared to bid or actual cost.

Item No.	Item Description	Units	Quantity	Unit Price	Item Cost
	Erosion Control				
1	Concrete Washout Area	EA	1	$ 100.00	$ 100.00
2	Seeding/ Mulching	AC	0.89	$ 2,500.00	$ 2,225.00
3	Silt Fence	LF	1430	$ 2.00	$ 2,860.00
4	Straw Bale Barrier	EA	18	$ 65.00	$ 1,170.00
5	Surface Roughening	AC	0.89	$ 600.00	$ 534.00
6	Vehicle Tracking Control	LS	1	$ 1,000.00	$ 1,000.00
7	Maintenance/ Replacement	LS	1	$ 2,500.00	$ 2,500.00

Remarks:		
	Cost of Items:	$ 10,389.00
	15% Contingencies:	$ 1,558.35
	Subtotal:	$ 11,947.35
	0% Const. Engineering/Observation:	
	Total Cost:	**$ 11,947.35**

PHASE I--BEFORE MAJOR OVERLOT GRADING ACTIVITIES COMMENCE

Site Entrances	Place vehicle traffic controls on the entrance.
West Property Line and Northeast Corner	Install a silt fence barrier.

PHASE II--DURING INITIAL OVERLOT GRADING ACTIVITIES

Disturbed Lands That Contribute Runoff	It is recommended wind erosion control be implemented ASAP on disturbed lands where construction shall not occur by installing silt fence on the west property line. Also maintain a rough soil surface throughout the site with ridges perpendicular to the prevailing wind direction.

PHASE III--IMMEDIATELY AFTER OVERLOT GRADING IS COMPLETED

Disturbed Lands That Contribute Runoff	If construction is to be delayed for more than 30 days, stabilization is to be achieved by both planting perennial grass seed and applying straw/hay mulch or planting a temporary cover crop. After one growing season, perennial grass seed is to be planted amongst any temporary cover crop residue if continued delay in construction occurs.

SEDIMENT AND EROSION CONTROL INSPECTION CRITERIA

During the Non-Rainfall (November 1 Through May 1) Season	Inspect all structures at least once a month.
During the Rainfall (March 15 Through October 31) Season	Inspect all structures whenever rainfall events cause runoff. Or Inspect all structures least every 7 days when runoff does not occur.
Regulatory Requirements	Complete and retain a written record of when inspections occurred.

SEDIMENT AND EROSION CONTROL MAINTENANCE CRITERIA

Silt Fence Barriers or Continuous Berms	Immediately repair any obvious signs of failures (e.g., destruction of fence, crushed barriers, etc.).
Containment Systems Including Barriers	Barriers: Remove material when accumulated sediments are within six inches of the top. All sediment removed is to be placed upstream of a containment system and stabilized against erosion.
Erosion Control Practices	Mulched Areas: If grass has not become established, replace mulch that has been removed.
Inlet Protection Structures	Immediately repair any obvious signs of failure and replace when there is a 50% reduction in the design capacity.
Regulatory Requirements	Include written comments with the inspection reports on any action that was completed.

INSPECTION REPORTING FORM

Project:		By:	Date:
	Overall Condition	Need Repair	Comment
Structural Measures			
Sediment Basin/Trap			
Barriers			
Silt Fence			
Straw Bales			
Other Methods			
Non-Structural Measures			
Seeding and Mulching			
Cover Crop			
Erosion Control Blankets			
Soil Binder			

Are uncontrolled releases of mud or muddy water from the site evident? YES NO If yes, what corrective actions are proposed to be implemented?

Is sedimentation occurring on adjacent offsite streets or properties? YES NO If yes, what corrective actions are proposed to be implemented?

Additional Comments:

I certify this inspection was completed by myself or under my supervision: _____

GRAND CAMP SUBDIVISION

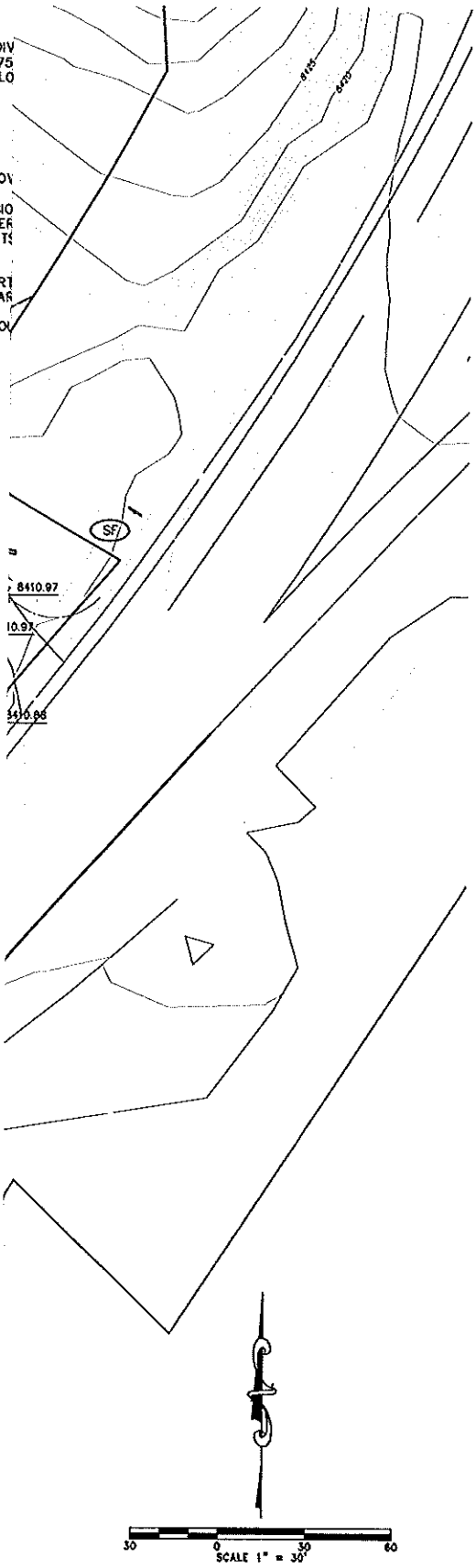
A PART OF TRACT A, BLOCK 4, SHADOW PARK WEST SUBDIV
A PART OF THE EAST HALF, NORTHWEST QUARTER, SECTION 6, T3N, R75
TOWN OF GRAND LAKE, COUNTY OF GRAND, STATE OF COLO

NOTES:

1. SURFACE ROUGHEN ALL SLOPES TO PROVIDE HORIZONTAL GROOV
2. SEED/MULCH ALL DISTURBED/EXPOSED AREAS. PROVIDE EROSIO NETTING ON ALL SLOPES EXCEEDING 10:1 TO PREVENT SLOPE ER ESTABLISHED. CONTRACTOR TO PROVIDE SEED MIX WHICH MEETS REQUIREMENTS.
3. STOCK PILE ANY EXCESS SOIL ON-SITE AS NECESSARY TO NORT ACTIVITIES. SPECIFIC LOCATION TO BE DETERMINED IF NECESSAR
4. ALL STOCK PILE AREAS MUST HAVE SILT FENCE INSTALLED ARO STOCKPILE PRIOR TO GRADING ACTIVITIES.

BMP LEGEND

W / STB	WATTLE STRAW BALES
SF	SILT FENCE
DD	DIVERSION DITCH
VTC	VEHICLE TRACKING CONTROL



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GRAND CAMP
COMMERCIAL PROJECT

GRADING/EROSION CONTROL PLAN

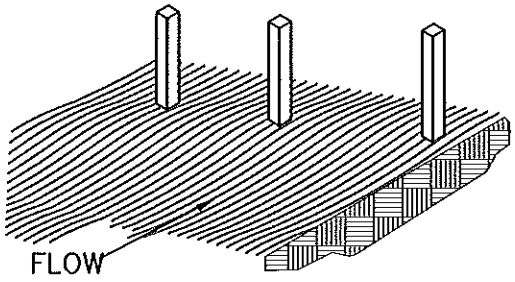
no	description of revisions	date	name

date NOVEMBER 12, 2008
job number
design by M. RAHL
drawn by M. RAHL
checked by J. ENOCHS

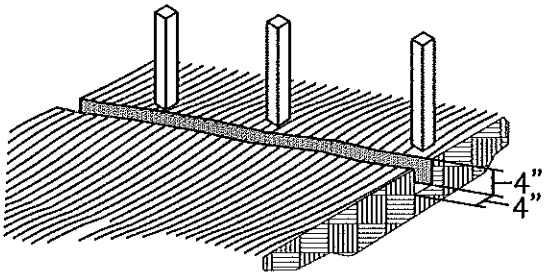
sheet number
C2

cad information
main file
plot date 11-10-08
reference BASE.DWG
PLAN
job no.
sheet no. C2
project
INFO

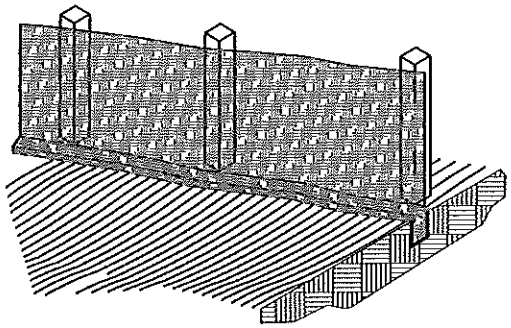
1. SET POSTS.



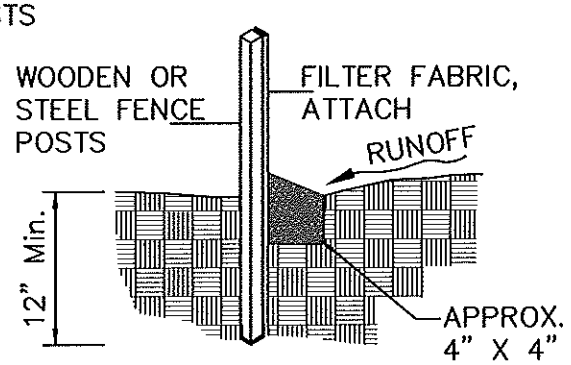
2. EXCAVATE A 4" X 4" TRENCH UPSLOPE ALONG THE LINE OF UPRIGHTS.



3. ATTACH FILTER MATERIAL TO POSTS OR INSERT SEWN POCKETS OVER POSTS AND EXTEND IT INTO THE TRENCH.



4. FINISHED SECTION:



SF

SILT FENCE

PREPARED BY:
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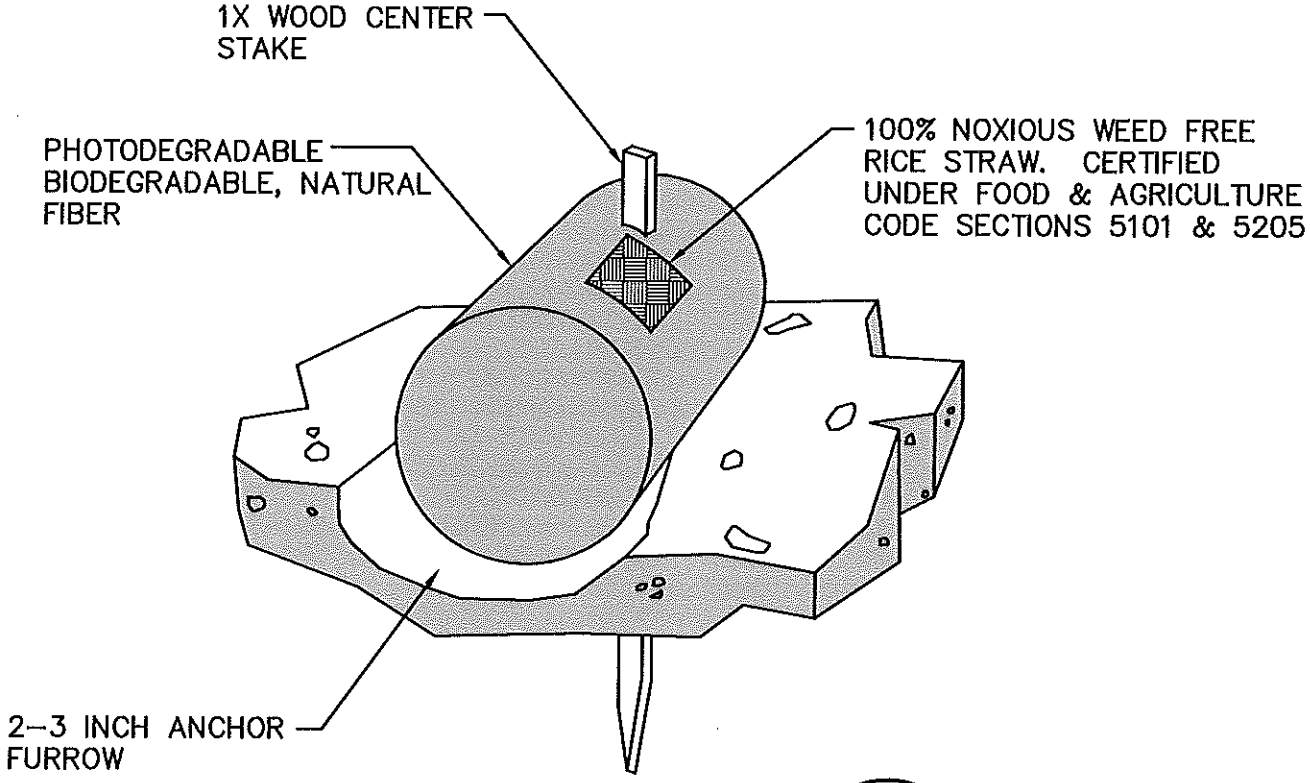
12640 W. CEDAR DR., SUITE C • LAKEWOOD, CO 80228
OFFICE 303-985-4204 FAX 303-985-4214



WATTLE INSTALLATION (W)

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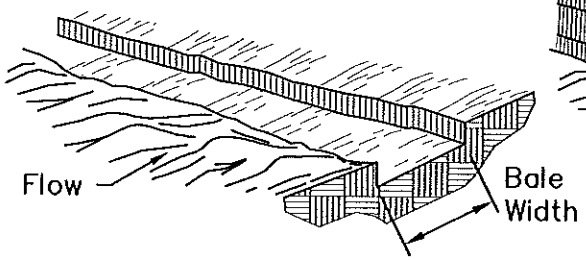
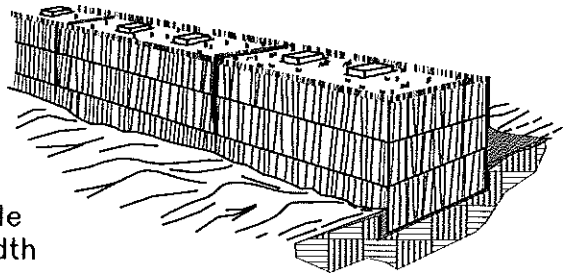
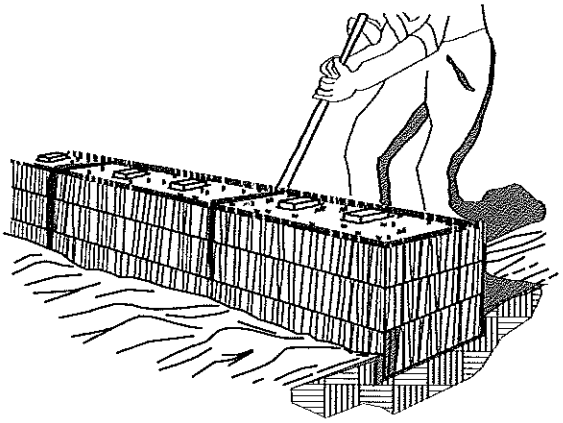
1. Excavate the trench.

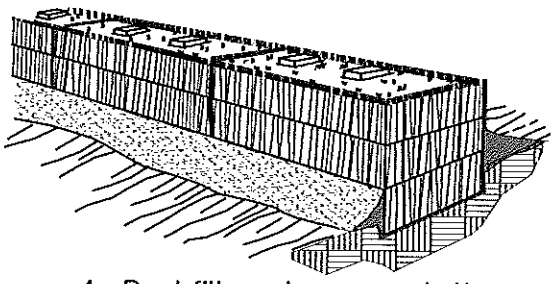


2. Place and stake straw bales.





3. Wedge loose straw between bales.



4. Backfill and compact the excavated soil.

STB

STRAW BALE BARRIER INSTALLATION

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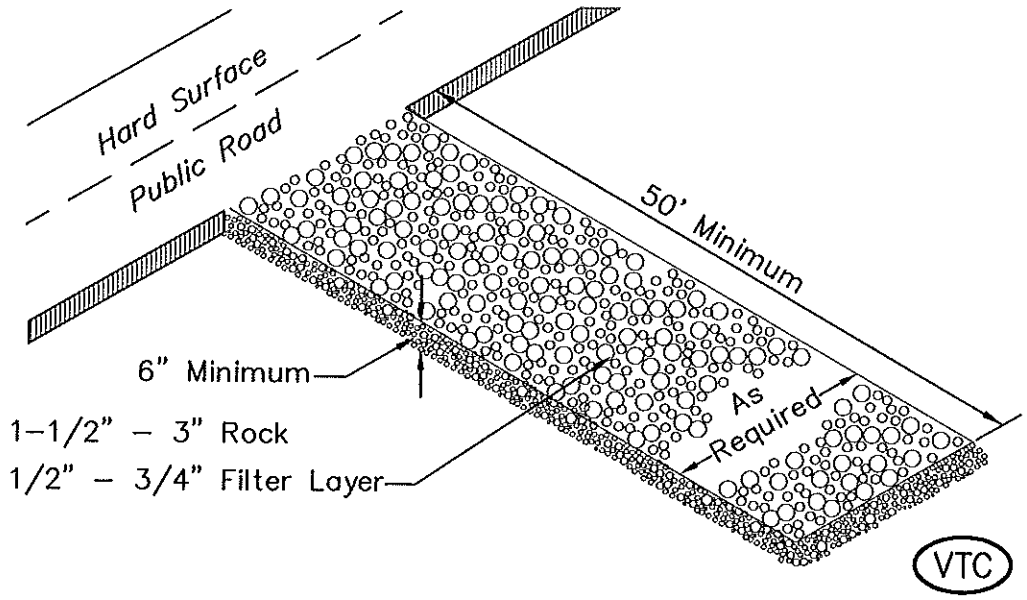

VEHICLE TRACKING CONTROL

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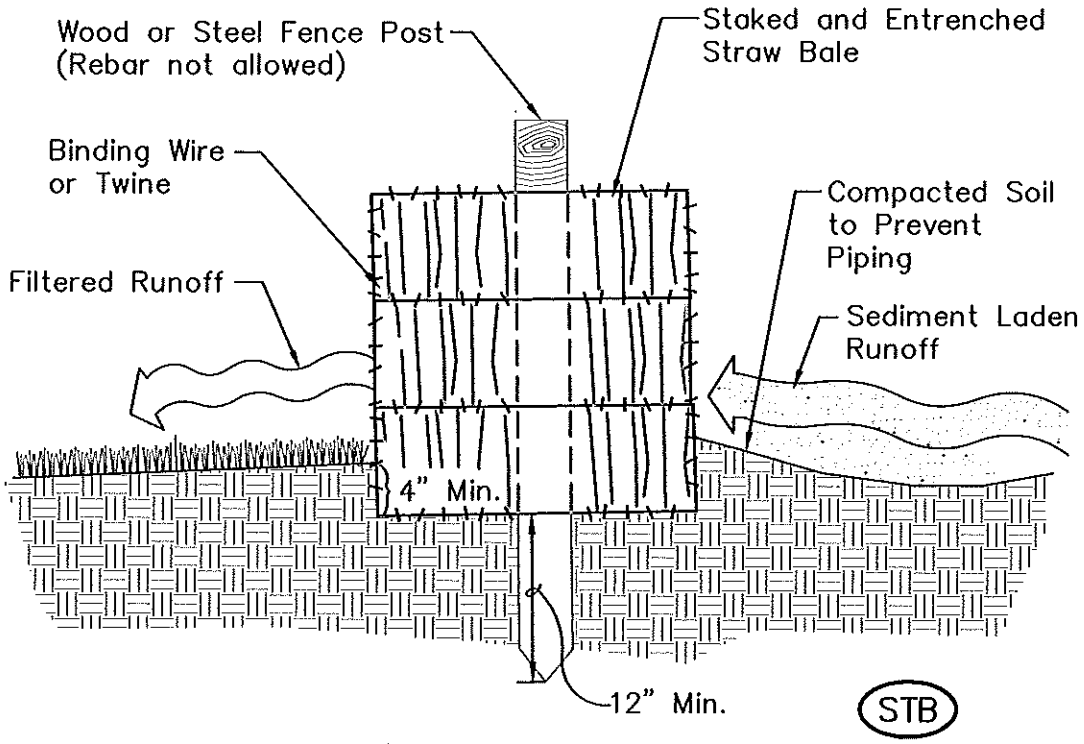

STRAW BALE BARRIER

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