APPENDIX B – CEQA MATRIX

HYDROLOGY AND WATER QUALITY

a. Would the project violate any water standard or waste discharge requirement?	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
	☐	☐	☐	☒

b. Would the project substantially delete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the groundwater table level, ultimately affecting the production rate of existing nearby wells?	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
	☐	☐	☐	☒

c. Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on or offsite?	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
	☐	☐	☒	☐

d. Would the project substantially alter the existing drainage pattern of the area, including through the alteration of the course of a stream or river or substantially increase the rate of runoff in a manner that would result in flooding on- or-offsite?	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
	☐	☐	☐	☒

e. Would the project create, contribute or alter hydrologic characteristics of the area producing runoff that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
	☐	☐	☐	☒

f. Would the project otherwise substantially degrade water quality?	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
	☐	☐	☒	☐

g. Would the project place structures within a 100-year flood hazard area, as mapped on a Federal Flood Hazard Boundary of Flood Insurance Rate Map or flood hazard delineation?	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
	☐	☐	☐	☒

h. Would the project place structures that would impede or redirect flood flows within a 100-year flood hazard area?	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
	☐	☐	☐	☒

i. Would the project expose people or structures to a significant risk of loss, injury, or death involving flooding as a result of the failure of a levee or dam?	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
	☐	☐	☐	☒

j. Would the project be susceptible to inundation by a seiche, tsunami or mud flow?	Potentially Significant Impact	Less than Significant With Mitigation Incorporation	Less than Significant Impact	No Impact
	☐	☐	☐	☒

APPENDIX C – RISK LEVEL 2 CALCULATION

Water Boards Storm Water Multiple Application & Report Tracking System 2

Help Logout

You are logged-in as: **Barbara Ashba - Ashba Engineers Limited** .
If this account does not belong to you, please log out.

Navigate To:

NOTICE OF INTENT - Risk

The Notice of Intent (NOI) is organized into different sections. Please complete all applicable sections before submitting the form. If you want to complete the NOI at a later time, please click on "Save & Exit".

WDID: **Owner:** [redacted] **Status of document:** Not Submitted **Processed Date:**

[redacted] **Certified Date:** **NOT Effective Date:**

Business Type: Construction **Site:** Hermosa Beach
555 Sixth St Hermosa Beach CA 90254

Owner Info Developer Info Site Info Addtnl Site Info Risk Post Construction Billing Info Attachments Certification Print

Status History

SEDIMENT RISK FACTOR WORKSHEET
Instructions: Enter R,K and LS factor values.System will calculate watershed erosion estimates and site sediment risk factor
A. Sediment Risk

A) R Factor Value:(What's this?) EPA RULE ATTACHED	30 *Instructions to Calculate the R -factor
B) K Factor Value (weighted average, by area, for all site soils)(What's this?) ***If not using the SWRCB map(Populate K Factor) upload your analysis on the Attachment Tab prior to submitting to the SWRCB.	0.2 * Populate K Factor
C) LS Factor (weighted average, by area, for all slopes)(What's this?)***If not using the SWRCB map(Populate LS Factor) upload your analysis on the Attachment Tab prior to submitting to the SWRCB.	1.4 * Populate LS Factor
Watershed Erosion Estimate (=R*K*LS) in tons/acre	8.4
Site Sediment Risk Factor Low Sediment Risk: < 15 tons/acre Medium Sediment Risk: >/= 15 and <75 tons/acre High Sediment Risk: >/= 75 tons/acre	Low

RECEIVING WATER (RW) RISK FACTOR WORKSHEET
A. Watershed Characteristics

A.1.(a) Does the disturbed area discharge directly or indirectly to a 303(d) listed waterbody impaired by sediment? OR A.1.(b) Is the disturbed area located within a sub-watershed draining to a 303(d) listed waterbody impaired by sediment? OR A.2. Is the disturbed area located within a planning watershed draining to a waterbody with designated beneficial uses of COLD, SPAWN AND MIGRATORY?	Populate Receiving Water Risk Yes * Yes = High, No = Low Statewide Map of High Receiving Water Risk Watersheds	High

C. Combined Risk Level Matrix

		Sediment Risk: Low	Medium	High
Receiving Water Risk	Low	Level1		Level2
	High		Level2	Level3

Project Sediment Risk: Low
Project Receiving Water Risk: High
Project Combined Risk: Level2

Risk Level 2

Save & Exit | Save & Continue

Fields marked with * are mandatory fields.

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Water Boards Storm Water Multiple Application & Report Tracking System 2

Help Logout

You are logged-in as: **Barbara Ashba - Ashba Engineers Limited** .
If this account does not belong to you, please log out.

Navigate To:

NOTICE OF INTENT - Site Information

The Notice of Intent (NOI) is organized into different sections. Please complete all applicable sections before submitting the form. If you want to complete the NOI at a later time, please click on "Save & Exit".

WDID: **Owner:** [redacted] **Status of document:** Not Submitted **Processed Date:**

[redacted] **Certified Date:** **NOT Effective Date:**

Business Type: Construction **Site:** Hermosa Beach
555 Sixth St Hermosa Beach CA 90254

Owner Info Developer Info Site Info Addtnl Site Info Risk Post Construction Billing Info Attachments Certification Print

Status History

Site Information | Same as Owner Info | Same As Developer Info | Clear Info | If Different, enter below

Site Name:	Hermosa Beach *	**Contact First Name:**	Carl *
Street Address:	555 Sixth St *	**Contact Last Name:**	Hasse *
Address Line 2:		**Title:**	
Latitude:	33.844534 * **Longitude:** -118.39453 * ? (Decimal degrees only, minimum 5 significant digits! Ex: 99.99999)	**Phone:**	626-669-6226 * **Ext:** (999-999-9999)
City:	Hermosa Beach - Los Angeles - Region 4 *	**Emergency Phone:**	**Ext:** (999-999-9999)
County:	Los Angeles *	**E-mail:**	chasse@prou.com * (abc@xyz.com)
Regional Board:	Region 4 - Los Angeles *		
State/Zip	CA 90254 *	**Total Site Size:**	1.3 * Acres Sqft

Additional Information(Construction Specific)

Total area to be disturbed:	1.3 Acres *	**Percent of Total disturbed:**	100 %
Imperviousness Before Construction:	98 % *	**Imperviousness After Construction:**	96 % *
Tract Number(s):			
Mile Post Marker:			
Is the construction site part of larger common plan of development?	Yes No *		
Name of plan or development:			
Construction commencement Date:	01/01/2013 * (MM/dd/yyyy)		
Complete grading date:	12/31/2013	**Complete project date:**	12/31/2018 *(MM/dd/yyyy)

Type of Construction

Construction

Residential Commercial Industrial Reconstruction Transportation Utility:

Other: *

Linear Utility Project

Above Ground Below Ground Gas Line Water/Sewer Line Communication Line Cable Line Electrical

Other: *

Type of Construction

Save & Exit | Save & Continue

Fields marked with * are mandatory fields.

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United States
Environmental Protection
Agency

Office of Water
(4203)

EPA 833-F-00-014
Revised March 2012
Fact Sheet 3.1[1]

EPA

Stormwater Phase II Final Rule

Construction Rainfall Erosivity Waiver

Stormwater Phase II Final Rule Fact Sheet Series

Overview

1.0 – Stormwater Phase II Proposed Rule Overview

Small MS4 Program

2.0 – Small MS4 Stormwater Program Overview

2.1 – Who's Covered? Designation and Waivers of Regulated Small MS4s

2.2 – Urbanized Areas: Definition and Description

Minimum Control Measures

2.3 – Public Education and Outreach

2.4 – Public Participation/ Involvement

2.5 – Illicit Discharge Detection and Elimination

2.6 – Construction Site Runoff Control

2.7 – Post-Construction Runoff Control

2.8 – Pollution Prevention/Good Housekeeping

2.9 – Permitting and Reporting: The Process and Requirements

2.10 – Federal and State-Operated MS4s: Program Implementation

Construction Program

3.0 – Construction Program Overview

3.1 – Construction Rainfall Erosivity Waiver

Industrial "No Exposure"

4.0 – Conditional No Exposure Exclusion for Industrial Activity

The 1972 amendments to the Federal Water Pollution Control Act, later referred to as the Clean Water Act (CWA), prohibit the discharge of any pollutant to navigable waters of the United States unless the discharge is authorized by a National Pollutant Discharge Elimination System (NPDES) permit. Because construction site stormwwater runoff can contribute significantly to water quality problems, the Phase I Stormwater Rule imposed a requirement that all construction sites with a planned land disturbance of 5 acres or more obtain an NPDES permit and implement stormwater runoff control plans. Phase II extends the requirements of the stormwater program to sites of between 1 and 5 acres. The Rainfall erosivity waiver allows permitting authorities to waive those sites that do not have adverse water quality impacts.

What is Erosivity?

Erosivity is the term used to describe the potential for soil to wash off disturbed, devegetated earth during storms. The potential for erosion is in part determined by the soil type and geology of the site. For instance, dense, clay-like soils on a glacial plain will erode less readily when it rains than will sandy soils on the side of a hill. Another important factor is the amount and force of precipitation expected during the time the earth will be exposed. While it is impossible to predict the weather several months in advance of construction, for many areas of the country, there are definite optimal periods, such as a dry season when rain tends to fall less frequently and with less force. When feasible, this is the time to disturb the earth, so that the site can be stabilized by the time the seasonal wet weather returns. There are many other important factors to consider in determining erosivity, such as freeze/thaw cycles and snow pack.

How Is Site Erosivity Determined?

The Universal Soil Loss Equation (USLE) was developed by the U.S. Department of Agriculture (USDA) in the 1950s to help farmers conserve their valuable topsoil. The methodology for determining if a site qualifies for the erosivity waiver provided in this guide is based on the *USDA Handbook 703 - Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)*, dated January 1997. (Note that a more updated version of USLE, the Revised USLE, Version 2 (RUSLE2), is available and can be used as an alternative method for determining if a site qualifies for the erosivity waiver. Information about the RUSLE2 computer program is provided later in this fact sheet.)

Using a computer model supported by decades' worth of soil and rainfall data, USDA established estimates of annual erosivity values (R factors) for sites throughout the country. These R factors are used as surrogate measures of the impact that rainfall had on erosion from a particular site. They have been mapped using isoerodent contours, as shown in Figures 2 through 5.

USDA developed the Erosivity Index Table (EI Table, provided here in Table 1), to show how the annual erosivity factor is distributed throughout the year in two-week increments. Table 1 is based on 120 rainfall distribution zones for the continental U.S. Detailed instructions for calculating a project R factor are provided later in this fact sheet.

[1] This revised fact sheet corrects errors identified in calculating the R factor from the 2001 version, and includes updated information about the USLE.

The Stormwater Phase II rule allows permitting authorities to waive NPDES requirements for small construction sites if the value of the rainfall erosivity factor is less than 5 during the period of construction activity (see § 122.26(b)(15)(i)(A)). Note that the permitting authority has the option to not allow waivers for small construction activity.

If the R factor for the period of construction calculates to less than 5, and the permitting authority allows the use of the waiver, the site owner may apply for a waiver under the low rainfall erosivity provision of the applicable EPA or State NPDES regulations. When applying, owners are encouraged to consider other site-specific factors, such as proximity to water resources and the sensitivity of receiving waters to sedimentation impacts. The small construction operator must certify to the permitting authority that the construction activity will take place during a period when the rainfall erosivity factor is less than 5.

The start and end dates used for the construction activity will be the initial date of disturbance and the anticipated date when the site will have achieved final stabilization as defined by the permit, respectively. If the construction continues beyond this period, the operator will need to recalculate the Erosivity Index for the site based on this new ending date (but keeping the old start date) and either resubmit the certification form or apply for NPDES permit coverage.

What Other Factors Can Affect Waiver Availability and Eligibility?

EPA has established the R factor of less than 5 as the criteria for determining waiver eligibility. However, since the intent is to waive only those construction activities that will not adversely impact water quality, State and Tribal permitting authorities have considerable discretion in determining where, when, and how to offer it. They can establish an R factor threshold lower than 5, or they can suspend the waiver within an area where watersheds are known to be heavily impacted by, or sensitive to, sedimentation. They can also suspend the waiver during certain periods of the year. They may opt not to offer the waiver at all. NOTE: This waiver is not available to sites that will disturb more than 5 acres of land (large construction).

What if My Site Is Not Eligible?

If your site is not eligible for a waiver, you must submit a Notice of Intent, or whichever type of application is required, to obtain coverage under the applicable NPDES construction stormwater permit, and comply with its requirements. For information about EPA's Construction General Permit (CGP), see http://www.epa.gov/npdes/stormwater/cgp. State program information is available at http://cfpub.epa.gov/npdes/contacts.cfm?program_id=6&type=STATE.

Examples

1. Construction started and completed in one calendar year.

Find the R factor value of a construction site in Denver, Colorado. Assume the site will be disturbed from March 10 to May 10 of the same year.

The EI distribution zone is 84 (Figure 1). Referring to Table 1, the project period will span from March 1 (from Table 1, the closest date prior to the actual March 10 start date) to May 15 (from Table 1, the closest date after the actual May 10 end date). The difference in values between these two dates is 9.7% (9.9 - 0.2 = 9.7). Since the annual erosion index for this location is about 45 (interpolated from Figure 2), the R factor for the scheduled construction project is 9.7% of 45, or 4.4.

Because 4.4 is less than 5, the operator of this site would be able to seek a waiver under the low rainfall erosivity provision.

2. Construction spanning two calendar years.

Find the R factor value for a construction site in Pittsburgh, Pennsylvania. Assume the site will be disturbed from August 1 to April 15.

The EI distribution zone is 111 (Figure 1). Referring to Table 1, the project period will span from July 29 (from Table 1, the closest date prior to the actual August 1 start date) to April 15. The difference in values between July 29 and December 31 is 35% (100 - 65.0 = 35.0). The difference between January 1 and April 15 is 8%. The total percentage EI for this project is 43% (35 + 8 = 43). Since the annual erosion index for this location is 112 (interpolated from Figure 2), the R factor for the scheduled construction is 43% of 112, or 48.

Since 48 is greater than 5, the operator of this site would not be able to seek a waiver under the low rainfall erosivity provision.

How Do I Compute the R factor for My Project?

1. Estimate the construction start date. This is the day you expect to begin disturbing soils, including grubbing, stockpiling, excavating, and grading activities.
2. Estimate the day you expect to achieve final stabilization, as defined by your permitting authority's regulations or NPDES construction stormwater permit, over all previous disturbed areas. This is your construction end date.
3. Refer to Figure 1 to find your Erosivity Index (EI) Zone based on your geographic location.

4. Refer to Table 1, the Erosivity Index (EI) Table. Find the number of your EI Zone in the left column. Locate the EI values for the dates that correspond to the project start and end dates you identified in Steps 1 and 2. If your specific date is not on the table, either interpolate between dates to obtain your %EI value, or use the closest date prior to your proposed start date and the closest date after your proposed end date. Subtract the start value from the end value to find the % EI for your site. The maximum annual EI value for a project is 100%. NOTE: If your project lasts for one year or more, your EI value is 100%.
5. Refer to the appropriate Isoerodent Map (Figures 2 through 5). Interpolate the annual isoerodent value for your area. This is the annual R factor for your site.
6. Multiply the percent value obtained in Step 4 by the annual isoerodent value obtained in Step 5. This is the R factor for your scheduled project.

Can I Use a Personal Computer to Calculate the R factor?

The computer program used by USDA to evaluate erosion potential is called the Revised Universal Soil Loss Equation, or RUSLE. The current version of RUSLE (RUSLE2) is a Windows-based model that uses extensive databases that are geographically-linked. RUSLE2 can be used to calculate the R factor for a proposed construction site; however, RUSLE2 can require a large investment of time to set up. RUSLE2 can be downloaded free of charge from the Internet at http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm. Note that RUSLE2 is an upgrade of RUSLE, and contains more detailed data. Therefore, your calculated R factor may differ based on whether you calculate your R factor using the methods specified above, which utilizes data from *USDA Handbook 703 - Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)*, January 1997, or whether you calculate your R factor using the more updated RUSLE2. EPA notes that either method of calculation is acceptable for determining eligibility for the construction rainfall erosivity waiver.

Where Can I Get Help?

- A copy of "Chapter 2, Rainfall-Runoff Erosivity Factor (R)" from the *USDA Handbook 703 - Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE)*, January 1997, is available on EPA's web site at http://www.epa.gov/npdes/pubs/ruslech2.pdf.
- Information about RUSLE2, and a download of the program, is available at http://fargo.nserl.purdue.edu/rusle2_dataweb/.
- Your local USDA Service Center may be able to provide assistance with calculating R factors and other conservation-related issues. To find the office nearest you, go to http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/contact/local.

For Additional Information

Reference Documents

Stormwater Phase II Final Rule Fact Sheet Series
- Internet: cfpub.epa.gov/npdes/stormwater/swfinal.cfm

Stormwater Phase II Final Rule (64 *FR* 68722)
- Internet: www.epa.gov/npdes/regulations/phase2.pdf
- Contact the U.S. EPA Water Resource Center (Phone: (202) 564-9545)

Agricultural Handbook Number 703, Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss Equation (RUSLE), Chapter 2, pp. 21-64, January 1997.
- Internet: www.epa.gov/npdes/pubs/ruslech2.pdf

Figure 1. Erosivity Index Zone Map

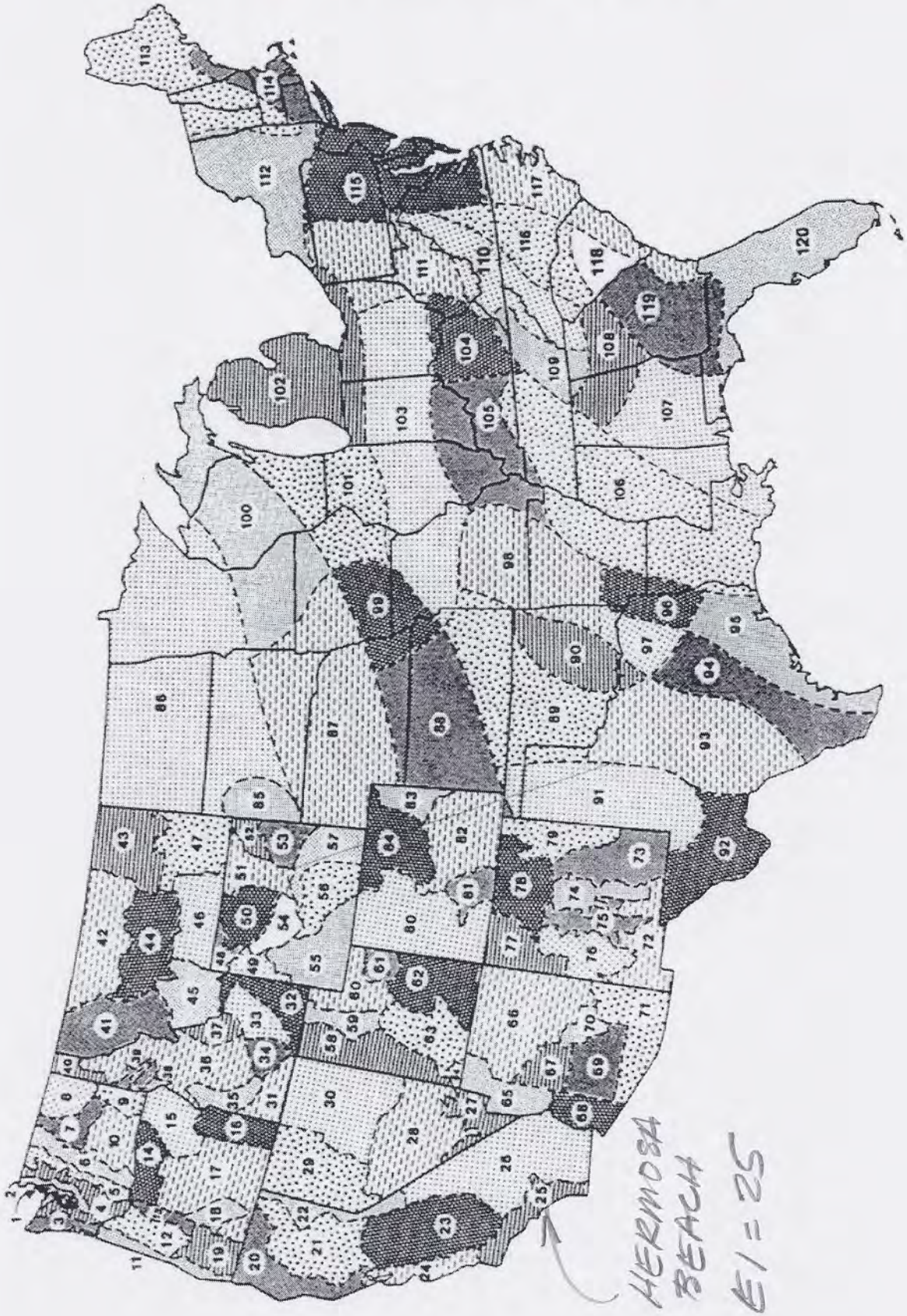


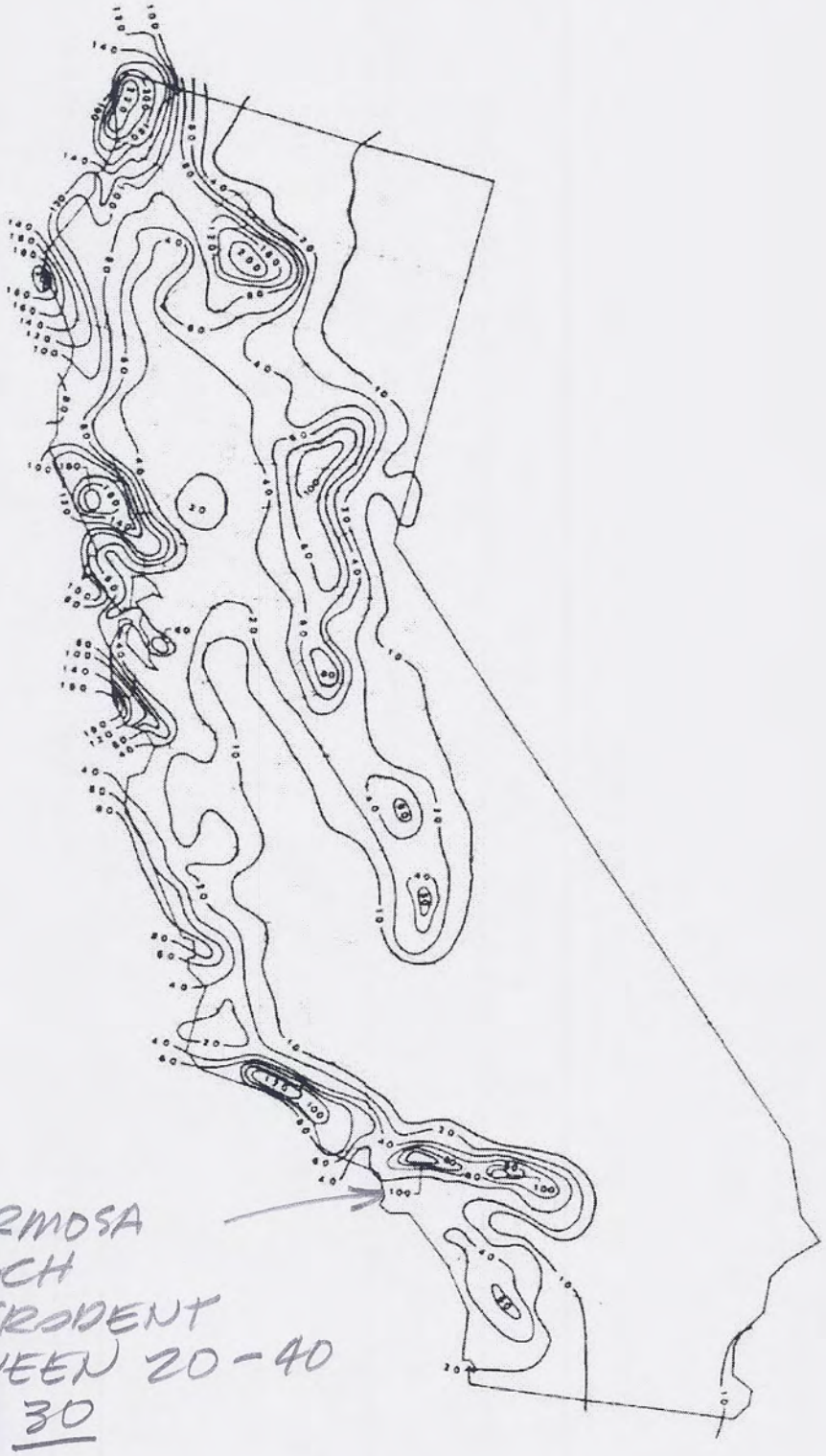
Figure 2. Isoerodent Map of the Eastern U.S.

Note: Units for all maps on this page are hundreds ft•tonf•in(ac•h•yr)$^{-1}$

Figure 3. Isoerodent Map of the Western U.S.

Note: Units for all maps on this page are hundreds ft•tonf•in(ac•h•yr)$^{-1}$

Figure 4. Isoerodent Map of California



HERMOSA
BEACH
ISOERODENT
BETWEEN 20-40
USE 30

Note: Units for all maps on this page are hundreds ft•tonf•in(ac•h•yr)$^{-1}$

33° 51' 30.98" N ≡ 33.844536 N
118° 23' 40.31" W ≡ 118.394531 W
GOOGLE

Figure 5. Isoerodent Map of Oregon and Washington

Note: Units for all maps on this page are hundreds ft•tonf•in(ac•h•yr)$^{-1}$

Table 1. Erosivity Index (%EI Values extracted from USDA Manual 703)

All values are at the end of the day listed below - Linear interpolation between dates is acceptable.
EI as a percentage of Average Annual R Value Computed for Geographic Areas Shown in Figure 1

1 YR

Month	Jan	Jan	Jan	Feb	Mar	Mar	Mar	Apr	Apr	May	May	Jun	Jun	Jul	Jul	Aug	Aug	Sept	Sept	Oct	Oct	Nov	Nov	Dec	Dec
Day	1	16	31	15	1	16	31	15	30	15	30	14	29	14	29	13	28	12	27	12	27	11	26	11	31
EI Zone																									
1	0	4.3	8.3	12.8	17.3	21.6	25.1	28	30.9	34.9	39.1	42.6	45.4	48.2	50.8	53	56	60.8	66.8	71	75.7	82	89.1	95.2	100
2	0	4.3	8.3	12.8	17.3	21.6	25.1	28.0	30.9	34.9	39.1	42.6	45.4	48.2	50.8	53.0	56.0	60.8	66.8	71.0	75.7	82.0	89.1	95.2	100
3	0	7.4	13.8	20.9	26.5	31.8	35.3	38.5	40.2	41.6	42.5	43.6	44.5	45.1	45.7	46.4	47.7	49.4	52.8	57.0	64.5	73.1	83.3	92.3	100
4	0	3.9	7.9	12.6	17.4	21.6	25.2	28.7	31.9	35.1	38.2	42.0	44.9	46.7	48.2	50.1	53.1	56.6	62.2	67.9	75.2	83.5	90.5	96.0	100
5	0	2.3	3.6	4.7	6.0	7.7	10.7	13.9	17.8	21.2	24.5	28.1	31.1	33.1	35.3	38.2	43.2	48.7	57.3	67.8	77.9	86.0	91.3	96.9	100
6	0	0.0	0.0	0.5	2.0	4.1	8.1	12.6	17.6	21.6	25.5	29.6	34.5	40.0	45.7	50.7	55.6	60.2	66.5	75.5	85.6	95.9	99.5	99.9	100
7	0	0.0	0.0	0.0	0.0	1.2	4.9	8.5	13.9	19.0	26.0	35.4	43.9	48.8	53.9	64.5	73.4	77.5	80.4	84.8	89.9	96.6	99.2	99.7	100
8	0	0.0	0.0	0.0	0.0	0.9	3.6	7.8	15.0	20.2	27.4	38.1	49.8	57.9	65.0	75.6	82.7	86.8	89.4	93.4	96.3	99.1	100.0	100.0	100
9	0	0.8	3.1	4.7	7.4	11.7	17.8	22.5	27.0	31.4	36.0	41.6	46.4	50.1	53.4	57.4	61.7	64.9	69.7	79.0	89.6	97.4	100.0	100.0	100
10	0	0.3	0.5	0.9	2.0	4.3	9.2	13.1	18.0	22.7	29.2	39.5	46.3	48.8	51.1	57.2	64.4	67.7	71.1	77.2	85.1	92.5	96.5	99.0	100
11	0	5.4	11.3	18.8	26.3	33.2	37.4	40.7	42.5	44.3	45.4	46.5	47.1	47.4	47.8	48.3	49.4	50.7	53.6	57.5	65.5	76.2	87.4	94.8	100
12	0	3.5	7.8	14.0	21.1	27.4	31.5	35.0	37.3	39.8	41.9	44.3	45.6	46.3	46.8	47.9	50.0	52.9	57.9	62.3	69.3	81.3	91.5	96.7	100
13	0	0.0	0.0	1.8	7.2	11.9	16.7	19.7	24.0	31.2	42.4	55.0	60.0	60.8	61.2	62.6	65.3	67.6	71.6	76.1	83.1	93.3	98.2	99.6	100
14	0	0.7	1.8	3.3	6.9	16.5	26.6	29.9	32.0	35.4	40.2	45.1	51.9	61.1	67.5	70.7	72.8	75.4	78.6	81.9	86.4	93.6	97.7	99.3	100
15	0	0.0	0.0	0.5	2.0	4.4	8.7	12.0	16.6	21.4	29.7	44.5	56.0	60.8	63.9	69.1	74.5	79.1	83.1	87.0	90.9	96.6	99.1	99.8	100
16	0	0.0	0.0	0.5	2.0	5.5	12.3	16.2	20.9	26.4	35.2	48.1	58.1	63.1	66.5	71.9	77.0	81.6	85.1	88.4	91.5	96.3	98.7	99.6	100
17	0	0.0	0.0	0.7	2.8	6.1	10.7	12.9	16.1	21.9	32.8	45.9	55.5	60.3	64.0	71.2	77.2	80.3	83.1	87.7	92.6	97.2	99.1	99.8	100
18	0	0.0	0.0	0.6	2.5	6.2	12.4	16.4	20.2	23.9	29.3	37.7	45.6	49.8	53.3	58.4	64.3	69.0	75.0	86.6	93.9	96.6	98.0	100.0	100
19	0	1.0	2.6	7.4	16.4	23.5	28.0	31.0	33.5	37.0	41.7	48.1	51.1	52.0	52.5	53.6	55.7	57.6	61.1	65.8	74.7	88.0	95.8	98.7	100
20	0	9.8	18.5	25.4	30.2	35.6	38.9	41.5	42.9	44.0	45.2	48.2	50.8	51.7	52.5	54.6	57.4	58.5	60.1	63.2	69.6	76.7	85.4	92.4	100
21	0	7.5	13.6	18.1	21.1	24.4	27.0	29.4	31.7	34.6	37.3	39.6	41.6	43.4	45.4	48.1	51.3	53.3	56.6	62.4	72.4	81.3	88.9	94.7	100
22	0	1.2	1.6	1.6	1.6	1.6	1.6	2.2	3.9	4.6	6.4	14.2	32.8	47.2	58.8	69.1	76.0	82.0	87.1	96.7	99.9	99.9	99.9	99.9	100
23	0	7.9	15.0	20.9	25.7	31.1	35.7	40.2	43.2	46.2	47.7	48.8	49.4	49.9	50.7	51.8	54.1	57.7	62.8	65.9	70.1	77.3	86.8	93.5	100
24	0	12.2	23.6	33.0	39.7	47.1	51.7	55.9	57.7	58.6	58.9	59.1	59.1	59.2	59.2	59.3	59.5	60.0	61.4	63.0	66.5	71.8	81.3	89.6	100
25	0	9.8	20.8	30.2	37.6	45.8	50.6	54.4	56.0	56.8	57.1	57.1	57.2	57.6	58.5	59.8	62.2	65.3	67.5	68.2	69.4	74.8	86.6	93.0	100
26	0	2.0	5.4	9.8	15.6	21.5	24.7	26.6	27.4	28.0	28.7	29.8	32.5	36.6	44.9	55.4	65.7	72.6	77.8	84.4	89.5	93.9	96.5	98.4	100
27	0	0.0	0.0	1.0	4.0	5.9	8.0	11.1	13.0	14.0	14.6	15.3	17.0	23.2	39.1	60.0	76.3	86.1	89.7	90.4	90.9	93.1	96.6	99.1	100
28	0	0.0	0.0	0.0	0.2	0.5	1.5	3.3	7.2	11.9	17.7	21.4	27.0	37.1	51.4	62.3	70.6	78.8	84.6	90.6	94.4	97.9	99.3	100.0	100
29	0	0.6	0.7	0.7	0.7	1.5	3.9	6.0	10.5	17.9	28.8	36.6	43.8	51.5	59.3	68.0	74.8	80.3	84.3	88.8	92.7	98.0	99.8	99.9	100
30	0	0.0	0.0	0.0	0.0	0.2	0.8	2.8	7.9	14.2	24.7	35.6	45.4	52.2	58.7	68.5	77.6	84.5	88.9	93.7	96.2	97.6	98.3	99.6	100
31	0	0.0	0.0	0.0	0.0	0.2	1.0	3.5	9.9	15.7	26.4	47.2	61.4	65.9	69.0	77.2	86.0	91.6	94.8	98.7	100.0	100.0	100.0	100.0	100
32	0	0.1	0.1	0.1	0.1	0.6	2.2	4.3	9.0	14.2	23.3	34.6	46.3	54.2	61.7	72.9	82.5	89.6	93.7	98.2	99.7	99.9	99.9	99.9	100
33	0	0.0	0.0	0.0	0.0	0.6	2.3	4.2	8.8	16.1	30.0	46.9	57.9	62.8	66.2	72.1	79.1	85.9	91.1	97.0	98.9	98.9	98.9	98.9	100
34	0	0.0	0.0	0.0	0.0	1.8	7.3	10.7	15.5	22.0	29.9	35.9	42.0	48.5	56.9	67.0	76.9	85.8	91.2	95.7	97.8	99.6	100.0	100.0	100
35	0	0.0	0.0	0.0	0.0	2.5	10.2	15.9	22.2	27.9	34.7	43.9	51.9	56.9	61.3	67.3	73.9	80.1	85.1	89.6	93.2	98.2	99.8	99.8	100

EI

100 − 0 = 100%

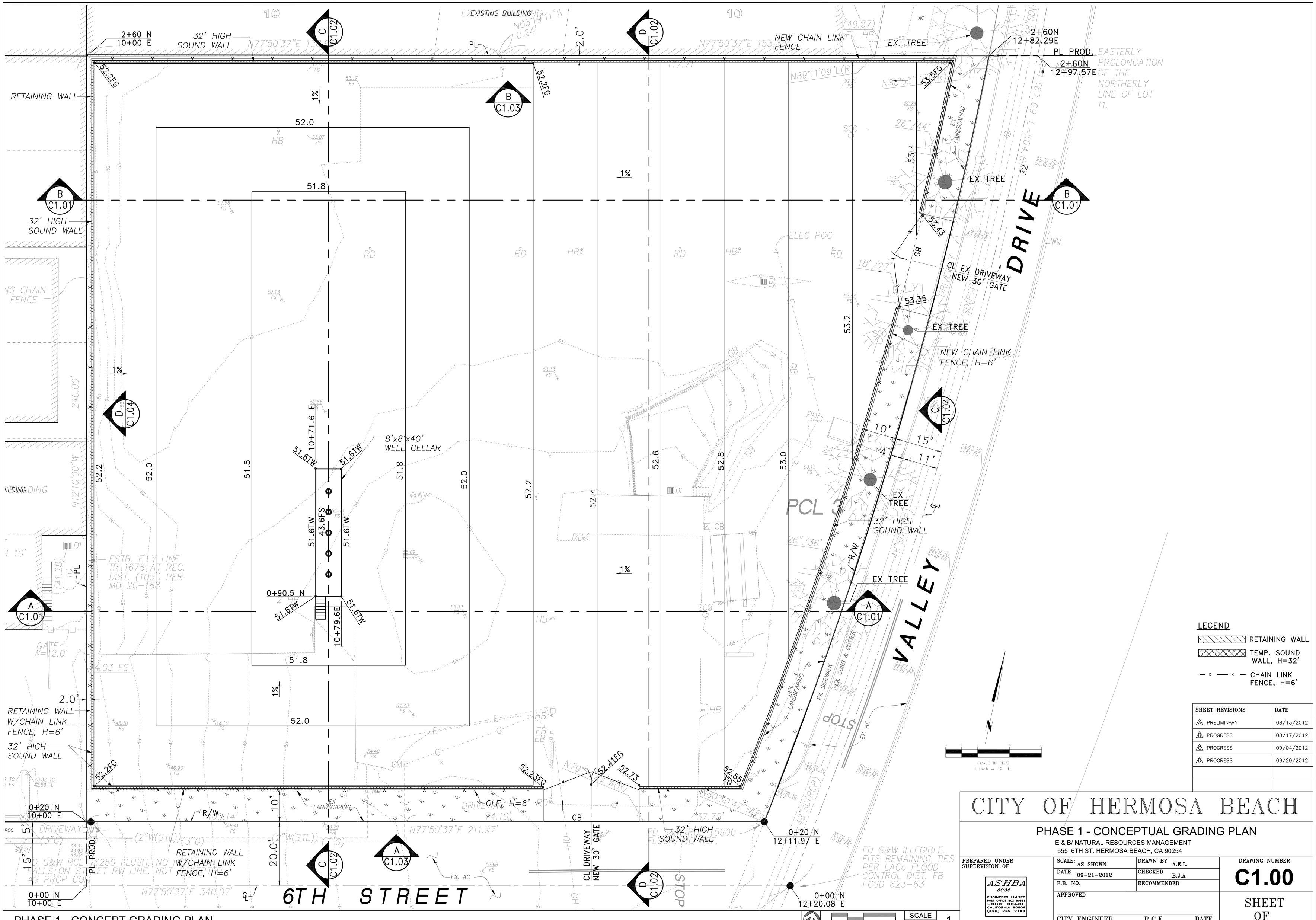
30 × 1.00 = 30 = R

Month	Jan	Jan	Jan	Feb	Mar	Mar	Mar	Apr	Apr	May	May	Jun	Jun	Jul	Jul	Aug	Aug	Sept	Sept	Oct	Oct	Nov	Nov	Dec	Dec
Day	1	16	31	15	1	16	31	15	30	15	30	14	29	14	29	13	28	12	27	12	27	11	26	11	31
EI Zone																									
36	0	0.0	0.0	0.0	0.0	0.9	3.4	6.7	12.7	18.5	26.6	36.3	46.0	53.5	60.2	68.3	75.8	82.6	88.3	96.3	99.3	99.9	100.0	100.0	100
37	0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	3.9	9.1	19.1	26.7	36.3	47.9	61.4	75.1	84.5	92.3	96.0	99.1	100.0	100.0	100.0	100.0	100
38	0	0.0	0.0	1.1	4.3	7.2	11.0	13.9	17.9	22.3	30.3	43.1	55.1	61.3	65.7	72.1	77.9	82.6	86.3	90.3	93.8	98.4	100.0	100.0	100
39	0	0.0	0.0	0.0	0.0	1.6	6.5	11.0	17.8	24.7	33.1	42.8	50.3	54.9	59.7	68.9	78.1	83.6	87.5	93.0	96.5	99.2	100.0	100.0	100
40	0	0.0	0.0	0.0	0.0	1.5	6.2	10.1	16.3	23.3	32.5	42.2	50.1	55.6	60.5	67.5	74.3	79.4	84.1	91.1	95.8	99.1	100.0	100.0	100
41	0	0.1	0.2	0.2	0.2	0.2	0.2	0.4	1.1	6.8	22.9	40.1	54.9	63.8	70.7	81.5	89.8	96.3	98.7	99.2	99.3	99.4	99.4	99.7	100
42	0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.9	5.2	17.3	33.8	53.2	66.5	75.9	87.6	93.7	97.5	99.0	99.7	100.0	100.0	100.0	100.0	100
43	0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	2.7	9.5	21.9	42.7	58.6	71.1	84.6	91.9	97.1	99.0	99.8	100.0	100.0	100.0	100.0	100
44	0	1.7	2.3	2.4	2.4	2.4	2.4	2.7	3.5	7.6	18.5	34.3	52.5	64.0	72.3	83.3	90.0	95.1	97.3	98.5	98.9	98.9	98.9	99.2	100
45	0	0.2	0.2	0.3	0.3	0.4	0.6	0.8	1.4	3.7	10.2	22.6	41.8	54.0	64.5	78.7	88.4	96.0	98.7	99.4	99.7	99.7	99.8	99.9	100
46	0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	2.6	7.5	19.6	32.9	48.9	63.0	73.5	83.3	89.5	95.6	98.3	99.6	100.0	100.0	100.0	100.0	100
47	0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.6	5.8	17.0	33.0	52.5	66.4	75.7	85.5	91.3	96.5	98.8	100.0	100.0	100.0	100.0	100.0	100
48	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	8.1	15.4	27.8	40.7	52.6	61.1	69.3	82.6	92.0	98.0	100.0	100.0	100.0	100.0	100
49	0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	2.7	8.3	20.0	27.5	35.6	44.6	46.0	70.2	81.3	89.2	93.6	98.5	100.0	100.0	100.0	100.0	100
50	0	0.0	0.0	0.0	0.0	0.1	0.4	2.4	8.2	13.7	23.8	38.8	55.1	66.1	73.6	81.8	87.7	93.8	97.0	99.4	100.0	100.0	100.0	100.0	100
51	0	0.0	0.0	0.0	0.0	0.3	1.0	3.1	8.7	18.8	35.8	49.6	60.4	70.2	77.0	84.0	88.8	93.8	96.6	99.1	100.0	100.0	100.0	100.0	100
52	0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	2.5	6.8	17.5	29.8	46.1	60.5	72.7	86.0	92.8	96.8	98.4	99.7	100.0	100.0	100.0	100.0	100
53	0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	3.0	9.5	24.2	35.3	48.0	63.1	76.1	87.7	93.5	97.2	98.6	99.5	99.8	99.9	100.0	100.0	100
54	0	0.0	0.0	0.0	0.0	0.2	0.7	2.4	7.2	14.7	27.2	37.2	47.3	58.8	67.6	74.0	79.2	86.7	92.6	97.9	99.8	99.9	100.0	100.0	100
55	0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	5.4	13.3	25.5	31.6	38.8	52.5	66.8	75.5	81.2	87.9	92.8	98.3	100.0	100.0	100.0	100.0	100
56	0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	5.1	11.4	22.3	29.5	38.5	51.1	65.2	77.8	85.6	91.7	95.0	98.7	100.0	100.0	100.0	100.0	100
57	0	0.0	0.0	0.0	0.0	0.0	0.1	1.0	3.5	9.2	21.5	31.0	43.5	60.4	75.1	86.1	91.6	96.2	98.1	99.4	99.9	99.9	100.0	100.0	100
58	0	0.0	0.0	0.0	0.0	0.2	0.9	2.9	8.0	13.2	21.0	29.1	38.0	45.9	54.5	65.4	74.8	82.1	87.5	95.4	98.8	99.7	100.0	100.0	100
59	0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	8.9	15.6	24.2	31.1	38.3	46.0	54.9	64.2	73.2	81.9	88.5	95.7	98.6	99.4	99.7	99.7	100
60	0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.5	4.0	9.5	13.3	20.5	33.6	52.8	66.5	76.7	88.1	94.2	98.6	100.0	100.0	100.0	100.0	100
61	0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	5.0	8.5	15.5	29.8	41.8	46.0	49.2	56.0	65.1	71.6	78.6	91.1	97.3	99.3	100.0	100.0	100
62	0	0.0	0.0	0.1	0.3	0.8	2.1	3.6	6.5	9.7	13.7	16.5	20.8	27.3	40.1	56.9	72.6	83.4	89.4	95.5	98.1	99.6	100.0	100.0	100
63	0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	3.7	7.8	13.3	15.8	19.9	29.0	46.8	64.7	78.3	88.8	93.9	98.5	100.0	100.0	100.0	100.0	100
64	0	0.0	0.0	0.7	2.8	7.4	12.4	14.4	15.6	17.3	19.4	21.0	24.4	32.3	48.0	61.4	72.1	81.9	87.0	90.1	92.4	98.1	100.0	100.0	100
65	0	3.6	7.0	9.6	11.4	13.0	14.4	16.3	17.7	18.4	19.3	20.5	23.6	32.0	50.0	66.2	77.2	85.4	88.8	90.4	91.3	92.7	94.8	97.0	100
66	0	0.0	0.0	0.0	0.0	0.1	0.5	1.1	2.2	3.6	6.0	7.6	11.1	19.8	38.9	59.7	74.4	83.2	88.1	94.6	97.7	99.4	100.0	100.0	100
67	0	0.0	0.0	0.0	0.0	0.1	0.4	0.9	1.6	1.9	2.4	5.0	12.1	24.8	48.3	73.6	86.5	92.0	94.3	96.6	97.9	99.5	100.0	100.0	100
68	0	2.3	4.5	7.8	10.4	12.0	13.3	16.3	17.7	18.1	18.2	18.3	18.4	19.9	24.5	35.0	54.4	69.4	78.6	85.7	89.2	91.9	93.9	97.0	100
69	0	2.0	3.7	5.7	7.8	10.5	12.4	13.7	14.3	14.7	15.1	15.7	17.1	22.7	36.7	50.4	63.6	75.0	81.8	87.8	90.8	93.2	94.9	97.5	100
70	0	0.5	0.7	1.0	1.3	1.7	2.2	2.8	3.4	3.9	4.7	5.4	7.4	15.7	36.5	55.8	70.3	80.9	86.4	90.9	93.4	96.4	98.1	99.4	100
71	0	0.7	1.2	1.6	2.1	2.8	3.3	3.6	4.0	4.5	5.6	6.5	9.1	18.5	40.6	59.7	74.0	86.3	91.7	94.7	96.0	96.7	97.3	98.8	100
72	0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.7	0.8	1.3	3.5	9.9	24.7	51.4	71.5	83.6	93.8	97.7	99.2	99.8	99.9	99.9	100.0	100
73	0	0.0	0.1	0.1	0.2	0.2	0.3	0.6	1.3	4.1	11.5	18.1	28.3	40.2	54.1	67.0	77.2	87.7	93.3	97.5	99.1	99.6	99.8	100.0	100
74	0	0.0	0.0	0.0	0.0	0.1	0.2	0.5	1.2	2.7	6.4	10.2	18.4	31.0	50.7	68.7	81.2	91.6	96.1	98.4	99.2	99.8	100.0	100.0	100
75	0	0.1	0.1	0.1	0.2	0.5	1.3	1.9	3.0	4.1	6.6	10.0	17.6	28.3	44.7	59.4	71.6	83.9	90.3	94.7	96.7	98.8	99.6	99.9	100

Month	Jan	Jan	Jan	Feb	Mar	Mar	Mar	Apr	Apr	May	May	Jun	Jun	Jul	Jul	Aug	Aug	Sept	Sept	Oct	Oct	Nov	Nov	Dec	Dec
Day	1	16	31	15	1	16	31	15	30	15	30	14	29	14	29	13	28	12	27	12	27	11	26	11	31
El Zone																									
76	0	0.0	0.0	0.0	0.0	0.1	0.2	0.6	1.3	2.0	3.5	4.9	8.4	17.4	37.3	57.5	72.9	83.7	89.5	95.8	98.4	99.6	100.0	100.0	100
77	0	0.2	0.3	0.3	0.4	0.8	1.5	2.0	2.8	3.9	5.9	7.2	10.3	21.5	46.5	66.3	78.3	86.5	90.8	96.0	98.2	99.1	99.5	99.8	100
78	0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	1.6	3.8	8.9	13.2	21.8	35.8	56.6	75.4	86.0	92.9	95.9	98.2	99.2	99.8	100.0	100.0	100
79	0	0.0	0.0	0.0	0.0	0.2	0.7	1.3	2.7	5.8	12.7	18.8	28.8	41.6	58.4	75.7	86.5	94.2	97.3	98.9	99.5	99.9	100.0	100.0	100
80	0	0.6	1.2	1.6	2.1	2.5	3.3	4.5	6.9	10.1	15.5	19.7	26.6	36.4	51.7	67.5	79.4	88.8	93.2	96.1	97.3	98.2	98.7	99.3	100
81	0	0.1	0.1	0.2	0.4	0.5	0.8	0.9	1.5	3.9	9.9	12.8	18.2	30.7	54.1	77.1	89.0	94.9	97.2	98.7	99.3	99.6	99.7	99.9	100
82	0	0.0	0.1	0.1	0.2	0.2	0.5	1.2	3.1	6.7	14.4	20.1	29.8	44.5	64.2	83.1	92.2	96.4	98.1	99.3	99.7	99.8	99.8	99.9	100
83	0	0.0	0.1	0.1	0.1	0.3	0.9	1.6	3.5	8.3	19.4	30.0	44.0	59.2	72.4	84.6	91.2	96.5	98.6	99.5	99.8	99.9	100.0	100.0	100
84	0	0.0	0.1	0.1	0.2	0.3	0.6	1.7	4.9	9.9	19.5	27.2	38.3	52.8	68.8	83.9	91.6	96.4	98.2	99.2	99.6	99.8	99.8	99.9	100
85	0	0.0	0.0	0.0	0.0	0.0	1.0	2.0	3.0	6.0	11.0	23.0	36.0	49.0	63.0	77.0	90.0	95.0	98.0	99.0	100.0	100.0	100.0	100.0	100
86	0	0.0	0.0	0.0	0.0	0.0	1.0	2.0	3.0	6.0	11.0	23.0	36.0	49.0	63.0	77.0	90.0	95.0	98.0	99.0	100.0	100.0	100.0	100.0	100
87	0	0.0	0.0	0.0	1.0	1.0	2.0	3.0	6.0	10.0	17.0	29.0	43.0	55.0	67.0	77.0	85.0	91.0	96.0	98.0	99.0	100.0	100.0	100.0	100
88	0	0.0	0.0	0.0	1.0	1.0	2.0	3.0	6.0	13.0	23.0	37.0	51.0	61.0	69.0	78.0	85.0	91.0	94.0	96.0	98.0	99.0	99.0	100.0	100
89	0	1.0	1.0	2.0	3.0	4.0	7.0	12.0	18.0	27.0	38.0	48.0	55.0	62.0	69.0	76.0	83.0	90.0	94.0	97.0	98.0	99.0	100.0	100.0	100
90	0	1.0	2.0	3.0	4.0	6.0	8.0	13.0	21.0	29.0	37.0	46.0	54.0	60.0	65.0	69.0	74.0	81.0	87.0	92.0	95.0	97.0	98.0	99.0	100
91	0	0.0	0.0	0.0	1.0	1.0	1.0	2.0	6.0	16.0	29.0	39.0	46.0	53.0	60.0	67.0	74.0	81.0	88.0	95.0	99.0	99.0	100.0	100.0	100
92	0	0.0	0.0	0.0	1.0	1.0	1.0	2.0	6.0	16.0	29.0	39.0	46.0	53.0	60.0	67.0	74.0	81.0	88.0	95.0	99.0	99.0	100.0	100.0	100
93	0	1.0	1.0	2.0	3.0	4.0	6.0	8.0	13.0	25.0	40.0	49.0	56.0	62.0	67.0	72.0	76.0	80.0	85.0	91.0	97.0	98.0	99.0	99.0	100
94	0	1.0	2.0	4.0	6.0	8.0	10.0	15.0	21.0	29.0	38.0	47.0	53.0	57.0	61.0	65.0	70.0	76.0	83.0	88.0	91.0	94.0	96.0	98.0	100
95	0	1.0	3.0	5.0	7.0	9.0	11.0	14.0	18.0	27.0	35.0	41.0	46.0	51.0	57.0	62.0	68.0	73.0	79.0	84.0	89.0	93.0	96.0	98.0	100
96	0	2.0	4.0	6.0	9.0	12.0	17.0	23.0	30.0	37.0	43.0	49.0	54.0	58.0	62.0	66.0	70.0	74.0	78.0	82.0	86.0	90.0	94.0	97.0	100
97	0	1.0	3.0	5.0	7.0	10.0	14.0	20.0	28.0	37.0	48.0	56.0	61.0	64.0	68.0	72.0	77.0	81.0	86.0	89.0	92.0	95.0	98.0	99.0	100
98	0	1.0	2.0	4.0	6.0	8.0	10.0	13.0	19.0	26.0	34.0	42.0	50.0	58.0	63.0	68.0	74.0	79.0	84.0	89.0	93.0	95.0	97.0	99.0	100
99	0	0.0	0.0	1.0	1.0	2.0	3.0	5.0	7.0	12.0	19.0	33.0	48.0	57.0	65.0	72.0	82.0	88.0	93.0	96.0	98.0	99.0	100.0	100.0	100
100	0	0.0	0.0	0.0	1.0	1.0	2.0	3.0	5.0	9.0	15.0	27.0	38.0	50.0	62.0	74.0	84.0	91.0	95.0	97.0	98.0	99.0	99.0	100.0	100
101	0	0.0	0.0	1.0	2.0	3.0	4.0	6.0	9.0	14.0	20.0	28.0	39.0	52.0	63.0	72.0	80.0	87.0	91.0	94.0	97.0	98.0	99.0	100.0	100
102	0	0.0	1.0	2.0	3.0	4.0	6.0	8.0	11.0	15.0	22.0	31.0	40.0	49.0	59.0	69.0	78.0	85.0	91.0	94.0	96.0	98.0	99.0	100.0	100
103	0	1.0	2.0	3.0	4.0	6.0	8.0	10.0	14.0	18.0	25.0	34.0	45.0	56.0	64.0	72.0	79.0	84.0	89.0	92.0	95.0	97.0	98.0	99.0	100
104	0	2.0	3.0	5.0	7.0	10.0	13.0	16.0	19.0	23.0	27.0	34.0	44.0	54.0	63.0	72.0	80.0	85.0	89.0	91.0	93.0	95.0	96.0	98.0	100
105	0	1.0	3.0	6.0	9.0	12.0	16.0	21.0	26.0	31.0	37.0	43.0	50.0	57.0	64.0	71.0	77.0	81.0	85.0	88.0	91.0	93.0	95.0	97.0	100
106	0	3.0	6.0	9.0	13.0	17.0	21.0	27.0	33.0	38.0	44.0	49.0	55.0	61.0	67.0	71.0	75.0	78.0	81.0	84.0	86.0	90.0	94.0	97.0	100
107	0	3.0	5.0	7.0	10.0	14.0	18.0	23.0	27.0	31.0	35.0	39.0	45.0	53.0	60.0	67.0	74.0	80.0	84.0	86.0	88.0	90.0	93.0	95.0	100
108	0	3.0	6.0	9.0	12.0	16.0	20.0	24.0	28.0	33.0	38.0	43.0	50.0	59.0	69.0	75.0	80.0	84.0	87.0	90.0	92.0	94.0	96.0	98.0	100
109	0	3.0	6.0	10.0	13.0	16.0	19.0	23.0	26.0	29.0	33.0	39.0	47.0	58.0	68.0	75.0	80.0	83.0	86.0	88.0	90.0	92.0	95.0	97.0	100
110	0	1.0	3.0	5.0	7.0	9.0	12.0	15.0	18.0	21.0	25.0	29.0	36.0	45.0	56.0	68.0	77.0	83.0	88.0	91.0	93.0	95.0	97.0	99.0	100
111	0	1.0	2.0	3.0	4.0	5.0	6.0	8.0	11.0	15.0	20.0	28.0	41.0	54.0	65.0	74.0	82.0	87.0	92.0	94.0	96.0	97.0	98.0	99.0	100
112	0	0.0	0.0	1.0	2.0	3.0	4.0	5.0	7.0	12.0	17.0	24.0	33.0	42.0	55.0	67.0	76.0	83.0	89.0	92.0	94.0	96.0	98.0	99.0	100
113	0	1.0	2.0	3.0	4.0	5.0	6.0	8.0	10.0	13.0	17.0	22.0	31.0	42.0	52.0	60.0	68.0	75.0	80.0	85.0	89.0	92.0	96.0	98.0	100
114	0	1.0	2.0	4.0	6.0	8.0	11.0	13.0	15.0	18.0	21.0	26.0	32.0	38.0	46.0	55.0	64.0	71.0	77.0	81.0	85.0	89.0	93.0	97.0	100
115	0	1.0	2.0	3.0	4.0	5.0	6.0	8.0	10.0	14.0	19.0	26.0	34.0	45.0	56.0	66.0	76.0	82.0	86.0	90.0	93.0	95.0	97.0	99.0	100

Month	Jan	Jan	Jan	Feb	Mar	Mar	Mar	Apr	Apr	May	May	Jun	Jun	Jul	Jul	Aug	Aug	Sept	Sept	Oct	Oct	Nov	Nov	Dec	Dec
Day	1	16	31	15	1	16	31	15	30	15	30	14	29	14	29	13	28	12	27	12	27	11	26	11	31
EI Zone																									
116	0	1.0	3.0	5.0	7.0	9.0	12.0	15.0	18.0	21.0	25.0	29.0	36.0	45.0	56.0	68.0	77.0	83.0	88.0	91.0	93.0	95.0	97.0	99.0	100
117	0	1.0	2.0	3.0	4.0	5.0	7.0	9.0	11.0	14.0	17.0	22.0	31.0	42.0	54.0	65.0	74.0	83.0	89.0	92.0	95.0	97.0	98.0	99.0	100
118	0	1.0	2.0	3.0	5.0	7.0	10.0	14.0	18.0	22.0	27.0	32.0	37.0	46.0	58.0	69.0	80.0	89.0	93.0	94.0	95.0	96.0	97.0	97.0	100
119	0	2.0	4.0	6.0	8.0	12.0	16.0	20.0	25.0	30.0	35.0	41.0	47.0	56.0	67.0	75.0	81.0	85.0	87.0	89.0	91.0	93.0	95.0	97.0	100
120	0	1.0	2.0	4.0	6.0	7.0	9.0	12.0	15.0	18.0	23.0	31.0	40.0	48.0	57.0	63.0	72.0	78.0	88.0	92.0	96.0	97.0	98.0	99.0	100
121	0	8.0	16.0	25.0	33.0	41.0	46.0	50.0	53.0	54.0	55.0	56.0	56.5	57.0	57.8	58.0	58.8	60.0	61.0	63.0	66.5	72.0	80.0	90.0	100
122	0	7.0	14.0	20.0	25.5	33.5	38.0	43.0	46.0	50.0	52.5	54.5	56.0	58.0	59.0	60.0	61.5	63.0	65.0	68.0	72.0	79.0	86.0	93.0	100
123	0	4.0	8.0	12.0	17.0	23.0	29.0	34.0	38.0	44.0	49.0	53.0	56.0	59.0	62.0	65.0	69.0	72.0	75.0	79.0	83.0	88.0	93.0	96.0	100
124	0	4.0	9.0	15.0	23.0	29.0	34.0	40.0	44.0	48.0	50.0	51.0	52.0	53.0	55.0	57.0	60.0	62.0	64.0	67.0	72.0	80.0	88.0	95.0	100
125	0	7.0	12.0	17.0	24.0	30.0	39.0	45.0	50.0	53.0	55.0	56.0	57.0	58.0	59.0	61.0	62.0	63.0	64.0	66.0	70.0	77.0	84.0	92.0	100
126	0	9.0	16.0	23.0	30.0	37.0	43.0	47.0	50.0	52.0	54.0	55.0	56.0	57.0	58.0	59.0	60.0	62.0	64.0	67.0	71.0	77.0	86.0	93.0	100
127	0	8.0	15.0	22.0	28.0	33.0	38.0	42.0	46.0	50.0	52.0	53.0	53.0	53.0	53.0	54.0	55.0	57.0	59.0	63.0	68.0	75.0	83.0	92.0	100
128	0	8.0	15.0	22.0	29.0	34.0	40.0	45.0	48.0	51.0	54.0	57.0	59.0	62.0	63.0	64.0	65.0	66.0	67.0	69.0	72.0	76.0	83.0	91.0	100
129	0	9.0	16.0	22.0	27.0	32.0	37.0	41.0	45.0	48.0	51.0	53.0	55.0	56.0	57.0	57.0	58.0	59.0	61.0	64.0	68.0	73.0	79.0	89.0	100
130	0	10.0	20.0	28.0	35.0	41.0	46.0	49.0	51.0	53.0	55.0	56.0	56.0	57.0	58.0	59.0	60.0	61.0	62.0	65.0	69.0	74.0	81.0	90.0	100
131	0	8.0	15.0	22.0	28.0	33.0	38.0	41.0	44.0	47.0	49.0	51.0	53.0	55.0	56.0	58.0	59.0	60.0	63.0	65.0	69.0	75.0	84.0	92.0	100
132	0	10.0	18.0	25.0	29.0	33.0	36.0	39.0	41.0	42.0	44.0	45.0	46.0	47.0	48.0	49.0	51.0	53.0	56.0	59.0	64.0	70.0	80.0	90.0	100
133	0	8.0	16.0	24.0	32.0	40.0	46.0	51.0	54.0	56.0	57.0	58.0	58.0	59.0	59.0	60.0	60.0	61.0	62.0	64.0	68.0	74.0	83.0	91.0	100
134	0	12.0	22.0	31.0	39.0	45.0	49.0	52.0	54.0	55.0	56.0	56.0	56.0	56.0	57.0	57.0	57.0	57.0	58.0	59.0	62.0	68.0	77.0	88.0	100
135	0	7.0	15.0	22.0	30.0	37.0	43.0	49.0	53.0	55.0	57.0	58.0	59.0	60.0	61.0	62.0	63.0	65.0	67.0	70.0	74.0	79.0	85.0	92.0	100
136	0	11.0	21.0	29.0	37.0	44.0	50.0	55.0	57.0	59.0	60.0	60.0	60.0	60.0	61.0	61.0	61.0	62.0	63.0	64.0	67.0	71.0	78.0	89.0	100
137	0	10.0	18.0	25.0	30.0	39.0	46.0	51.0	54.0	57.0	58.0	59.0	59.0	60.0	60.0	60.0	61.0	62.0	63.0	64.0	67.0	72.0	80.0	90.0	100
138	0	11.0	22.0	31.0	39.0	46.0	52.0	56.0	58.0	59.0	60.0	61.0	61.0	61.0	61.0	62.0	62.0	62.0	63.0	64.0	66.0	71.0	78.0	89.0	100
139	0	8.0	14.0	20.0	25.0	32.0	37.0	42.0	47.0	50.0	53.0	55.0	56.0	58.0	59.0	61.0	63.0	64.0	66.0	68.0	71.0	76.0	85.0	93.0	100
140	0	13.0	18.0	43.0	56.0	65.0	69.0	69.4	69.7	70.1	70.4	70.8	71.1	71.5	71.9	72.2	72.6	73.0	73.3	73.6	74.0	76.0	81.0	89.0	100

APPENDIX D – GRADING PLANS



SHEET REVISIONS	DATE
1 PRELIMINARY	08/13/2012
2 PROGRESS	08/17/2012
3 PROGRESS	09/04/2012
4 PROGRESS	09/20/2012

CITY OF HERMOSA BEACH

PHASE 1 - CONCEPTUAL GRADING PLAN

E & B/ NATURAL RESOURCES MANAGEMENT
555 6TH ST. HERMOSA BEACH, CA 90254

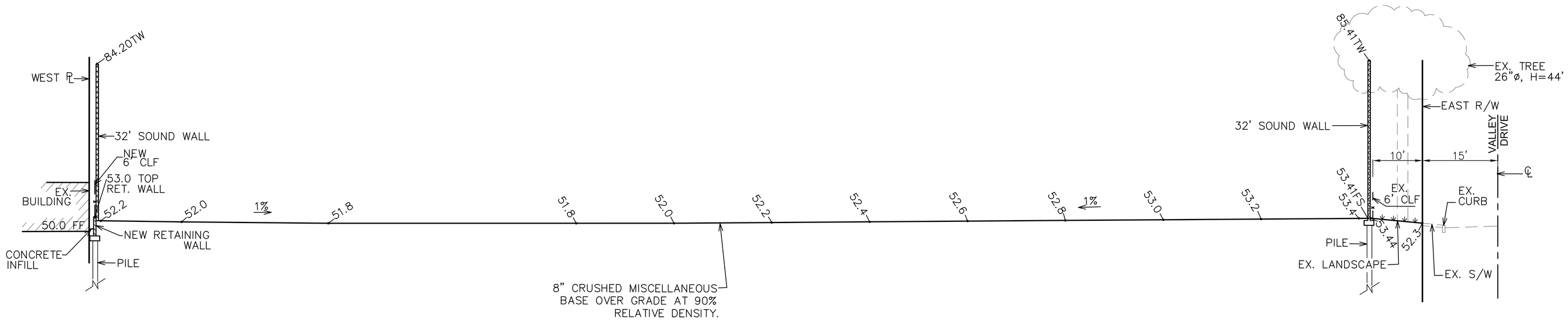
PREPARED UNDER SUPERVISION OF:

ASHBA 8036
ENGINEERS LIMITED
POST OFFICE BOX 90833
LONG BEACH
CALIFORNIA 90809
(562) 989-9184

SCALE: AS SHOWN	DRAWN BY A.E.L.	DRAWING NUMBER	
DATE 09-21-2012	CHECKED B.J.A	C1.00	
F.B. NO.	RECOMMENDED		
APPROVED		SHEET OF	
CITY ENGINEER	R.C.E. DATE		

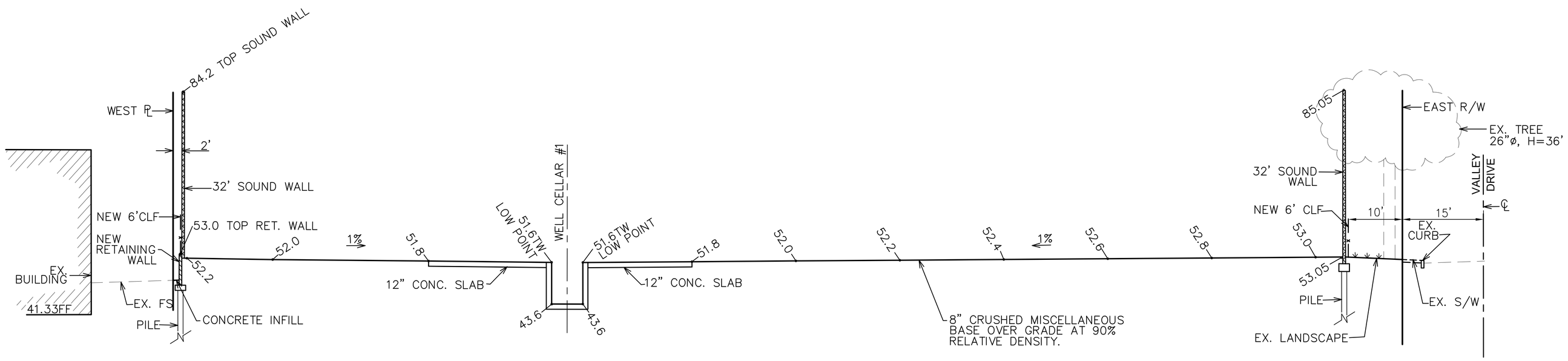
PHASE 1 - CONCEPT GRADING PLAN

8036 GRADE.dwg Nov 13, 2012 11:54AM



PHASE 1 - SECTIONS B

SCALE 1"=10' B



SHEET REVISIONS	DATE
3 PRELIMINARY	08/13/2012
4 PROGRESS	08/17/2012
5 PROGRESS	09/04/2012
6 PROGRESS	09/20/2012

CITY OF HERMOSA BEACH

PHASE 1 - SECTIONS

E & B/ NATURAL RESOURCES MANAGEMENT
555 6TH ST. HERMOSA BEACH, CA 90254

PREPARED UNDER SUPERVISION OF:

ASHBA 8036
ENGINEERS LIMITED
POST OFFICE BOX 90833
LONG BEACH
CALIFORNIA 90809
(562) 989-9154

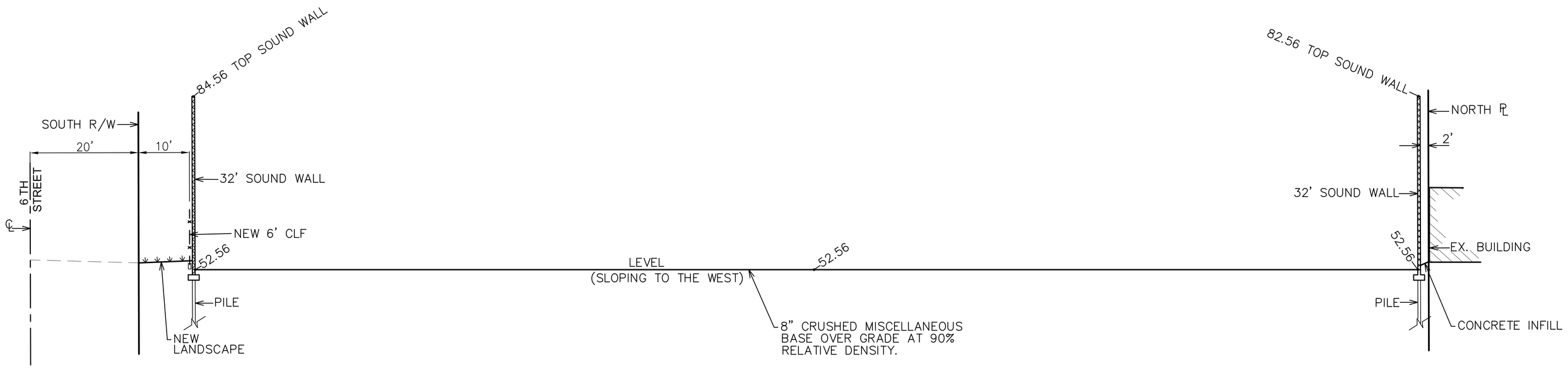
SCALE: AS SHOWN	DRAWN BY A.E.L.	DRAWING NUMBER
DATE 09-21-2012	CHECKED B.J.A	C1.01
F.B. NO.	RECOMMENDED	
APPROVED		SHEET OF

CITY ENGINEER R.C.E. DATE

PHASE 1 - SECTIONS A

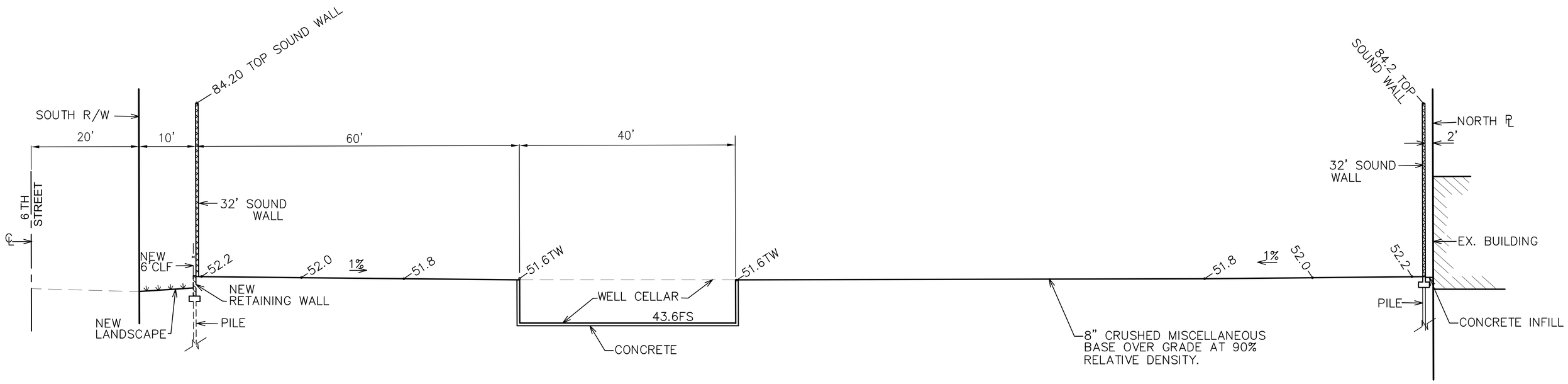
SCALE 1"=10' A

80365SECTIONS.dwg Nov 13, 2012 11:59AM



PHASE 1 - SECTIONS D

0 10 20 SCALE 1"=10' D



SHEET REVISIONS	DATE
A PRELIMINARY	08/13/2012
B PROGRESS	08/17/2012
C PROGRESS	09/04/2012
D PROGRESS	09/20/2012

CITY OF HERMOSA BEACH

PHASE 1 - SECTIONS

E & B/ NATURAL RESOURCES MANAGEMENT
555 6TH ST. HERMOSA BEACH, CA 90254

PREPARED UNDER SUPERVISION OF:

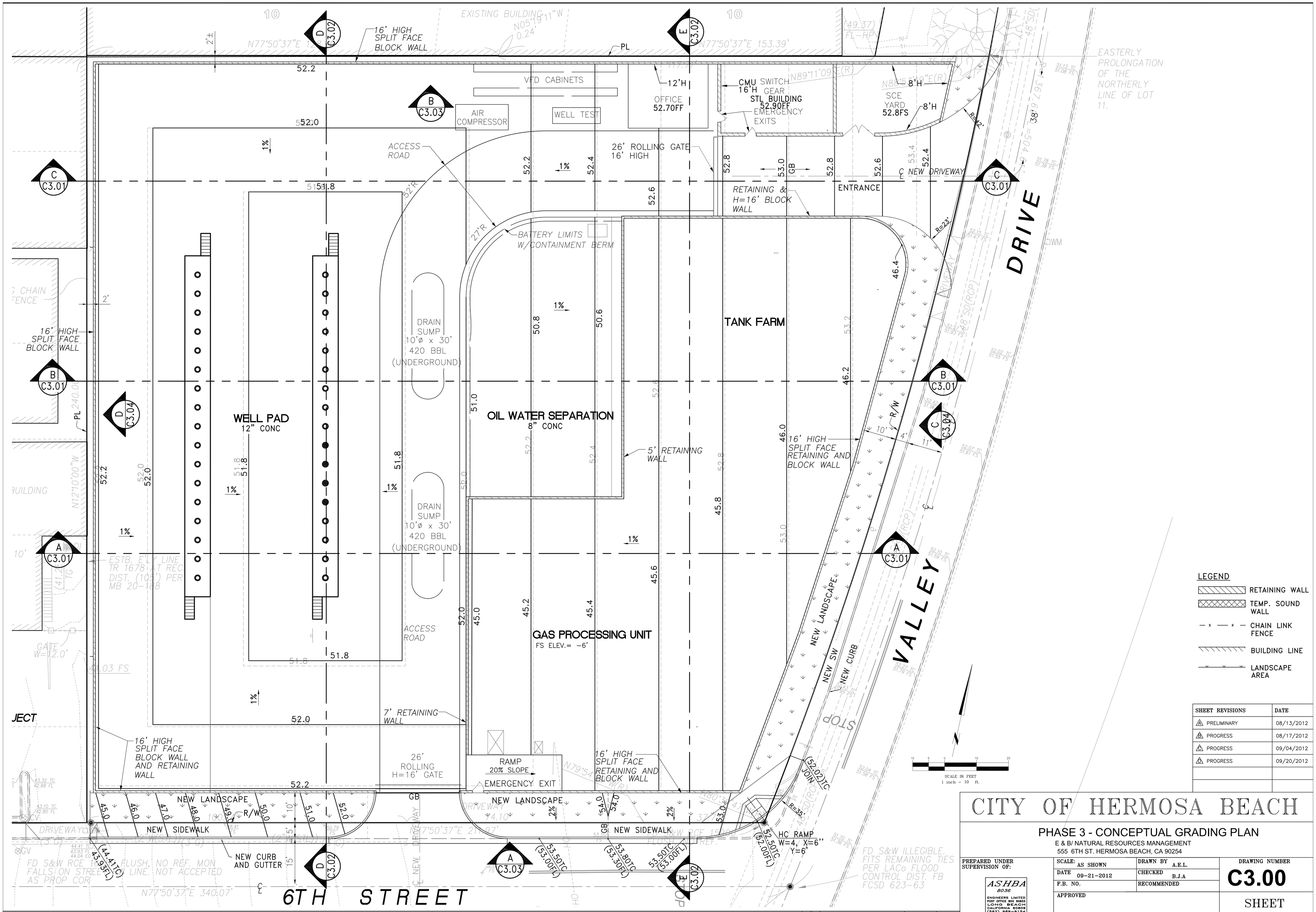
ASHBA 8036 ENGINEERS LIMITED POST OFFICE BOX 90833 LONG BEACH CALIFORNIA 90809 (562) 989-9154

SCALE: AS SHOWN	DRAWN BY A.E.L.	DRAWING NUMBER
DATE 09-21-2012	CHECKED B.J.A	C1.02
F.B. NO.	RECOMMENDED	
APPROVED		SHEET OF
CITY ENGINEER	R.C.E. DATE	

PHASE 1 - SECTIONS C

0 10 20 SCALE 1"=10' C

8036SECTIONS.dwg Nov 13, 2012 12:00PM



SHEET REVISIONS	DATE
1 PRELIMINARY	08/13/2012
2 PROGRESS	08/17/2012
3 PROGRESS	09/04/2012
4 PROGRESS	09/20/2012

CITY OF HERMOSA BEACH

PHASE 3 - CONCEPTUAL GRADING PLAN

E & B/ NATURAL RESOURCES MANAGEMENT
555 6TH ST. HERMOSA BEACH, CA 90254

PREPARED UNDER SUPERVISION OF:

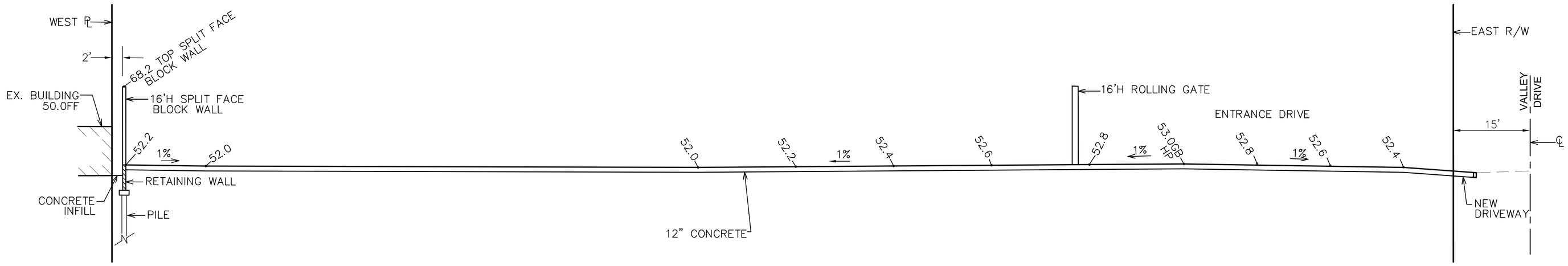
A.S.HBA 8036
ENGINEERS LIMITED
POST OFFICE BOX 90833
LONG BEACH
CALIFORNIA 90809
(562) 989-9194

SCALE: AS SHOWN	DRAWN BY A.E.L.	DRAWING NUMBER
DATE 09-21-2012	CHECKED B.J.A	C3.00
F.B. NO.	RECOMMENDED	
APPROVED		SHEET OF
CITY ENGINEER	R.C.E.	DATE

PHASE 3 - CONCEPTUAL GRADING PLAN

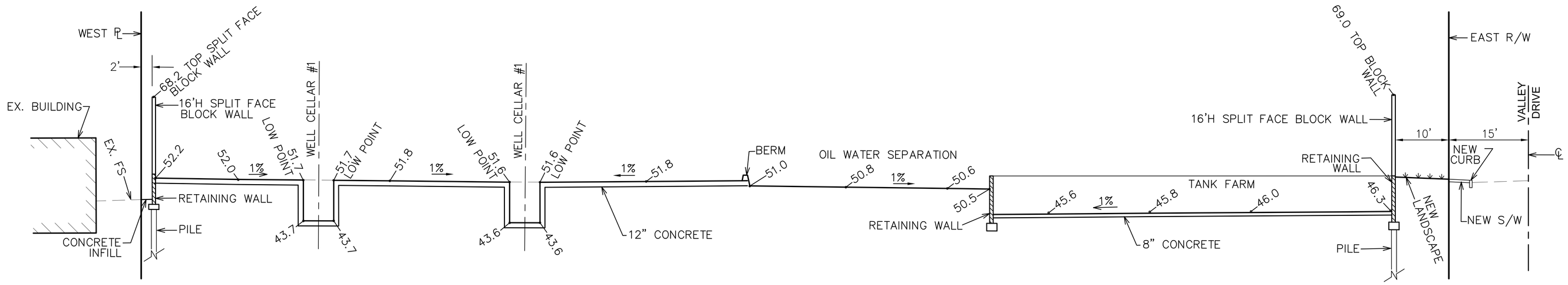
SCALE 1"=10' 1

8036_GRADE.dwg Nov 13, 2012 12:04PM



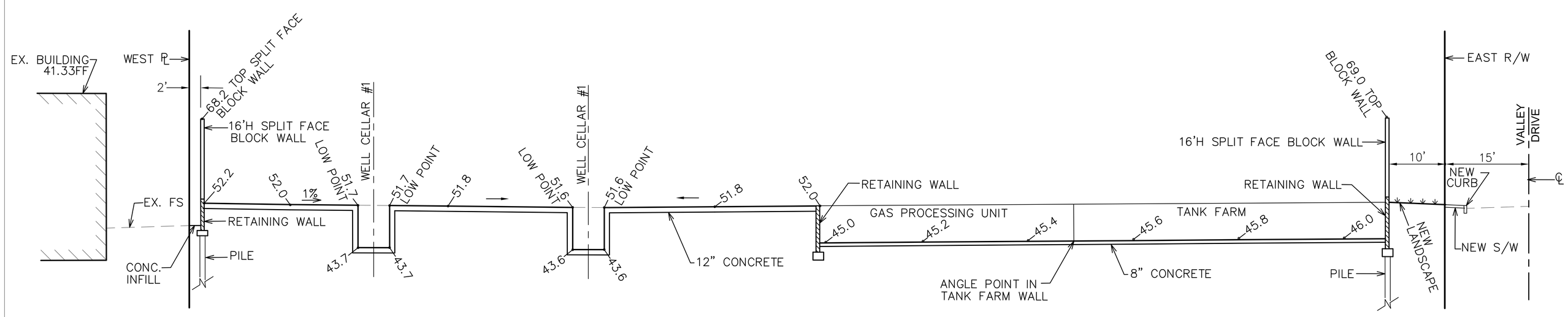
PHASE 3 - SECTION C

SCALE 1"=10' (0 10 20) — C



PHASE 3 - SECTION B

SCALE 1"=10' (0 10 20) — B



PHASE 3 - SECTION A

SCALE 1"=10' (0 10 20) — A

SHEET REVISIONS	DATE
1 PRELIMINARY	08/13/2012
2 PROGRESS	08/17/2012
3 PROGRESS	09/04/2012
4 PROGRESS	09/20/2012

CITY OF HERMOSA BEACH

PHASE 3 - SECTIONS

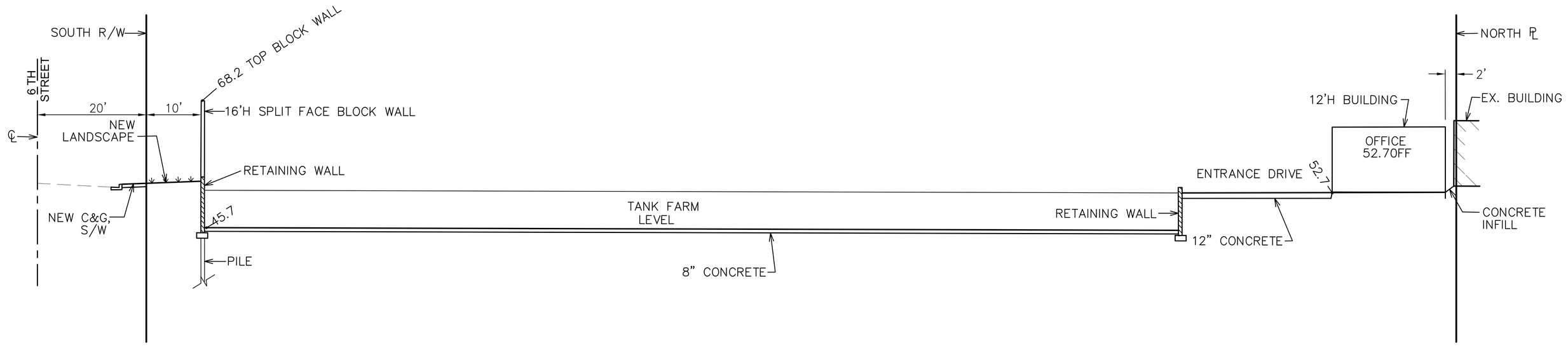
E & B/ NATURAL RESOURCES MANAGEMENT
555 6TH ST. HERMOSA BEACH, CA 90254

PREPARED UNDER SUPERVISION OF:

ASHBA 8036
ENGINEERS LIMITED
POST OFFICE BOX 90833
LONG BEACH
CALIFORNIA 90809
(562) 989-9154

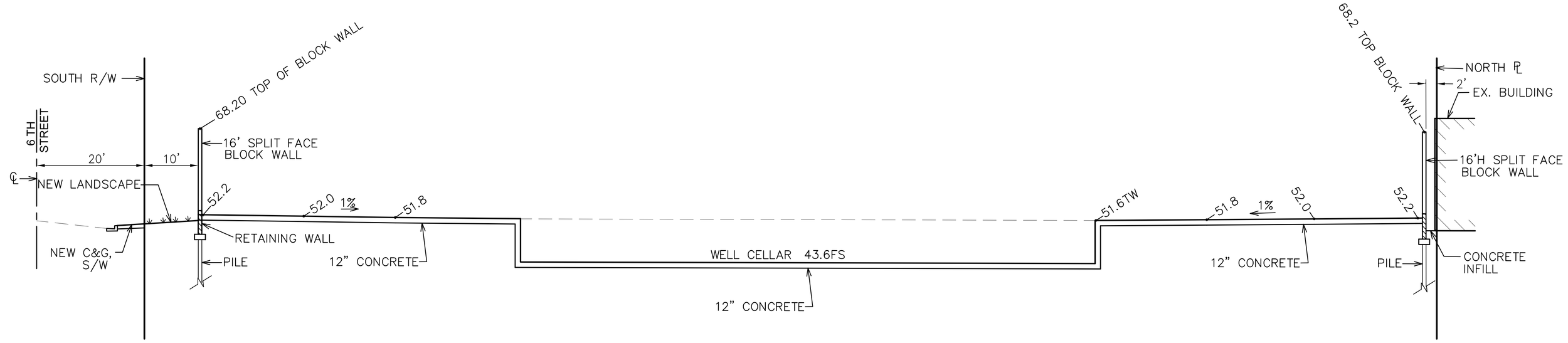
SCALE: AS SHOWN	DRAWN BY A.E.L.	DRAWING NUMBER
DATE 09-21-2012	CHECKED B.J.A	C3.01
F.B. NO.	RECOMMENDED	
APPROVED		SHEET OF
CITY ENGINEER	R.C.E.	DATE

8036 SECTIONS.dwg Nov 13, 2012 12:05PM



PHASE 3 - SECTION E

SCALE 1"=10' (0 10 20) — E



SHEET REVISIONS	DATE
1 PRELIMINARY	08/13/2012
2 PROGRESS	08/17/2012
3 PROGRESS	09/04/2012
4 PROGRESS	09/20/2012

CITY OF HERMOSA BEACH

PHASE 3 - SECTIONS

E & B/ NATURAL RESOURCES MANAGEMENT
555 6TH ST. HERMOSA BEACH, CA 90254

PREPARED UNDER SUPERVISION OF:

ASHBA 8036
ENGINEERS LIMITED
POST OFFICE BOX 90833
LONG BEACH
CALIFORNIA 90809
(562) 989-9154

SCALE: AS SHOWN	DRAWN BY A.E.L.	DRAWING NUMBER
DATE 09-21-2012	CHECKED B.J.A	C3.02
F.B. NO.	RECOMMENDED	
APPROVED		SHEET OF

CITY ENGINEER R.C.E. DATE

PHASE 3 - SECTION D

SCALE 1"=10' (0 10 20) — D

8036 SECTIONS.dwg Nov 13, 2012 12:06PM

APPENDIX E – EARTHWORK

HERMOSA BEACH, PHASE 1

Client Ref # 8036
EC Job # 120711

EARTHCALC INC.
EARTHWORK ESTIMATING • GPS • RENDERING

Modesto, CA
Newport Beach, CA
Portland, OR
Las Vegas, NV
Phoenix, AZ

Phone 800.765.1717 Fax 866.653.0365 www.earthcalc.com earthcalc@earthcalc.com

EARTHCALC INC.
EARTHWORK ESTIMATING • GPS • RENDERING

Modesto, CA
Newport Beach, CA
Portland, OR
Las Vegas, NV
Phoenix, AZ

Earthwork Summary

Project Name:	HERMOSA BEACH PHASE 1	Job Number:	120711
Prepared for:	ASHBA ENGINEERING LTD	Contact:	Barbara Ashba
Prepared by:	Keri Sheppard	Client Ref#:	8036
Study Date:	10/2/2012	Plan Date:	

Construction Assumptions

Setbacks	None	Sections	None
Undercut	None		
Overbuilds	None		
Slab	None		
Notes	Demolition/Removal removed before Raw Earthwork Calculated, and needs to be stockpiled or offhauled.		

Raw Earthwork

Region	Area (SF) Total	Area (SF) Cut	Area (SF) Fill	Raw Volumes (CY) Cut	Raw Volumes (CY) Fill	Raw Balance		Balance Change\.1'
Site Total	55,738	33,983	21,755	1,393	1,409	16	Import	206
Raw Total	**55,738**	**33,983**	**21,755**	**1,393**	**1,409**	**16**	**Import**	

Adjusted Earthwork

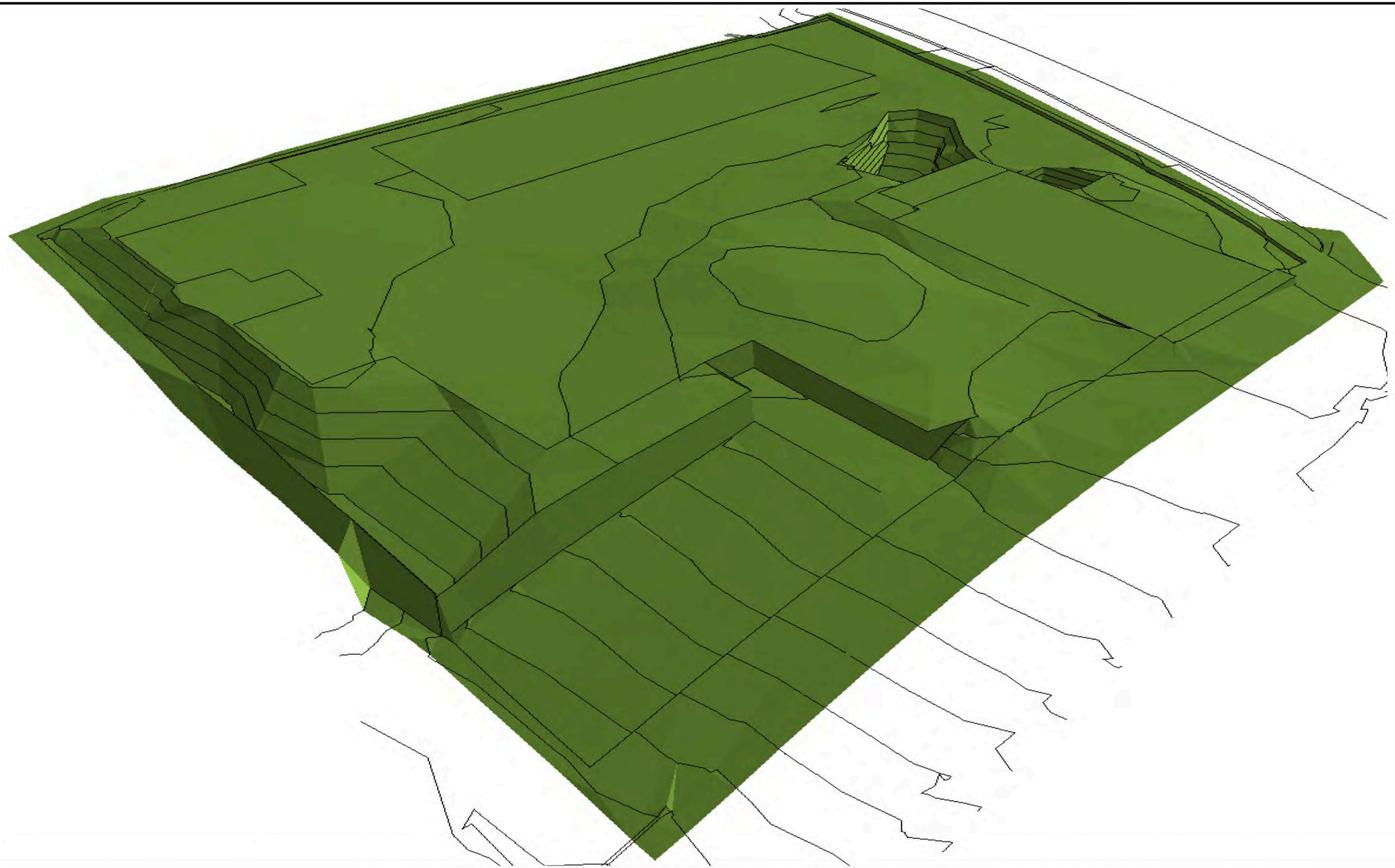
						Volume (cy)	Type
Raw Balance					(from above)	16	Import
Stripping	Depth(ft):	0.00	Area (sf):	55,738			
Demolition/Removal	Depth(ft):	0.50	Area (sf):	55,738	**1,032 CY**		
Subsidence	Depth(ft):	-0.10	Area (sf):	55,738		206	Loss
Swell	0%	Cut					
Shrinkage	7%	Fill				99	Loss
Over-ex	Depth(ft):	0.00	Area (sf):	55,738			
Spoils	None						
Other adjustments	None						
					Net Balance	**321**	**Import**

Phone 800.765.1717 Fax 866.653.0365 www.earthcalc.com earthcalc@earthcalc.com

Project Name:	HERMOSA BEACH PHASE 1	Job Number:	120711
Prepared for:	ASHBA ENGINEERING LTD	Contact:	Barbara Ashba
Prepared by:	Keri Sheppard	Client Ref#:	8036
Study Date:	10/2/2012	Plan Date:	

Raw Earthwork

Region	Area (SF) Total	Area (SF) Cut	Area (SF) Fill	Raw Volumes (CY) Cut	Raw Volumes (CY) Fill	Net Balance		Balance Change /.1'
Site Total	55,738	33,983	21,755	1,393	1,409	16	Import	206



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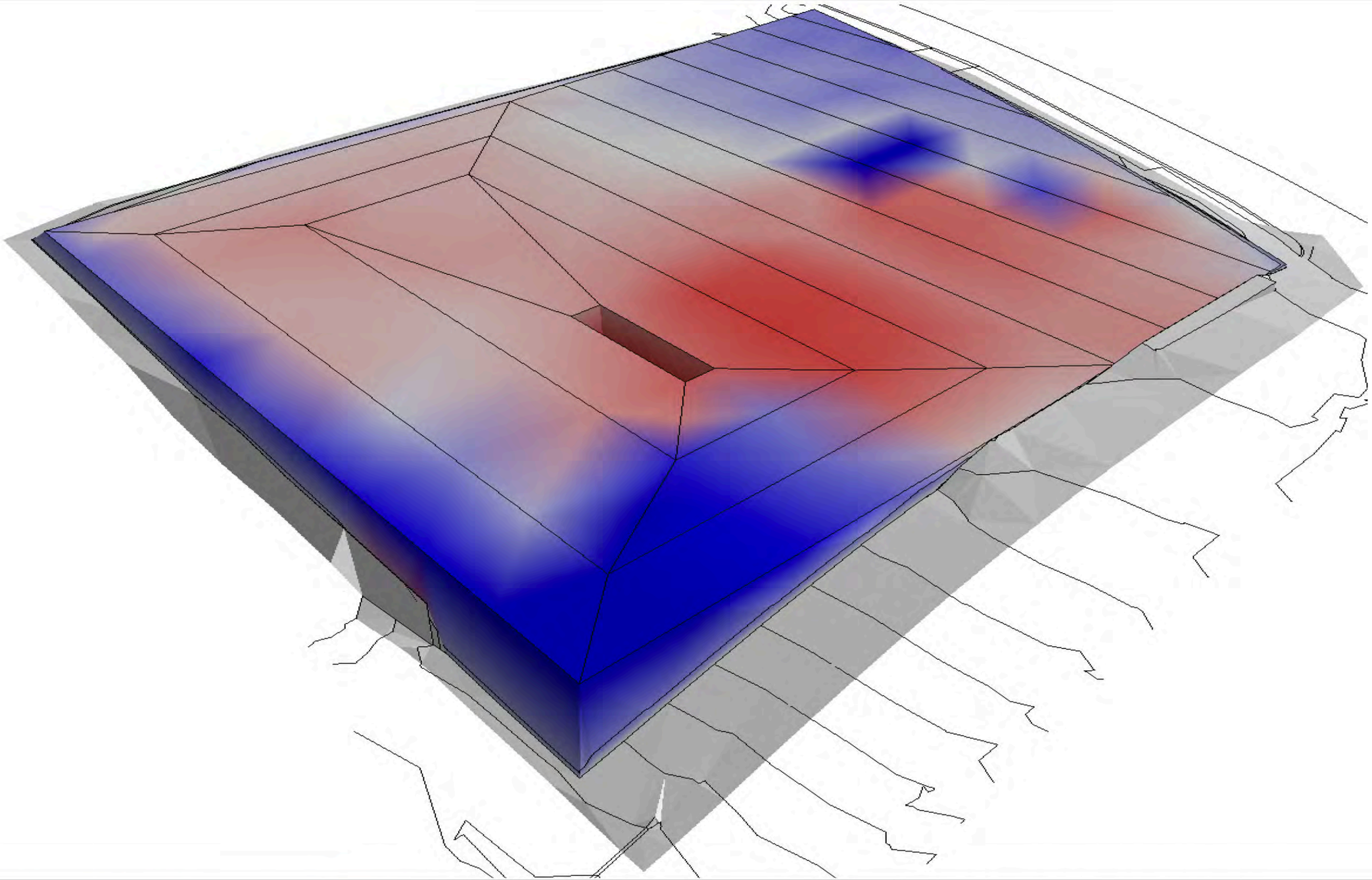
EXISTING

HERMOSA BEACH, PHASE 1
ASHBA ENGINEERING LTD

120711 **10/2/2012**



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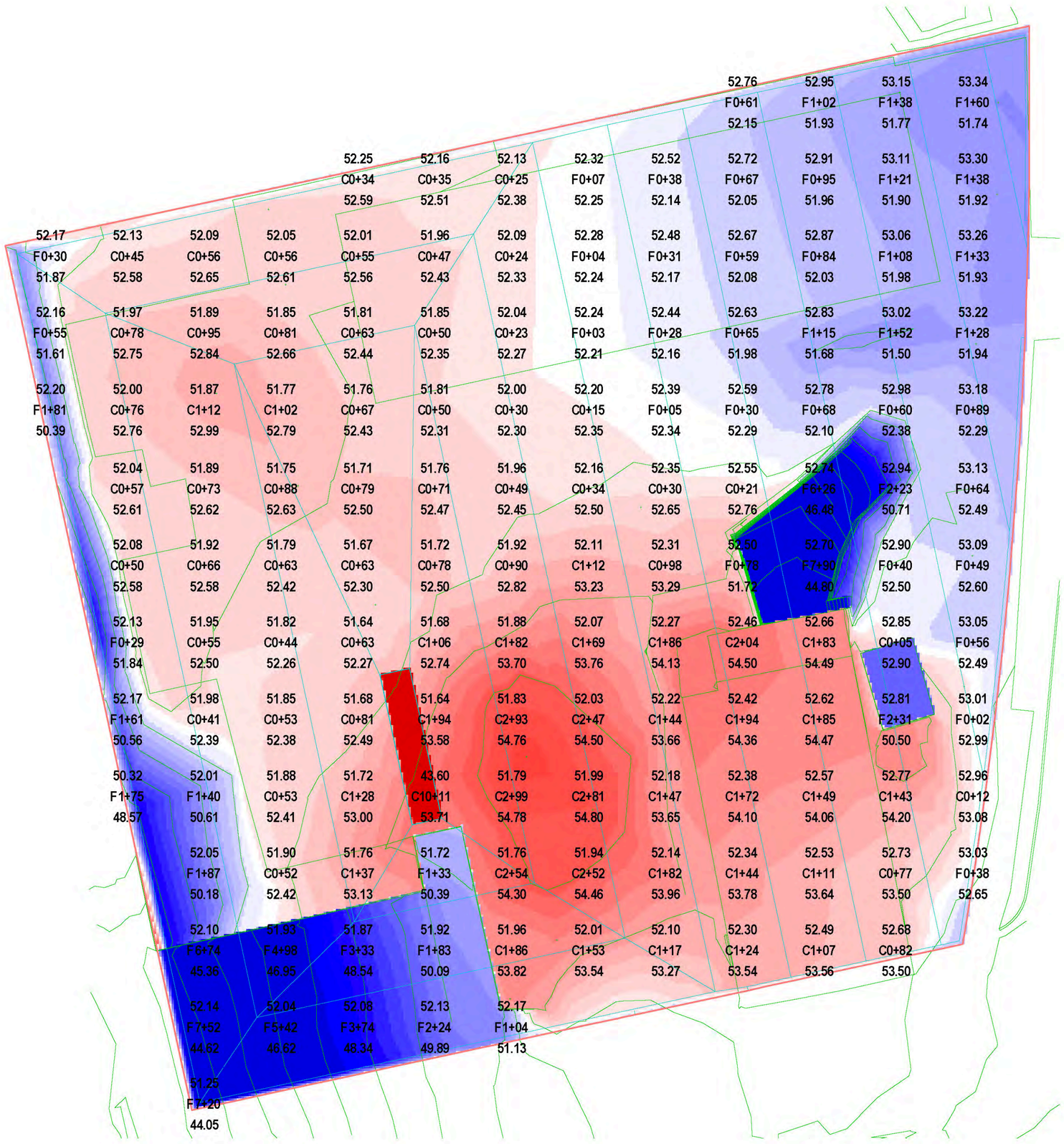
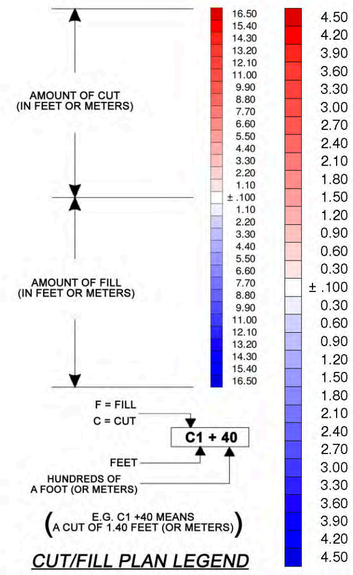
PROPOSED

HERMOSA BEACH, PHASE 1
ASHBA ENGINEERING LTD

120711 **10/2/2012**





CUT/FILL PLAN LEGEND

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0 20 40
SCALE

HERMOSA BEACH, PHASE 1
ASHBA ENGINEERING LTD

120711 **10/2/2012**

HERMOSA BEACH, PHASE 2

Client Ref # 8036
EC Job # 120711

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EARTHCALC INC.
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Modesto, CA
Newport Beach, CA
Portland, OR
Las Vegas, NV
Phoenix, AZ

Earthwork Summary

Project Name:	HERMOSA BEACH PHASE 2	Job Number:	120711
Prepared for:	ASHBA ENGINEERING LTD	Contact:	Barbara Ashba
Prepared by:	Keri Sheppard	Client Ref#:	8036
Study Date:	10/2/2012	Plan Date:	

Construction Assumptions

Setbacks	None	Sections	Well Pad: 12", All other areas: 8"
Undercut	None		
Overbuilds	None		
Slab	FF-8"		
Notes	Demolition/Removal removed before Raw Earthwork Calculated, and needs to be stockpiled or offhauled.		

Raw Earthwork

Region	Area (SF) Total	Area (SF) Cut	Area (SF) Fill	Raw Volumes (CY) Cut	Raw Volumes (CY) Fill	Raw Balance		Balance Change\.1'
Site Total	62,178	57,034	5,144	5,169	102	5,067	Export	230
Raw Total	**62,178**	**57,034**	**5,144**	**5,169**	**102**	**5,067**	**Export**	

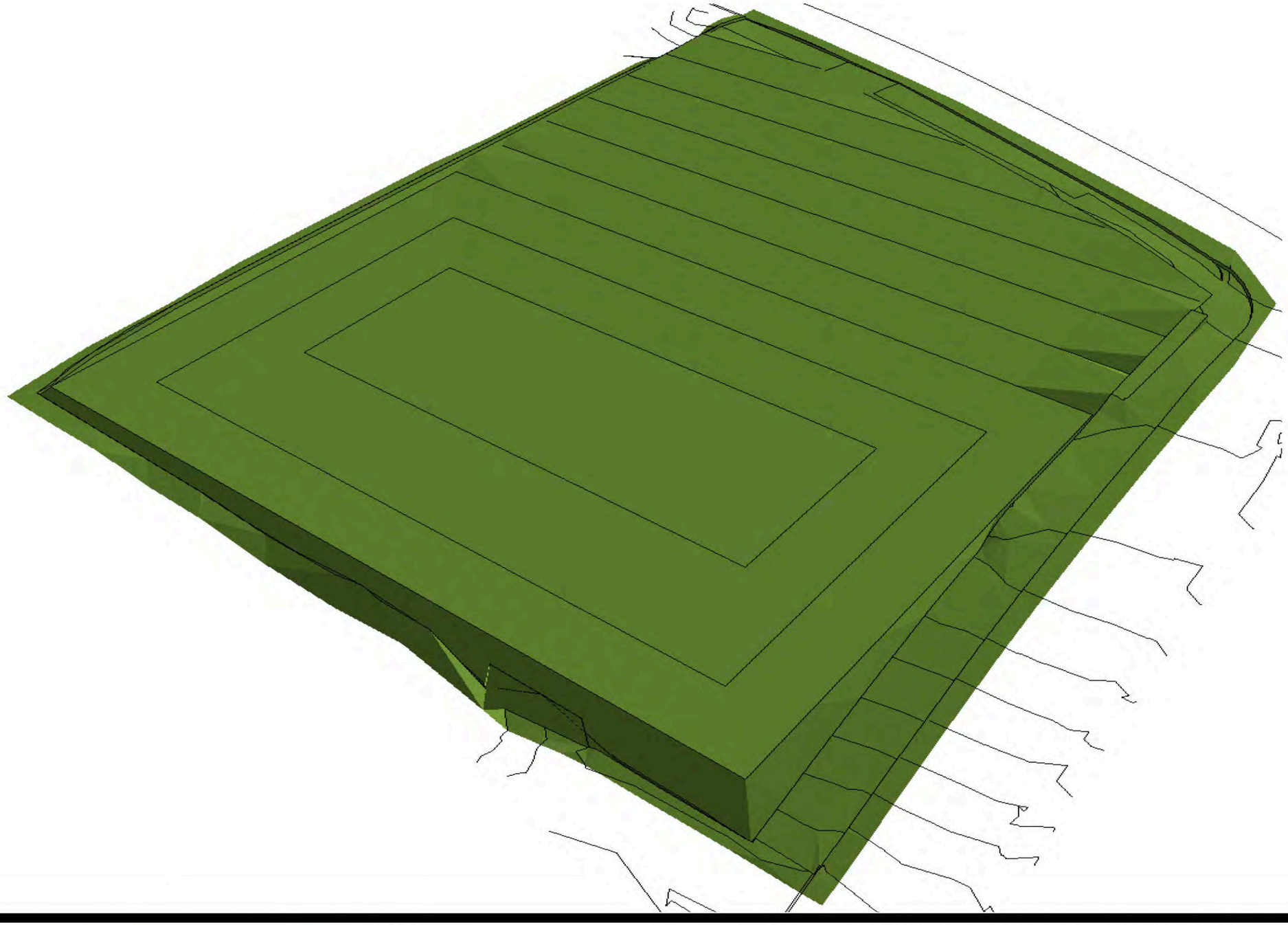
Adjusted Earthwork

						Volume (cy)	Type
Raw Balance					(from above)	5,067	Export
Stripping	Depth(ft):	0.00	Area (sf):	62,178			
Demolition/Removal	Depth(ft):	0.50	Area (sf):	62,178	1,151 CY		
Subsidence	Depth(ft):	-0.10	Area (sf):	62,178		230	Loss
Swell	0%	Cut					
Shrinkage	7%	Fill				7	Loss
Over-ex	Depth(ft):	0.00	Area (sf):	62,178			
Spoils	None						
Other adjustments	None						
					Net Balance	**4,830**	**Export**

Project Name:	HERMOSA BEACH PHASE 2	Job Number:	120711
Prepared for:	ASHBA ENGINEERING LTD	Contact:	Barbara Ashba
Prepared by:	Keri Sheppard	Client Ref#:	8036
Study Date:	10/2/2012	Plan Date:	

Raw Earthwork

Region	Area (SF) Total	Area (SF) Cut	Area (SF) Fill	Raw Volumes (CY) Cut	Raw Volumes (CY) Fill	Net Balance		Balance Change /.1'
Access Road	9,679	9,303	376	77	1	76	Export	36
Buildings	2,426	2,308	118	25	0	25	Export	9
Landscape	3,590	114	3,476	1	83	82	Import	13
Oil Water Separation	4,379	4,379	0	258	0	258	Export	16
Sidewalk	1,702	678	1,024	4	9	5	Import	6
Tank Farm	16,844	16,844	0	4,341	0	4,341	Export	62
Well Pad	23,558	23,408	150	463	9	454	Export	87
Site Total	**62,178**	**57,034**	**5,144**	**5,169**	**102**	**5,067**	**Export**	**230**



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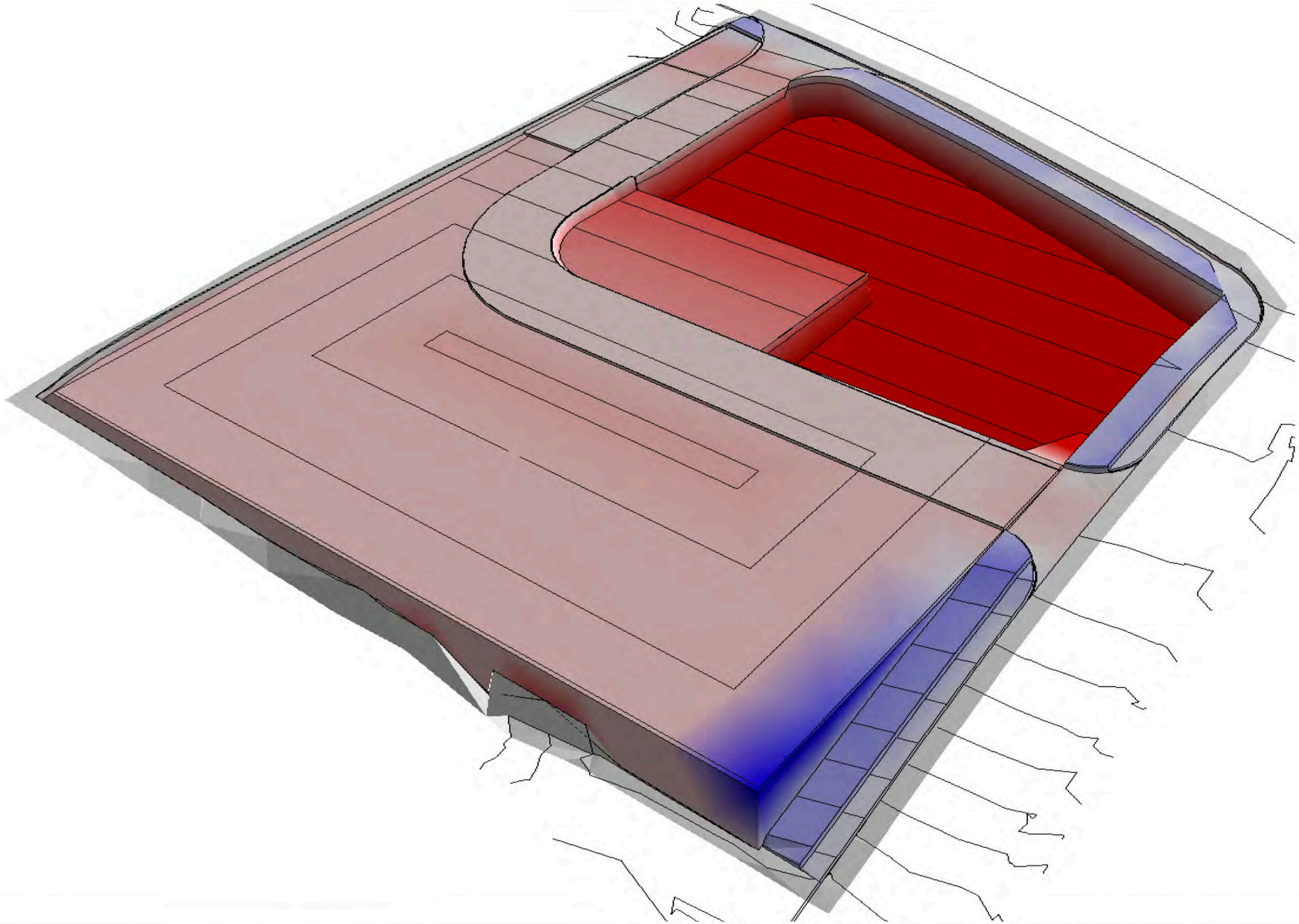
EXISTING

HERMOSA BEACH, PHASE 2
ASHBA ENGINEERING LTD

120711 10/2/2012



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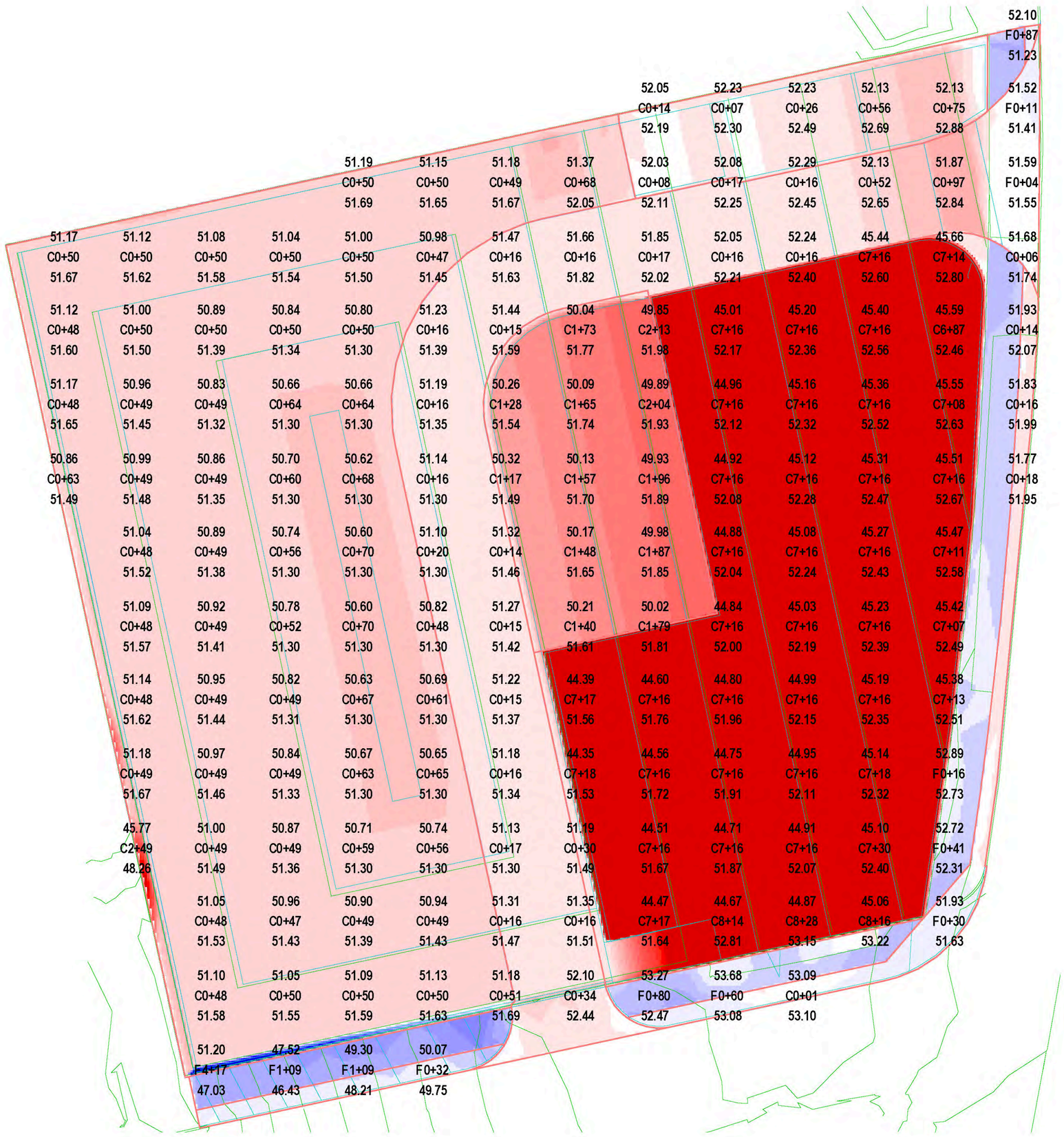
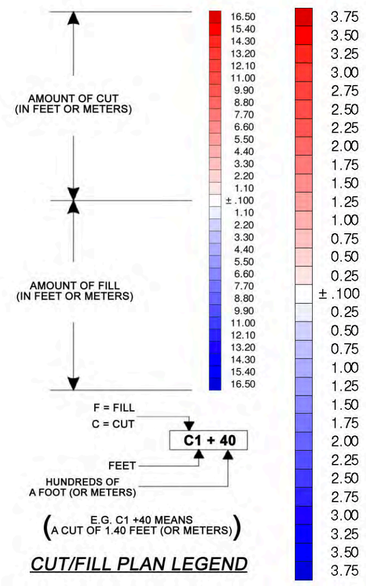
PROPOSED

HERMOSA BEACH, PHASE 2
ASHBA ENGINEERING LTD

120711 **10/2/2012**





CUT/FILL PLAN LEGEND

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0 20 40
SCALE

HERMOSA BEACH, PHASE 2
ASHBA ENGINEERING LTD

120711 **10/2/2012**

HERMOSA BEACH, PHASE 3

Client Ref # 8036
EC Job # 120711

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Earthwork Summary

Project Name:	HERMOSA BEACH PHASE 3	Job Number:	120711
Prepared for:	ASHBA ENGINEERING LTD	Contact:	Barbara Ashba
Prepared by:	Keri Sheppard	Client Ref#:	8036
Study Date:	10/2/2012	Plan Date:	

Construction Assumptions

Setbacks	None	Sections	None
Undercut	None		
Overbuilds	None		
Slab	None		
Notes	Demolition/Removal removed before Raw Earthwork Calculated, and needs to be stockpiled or offhauled.		

Raw Earthwork

Region	Area (SF) Total	Area (SF) Cut	Area (SF) Fill	Raw Volumes (CY) Cut	Raw Volumes (CY) Fill	Raw Balance		Balance Change\.1'
Site Total	22,885	22,885	0	12,492	0	12,492	Export	85
Raw Total	**22,885**	**22,885**	**0**	**12,492**	**0**	**12,492**	**Export**	

Adjusted Earthwork

						Volume (cy)	Type
Raw Balance					(from above)	12,492	Export
Stripping	Depth(ft):	0.00	Area (sf):	22,885			
Demolition/Removal	Depth(ft):	0.50	Area (sf):	22,885	**424 CY**		
Subsidence	Depth(ft):	-0.10	Area (sf):	22,885		85	Loss
Swell	0%	Cut					
Shrinkage	7%	Fill					
Over-ex	Depth(ft):	0.00	Area (sf):	22,885			
Spoils	None						
Other adjustments	None						
					Net Balance	12,407	Export

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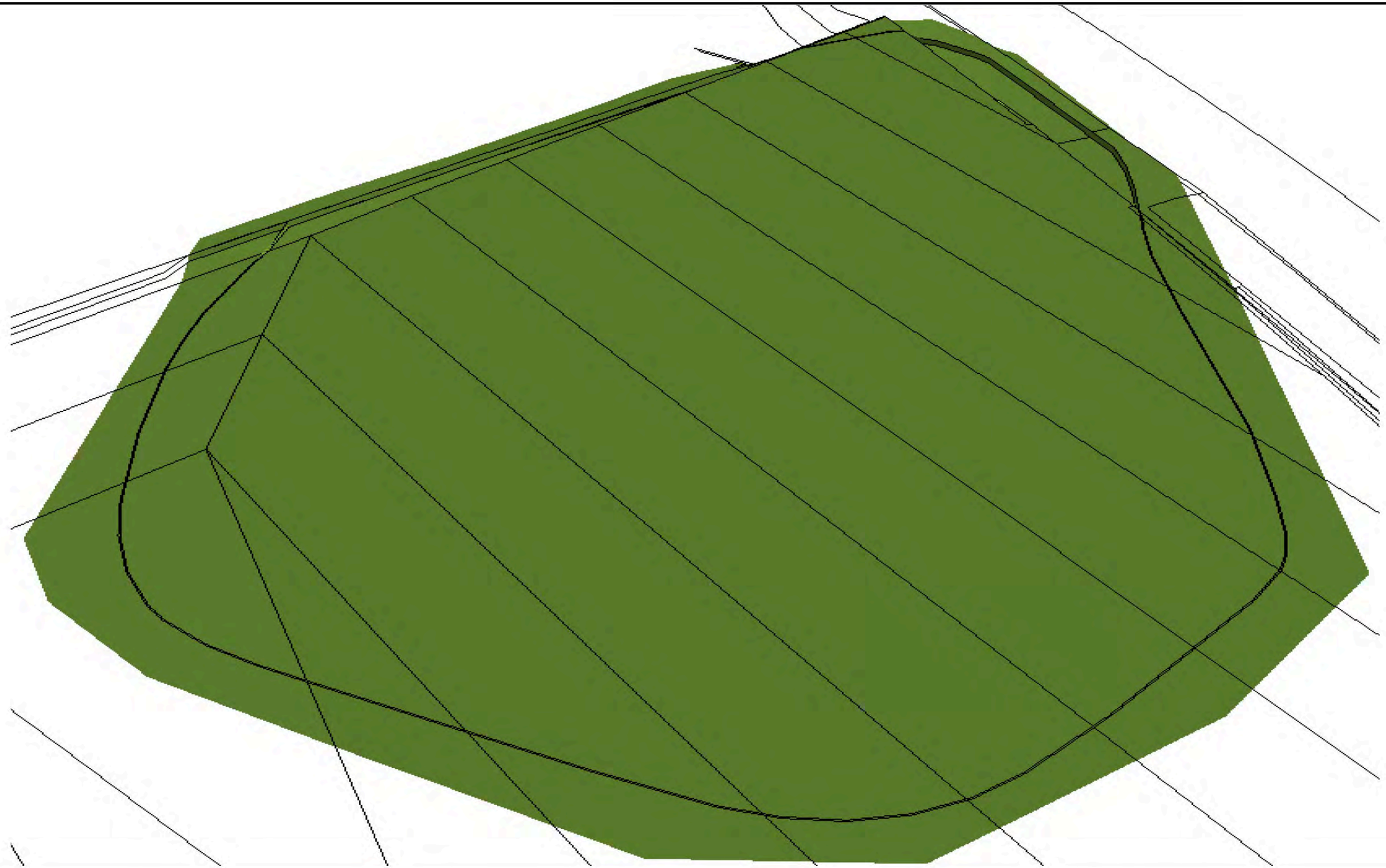
Project Name:	HERMOSA BEACH PHASE 3	Job Number:	120711
Prepared for:	ASHBA ENGINEERING LTD	Contact:	Barbara Ashba
Prepared by:	Keri Sheppard	Client Ref#:	8036
Study Date:	10/2/2012	Plan Date:	

Raw Earthwork

Region	Area (SF) Total	Area (SF) Cut	Area (SF) Fill	Raw Volumes (CY) Cut	Raw Volumes (CY) Fill	Net Balance		Balance Change /.1'
Site Total	22,885	22,885	0	12,492	0	12,492	Export	85



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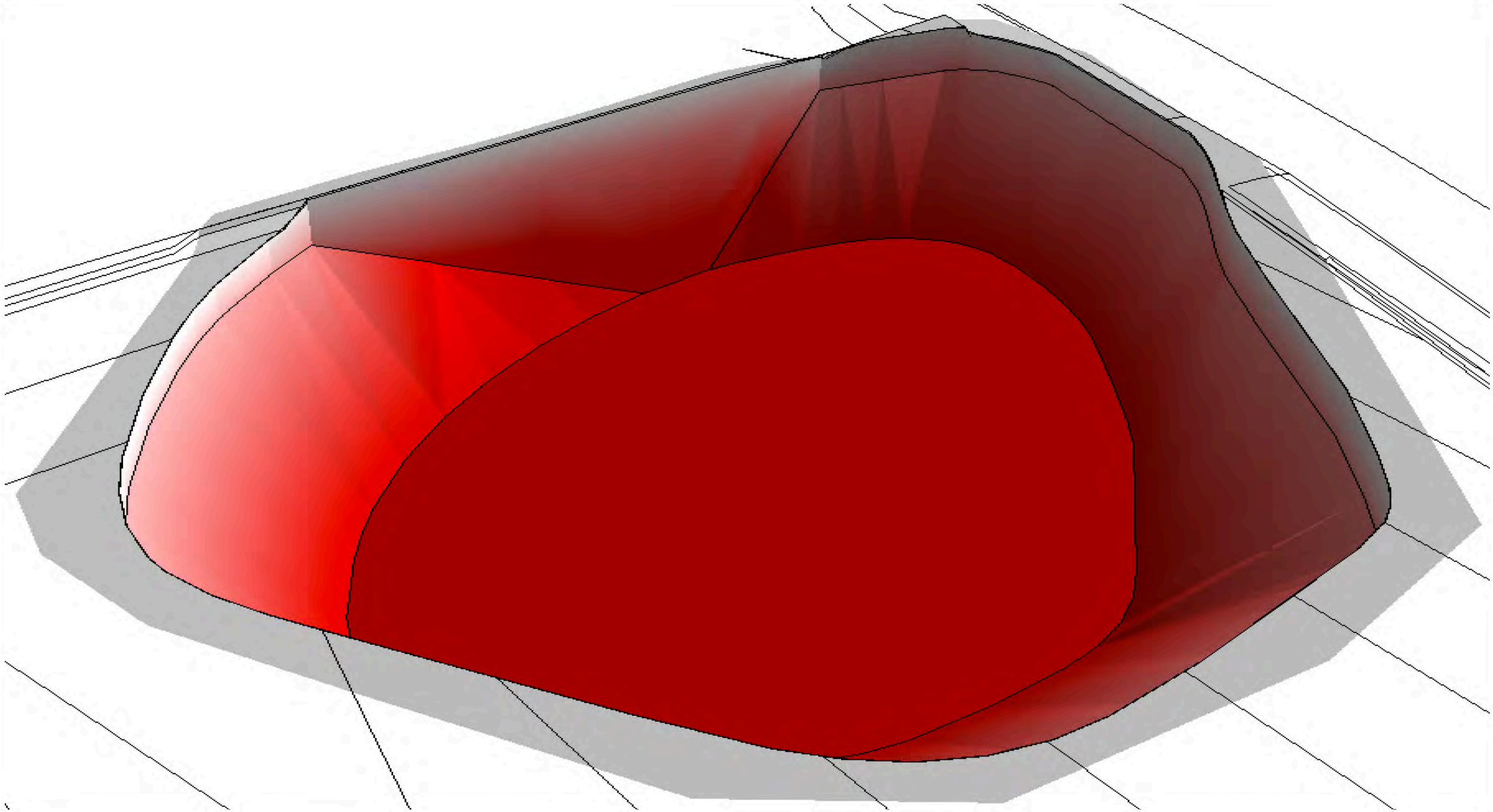
EXISTING

HERMOSA BEACH, PHASE 3
ASHBA ENGINEERING LTD

120711 10/2/2012



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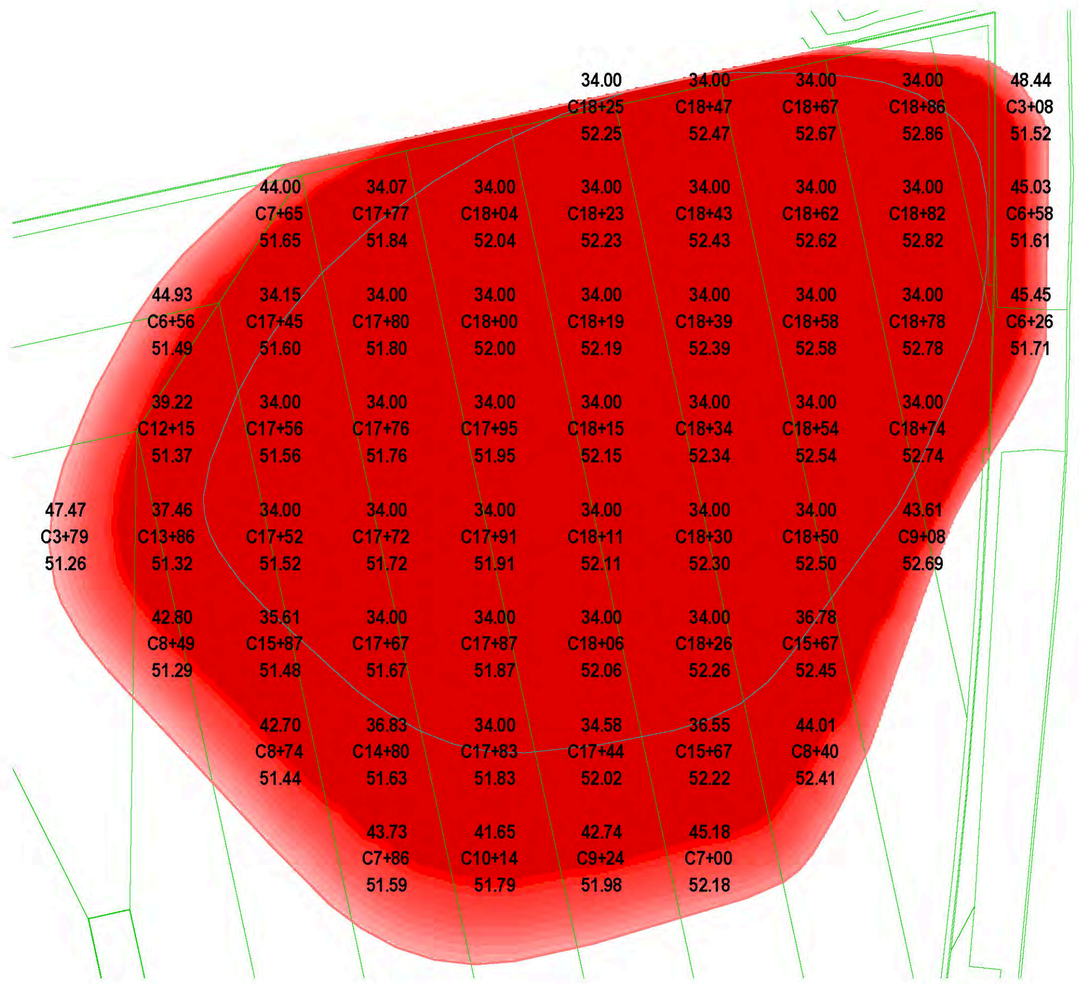
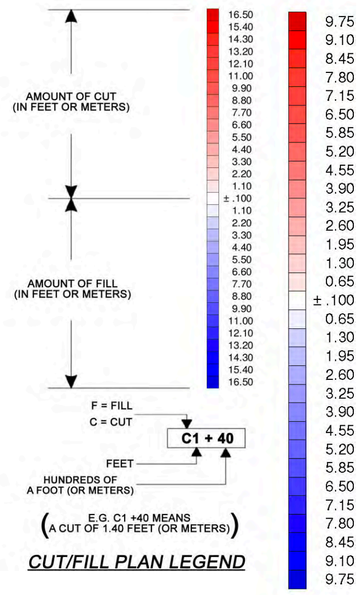
PROPOSED

HERMOSA BEACH, PHASE 3
ASHBA ENGINEERING LTD

120711 **10/2/2012**





F = FILL
C = CUT

C1 + 40

FEET

HUNDREDS OF
A FOOT (OR METERS)

(E.G. C1 +40 MEANS
A CUT OF 1.40 FEET (OR METERS))

CUT/FILL PLAN LEGEND

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0 20 40
SCALE

HERMOSA BEACH, PHASE 3
ASHBA ENGINEERING LTD

120711 **10/2/2012**

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Earthwork Summary

Project Name:	**HERMOSA BEACH PHASE 3**	Job Number:	**120711**
Prepared for:	**ASHBA ENGINEERING LTD**	Contact:	**Barbara Ashba**
Prepared by:	**Keri Sheppard**	Client Ref#:	**8036**
Study Date:	**10/2/2012**	Plan Date:	

Construction Assumptions

Setbacks	**None**	Sections	**None**
Undercut	**None**		
Overbuilds	**None**		
Slab	**None**		
Notes	Demolition/Removal removed before Raw Earthwork Calculated, and needs to be stockpiled or offhauled.		

Raw Earthwork

	Area (SF)			Raw Volumes (CY)		Raw		Balance
Region	**Total**	**Cut**	**Fill**	**Cut**	**Fill**	**Balance**		**Change\.1'**
Volume Above 49'	22,885	22,885	0	2,545	0	**2,545**	Export	85
Volume 49'-34'	22,885	22,885	0	9,954	0	**9,954**	Export	85
Raw Total	**45,770**	**45,770**	**0**	**12,499**	**0**	**12,499**	**Export**	

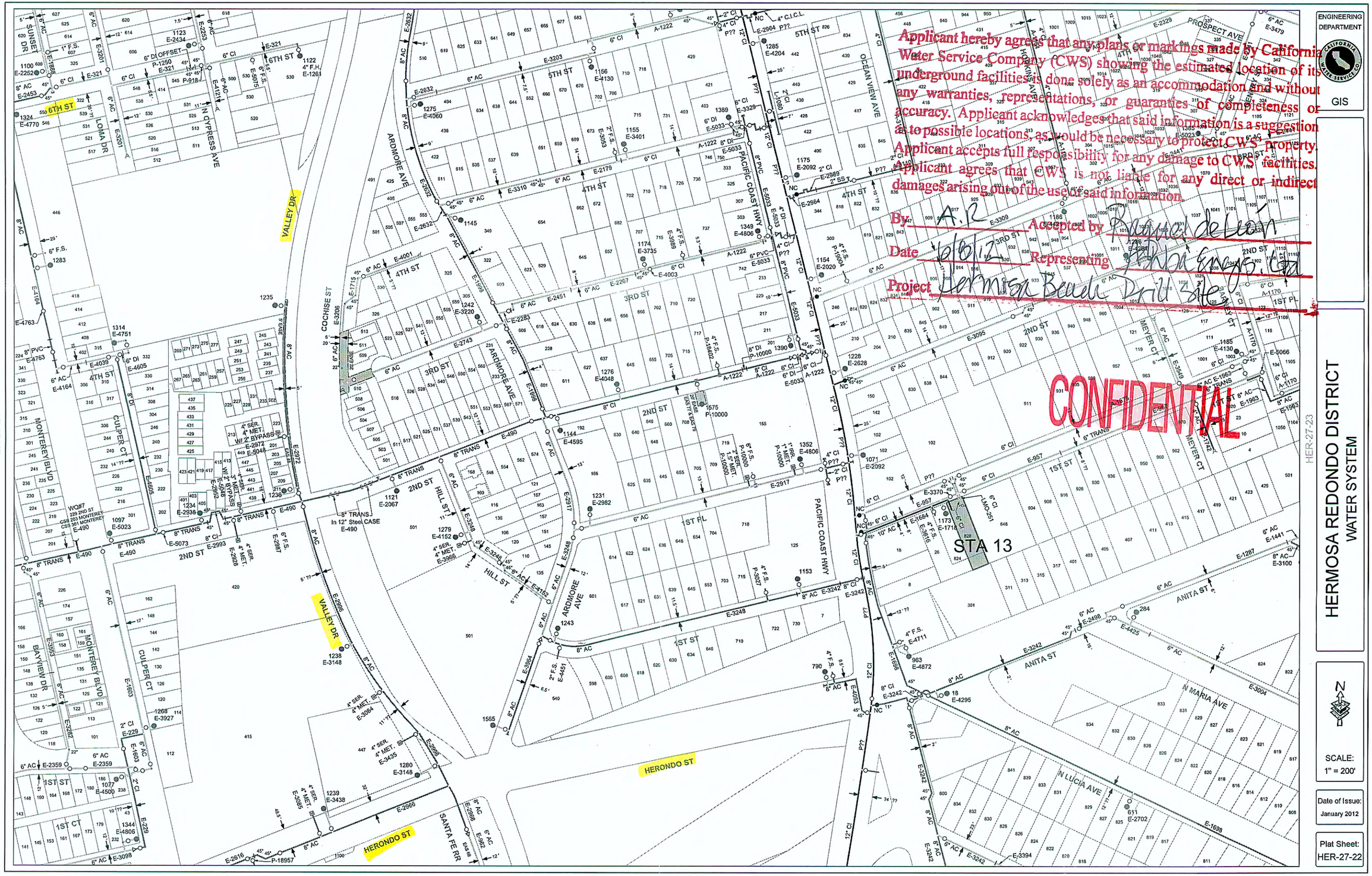
Adjusted Earthwork

						Volume (cy)	Type
Raw Balance					(from above)	**12,499**	Export
Stripping	Depth(ft):	0.00	Area (sf):	45,770			
Demolition/Removal	Depth(ft):	0.50	Area (sf):	45,770	**424 CY**		
Subsidence	Depth(ft):	-0.10	Area (sf):	45,770		170	Loss
Swell	0%	Cut					
Shrinkage	7%	Fill					
Over-ex	Depth(ft):	0.00	Area (sf):	45,770			
Spoils	None						
Other adjustments	None						
					Net Balance	**12,329**	**Export**

Phone 800.765.1717 Fax 866.653.0365 www.earthcalc.com earthcalc@earthcalc.com

APPENDIX F- WATER ATLAS SHEETS

Applicant hereby agrees that any plans or markings made by California Water Service Company (CWS) showing the estimated location of its underground facilities is done solely as an accommodation and without any warranties, representations, or guaranties of completeness or accuracy. Applicant acknowledges that said information is a suggestion of possible locations, as would be necessary to protect CWS' property. Applicant accepts full responsibility for any damage to CWS' facilities. Applicant agrees that CWS is not liable for any direct or indirect damages arising out of the use of said information.
By
Accepted by
Date
Representing
Project
CONFIDENTIAL
ENGINEERING DEPARTMENT
GIS
HERMOSA REDONDO DISTRICT
WATER SYSTEM
SCALE:
1" = 200'
Date of Issue:
January 2012
Plat Sheet:
HER-26-22
POLICE DEPT.
AUBREY CT
OCEAN DR
MONTGOMERY DR
AVIATION BLVD
BONNIE BRAE ST
CROSS AVE
PROSPECT AVE
11TH PL
11TH ST
10TH ST
9TH ST
8TH PL
8TH ST
7TH PL
7TH ST
6TH ST
5TH ST
PACIFIC COAST HWY
ARDMORE AVE
VALLEY DR
BARD ST
N CYPRESS AVE
CYPRESS AVE
LOMA DR
SUNSET DR
N GRAVELEY CT
PINE ST
HOPKINS AVE
GENTRY ST



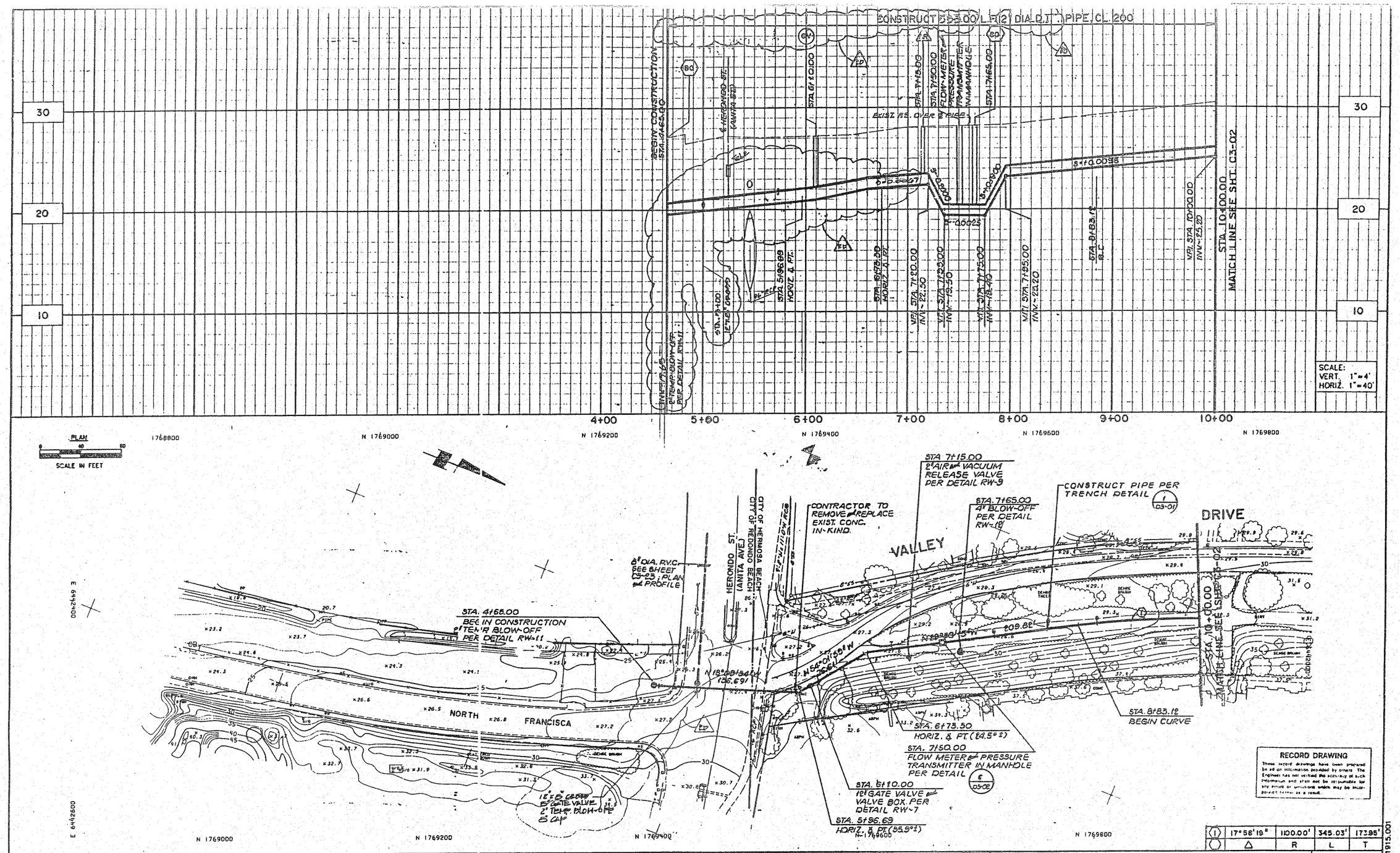
Applicant hereby agrees that any plans or markings made by California Water Service Company (CWS) showing the estimated location of its underground facilities is done solely as an accommodation and without any warranties, representations, or guaranties of completeness or accuracy. Applicant acknowledges that said information is a suggestion as to possible locations, as would be necessary to protect CWS' property. Applicant accepts full responsibility for any damage to CWS' facilities. Applicant agrees that CWS is not liable for any direct or indirect damages arising out of the use of said information.

By A.R. Accepted by Raquel de Leon

Date 6/8/12 Representing SPW Engrs. Ltd

Project Hermosa Beach Drill Site

APPENDIX G – RECLAIMED WATER ATLAS SHEETS



RECORD DRAWING

These record drawings have been prepared based on information provided by others. The Engineer has not verified the accuracy of such information and shall not be responsible for any errors or omissions which may be incorporated herein as a result.

17°56'19"	100.00'	345.03'	173.95'
Δ	R	L	T

DESCRIPTION	DATE	BY
FINAL DRAWING	11/84	J.E.

REVISIONS

REGISTERED PROFESSIONAL ENGINEER — STEVEN D. TEDESCO — CIVIL — STATE OF CALIFORNIA

ASL Consultants, Inc.
ONE JENNER STREET, SUITE 200
IRVINE, CA. 92718
(714) 727-7099

- ☐ ARCADIA
- ☒ IRVINE
- ☐ PALM SPRINGS
- ☐ CAMARILLO
- ☐ RANCHO CUCAMONGA
- ☐ SAN DIEGO

DESIGNED BY:
DRAWN BY:
CHECKED BY:

WEST BASIN MUNICIPAL WATER DISTRICT
17140 S. AVALON BLVD., SUITE 210
CARSON, CA 90746-1216
TEL: 213-217-2411

WEST BASIN WATER RECLAMATION PROGRAM

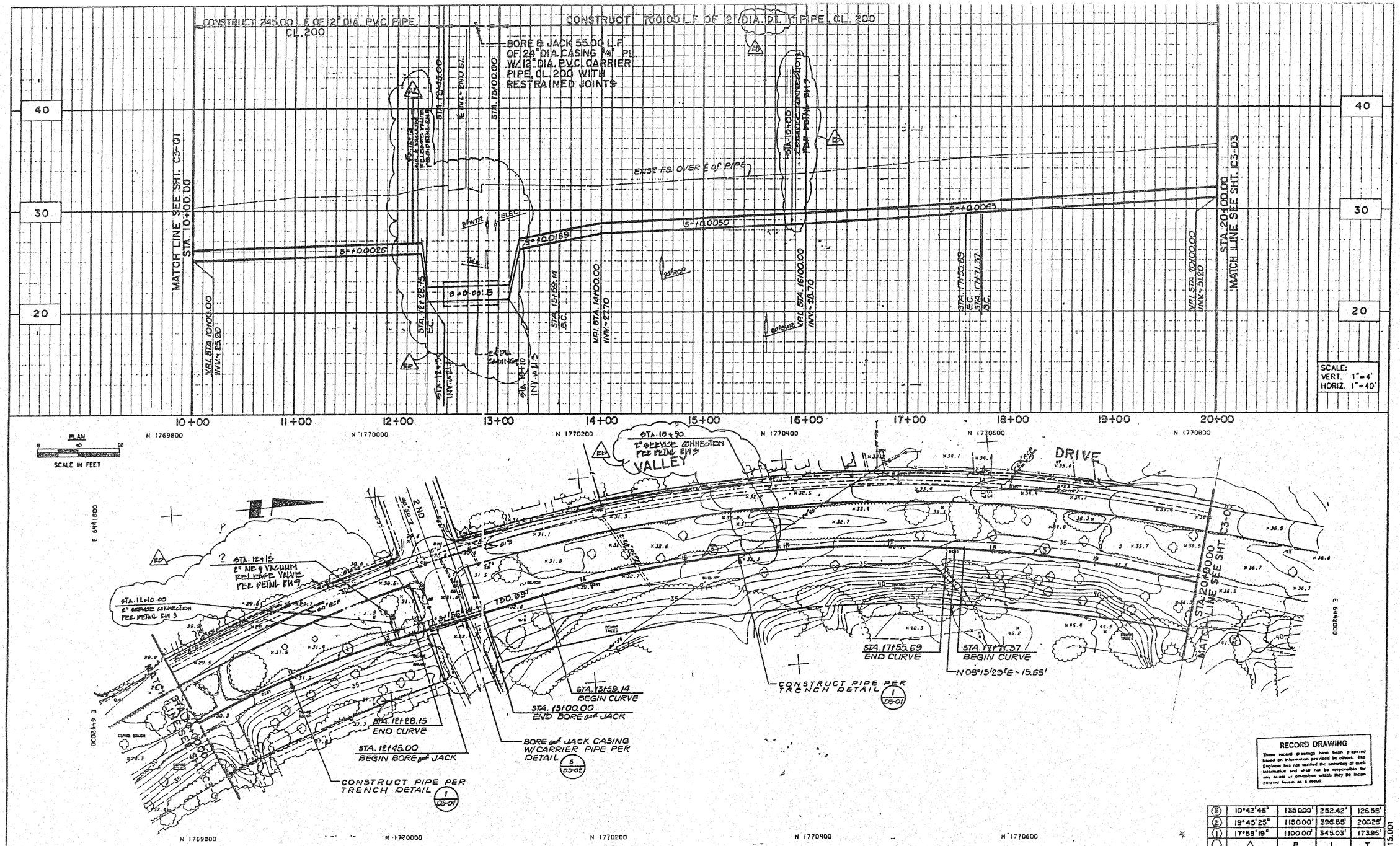
PHASE 1 RECLAIMED WATER DISTRIBUTION SYSTEM

PLAN AND PROFILE
SCHEDULE 3
VALLEY / ARDMORE
STA. 4+55.02 TO STA. 10+00.00

PROJECT NO. C3-01

DWG. NO. 6 OF 40

ASL PROJECT NO. 1915.001



(3)	10°42'46"	1350.00'	252.42'	126.58'
(2)	19°45'25"	1150.00'	396.55'	200.26'
(1)	17°58'19"	1100.00'	345.03'	173.95'
○	△	R	L	T

RECORD DRAWING	11/14	A.E.
DESCRIPTION	DATE	BY

REVISIONS

REGISTERED PROFESSIONAL ENGINEER STEVEN B. TEDESCO CIVIL STATE OF CALIFORNIA

ASL Consultants, Inc.
ONE JENNER STREET, SUITE 200
IRVINE, CA. 92718
(714) 727-7099

- ☐ ARCADIA
- ☒ IRVINE
- ☐ PALM SPRINGS
- ☐ CAMARILLO
- ☐ RANCHO CUCAMONGA
- ☐ SAN DIEGO

DESIGNED BY :
DRAWN BY :
CHECKED BY :

WEST BASIN MUNICIPAL WATER DISTRICT
17140 S. AVALON BLVD., SUITE 210
CARSON, CA 90746-1218
TEL: 213-217-2411

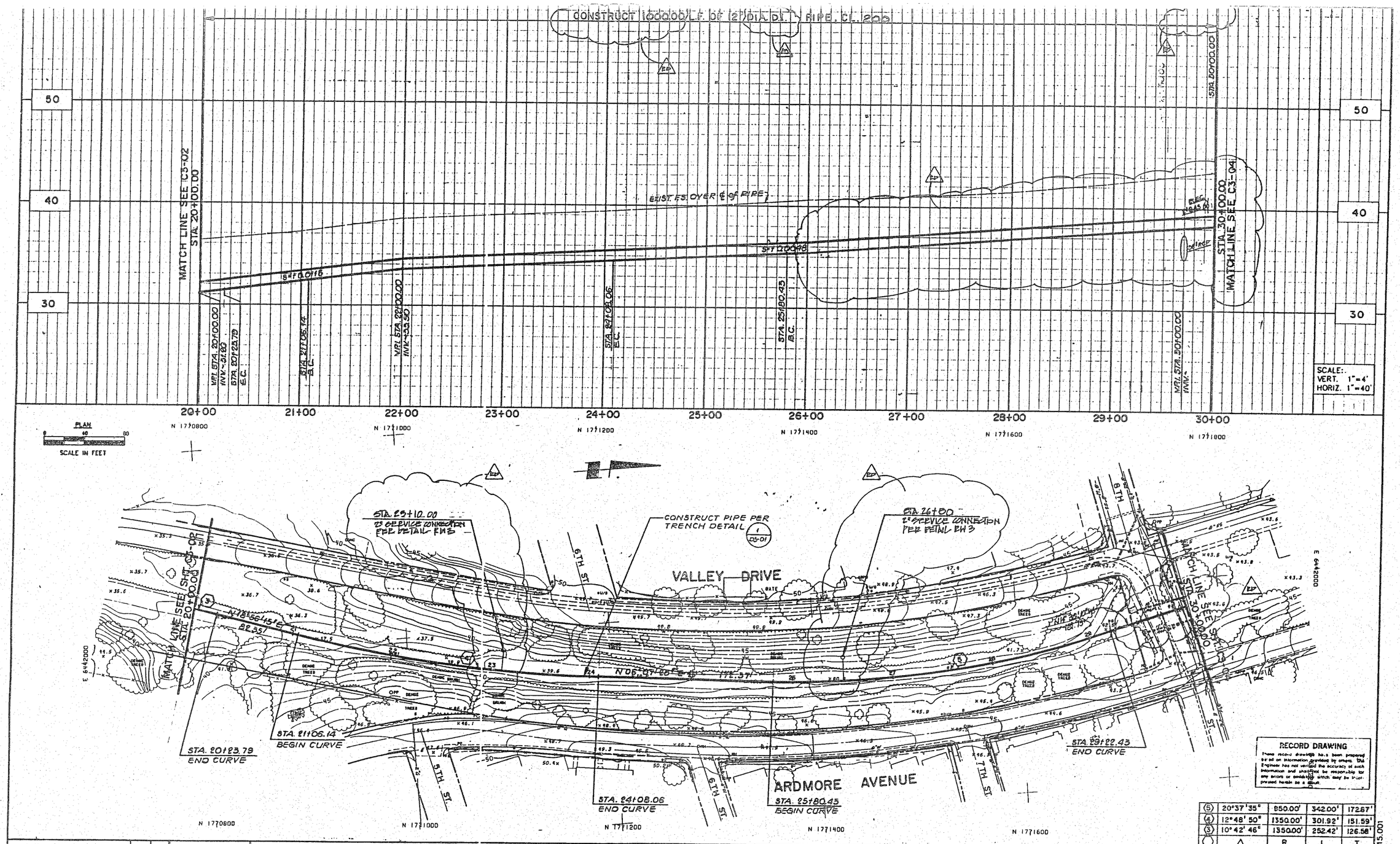
WEST BASIN WATER-RECLAMATION PROGRAM

PHASE 1 RECLAIMED WATER DISTRIBUTION SYSTEM

PLAN AND PROFILE
SCHEDULE 3
VALLEY/ARDMORE
STA. 10+00.00 TO STA. 20+00.00

C3-02
PROJECT NO.
DWG. NO. 7 OF 40

ASL PROJECT NO. 1915.001



(5)	20°37'35"	850.00'	342.00'	172.67'
(4)	12°48'50"	1350.00'	301.92'	151.59'
(3)	10°42'46"	1350.00'	252.42'	126.58'
○	Δ	R	L	T

5	RECORD DRAWING	11/94
	DESCRIPTION	DATE
	REVISIONS	

REGISTERED PROFESSIONAL ENGINEER STEVEN D. TEDESCO No. C038251 Exp. 9-31-93 CIVIL STATE OF CALIFORNIA

ASL Consultants, Inc.
ONE JENNER STREET, SUITE 200
IRVINE, CA. 92718
(714) 727-7099

- ☐ ARCADIA
- ☒ IRVINE
- ☐ PALM SPRINGS
- ☐ CAMARILLO
- ☐ RANCHO CUCAMONGA
- ☐ SAN DIEGO

DESIGNED BY:
DRAWN BY:
CHECKED BY:

WEST BASIN MUNICIPAL WATER DISTRICT
17140 S. AVALON BLVD., SUITE 210
CARSON, CA 90746-1218
TEL: 213-217-2411

WEST BASIN WATER RECLAMATION PROGRAM

PHASE 1 RECLAIMED WATER DISTRIBUTION SYSTEM

PLAN AND PROFILE
SCHEDULE 3
VALLEY/ARDMORE
STA. 20+00.00 TO STA. 30+00.00

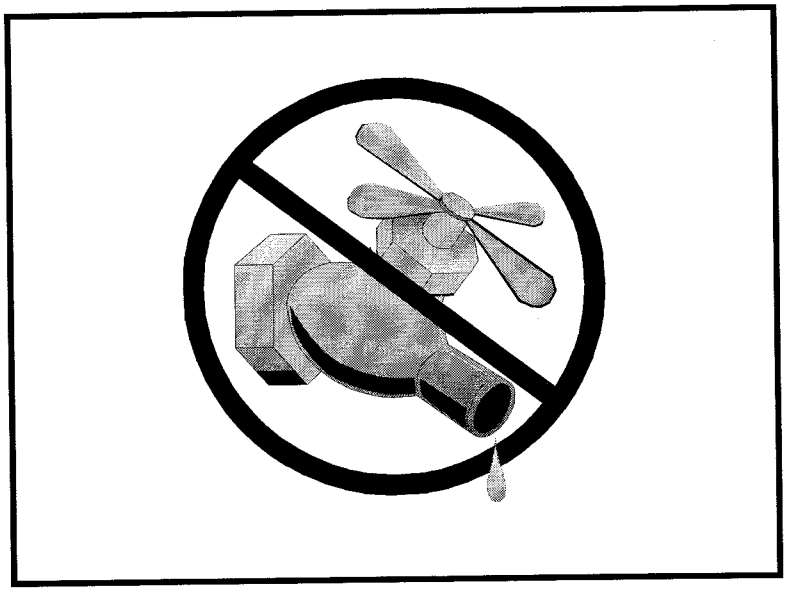
C3-03
PROJECT NO.
DWG. NO. 8 OF 40

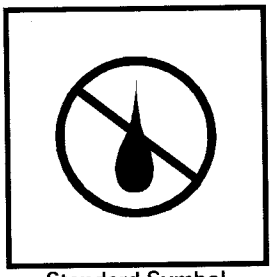
ASL PROJECT NO. 1915.001

APPENDIX H – BEST MANAGEMENT PRACTICES

Water Conservation Practices

NS-1





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Water conservation practices are activities that use water during the construction of a project in a manner that avoids discharge to the ground or discharge causing erosion and/or the transport of pollutants off site.

Appropriate Applications

- Water conservation practices are implemented on all construction sites and wherever water is used.
- Applies to all construction projects.

Limitations

- None identified.

Standards and Specifications

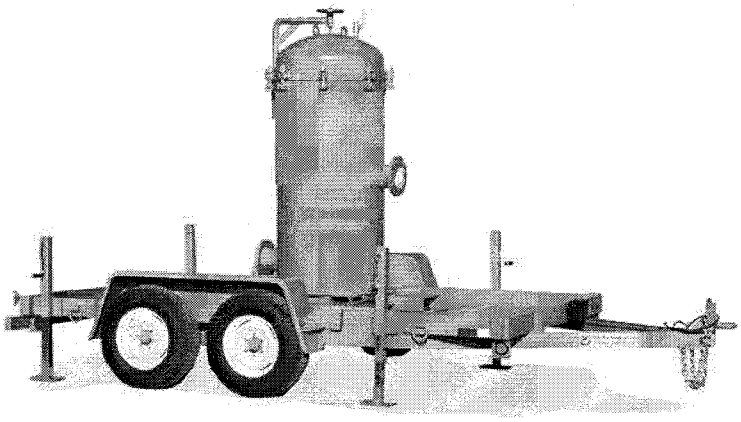
- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks immediately.
- Do not allow water to flow offsite or into storm drain system.
- Vehicles and equipment washing on the construction site is discouraged.
- Avoid using water to clean construction areas. Do not use water to clean pavement. Paved areas shall be swept and vacuumed.
- Direct construction water runoff to areas where it can infiltrate into the ground.
- Apply water for wind erosion control in accordance with WE-1 BMPs.
- Report discharges to Engineer immediately.

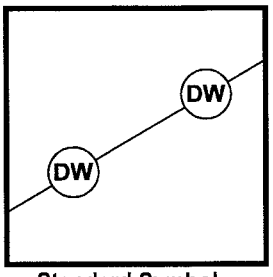
Maintenance and Inspection

- Inspect water conservation practices weekly and before and after every rainfall events. During extended rainfall events, inspect water conservation practices at least once every 24 hours.
- Repair water equipment as needed or as directed by the Engineer.

Dewatering Operations

NS-2





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Dewatering Operations are practices that manage the discharge of pollutants when non-storm water and accumulated precipitation (storm water) must be removed from a work location so that construction work may be accomplished.

Appropriate Applications

- These practices are implemented for discharges of non-storm water and storm water (accumulated rain water) from construction sites. Non-storm water includes, but is not limited to, dewatering of piles, water from cofferdams, water diversions, and water used during construction activities that must be removed from a work area.
- Practices identified in this section are also appropriate for implementation when managing the removal of accumulated precipitation (storm water) from a construction site.
- Storm water mixed with non-storm water shall be managed as non-storm water.

Limitations

- All construction groundwater dewatering shall be in full compliance with the contract special provisions and Monitoring and Reporting Program and Waste Discharge Requirements (WDR) of the NPDES permit included in the contract Special Provisions. All Contractor operations shall be in full compliance with all applicable laws and regulations that govern water quality.
- If groundwater is encountered on the construction site and the contract Special Provisions do **not** include provisions for construction dewatering, the Contractor shall immediately notify the Engineer for direction. No groundwater shall be discharged to the sanitary sewer system, street/gutter, or any other location, whether contaminated, treated, or not, without prior approval by the Engineer.

Standards and Specifications

- Dewatering for accumulated precipitation (storm water) shall follow this BMP in accordance with the approved Accumulated Precipitation Procedure (APP) and use treatment measures specified herein (See example in Section 7.2).
- The Contractor shall submit an APP as part of the SWPPP detailing methods and procedures for management and discharge of accumulated precipitation on the construction site, including treatment technologies/BMPs, equipment, discharge locations, and all other pertinent information. If a SWPPP is not required per the contract Special Provisions, the Contractor shall prepare an APP and submit it to the Engineer separately.
- Sediment control and other appropriate BMPs. Implement SS-10 "Outlet Protection/Velocity Dissipation Devices" to prevent erosion at the discharge point.
- Discharges must comply with regional and watershed-specific discharge requirements.
- The controls discussed in this BMP address sediment only. If the presence of other pollutants is identified in the contract Special Provisions, the Contractor shall implement dewatering pollution controls as required by the contract Special Provisions.
- If other pollutants are identified or suspected in the water to be removed by dewatering, and are not identified in the contract Special Provisions, the contractor shall not discharge the water and immediately notify the Engineer.
- Reuse water on-site (such as dust control, compaction, etc) if approved by the Engineer.
- Treatment system shall be fenced to prevent unauthorized entry
- Additional permits or permissions from other agencies may be required for dewatering cofferdams or diversions.

Maintenance and Inspection

- Inspect dewatering operations daily and document weekly and before and after every rainfall events. During extended rainfall events, inspect paving and grinding operations at least once every 24 hours.
- Inspect all BMPs implemented to comply with permit requirements frequently and repair or replace BMPs to ensure they function as designed.
- Conduct water quality monitoring pursuant to the permit requirements of the contract Special Provisions. Documentation must be included in the SWPPP.
- Accumulated sediment that is commingled with other pollutants must be disposed of in accordance with all applicable laws and regulations and as approved by the Engineer.

Sediment Treatment

A variety of methods can be used to treat water during dewatering operations from the construction site. Several devices are presented in this section that provide options to achieve sediment removal. The size of particles present in the sediment and Permit or receiving water limitations on sediment are key considerations for selecting sediment treatment option(s); in some cases, the use of multiple devices may be appropriate. If a selected method or device does not adequately remove sediment, a different or additional method shall be implemented.

Category 1: Constructed Settling Technologies

The devices discussed in this category are to be used exclusively for dewatering operations only.

Sediment/Desilting Basin (SC-2)

A sediment/desilting basin is a temporary basin with a controlled release structure that is formed by excavation and/or construction of an embankment to detain sediment-laden runoff and allow sediment to settle out before discharging.

Appropriate Applications:

- Effective for the removal of trash, gravel, sand, and silt and some metals that settle out with the sediment.

Maintenance:

- Maintenance is required for safety fencing, vegetation, embankment, inlet and outfall structures, as well as other features.
- Removal of sediment is required when the storage volume is reduced by one-third.

Sediment Trap (SC-3)

A sediment trap is a temporary basin formed by excavation and/or construction of an earthen embankment across a waterway or low drainage area to detain sediment-laden runoff and allow sediment to settle out before discharging.

Appropriate Applications:

- Effective for the removal of large and medium sized particles (sand and gravel) and some metals that settle out with the sediment.

Maintenance:

- Maintenance is required for vegetation, embankment, inlet and outfall structures, as well as other features.
- Removal of sediment is required when the storage volume is reduced by one-third.

Category 2: Mobile Settling Technologies

The devices discussed in this category are typical of tanks that can be used for sediment treatment of dewatering operations. A variety of vendors are available who supply these tanks.

Weir Tank

A weir tank separates water and waste by using weirs. The configuration of the weirs (over and under weirs) maximizes the residence time in the tank and determines the waste to be removed from the water, such as oil, grease, and sediments.

Appropriate Applications:

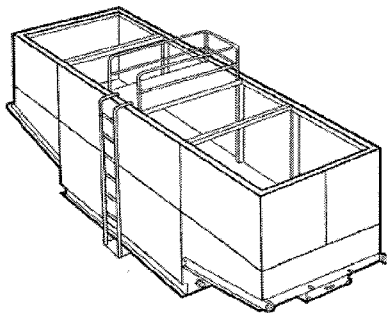
- The tank removes trash, some settleable solids (gravel, sand, and silt), some visible oil and grease, and some metals (removed with sediment). To achieve high levels of flow, multiple tanks can be used in parallel. If additional treatment is desired, the tanks can be placed in series or as pre-treatment for other methods.

Implementation:

- Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.
- Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors shall be consulted to appropriately size tank.

Maintenance:

- Periodic cleaning is required based on visual inspection or reduced flow.
- Oil and grease disposal must be by licensed waste disposal company in accordance with WM-6.



Weir Tank

Dewatering Tank

A dewatering tank removes debris and sediment. Flow enters the tank through the top, passes through a fabric filter, and is discharged through the bottom of the tank. The filter separates the solids from the liquids.

Appropriate Applications:

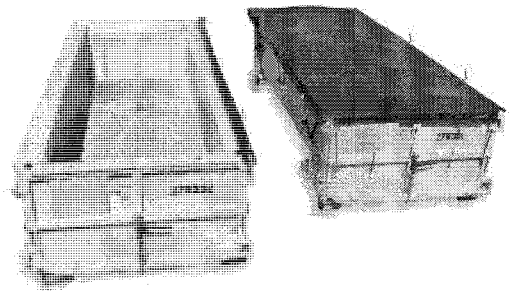
- The tank removes trash, gravel, sand, and silt, some visible oil and grease, and some metals (removed with sediment). To achieve high levels of flow, multiple tanks can be used in parallel. If additional treatment is desired, the tanks can be placed in series or as pre-treatment for other methods.

Implementation:

- Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.
- Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors shall be consulted to appropriately size tank.

Maintenance:

- Periodic cleaning is required based on visual inspection or reduced flow.
- Oil and grease disposal must be by licensed waste disposal company in accordance with WM-6..



Dewatering Tanks

Category 3: Basic Filtration Technologies

Gravity Bag Filter

A gravity bag filter, also referred to as a dewatering bag, is a square or rectangular bag made of non-woven geotextile fabric that collects sand, silt, and fines.

Appropriate Applications:

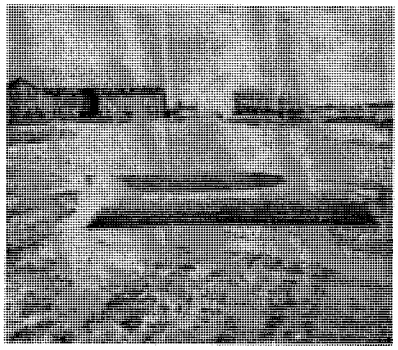
- Effective for the removal of sediments (gravel, sand, and silt). Some metals are removed with the sediment.

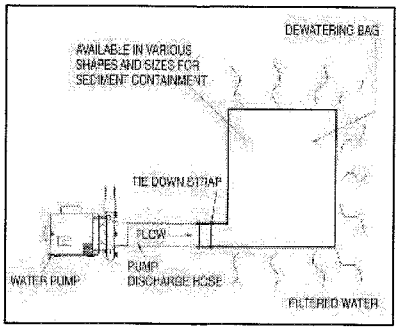
Implementation:

- Water is pumped into one side of the bag and seeps through the bottom and sides of the bag.
- A secondary barrier, such as a rock filter bed or gravel bag barrier, is placed beneath and beyond the edges of the bag to capture sediments that escape the bag.

Maintenance:

- Inspection of the flow conditions, bag condition, bag capacity, and the secondary barrier is required.
- Replace the bag when it no longer filters sediment or passes water at a reasonable rate.
- The bag is disposed off-site, or on-site as directed by the Engineer.





Gravity Bag Filter

Category 4: Advanced Filtration Technologies

Sand Media Particulate Filter

Water is treated by passing it through canisters filled with sand media. Generally, sand filters provide a final level of treatment. They are often used as a secondary or higher level of treatment after a significant amount of sediment and other pollutants have been removed.

Appropriate Applications:

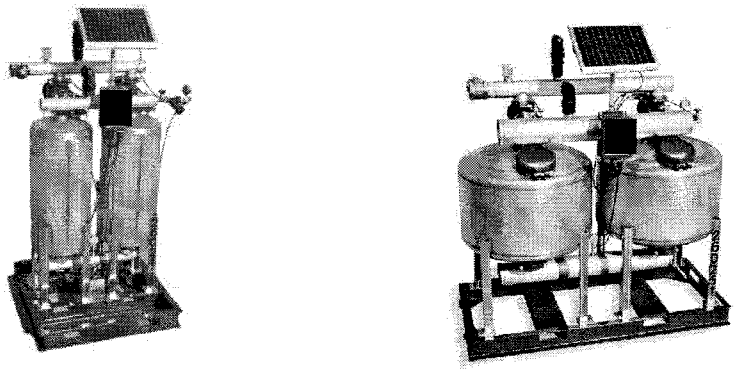
- Effective for the removal of trash, gravel, sand, and silt and some metals, as well as the reduction of biochemical oxygen demand (BOD) and turbidity.
- Sand filters can be used for standalone treatment or in conjunction with bag and cartridge filtration if further treatment is required.
- Sand filters can also be used to provide additional treatment to water treated via settling or basic filtration.

Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation.

Maintenance:

- The filters require monthly service to monitor and maintain the sand media.



Sand Media Particulate Filters

Pressurized Bag Filter

A pressurized bag filter is a unit composed of single filter bags made from polyester felt material. The water filters through the unit and is discharged through a header, allowing for the discharge of flow in series to an additional treatment unit. Vendors provide pressurized bag filters in a variety of configurations. Some units include a combination of bag filters and cartridge filters for enhanced contaminant removal.

Appropriate Applications:

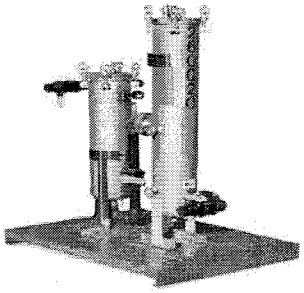
- Effective for the removal of sediment (sand and silt) and some metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Oil absorbent bags are available for hydrocarbon removal.
- Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

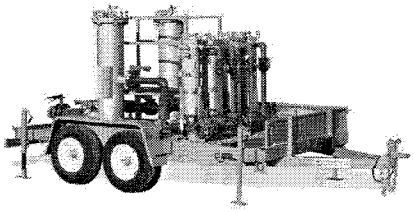
Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance with installation and operation.

Maintenance:

- The filter bags require replacement when the pressure differential exceeds the manufacturer's recommendation.





Pressurized Bag Filter

Cartridge Filter

Cartridge filters provide a high degree of pollutant removal by utilizing a number of individual cartridges as part of a larger filtering unit. They are often used as a secondary or higher (polishing) level of treatment after a significant amount of sediment and other pollutants are removed. Units come with various cartridge configurations (for use in series with pressurized bag filters) or with a larger single cartridge filtration unit (with multiple filters within).

Appropriate Applications:

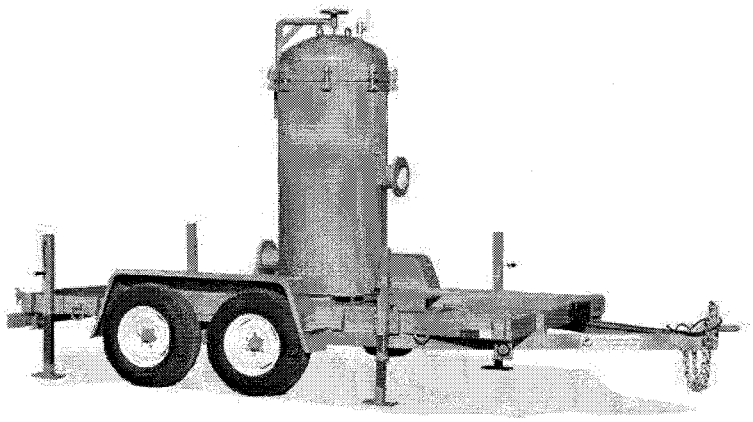
- Effective for the removal of sediment (sand, silt, and some clays) and metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Hydrocarbons can effectively be removed with special resin cartridges.
- Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

Implementation:

- The filters require delivery to the site and initial set up. The vendor can provide assistance.

Maintenance:

- The cartridges require replacement when the pressure differential exceeds the manufacturer's recommendation.



Cartridge Filter

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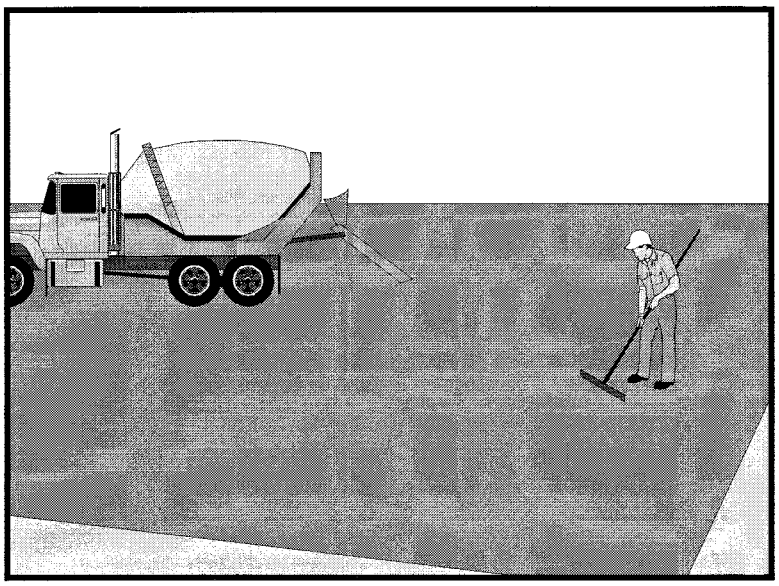
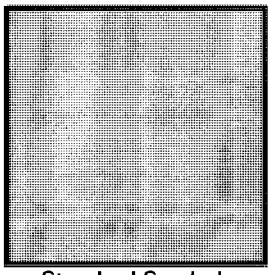
Paving and Grinding Operations

NS-3





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Procedures and practices for conducting paving, concrete slurry, cement or masonry, saw cutting, and grinding operations to minimize the transport of pollutants to the storm drain system or receiving water body.

Appropriate Applications

These procedures are implemented where paving, surfacing, resurfacing, grinding, slurry, cement, mortar or sawcutting, may pollute storm water runoff or discharge to the storm drain system or watercourses.

Limitations

- Finer solids are not effectively removed by sediment control BMPs (SC-1 through SC-10) settling or filtration systems. SC-10 is not adequate for drain inlet protection from paving/concrete pollutants.

Standards and Specifications

- Substances used to coat asphalt transport trucks, asphalt trucks, and asphalt spreading equipment shall not contain soap and shall be non-foaming and non-toxic.
- Place plastic materials under asphaltic concrete (AC) paving equipment while not in use, to catch and/or contain drips and leaks. See also BMP WM-4, "Spill Prevention and Control."
- When paving involves AC, the following steps shall be implemented to prevent the discharge of uncompacted or loose AC, tack coats, equipment cleaners, or other paving materials:
  - Minimize sand and gravel from new asphalt from getting into storm drains, streets, and creeks by sweeping.
  - Old, broken, or spilled asphalt shall be removed from the project site and recycled or disposed of as approved by the Engineer.
  - AC grindings, pieces, or chunks shall not be used in embankments or shoulder backing unless approved by the Engineer.

- Collect and remove all broken asphalt and recycle off-site or dispose of offsite in accordance with all applicable laws and regulations.
- During chip seal application and sweeping operations, petroleum or petroleum covered aggregate shall not be discharged to the ground surface, enter any storm drain or water courses. Filter fabrics or plastic must be used to cover inlets to prevent any discharge of sediment or water until installation is complete.
- Use only non-toxic substances to coat asphalt transport trucks and asphalt spreading equipment.

- Drainage inlet structures and manholes shall be covered with plastic during application of seal coat, tack coat, slurry seal, and/or fog seal, or any other paving/concrete, cement, slurry or mortar related pollutant to prevent any discharge to the storm drain system.
- Seal coat, tack coat, slurry seal, or fog seal shall not be applied if rainfall is predicted to occur during the application or curing period.
- Paving equipment parked onsite shall be parked over plastic to prevent discharge to the ground surface.
- No washing of asphalt equipment shall be conducted on-site. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in BMP WM-5, "Solid Waste Management." Any cleaning onsite shall follow BMP NS-8, "Vehicle and Equipment Cleaning."
- Do not wash sweepings from exposed aggregate concrete into a storm drain system. Collect and return to stockpile (WM-3), or dispose of properly.

Sawcutting

- Do not conduct sawcutting during rain or when there is a 50% percent chance of measurable precipitation (0.01 inches or more).
- Use minimum sawcutting blade speed to reduce required amount of water needed.
- Vacuum up sawcutting waste as it is generated. Do not wait to complete sawcutting operation.
- After vacuuming, the fine slurry shall be swept up after it dries.
- Do not allow sawcutting waste slurry to get to storm drain inlet. SC-10 Storm Drain Inlet Protection and other sediment BMPs are not adequate to prevent discharge. Drain inlets shall be protected by impervious materials such as plastic. The impervious drain inlet protection shall be removed after the sawcutting operation is completed and all waste is cleaned up. The waste slurry must be completely contained in a concrete washout (WM-8) and/or shall be disposed of offsite without discharging

to permeable or impermeable surfaces.

Pavement Grinding or Removal

- Residue from PCC grinding operations shall be picked up by means of a vacuum attachment to the grinding machine, shall not be allowed to flow across the pavement, and shall not be left on the surface of the pavement. See also BMP WM-8, "Concrete Waste Management;" and BMP WM-10, "Liquid Waste Management."
- Collect pavement digout material by mechanical or manual methods. This material may be recycled if approved by the Engineer for use as shoulder backing or base material at locations approved by the Engineer.
- If digout material cannot be recycled, transport the material to a storage site approved by the Engineer or offsite in accordance with all applicable laws and regulations. Digout activities shall not be conducted in the rain.
- When approved by the Engineer, stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses and stored consistent with BMP WM-3, "Stockpile Management."
- Disposal or use of AC grindings shall be approved by the Engineer. See also BMP WM-8, "Concrete Waste Management."
- No "kick-brooms" shall be used.

Thermoplastic Striping

- All thermoplastic striper and pre-heater equipment shutoff valves shall be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the storm water drainage system, or watercourses.
- The pre-heater shall be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave six inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move when the vehicle is deadheaded.
- Contractor shall not pre-heat, transfer, or load thermoplastic near drain inlets or watercourses.
- Clean truck beds daily of loose debris and melted thermoplastic. When possible recycle thermoplastic material. Thermoplastic waste shall be disposed of in accordance with all applicable laws and regulations.

Raised/Recessed Pavement Marker Application and Removal

- Do not transfer or load bituminous material near drain inlets, the storm water drainage system or watercourses.

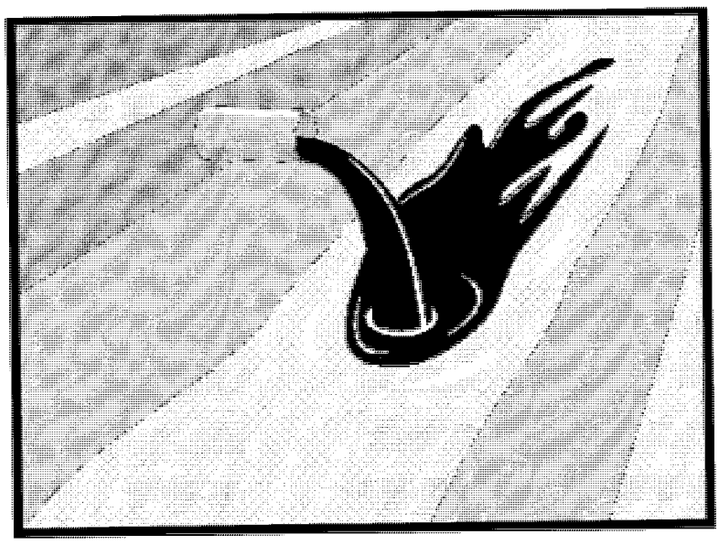
- Melting tanks shall be loaded with care and not filled to beyond six inches from the top to leave room for splashing when vehicle is deadheaded.
- When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.
- On large scale construction sites, use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.
- Waste shall be disposed of in accordance with all applicable laws and regulations.

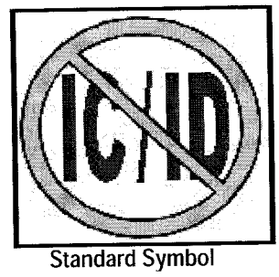
Maintenance and Inspection

- Inspect paving and grinding operations weekly and before and after every rainfall events. During extended rainfall events, inspect paving and grinding operations at least once every 24 hours.
- Inspect sawcutting operation and ensure that all waste slurry is vacuumed up. Any residual shall be swept or scraped up if necessary to remove it.
- Ensure that employees and subcontractors are implementing appropriate measures during paving operations.

Illicit Connection/Illegal Discharge Detection and Reporting

NS-6





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Procedures and practices designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents to the Engineer.

Appropriate Applications

Illicit connection/illegal discharge detection and reporting is applicable for all project sites and anytime an illicit connection or discharge is discovered or illegally dumped material is found on the construction site.

Illicit connections and illegal discharges or dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor.

- Inspect construction site weekly during project execution for evidence of illicit connections or illegal dumping or discharges.
- Observe construction site perimeter for evidence or potential of illicitly discharged or illegally dumped material, which may enter the construction site.

Identification of Illicit Connections and Illegal Dumping or Discharges

- Unlabeled or non-identifiable material shall be assumed to be hazardous.
- Solids - Look for debris, or rubbish piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible to the public.
- Liquids – signs of illegal liquid dumping or discharge can include:
  - Visible signs of staining or unusual colors to the pavement or surrounding adjacent soils.
  - Pungent odors coming from the drainage systems.
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes.
  - Abnormal water flow during the dry weather season.
- Urban Areas - Evidence of illicit connections or illegal discharges is typically detected at storm drain outfall locations or at manholes. Signs of an illicit connection or illegal discharge can include:
  - Abnormal water flow during the dry weather season.
  - Unusual flows in subdrain systems used for dewatering.
  - Pungent odors coming from the drainage systems.
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes.
  - Excessive sediment deposits, particularly adjacent to or near other active construction sites.
- Rural Areas - Illicit connections or illegal discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include:
  - Abnormal water flow during the dry weather season.
  - Non-standard junction structures.
  - Broken concrete or other disturbances at or near junction structures.

Reporting

- Notify the Engineer of any illicit connections and illegal dumping or discharge incidents at the time of discovery.

Cleanup and Removal

The Agency may direct contractor to clean up non-hazardous dumped or discharged material on the construction site.

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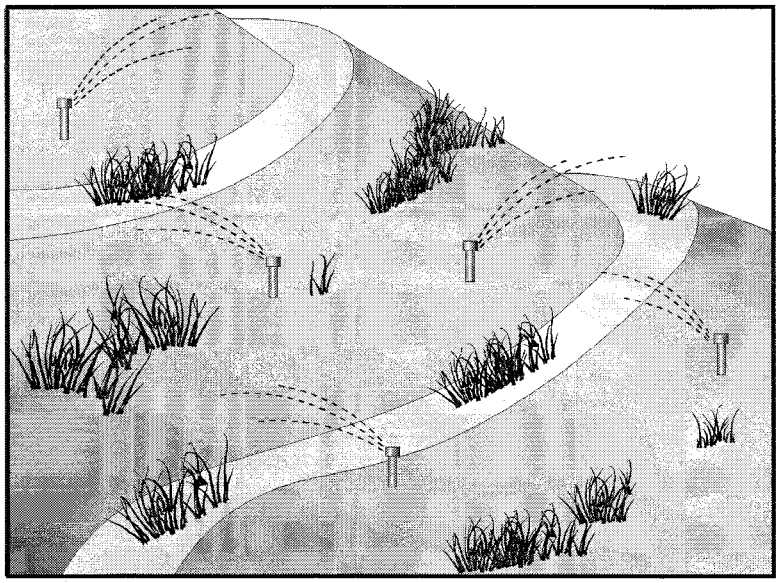
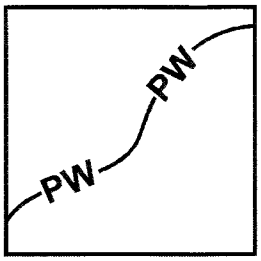
Potable Water/Irrigation

NS-7





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Potable Water/Irrigation management consists of practices and procedures to manage the discharge of potential pollutants generated during discharges from irrigation water lines, landscape irrigation, lawn or garden watering, planned and unplanned discharges from potable water sources, water line flushing, hydrant flushing and any other water.

Appropriate Applications

Implement this BMP whenever the above activities or discharges occur or could occur at or enter or run-on to a construction site.

Limitations

- None identified.

Standards and Specifications

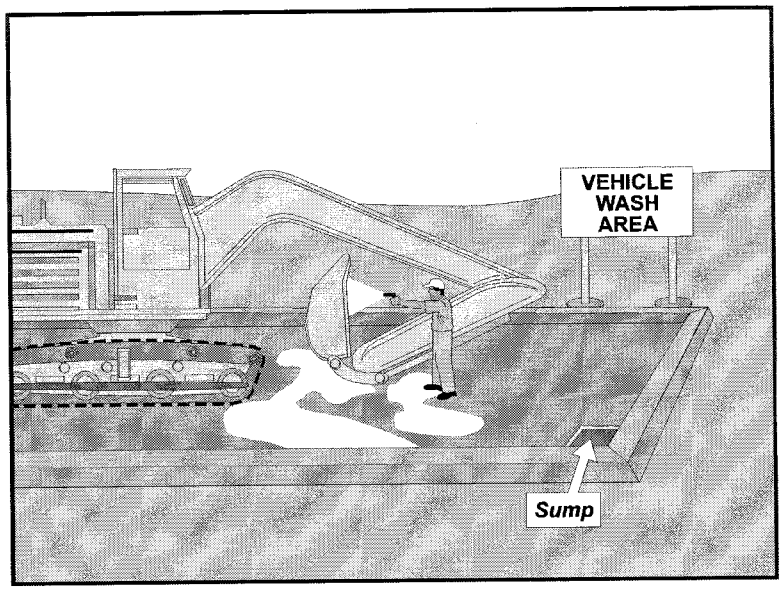
- Do not allow potable water/irrigation activities to allow discharge to the storm drain system or receiving waters.
- Engineer approval is required prior to commencing any washing activities that could discharge to a permeable or impermeable surface, the storm drain or receiving waterbody.
- Shut off the water source to broken lines, sprinklers, or valves as soon as possible to prevent excess water flow.
- Install appropriate BMPs to protect downstream storm water drainage systems and watercourses from water pumped or bailed from trenches excavated to repair water lines or other reason.
- Dechlorinate all water lines with a by properly neutralizing chemical such as sulfur dioxide, see Appendix B of the American Water Works Association (AWWA) C651. Disposal of heavily chlorinated water shall comply with all applicable law and requirements of Federal, State, County, or other local agencies.

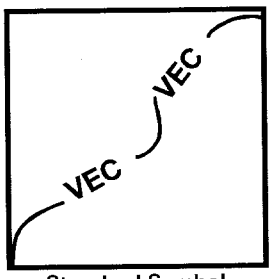
Maintenance and Inspection

- Inspect potable water and irrigation systems weekly, and before and after every rainfall events. During extended rainfall events, inspect all entrances, exits, access roads at least once every 24 hours.
- Repair broken water lines immediately or as directed by the Engineer.
- Inspect irrigated areas for signs of erosion and/or discharge. If erosion or discharge are observed, take corrective action to stop discharge and erosion immediately or as directed by the Engineer.
- Inspect irrigated areas within the construction limits for excess watering. Adjust watering times and schedules to ensure that the appropriate amount of water is being used and to minimize runoff. Consider factors such as soil structure, grade, time of year, and type of plant material in determining the proper amounts of water for a specific area.

Vehicle and Equipment Cleaning

NS-8





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Vehicle and equipment cleaning procedures and practices are used to minimize or eliminate the discharge of pollutants from vehicle and equipment cleaning operations to the ground, storm drain system or to watercourses.

Appropriate Applications

These procedures are applied on all construction sites where vehicle and equipment cleaning is performed.

Limitations

- Sediment control BMPs (SC-1 through SC-10) are not adequate to prevent the discharge of pollutants generated from vehicle and equipment cleaning.

Standards and Specifications

- On-site vehicle and equipment washing is discouraged.
- Prevent disposal of any rinse or wash waters or materials onto impervious or pervious site surfaces or into the storm drain system or watercourses.
- Cleaning of vehicles and equipment with soap, solvents or steam shall not occur on the project site unless the Engineer has been notified in advance and the resulting wastes are fully contained and disposed of offsite in conformance with all applicable laws and regulations. Resulting wastes and by-products shall not be discharged or buried and must be captured and recycled or disposed according to the requirements of WM-6, "Hazardous Waste Management," depending on the waste characteristics. Minimize use of solvents. The use of diesel for vehicle and equipment cleaning is prohibited.
- Vehicle and equipment wash water shall be contained to prevent it from entering the storm drain inlets or watercourses and shall not be discharged on site. Protect drain inlets (SC-10 is not adequate) by covering with plastic to completely block the inlet and do not allow any discharge. Remove plastic after cleaning operations are completed and the water has been disposed of properly.

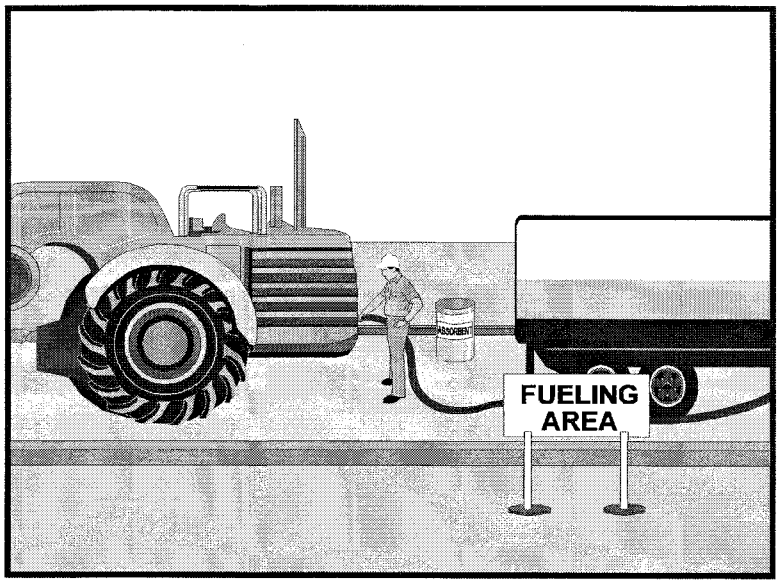
- All vehicles/equipment that regularly enter and leave the construction site shall be cleaned off-site.
- Prevent oil, grease or fuel from leaking onto the ground (impervious or pervious site surfaces) or into the storm drains or surface waters.
- Clean up leaks or spills immediately and dispose of properly in accordance with WM-4.
- When vehicle/equipment washing/cleaning must occur onsite, cleaning area shall have the following characteristics, and shall be approved by the Engineer:
  - Located away from storm drain inlets, drainage facilities, or watercourses.
  - Paved with concrete or asphalt and bermed to contain wash waters and to prevent run-on and runoff.
  - Configured with a sump to allow collection and disposal of wash water.
  - Wash waters shall not be discharged to storm drains or watercourses.
  - Used only when necessary.
- When cleaning vehicles/equipment with water:
  - Use as little water as possible. High pressure sprayers may use less water than a hose, and shall be considered.
  - Use positive shutoff valve to minimize water usage.

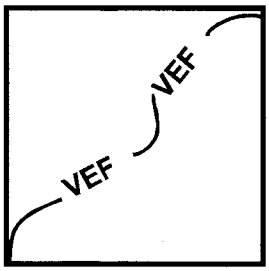
Maintenance and Inspection

- Inspect all entrances, exits, access roads daily and document weekly, and before and after every rainfall events. During extended rainfall events, inspect all entrances, exits, access roads at least once every 24 hours.
- Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.
- Remove liquids and sediment as needed or as directed by the Engineer.

Vehicle and Equipment Fueling

NS-9





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Vehicle and equipment fueling procedures and practices are designed to minimize or eliminate the discharge of fuel spills and leaks onto the ground (impervious or pervious site surfaces) or into storm drain systems or to watercourses.

Appropriate Applications

These procedures are applied on all construction sites where vehicle and equipment fueling takes place.

Limitations

- Onsite vehicle and equipment fueling shall only be used where it's impractical to send vehicles and equipment off-site for fueling.

Standards and Specifications

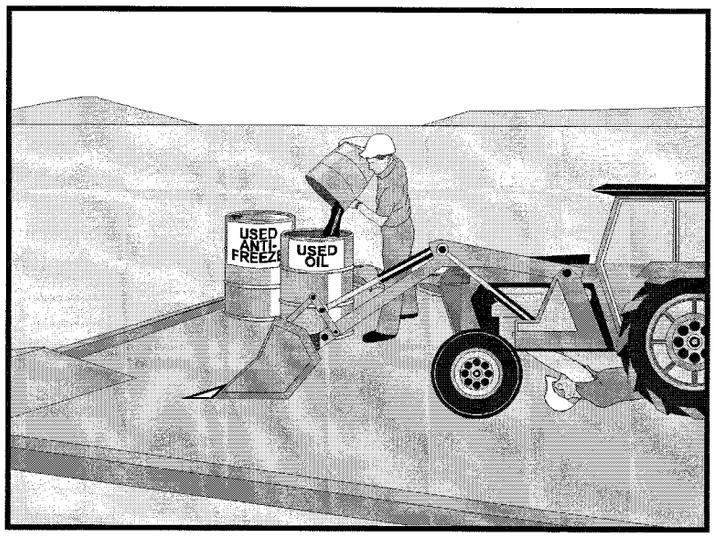
- The contractor shall select and designate an area to be used for fueling. The fueling area shall be identified in the SWPPP or approved by the Engineer for non-SWPPP projects.
- Prevent oil, grease, or fuel to leak in to the ground, offsite, storm drains, surface waters, or water courses.
- Absorbent spill clean-up materials and spill kits shall be available in fueling areas and on fueling trucks and shall be disposed of properly after use.
- Drip pans or absorbent pads shall be used during vehicle and equipment fueling.
- Dedicated fueling areas shall be protected with berms and/or dikes from storm water run-on and runoff, and shall be located at least 50 ft from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Nozzles used in vehicle and equipment fueling shall be equipped with an automatic shut-off to control drips and spills. Fueling operations shall not be left unattended.

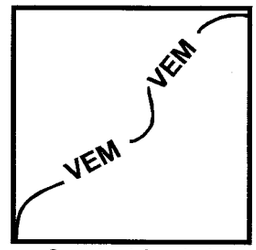
- Comply with applicable local Air Quality Management District regulations with berms and/or dikes District's (AQMD) regulations. Ensure nozzles are secured upright when not in use.
- Fuel tanks shall not be "topped-off."
- Vehicles and equipment shall be inspected on each day of use for leaks. Leaks shall be repaired immediately or problem vehicles or equipment shall be removed from the project site.
- Absorbent spill clean-up materials shall be available in fueling and maintenance areas and used on small spills instead of hosing down or burying techniques. The spent absorbent material shall be removed promptly and disposed of properly.
- Federal, state, and local requirements shall be observed for any stationary above ground storage tanks. Refer to WM-1, "Material Delivery and Storage."
- Mobile fueling of construction equipment throughout the site shall be minimized. Whenever practical, equipment shall be transported to the designated fueling area.

Maintenance and Inspection

- Inspect all fueling areas and operations daily and document weekly, and before and after every rainfall events. During extended rainfall events, inspect all entrances, exits, access roads at least once every 24 hours.
- Fueling areas and storage tanks shall be inspected regularly.
- Keep an ample supply of spill cleanup material on the site.
- Immediately cleanup spills and properly dispose of contaminated soil and cleanup materials in accordance with WM-4.

Vehicle and Equipment Maintenance NS-10





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Procedures and practices to minimize or eliminate the discharge of pollutants to the storm drain systems or to watercourses from vehicle and equipment operation, maintenance, and modification procedures.

Appropriate Applications

These procedures are applied on all construction projects for storage, operation, and maintenance of heavy equipment and vehicles.

Limitations

- None identified.

Standards and Specifications

- Place all vehicles or equipment to be maintained or stored in a designated and dedicated area.
- Use off-site maintenance facilities whenever practical.
- The vehicles or equipment maintenance and storage areas shall be identified in the SWPPP or approved by the Engineer for non-SWPPP projects.
- Dedicated maintenance areas shall be protected from storm water run-on and runoff, and shall be located at least 50 ft from downstream drainage facilities and watercourses.
- Prevent oil, grease, or fuel to leak in to ground (impervious or pervious site surfaces), storm drains, or watercourses.
- Clean spills and leaks immediately and dispose of leaked materials and cleanup waste properly in accordance with WM-4.

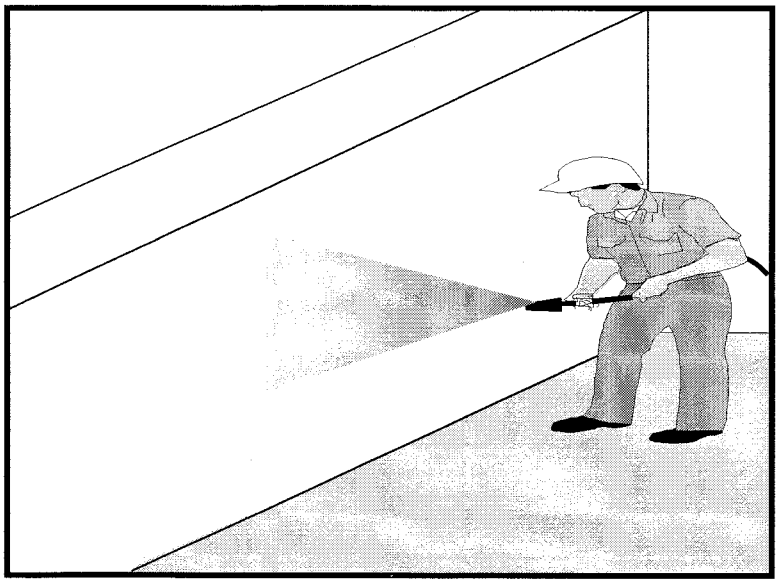
- Absorbent spill clean-up materials shall be available in maintenance areas and shall be disposed of properly after use.
- For long-term projects, consider constructing roofs or using portable tents over maintenance areas.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not dump oil, fuels and lubricants onto the ground (impervious or pervious site surfaces), storm drain system, or watercourses.
- Properly dispose or recycle used batteries.
- Do not bury used tires.
- Repair fluid and oil leaks immediately.
- Provide spill containment dikes or secondary containment around stored oil and chemical drums per WM-1.

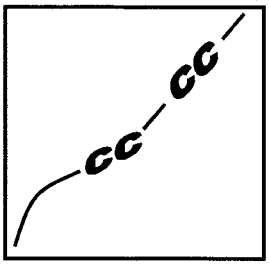
Maintenance and Inspection

- Inspect all vehicle and equipment maintenance areas weekly, and before and after every rainfall events. During extended rainfall events, inspect all vehicle and equipment maintenance areas at least once every 24 hours.
- Maintain waste fluid containers in leak proof condition.
- Vehicles and equipment shall be inspected on each day of use. Leaks shall be repaired immediately or the problem vehicle(s) or equipment shall be removed from the project site. Spills shall be cleaned up in accordance with BMP WM-04 Spill Prevention and Control.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed and clean up any spills or leaks immediately.
- Wastes generated from cleanups shall be disposed of in accordance with BMP WM-04 Spill Prevention and Control in compliance with all applicable laws and regulations.

Concrete Curing

NS-12





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

Concrete curing is used in the construction of structures such as bridges, retaining walls, and pump houses. Concrete curing includes the use of both chemical and water methods. Proper procedures minimize pollution of runoff during concrete curing.

Appropriate Applications

All concrete elements of a structure (e.g., footings, columns, abutments, stems, soffit, deck) are subject to curing requirements.

Limitations

- None identified.

Standards and Specifications

Chemical Curing

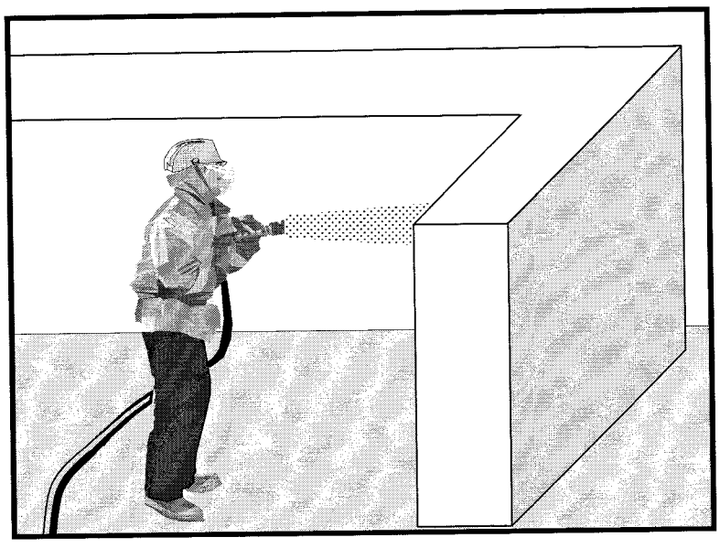
- Prevent over-spray or drift of curing compounds by applying the curing compound close to the concrete surface. Apply an amount of compound that covers the surface, but does not allow any runoff of the compound.
- Use proper storage and handling techniques for concrete curing compounds. Refer to BMP WM-1, "Material Delivery and Storage."
- Protect drain inlets prior to the application of curing compounds.
- Refer to WM-4, "Spill Prevention and Control."
- Apply cure water in a manner the does not produce runoff or result in a non-storm-water discharge.
- Prevent cure water from discharging to the ground, storm drain system and watercourses to collection areas for removal as approved by the Engineer and in accordance with all applicable permits, laws and regulations.
- Utilize wet blankets or a similar method that maintains moisture while minimizing the use and possible discharge of water.

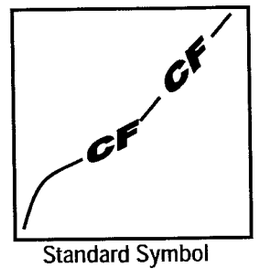
Maintenance and Inspection

- Inspect all concrete curing operations and equipment weekly, and before and after every rainfall events. During extended rainfall events, inspect all concrete curing operations and equipment at least once every 24 hours.
- Ensure that employees and subcontractors implement appropriate measures for storage, handling, and use of curing compounds.
- Inspect cure containers and spraying equipment for leaks. Repair leaks immediately.

Concrete Finishing

NS-14





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

Concrete finishing methods are used for bridge deck rehabilitation, paint removal, curing compound removal, final surface finish appearances, and other construction operations that remove or add to concrete surfaces. Methods include sand blasting, shot blasting, grinding, high pressure water blasting, or other method. Proper procedures minimize the impact that concrete finishing methods may have on runoff.

Appropriate Applications

These procedures apply to all construction sites where concrete finishing operations are performed.

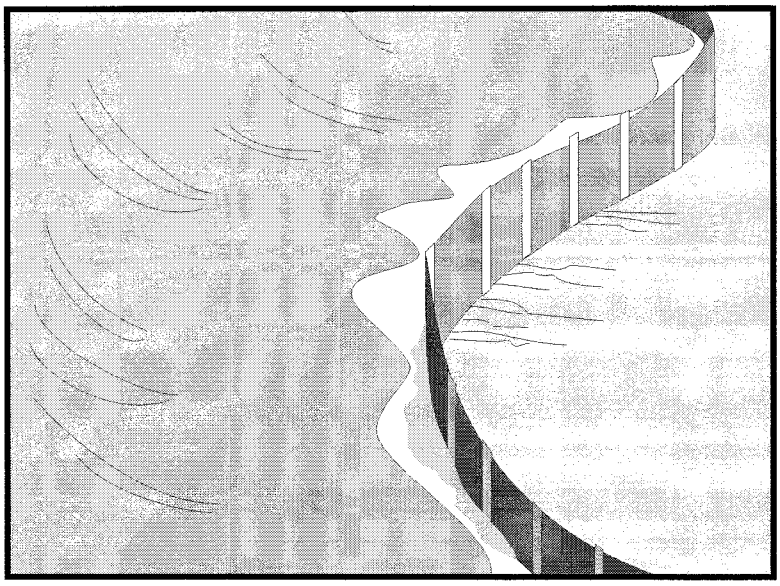
- Refer to BMP WM-8, "Concrete Waste Management."
- Minimize the drift of dust and blast material as much as possible by keeping the blasting nozzle close to the surface.
- When blast residue contains a potentially hazardous waste, refer to BMP WM-6, "Hazardous Waste Management."
- Debris produced when cleaning shall not be temporarily stored on the ground or pavement. Debris accumulated inside the containment system shall be removed before the end of each work shift. Debris shall be stored in approved, leak proof containers and shall be handled in such a manner that no spillage will occur.
- The Contractor shall disposed of the debris generated at a facility equipped to recycle the debris, is subject to the following requirements:
  - An exclusively recyclable material (ERM) such as Copper slag abrasive blended by the supplier with a calcium silicate compound shall be used for blast cleaning.
  - If cleaning or finishing metal surfaces, the debris produced shall be tested by using Title 22 of the California Code of Regulations CAM Metals Method, and 40 CFR Part 268 Method. The Contractor to confirm that the Soluble Threshold Limit Concentrations (STLC), the Total Threshold Limit Concentrations (TTLC), and the Toxicity Characteristic Leaching Procedure (TCLP) of the heavy metals are below regulatory limits and the debris may be transported to the recycling facility as a non-hazardous waste.
  - The Contractor shall make all arrangements with the recycling facility and perform any testing required by the recycling facility operator, or in compliance with regulations.
  - The Contractor shall specify to the Agency, the name, location and Statement of Qualifications (SOQs) of the recycling facility for review and approval by the Agency.

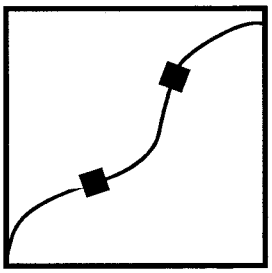
Maintenance and Inspection

- Inspect concrete finishing operations weekly and before and after rainfall events. During extended rainfall events, inspect concrete finishing operations at least every 24 hours.

Silt Fence

SC-1





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

A silt fence is a temporary linear sediment barrier of permeable fabric designed to intercept and slow the flow of sediment-laden sheet flow runoff. Silt fences allow sediment to settle from runoff before water leaves the construction site.

Appropriate Applications

Silt fences are placed:

- Below the toe of exposed and erodible slopes.
- Down-slope of exposed soil areas.
- Around temporary stockpiles.
- Along streams and channels.
- Along the perimeter of a project.

Limitations

- Shall not be used below slopes subject to creep, slumping, or landslides.
- Shall not be used in streams, channels, drain inlets, or anywhere flow is concentrated.
- Shall not be used to divert flow. Silt fences shall not be used in concentrated flow areas.

Standards and Specifications

Design and Layout

- The maximum length of slope draining to any point along the silt fence shall be 200 ft or less.
- The slope of area draining to silt fence shall be less than 1:1 (V:H).
- Shall not use as mid-slope protection on slopes greater than 1:4 (V:H).

- Limit silt fence installation to locations suitable for temporary ponding and deposition of sediment.
- Fabric life span is generally limited. Longer periods may require fabric replacement.
- Lay out shall be in accordance with Pages 5 and 6 of this BMP.
- For slopes steeper than 1:2 (V:H) and that contain a high number of rocks or large dirt clods that tend to dislodge, it may be necessary to install additional protection immediately adjacent to the bottom of the slope, prior to installing silt fence. Additional protection may be a chain link fence or a cable fence.
- For slopes adjacent to water bodies or Environmentally Sensitive Areas (ESAs), or as directed by the engineer, additional temporary soil stabilization BMPs shall be used.

Materials

- Silt fence fabric shall be woven polypropylene with a minimum width of 36 inches and a minimum tensile strength of 100 lb force. The fabric shall conform to the requirements in ASTM designation D4632 and shall have an integral reinforcement layer. The reinforcement layer shall be a polypropylene, or equivalent, net provided by the manufacturer. The permittivity of the fabric shall be between 0.1 sec-1 and 0.15 sec-1 in conformance with the requirements in ASTM designation D4491. Contractor shall submit certificate of compliance with these specifications.
- Wood stakes shall be commercial quality lumber of the size and shape shown on the plans. Each stake shall be free from decay, splits or cracks longer than the thickness of the stake or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable.
- Bar reinforcement may be used in lieu of wood stakes. The bars shall be equal to a number four (4) or greater. End protection shall be provided for any exposed bar reinforcement.
- Staples used to fasten the fence fabric to the stakes shall be not less than 1.75 inches long and shall be fabricated from 15 gauge or heavier wire. The wire used to fasten the tops of the stakes together when joining two sections of fence shall be 9 gauge or heavier wire.

Installation

- Silt fences shall be used in conjunction with soil stabilization source controls up slope to provide effective erosion and sediment control.
- Bottom of the silt fence shall be keyed or trenched -in a minimum of 12 inches. Trenches shall not be excavated wider and deeper than necessary for proper installation of the temporary linear sediment barriers.

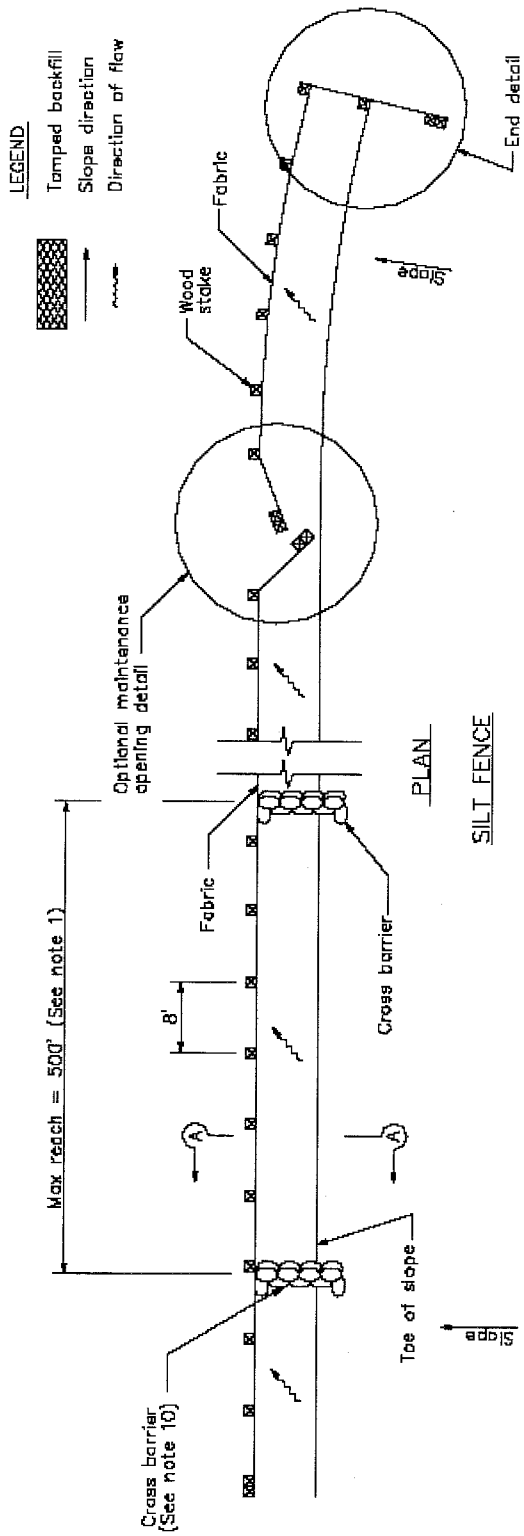
- Excavation of the trenches shall be performed immediately before installation of the temporary linear sediment barriers.
- Construct silt fences with a set-back of at least 3 feet from the toe of a slope. Where a silt fence is determined to be not practical due to specific site conditions, the silt fence may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practical.
- Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the barrier.
- Cross barriers shall be a minimum of 1/3 and a maximum of 1/2 the height of the linear barrier.

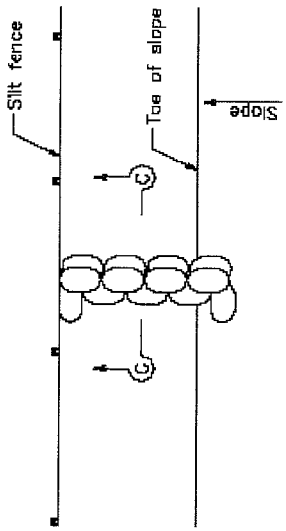
Maintenance and Inspection

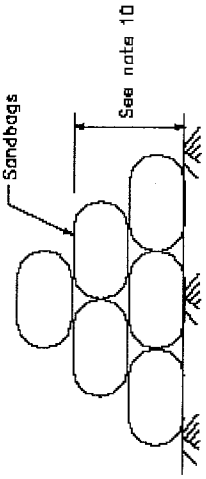
- Ensure that perimeter controls are maintained and protected from activities that reduce their effectiveness.
- Repair undercut silt fences. Repair or replace split, torn, slumping, or weathered fabric.
- Inspect all silt fences a minimum of weekly and before and after every rainfall events. During extended rainfall events, inspect inlet protection devices at least once every 24 hours. Perform necessary maintenance, or maintenance required by the Engineer.
- Maintain silt fences to provide an adequate sediment holding capacity. Sediment shall be removed when the sediment accumulation reaches one-third (1/3) of the barrier height. Removed sediment shall be incorporated in the project at locations designated by the Engineer or disposed of outside the right-of-way in conformance with all applicable laws and regulations.
- Silt fences that are damaged and become unsuitable for the intended purpose, as determined by the Engineer, shall be removed from the site of work, disposed of outside the project right-of-way in conformance with all applicable laws and regulations, and replaced with new silt fence barriers.
- Remove silt fence when no longer needed or as required by the Engineer. Fill and compact post holes and anchorage trench, remove sediment accumulation, grade fence alignment to blend with adjacent ground and stabilized disturbed soil areas.

Silt Fence

SC-1

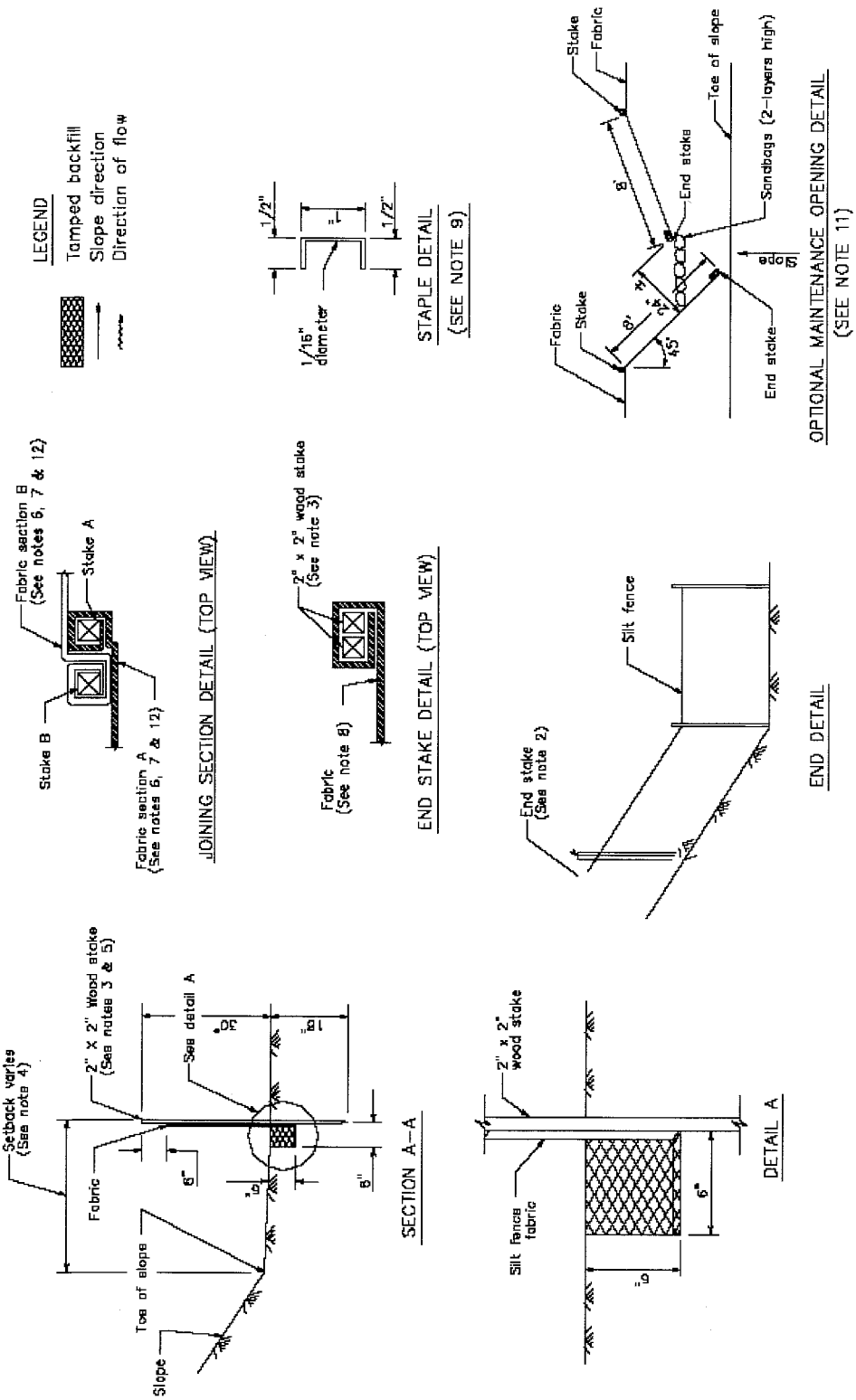






NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the linear barrier, in no case shall the reach length exceed 500'.
2. The last 8'–0" of fence shall be turned up slope.
3. Stake dimensions are nominal.
4. Dimension may vary to fit field condition.
5. Stakes shall be spaced at 8'–0" maximum and shall be positioned on downstream side of fence.
6. Stakes to overlap and fence fabric to fold around each stake one full turn. Secure fabric to stake with 4 staples.
7. Stakes shall be driven tightly together to prevent potential flow-through of sediment at joint. The tops of the stakes shall be secured with wire.
8. For end stake, fence fabric shall be folded around the stakes one full turn and secured with 4 staples.
9. Minimum 4 staples per stake. Dimensions shown are typical.
10. Cross barriers shall be a minimum of 1/3 and a maximum of 1/2 the height of the linear barrier.
11. Maintenance openings shall be constructed in a manner to ensure sediment remains behind silt fence.
12. Joining sections shall not be placed at sump locations.
13. Sandbag rows and layers shall be offset to eliminate gaps.


LEGEND
Tamped backfill
Slope direction
Direction of flow
Fabric section B (See notes 6, 7 & 12)
Stake A
Stake B
Fabric section A (See notes 6, 7 & 12)
JOINING SECTION DETAIL (TOP VIEW)
2" x 2" wood stake (See note 3)
Fabric (See note 8)
END STAKE DETAIL (TOP VIEW)
1/2"
1/16" diameter
STAPLE DETAIL
(SEE NOTE 9)
Stake
Fabric
Toe of slope
Sandbags (2-layers high)
End stake
Slope
OPTIONAL MAINTENANCE OPENING DETAIL
(SEE NOTE 11)
Setback varies (See note 4)
2" X 2" Wood stake (See notes 3 & 5)
See detail A
Fabric
Toe of slope
Slope
SECTION A-A
End stake (See note 2)
Silt fence
END DETAIL
2" x 2" wood stake
Silt fence fabric
DETAIL A

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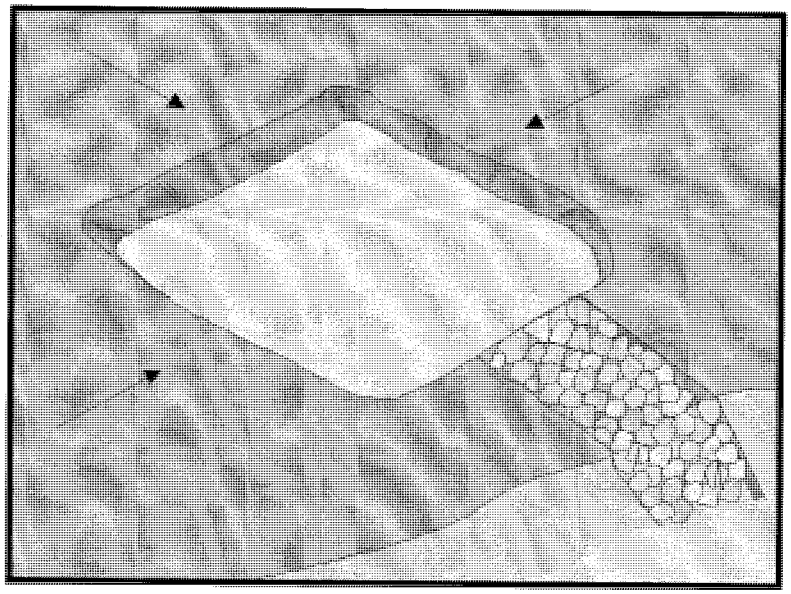
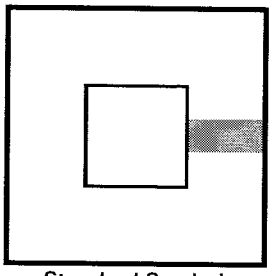
Sediment Trap

SC-3





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

A sediment trap is a temporary containment area that allows sediment in collected storm water to settle out during infiltration or before the runoff is discharged through a stabilized spillway. Sediment traps are formed by excavating or constructing an earthen or other embankment across a waterway or low drainage area.

Appropriate Applications

- Sediment traps may be used on construction projects where the drainage area is less than 5 ac. Traps should be placed where sediment-laden storm water enters a storm drain or watercourse.
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Engineer.
- As a supplemental control, sediment traps provide additional protection for a water body or for reducing sediment before it enters a drainage system.

Limitations

- Requires large surface areas to permit infiltration and settling of sediment.
- Not appropriate for drainage areas greater than 5 ac.
- Only removes large and medium sized particles and requires upstream erosion control.
- Size may be limited by availability of area on construction site.

Standards and Specifications

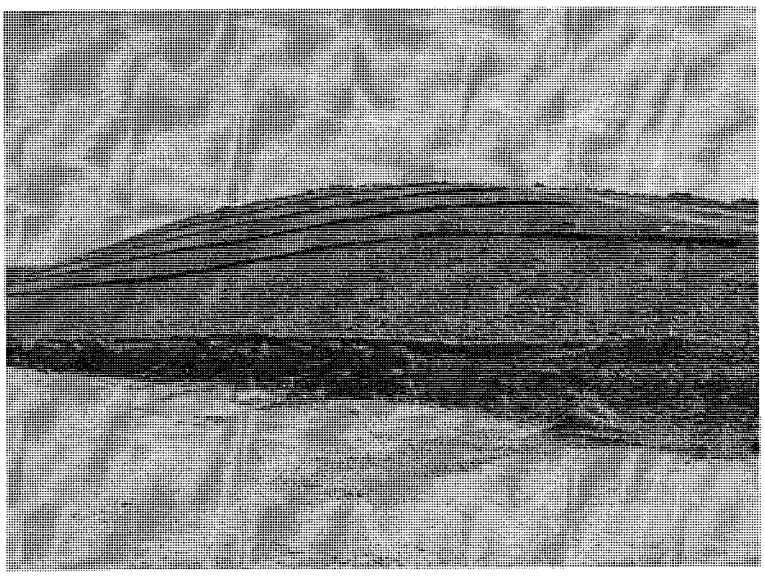
- Trap shall be situated according to the following criteria: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where failure would not cause loss of life or property damage, and (3) to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area.
- Trap shall be sized to accommodate a settling zone and sediment storage zone with recommended minimum volumes of 67 yd^3/ac and 33 yd^3/ac of contributing drainage area, respectively, based on 0.5 inches of runoff volume over a 24-hr period. Multiple traps and/or additional volume may be required to accommodate site specific rainfall and soil conditions.
- Sediment/desilting basin shall be designed by a professional Engineer registered with the State of California. The design details shall be included in the SWPPP or SWPPP amendment or approved by the Engineer prior to construction.
- The design shall include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the trap outlet and bypass structures.
- Areas under embankments, structural works, and sediment traps shall be cleared and stripped of vegetation and root material. The pool area shall be cleared.
- Use SS-10 to protect the trap outlets against erosion.
- Fencing shall be provided to prevent unauthorized entry.

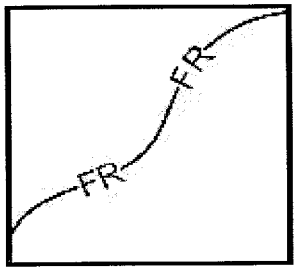
Maintenance and Inspection

- Inspect sediment traps a minimum of weekly, before and after rainfall events. During extended rainfall events, inspect sediment traps at least every 24 hours.
- If captured runoff has not completely infiltrated within 72 hours, the sediment trap must be dewatered per NS-2 requirements.
- Inspect trap banks for embankment seepage and structural soundness. Inspect outlet area for erosion and stabilize as required, or as directed by the Engineer.
- Inspect outlet structure and rock spillway for any damage or obstructions. Repair damage and remove obstructions as needed or as directed by the Engineer.
- Remove accumulated sediment when the volume has reached one-third the original trap volume. Properly dispose of sediment and debris removed from the trap.
- Inspect fencing for damage and repair as needed or as directed by the Engineer.

Fiber Rolls

SC-5





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

A fiber roll consists of wood excelsior, rice or wheat straw, or coconut fibers that is rolled or bound into a tight tubular roll and placed on the toe and face of slopes to intercept runoff, reduce its flow velocity, release the runoff as sheet flow and provide removal of sediment from the runoff. Fiber rolls may also be used for run-on diversion, inlet protection and check dams under certain situations.

Appropriate Applications

- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Contractor or Engineer.
- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
- Below the toe of exposed and erodible slopes.
- Fiber rolls may be used as check dams in unlined ditches if approved by the Engineer (refer to SC-4 "Check Dams").
- Fiber rolls may be used for drain inlet protection if they can be properly anchored and if approved by the Engineer (refer to SC-10 "Storm Drain Inlet Protection").
- Fiber rolls may be used for run-on diversion when properly anchored and approved by the Engineer.
- Down-slope of exposed soil areas.
- Around temporary stockpiles.
- Along the perimeter of a project.

Limitations

- Runoff and erosion may occur if the fiber roll is not adequately trenched in.
- Fiber rolls at the toe of slopes greater than 1:5 may require the use of 20" diameter rolls or installations achieving the same protection (i.e., stacked smaller diameter fiber rolls, etc.).
- Difficult to move once saturated.
- Fiber rolls could be transported by high flows if not properly staked and trenched in.
- Fiber rolls have limited sediment capture zone.
- Do not use fiber rolls on slopes subject to creep, slumping, or landslide.

Standards and Specifications

Fiber Roll Materials

- Fiber rolls shall be either:
  - Prefabricated rolls.
  - Rolled tubes of erosion control blanket.

Assembly of Field Rolled Fiber Roll

- Roll length of erosion control blanket into a tube of minimum 8 in. diameter.
- Bind roll at each end and every 4 ft. along length of roll with jute-type twine.

Installation

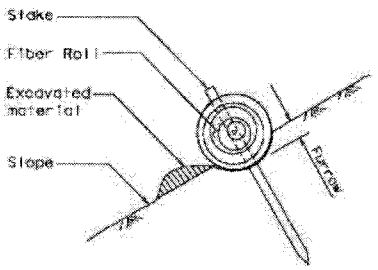
- Slope inclination of 1:4 or flatter: fiber rolls shall be placed on slopes 20 ft. (6m) apart.
- Slope inclination of 1:4 to 1:2: fiber rolls shall be placed on slopes 15 ft. (4.5 m) apart.
- Slope inclination 1:2 or greater: fiber rolls shall be placed on slopes 10 ft. (3 m) apart.
- Stake fiber rolls into a 2 to 4 in. trench.
- Use wood stakes with a nominal classification of 3/4 by 3/4 in, and minimum length of 24 in. Drive stakes at the end of each fiber roll and spaced 2 ft (600 mm) apart if Type 2 installation is used (refer to Page 4). Otherwise, space stakes 4 ft maximum on center if installed as shown on Pages 5 and 6.
- If more than one fiber roll is placed in a row, the rolls shall be overlapped; not abutted.

Removal

- Fiber rolls are typically left in place.
- If fiber rolls are removed, collect and dispose of sediment accumulation, and fill and compact holes, trenches, depressions or any other ground disturbance to blend with adjacent ground.

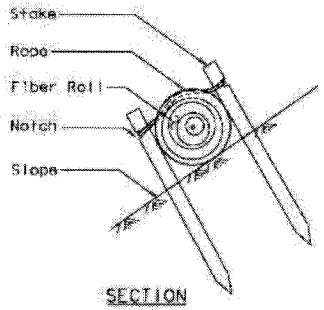
Maintenance and Inspection

- Ensure that all perimeter controls are maintained and protected from activities that reduce their effectiveness.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- Inspect all fiber rolls weekly and before and after every rainfall events. During extended rainfall events, inspect fiber rolls at least once every 24 hours.
- Perform maintenance as needed or as required by the Engineer.
- Maintain fiber rolls to provide an adequate sediment holding capacity. Sediment shall be removed when the sediment accumulation reaches three quarters (3/4) of the barrier height. Removed sediment shall be incorporated in the project at locations designated by the Engineer or disposed of outside the highway right-of-way in conformance with all applicable laws and regulations. If removed sediment is stored on site, it shall be in conformance with WM-3 Stockpile Management.

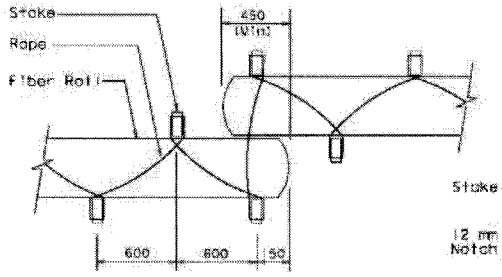


SECTION

TEMPORARY FIBER ROLL (TYPE 1)

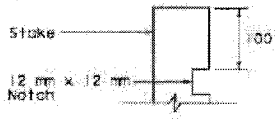


SECTION



PLAN

TEMPORARY FIBER ROLL (TYPE 2)

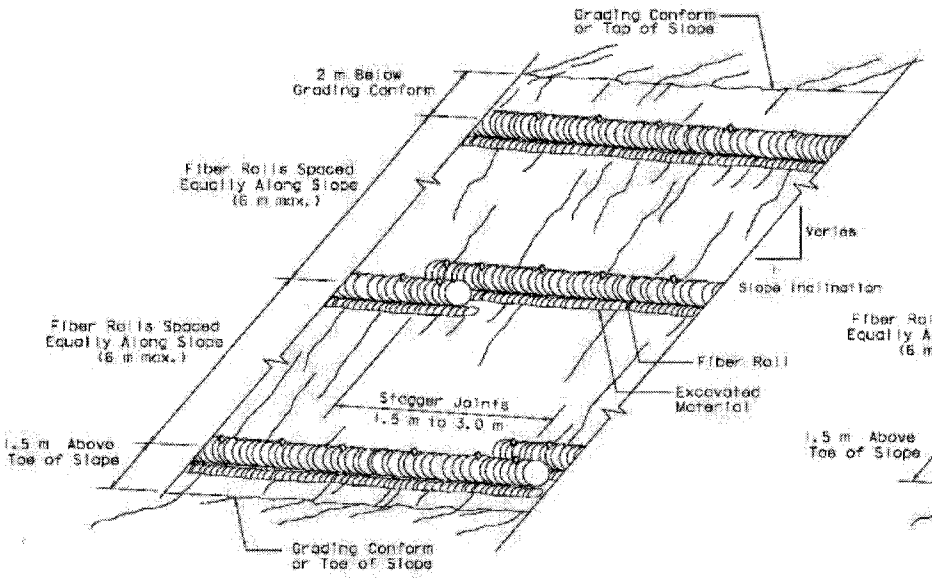


ELEVATION

NOTCH DETAIL

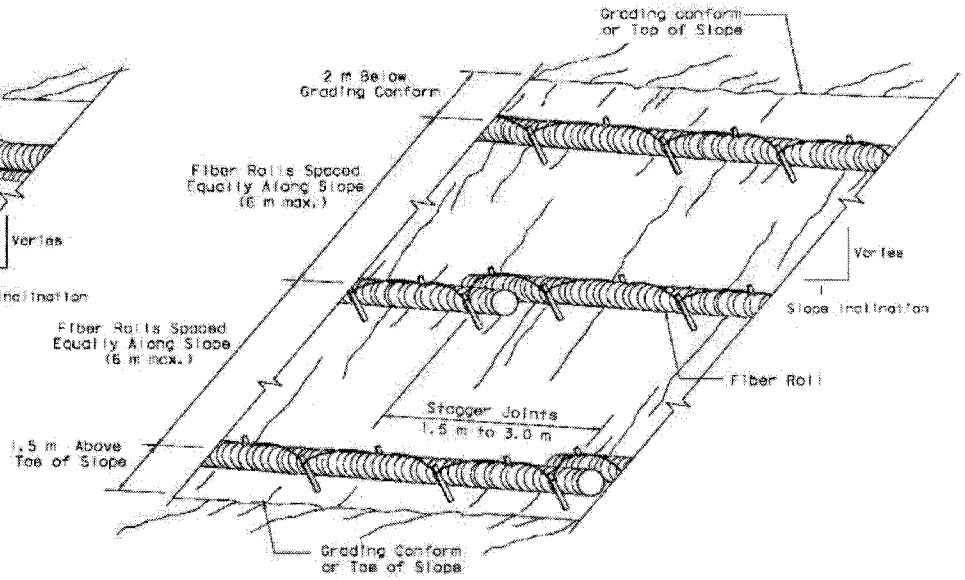
NOTE

1. Temporary fiber roll spacing varies depending upon slope inclination.



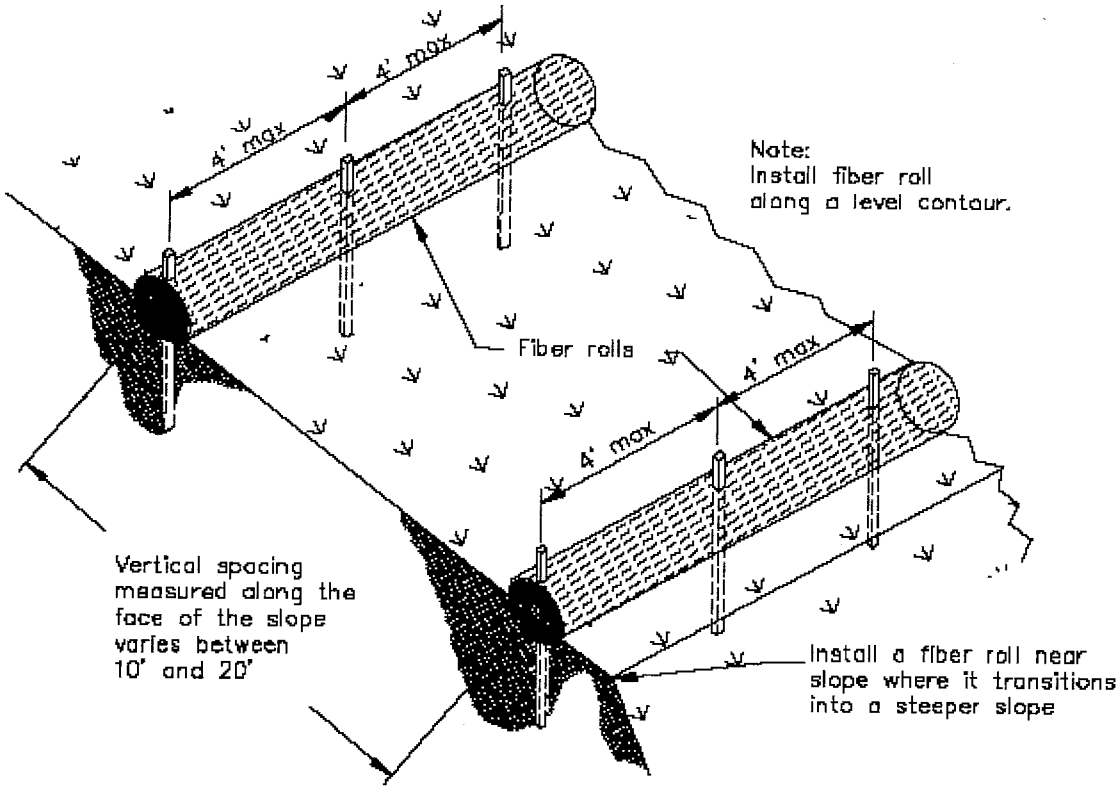
PERSPECTIVE

TEMPORARY FIBER ROLL (TYPE 1)



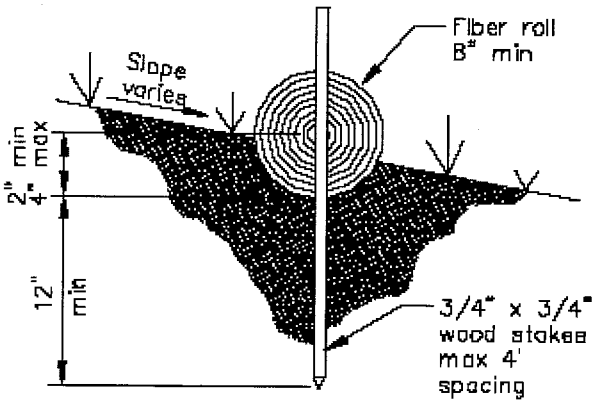
PERSPECTIVE

TEMPORARY FIBER ROLL (TYPE 2)



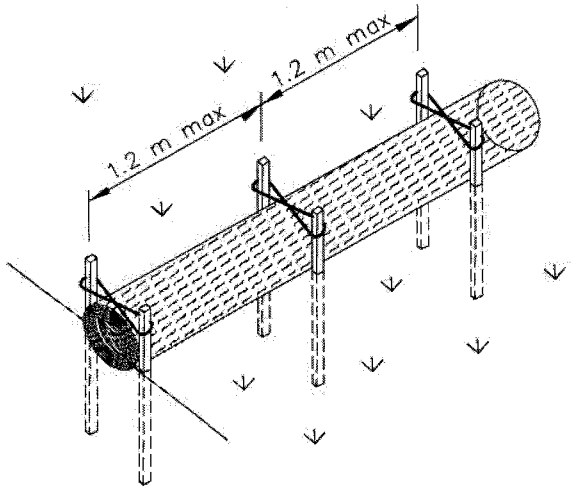
TYPICAL FIBER ROLL INSTALLATION

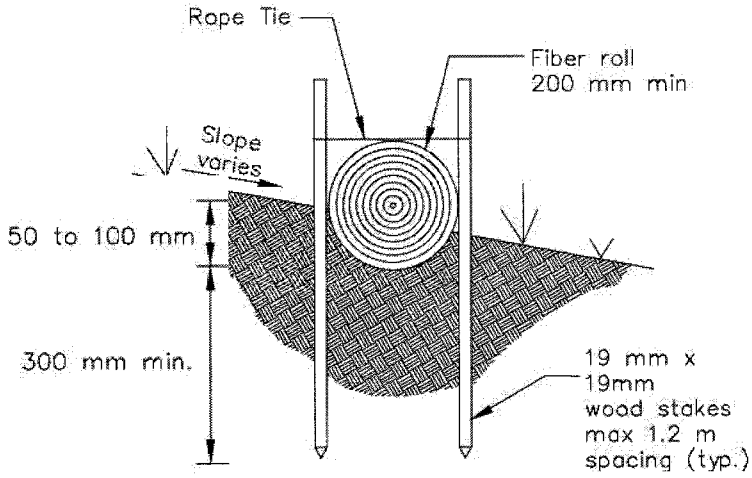
N.T.S.



ENTRENCHMENT DETAIL

N.T.S.



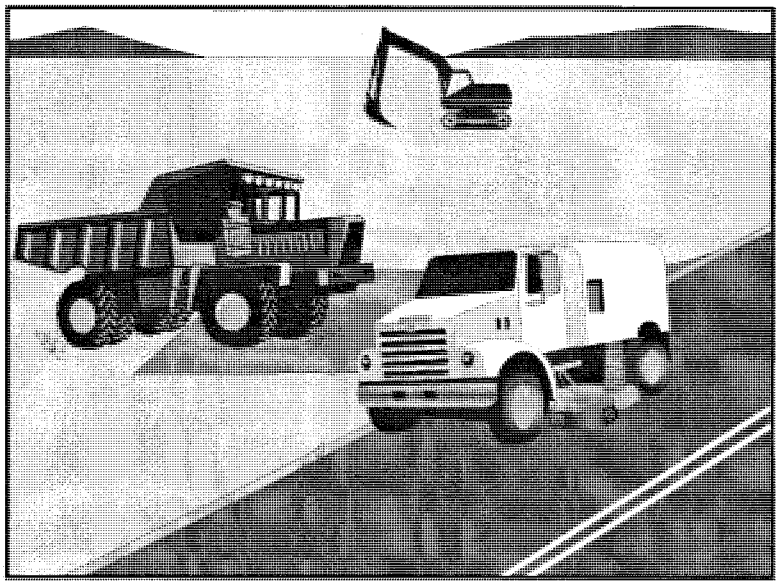


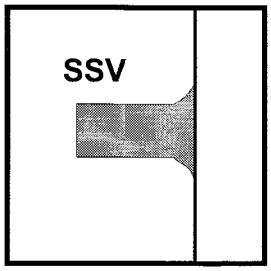
OPTIONAL ENTRENCHMENT DETAIL

N.T.S.

Street Sweeping and Vacuuming

SC-7





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ● Sediment Control
- ● Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Practices to remove tracked sediment to prevent the sediment from entering a storm drain or watercourse.

Appropriate Applications

These practices are implemented anywhere sediment is tracked from the project site onto public or private paved roads, typically at points of ingress/egress.

Limitations

Sweeping and vacuuming may not be effective when soil is wet or muddy.

Standards and Specifications

- Streets will be cleaned in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.
- Manually sweep or shovel may be used or a sweeper/vacuum truck. The swept sediment and debris shall be vacuumed or contained and swept off site.
- Kick brooms or sweeper attachments shall not be used.
- Visible sediment tracking shall be swept and/or vacuumed daily.
- If not mixed with debris or trash, consider incorporating the removed sediment back into the project.

Maintenance and Inspection

- Inspect ingress/egress access points daily and sweep tracked sediment as needed, or as required by the Engineer.
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite per WM-5 and WM-6 for proper disposal procedures.

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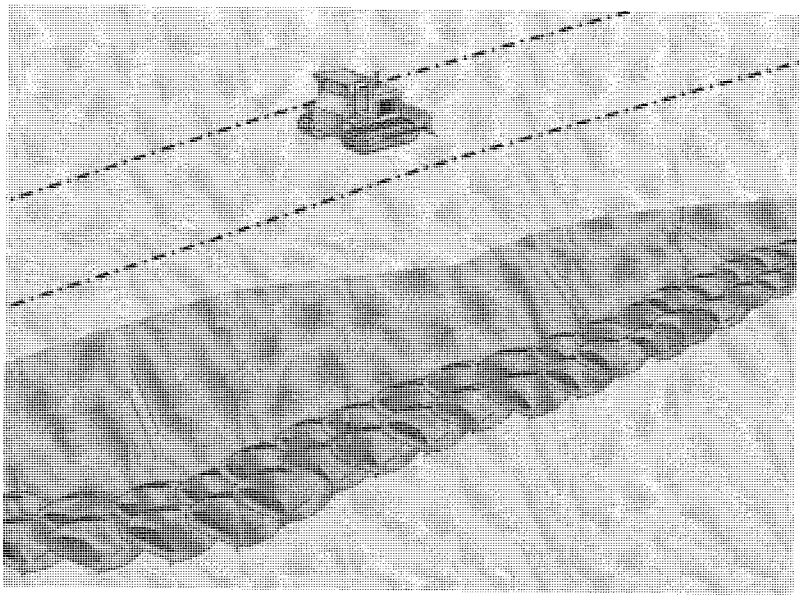
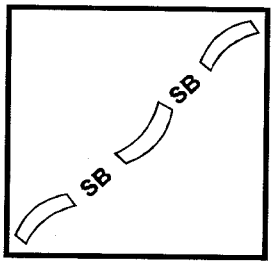
Sandbag Barrier

SC-8





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

A sandbag barrier is a temporary linear sediment barrier consisting of stacked sandbags, designed to intercept and slow the flow of sediment-laden sheet flow runoff. Sandbag barriers allow sediment to settle from runoff before water leaves the construction site.

Appropriate Applications

- This BMP may be implemented on a project-by-project basis in addition to other BMPs when determined necessary and feasible by the Contractor or Engineer.
- Along the perimeter of a site.
- Along streams and channels.
- Below the toe of exposed and erodible slopes.
- Down slope of exposed soil areas.
- Around stockpiles.
- Across channels to serve as a barrier for utility trenches or provide a temporary channel crossing for construction equipment, to reduce stream impacts.
- Parallel to a roadway to keep sediment off paved areas.
- At the top of slopes to divert roadway runoff away from disturbed slopes.
- To divert or direct flow or create a temporary sediment/desilting basin.
- During construction activities in stream beds when the contributing drainage area is less than 5 ac.

- With plastic cover along the perimeter of vehicle and equipment fueling and maintenance areas or chemical storage areas.
- To capture and detain non-storm water flows until proper cleaning operations occur.
- When site conditions or construction sequencing require adjustments or relocation of the barrier to meet changing field conditions and needs during construction.
- To temporarily close or continue broken, damaged or incomplete curbs.

Limitations

- Limit the drainage area upstream of the barrier to 5 ac.
- Degraded sandbags may rupture spilling sand.
- Installation can be labor intensive.
- Limited durability for long-term projects.
- When used to detain concentrated flows, maintenance requirements increase.

Standards and Specifications

Materials

- Sandbag Material: Sandbag shall be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight four ounces per square yard, mullen burst strength exceeding 300 psi in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355. Use of burlap is not acceptable.
- Sandbag Size: Each sand-filled bag shall have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lb. Bag dimensions are nominal, and may vary based on locally available materials. Alternative bag sizes shall be submitted to the Engineer for approval prior to deployment.
- Fill Material: All sandbag fill material shall be non-cohesive, Class 1 or Class 2 permeable material free from clay and deleterious material. Fill material is subject to approval by the Engineer.

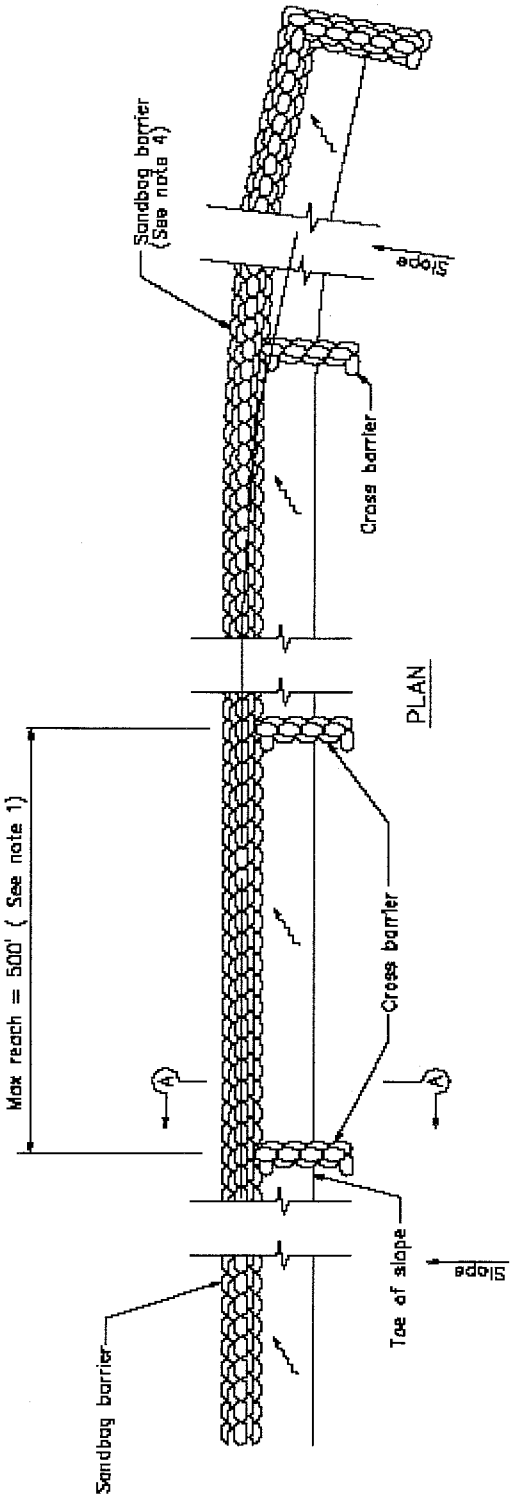
Installation

- When used as a linear sediment control:
  - Install along a level contour.
  - Turn ends of sandbag row up slope to prevent flow around the ends.
  - Generally, sandbag barriers shall be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.
  - Install as shown in Pages 4 and 5 of this BMP.

- Construct sandbag barriers with a set-back of at least 3 ft from the toe of a slope. Where a setback is determined to be not practical due to specific site conditions, the sandbag barrier may be constructed at the toe of the slope, but shall be constructed as far from the toe of the slope as practicable.

Maintenance and Inspection

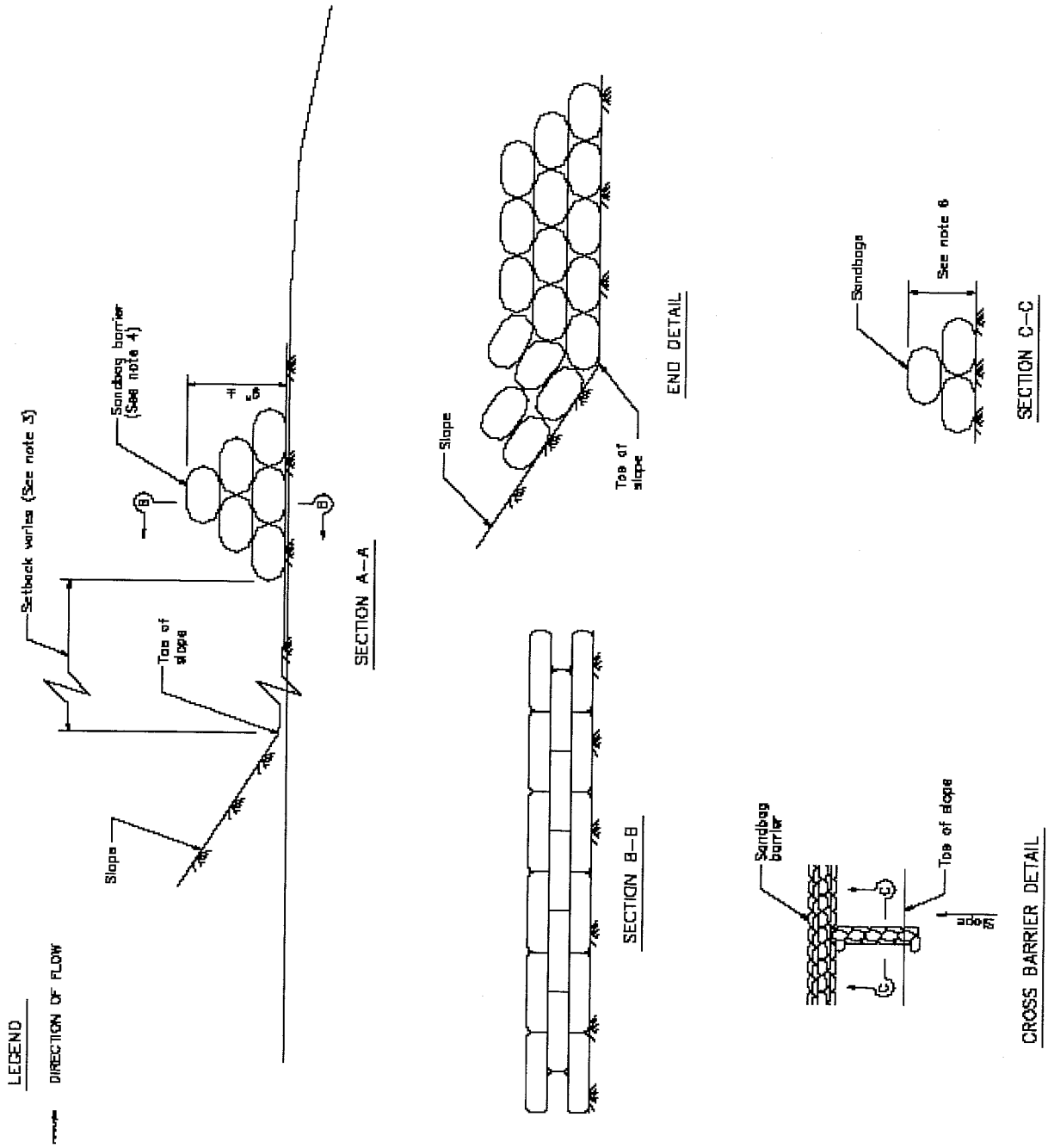
- Ensure that all perimeter controls are maintained and protected from activities that reduce their effectiveness.
- Inspect all sandbag barriers weekly and before and after every rainfall events. During extended rainfall events, inspect sandbag barriers at least once every 24 hours.
- Reshape or replace sandbags as needed, or as directed by the Engineer.
- Repair washouts or other damages as needed, or as directed by the Engineer.
- Inspect sandbag barriers for sediment accumulations and remove sediments when accumulation reaches one-third the barrier height. Removed sediment shall be incorporated in the project at locations designated by the Engineer or disposed of off the construction site in conformance with all applicable laws and regulations. If accumulated sediment is stored on site, it shall be in accordance with WM-3 Stockpile Management.
- Remove sandbags when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilized the area.



SANDBAG BARRIER

NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 500'.
2. Place sandbags tightly.
3. Dimension may vary to fit field condition.
4. Sandbag barrier shall be a minimum of 3 bags high.
5. The end of the barrier shall be turned up slope.
6. Cross barriers shall be a min of 1/2 and a max of 2/3 the height of the linear barrier.
7. Sandbag rows and layers shall be staggered to eliminate gaps.


LEGEND
DIRECTION OF FLOW
Setback varies (See note 3)
Sandbag barrier (See note 4)
Top of slope
Slope
SECTION A–A
Slope
Top of slope
END DETAIL
SECTION B–B
Sandbags
See note 6
SECTION C–C
Sandbag barrier
Top of slope
Slope
CROSS BARRIER DETAIL

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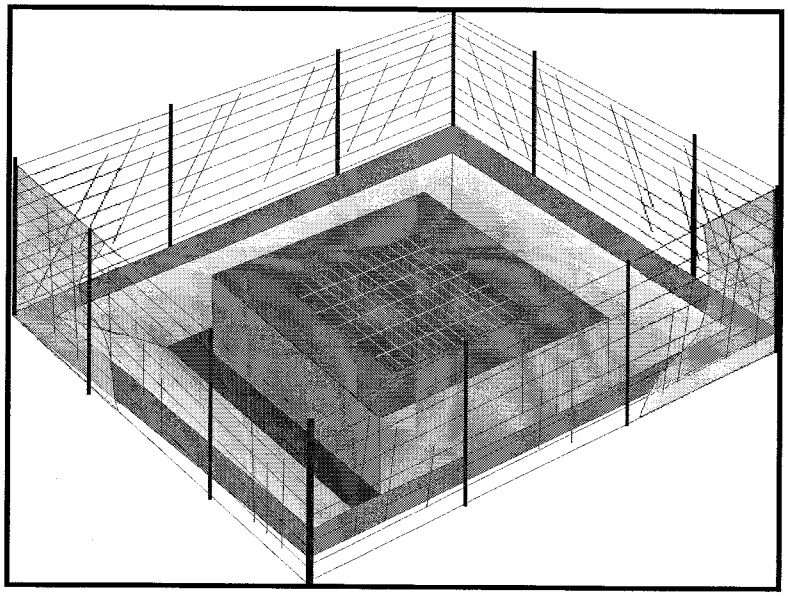
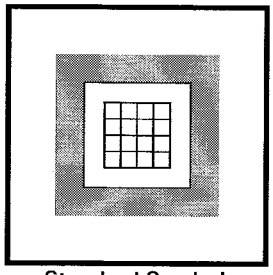
Storm Drain Inlet Protection

SC-10





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Storm drain inlet protection includes devices used at storm drain inlets that are subject to runoff from construction activities to detain and/or filter sediment-laden runoff to allow sediment to settle and/or to filter sediment prior to discharge into storm drainage systems or watercourses.

Appropriate Applications

- Where ponding will not encroach into roadway traffic.
- Where sediment laden surface runoff may enter an inlet.
- Where disturbed drainage areas have not yet been permanently stabilized.
- Required to be implemented on a year around basis.

Limitations

- Not a stand-alone BMP. Storm Drain Inlet Protection shall always be implemented with other erosion and sediment controls upgradient.
- Requires an adequate area for water to pond without encroaching upon traveled way and shall not be an obstacle to oncoming traffic.
- Other methods of temporary protection are required to prevent non-storm water discharges from entering the storm drain system.
- Sediment removal may be difficult in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are expected, use other on-site sediment trapping techniques (e.g. check dams) in conjunction with inlet protection.
- For drainage areas larger than 1 ac, runoff shall be routed to a sediment trapping device designed for larger flows. See BMPs SC-2, "Sediment/Desilting Basin," and SC-3 "Sediment Trap."
- Filter fabric fence inlet protection is appropriate in open areas that are subject to sheet flow and for flows not exceeding 0.5 cfs.

- Gravel bag barriers for inlet protection are applicable when sheet flows or concentrated flows exceed 0.5 cfs, and it is necessary to allow for overtopping to prevent flooding.
- Fiber rolls and foam barriers are not appropriate for locations where they cannot be properly anchored to the surface.
- Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected and overflow capability is needed.

Standards and Specifications

Identify existing and/or planned storm drain inlets that have the potential to receive sediment-laden surface runoff. Determine which method to use.

Methods and Installation

- ***DI Protection Type 1 - Filter Fabric Fence -*** The filter fabric fence (Type 1) protection is illustrated on Page 5. It is similar to constructing a silt fence. See BMP SC-1, "Silt Fence." Do not place filter fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced.
- ***DI Protection Type 2 - Excavated Drop Inlet Sediment Trap -*** The excavated drop inlet sediment trap (Type 2) is illustrated in Page 6. It is similar to constructing a temporary silt fence, See BMP SC-1, "Silt Fence." Size excavated trap to provide a minimum storage capacity calculated at the rate of 67 yd^3/ac of drainage area.
- ***DI Protection Type 3 – Gravel bag -*** The gravel bag barrier (Type 3) is illustrated in Page 7. Flow from a severe storm shall not flow over the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct gravel bags in accordance with BMP SC-6, "Gravel Bag Berm." Gravel bags shall be used due to their high permeability.
- ***DI Protection Type 4 – Block and Gravel Filter – The block and gravel filter*** (Type 4) is placed around the inlet as illustrated in Page 8. Block and gravel filters are suitable for curb inlets commonly used in residential, commercial, and industrial construction. Engineer approval is required.
- ***DI Protection Type 5 – Foam Barriers and Fiber Rolls*** – Foam barrier or fiber roll (Type 5) is placed around the inlet and keyed and anchored to the surface. Foam barriers and fiber rolls are intended for use as inlet protection where the area around the inlet is unpaved and the foam barrier or fiber roll can be secured to the surface. Engineer approval is required.

Maintenance and Inspection

General

- Inspect all inlet protection devices weekly and before and after every rainfall events. During extended rainfall events, inspect inlet protection devices at least once every 24 hours.

- Ensure that all storm drain inlets are maintained and protected from activities that reduce their effectiveness.
- Remove all inlet protection devices within thirty days after the site is stabilized, or when the inlet protection is no longer needed.
  - Bring the disturbed area to final grade and smooth and compact it. Appropriately stabilize all bare areas around the inlet.
  - Clean and re-grade area around the inlet and clean the inside of the storm drain inlet as it must be free of sediment and debris.

Requirements by Method

- ***Type 1 - Filter Fabric Fence***

This method shall be used for drain inlets requiring protection in areas where finished grade is established and erosion control seeding has been applied or is pending.

- Make sure the stakes are securely driven in the ground and are structurally sound (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes.
- Replace or clean the fabric when the fabric becomes clogged with sediment. Make sure the fabric does not have any holes or tears. Repair or replace fabric as needed or as directed by the Engineer.
- At a minimum, remove the sediment behind the fabric fence when accumulation reaches one-third the height of the fence or barrier height. Removed sediment shall be incorporated in the project at locations designated by the Engineer or disposed of outside the right-of-way in conformance with all applicable laws and regulations.

- ***Type 2 – Excavated Drop Inlet Sediment Trap***

This method may be used for drain inlets requiring protection in areas that have been cleared and grubbed, and where exposed soil areas are subject to grading.

- Remove sediment from basin when the volume of the basin has been reduced by one-third.

- ***Type 3 - Gravel Bag Barrier***

This method may be used for drain inlets surrounded by AC or paved surfaces.

- Inspect bags for holes, gashes, and snags.
- Check gravel bags for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier. Removed sediment shall be incorporated in the project at locations designated by the Engineer or disposed of in conformance with applicable laws and regulations.

- ***Type 4 -Block and Gravel Filter***

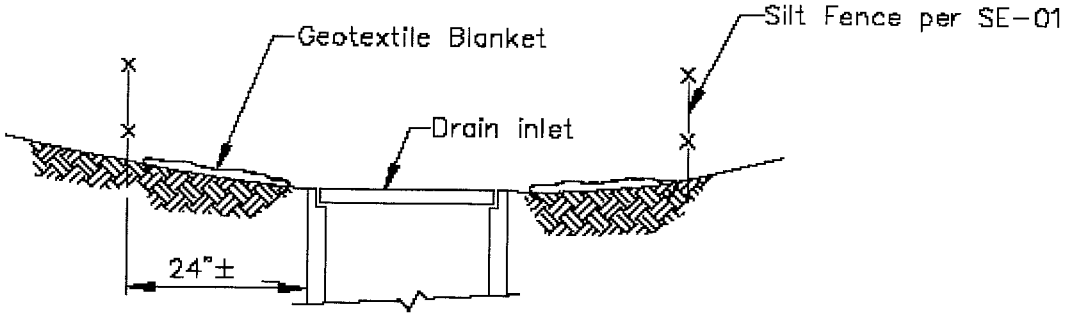
The block and gravel filter (Type 4) is shown in the figures. Block and gravel filters are suitable for curb inlets commonly used in residential, commercial, and industrial construction.

  - Place hardware cloth or comparable wire mesh with 0.5 in. openings over the drop inlet so that the wire extends a minimum of 1 ft beyond each side of the inlet structure. If more than one strip is necessary, overlap the strips. Place filter fabric over the wire mesh.
  - Place concrete blocks lengthwise on their sides in a single row around the perimeter of the inlet, so that the open ends face outward, not upward. The ends of adjacent blocks should abut. The height of the barrier can be varied, depending on design needs, by stacking combinations of blocks that are 4 in., 8 in., and 12 in. wide. The row of blocks should be at least 12 in. but no greater than 24 in. high.
  - Place wire mesh over the outside vertical face (open end) of the concrete blocks to prevent stone from being washed through the blocks. Use hardware cloth or comparable wire mesh with 0.5 in. opening.
  - Pile washed stone against the wire mesh to the top of the blocks. Use 0.75 to 3 in.

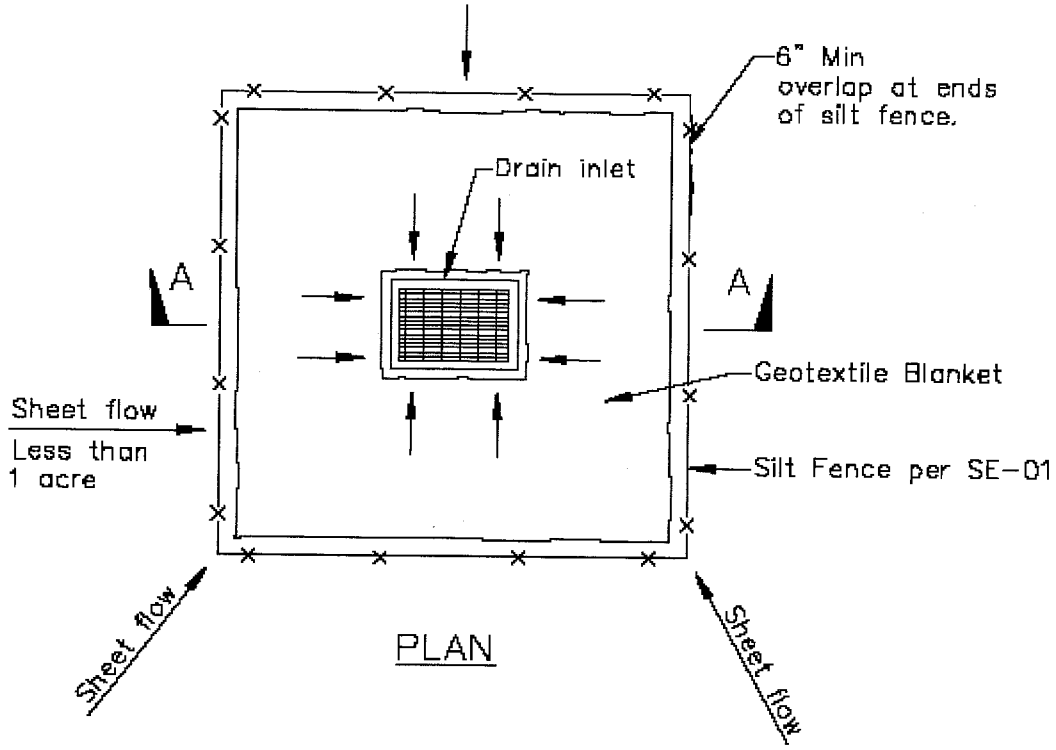
- ***Type 5 Foam Barriers and Fiber Rolls***

This method may be used for drain inlets requiring protection in areas that have been cleared and grubbed, and where exposed soil areas subject to grading. Engineer approval is required.

  - Check foam barrier or fiber roll for proper arrangement and displacement. Remove the sediment behind the barrier when it reaches one-third the height of the barrier. Removed sediment shall be incorporated in the construction site at locations designated by the Engineer or disposed of in conformance with all applicable laws and regulations.



SECTION A–A

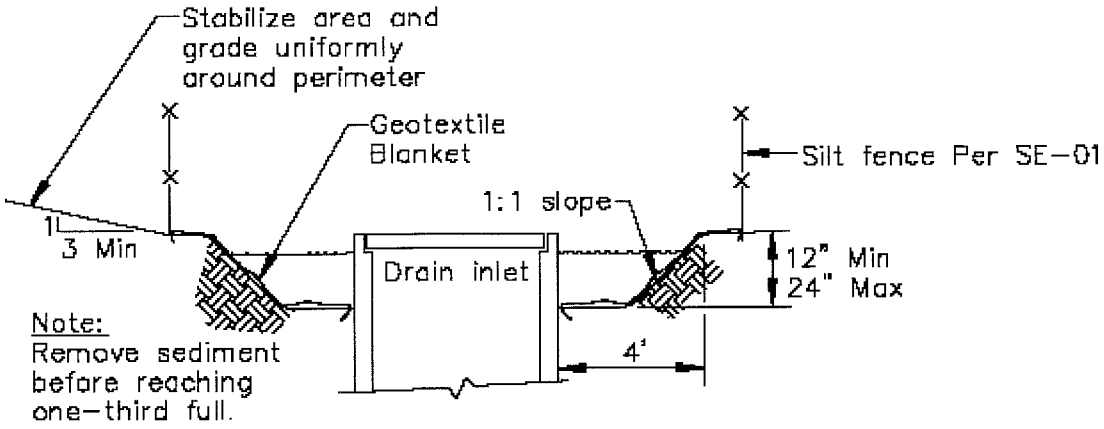


PLAN

DI PROTECTION TYPE 1
NOT TO SCALE

NOTES:

1. For use in areas where grading has been completed and final soil stabilization and seeding are pending.
2. Not applicable in paved areas.
3. Not applicable with concentrated flows.



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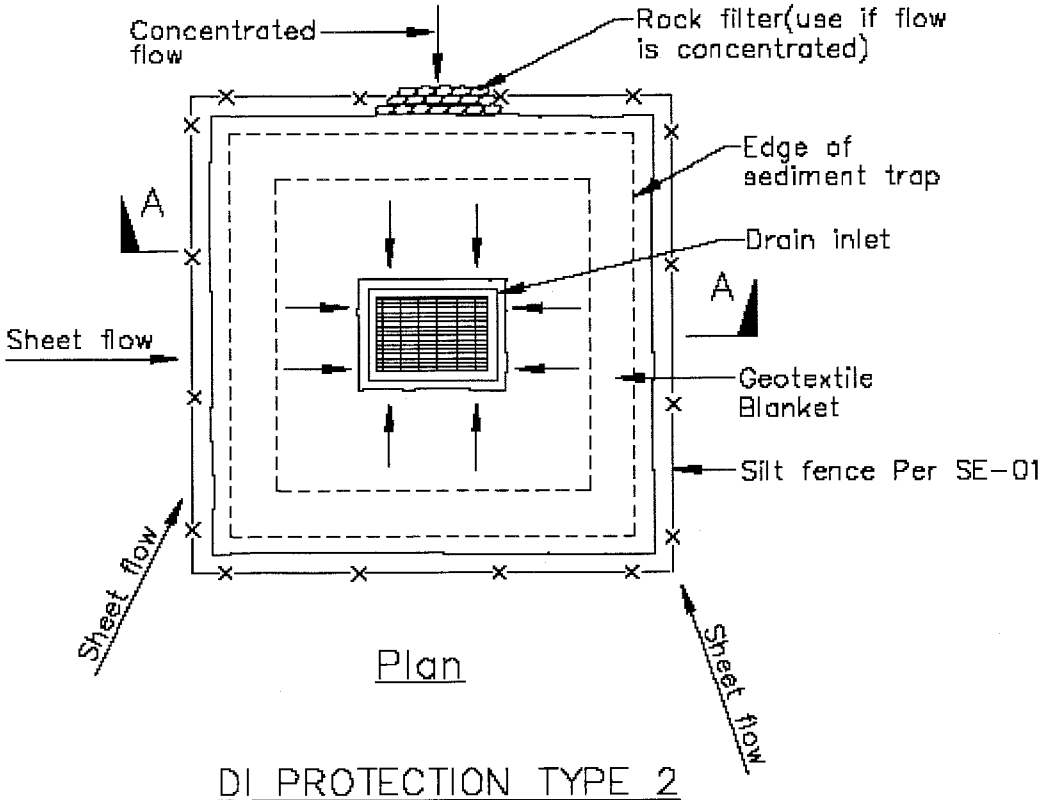
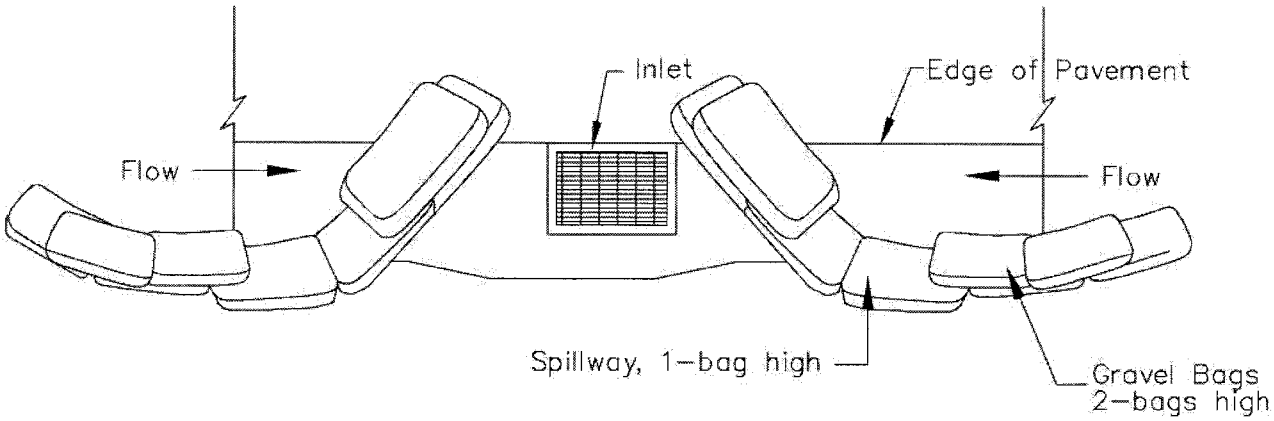


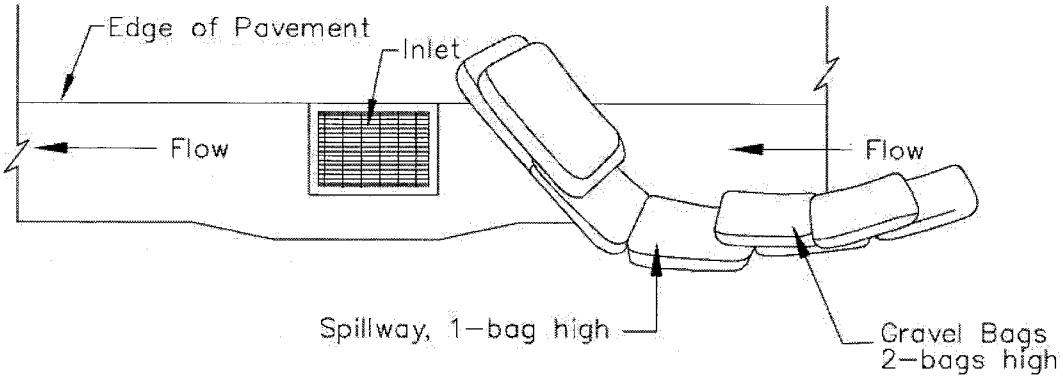
Plan

DI PROTECTION TYPE 2
NOT TO SCALE

Notes
1. For use in cleared and grubbed and in graded areas.
2. Shape basin so that longest inflow area faces longest length of trap.
3. For concentrated flows, shape basin in 2:1 ratio with length oriented towards direction of flow.



TYPICAL PROTECTION FOR INLET WITH OPPOSING FLOW DIRECTIONS



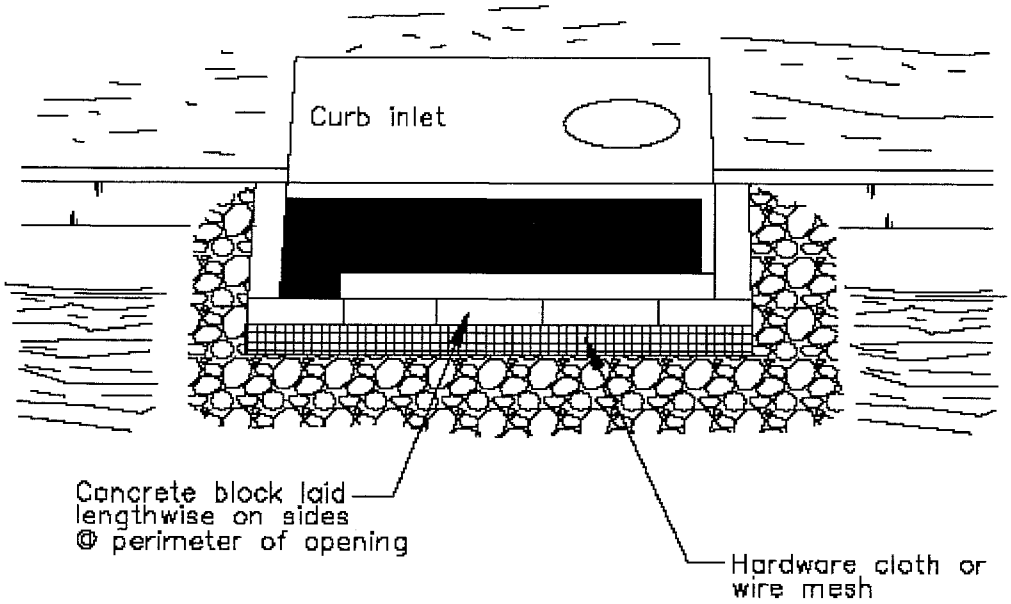
TYPICAL PROTECTION FOR INLET WITH SINGLE FLOW DIRECTION

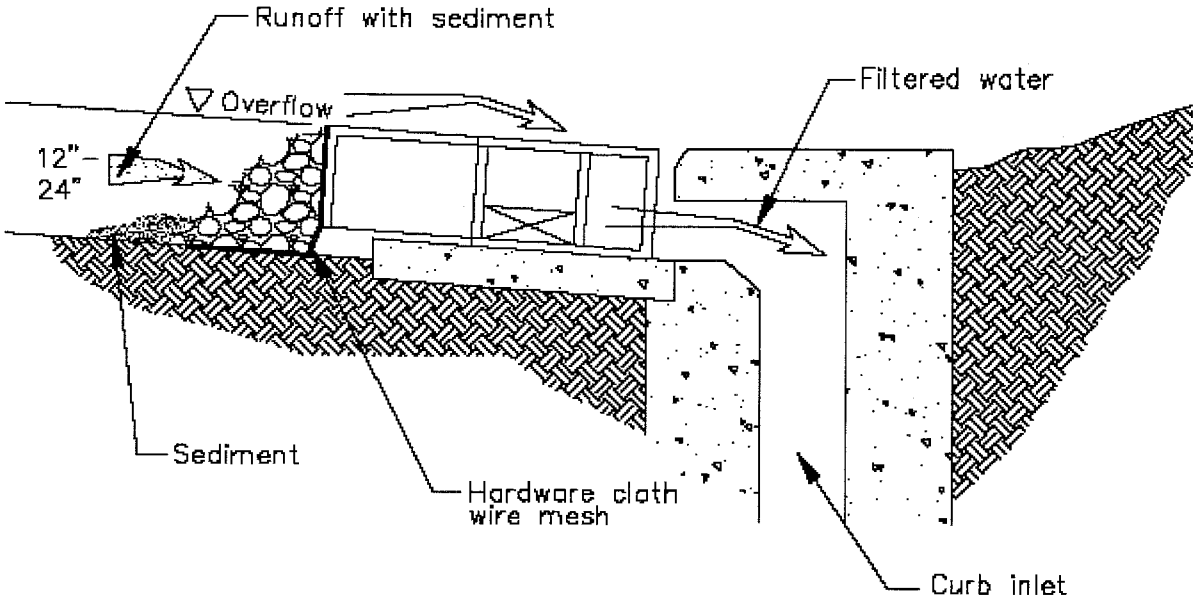
NOTES:

1. Intended for short–term use.
2. Use to inhibit non–storm water flow.
3. Allow for proper maintenance and cleanup.
4. Bags must be removed after adjacent operation is completed
5. Not applicable in areas with high silts and clays without filter fabric.

DI PROTECTION - TYPE 3

Not to scale



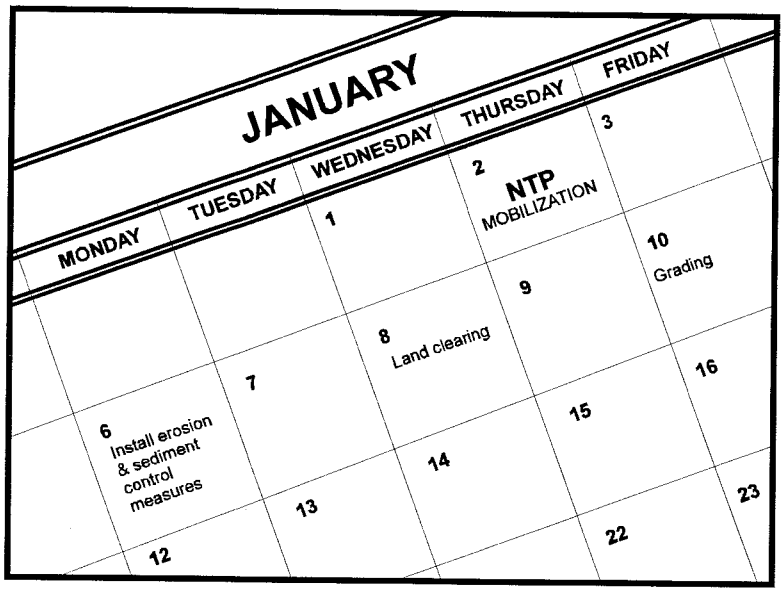


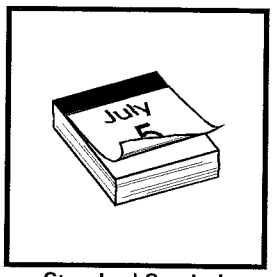
DI PROTECTION – TYPE 4

NOT TO SCALE

Scheduling

SS-1





Standard Symbol

BMP Objectives

- Soil Stabilization
- Sediment Control
- Tracking Control
- Wind Erosion Control
- Non-Storm Water Management
- Materials and Waste Management

Definition and Purpose

This best management practice (BMP) involves sequencing of construction activities with the implementation of construction site BMPs such as temporary soil stabilization (erosion control) and temporary sediment control measures. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Appropriate Applications

Scheduling and planning the project are the very first steps in an effective storm water program and are required for every construction project.

Limitations

None identified.

Standards and Specifications

- Construction sequencing shall be scheduled to minimize land disturbance for all projects throughout the year. Appropriate BMPs shall be implemented on a year round basis. The construction schedule shall be reflected in the SWPPP implementation of BMPs.
- Schedule year around implementation and deployment of:
  - Temporary soil stabilization BMPs.
  - Temporary sediment control BMPs.
  - Tracking control BMPs.
  - Wind erosion control BMPs.
  - Non-storm water BMPs.
  - Waste management and materials pollution control BMPs.

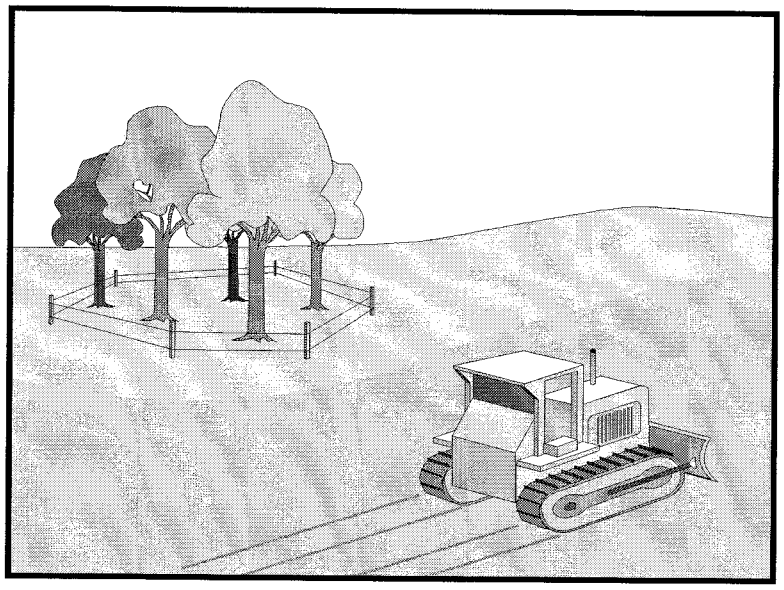
- Develop the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, pouring foundations, installing utilities, etc., to minimize the soil disturbing activities during the rainy season.
- Schedule major grading operations for the non-rainy season when practical.
- Stabilize non-active areas within 14 days from the cessation of soil-disturbing activities or one day prior to the onset of precipitation, whichever occurs first.
- Monitor the weather forecast for rainfall.
- When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization and sediment controls and sediment treatment controls on all disturbed areas prior to the onset of rain.
- Be prepared year-round to deploy soil stabilization and sediment control practices. Erosion may be caused during the non-rainy season by unseasonal rainfall, wind, and vehicle tracking. Keep the site stabilized year-round, and retain and maintain sediment tapping devices in operational condition.
- Incorporate staged seeding and re-vegetation of graded slopes as work progresses according to the contract Special Provisions or as directed by the Engineer.
- Apply and maintain temporary erosion and sediment controls to all areas until permanent stabilization has been established.

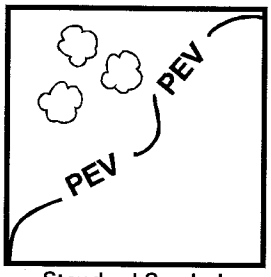
Maintenance and Inspection

- Review and update project site weekly.
- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Amend the schedule when changes are warranted or when directed by the Engineer.

Preservation of Existing Vegetation

SS-2





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ● Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Preservation of existing vegetation is the identification and protection of desirable vegetation that provides erosion and sediment control benefits.

Appropriate Applications

- Preserve existing vegetation at areas on a site where no construction activity is required by the contract Special Provisions.
- On a year-round basis, temporary fencing shall be installed at the limits clearing and grubbing operations and other soil-disturbing activities. The temporary fencing shall be installed prior to commencement of clearing and grubbing operations and other soil-disturbing activities
- Clearing and grubbing operations shall be staged to preserve existing vegetation.

Limitations

Protection of existing vegetation requires planning, and may limit the area available for construction activities.

Standards and Specifications

Do NOT drive over vegetation or store materials on vegetation or otherwise disturb vegetation outside construction project boundaries shown on the project plans.

Schedule

- The Contractor shall not prune or remove any trees for any reason during the nesting season (see contract Special Provisions) for migratory non-game native bird species, including raptors.
- If approved by the Engineer, the Contractor may prune or remove any trees during the nesting season. The Contractor will coordinate with the Agency to provide all required bird surveys to detect any protected native birds in the trees to be removed and other suitable nesting habitat.

- If a protected native bird is found, the Agency will delay all clearance/construction disturbance activities in suitable nesting habitat or continue the surveys in order to locate any nests. If an active nest is located, clearance/construction disturbance activities shall be delayed until the nest is vacated and juveniles have fledged and when there is no evidence of a second attempt at nesting. Limits of construction to avoid a nest shall be established in the field by the Agency.

- Refer to contract Special Provisions for any other provisions or requirements for the preservation vegetation.

Design and Layout

- Mark areas to be preserved with temporary fencing.

- Minimize the disturbed areas by locating temporary roadways, stockpiles and layouts areas to avoid stands of trees, shrubs, and grass. Follow existing contours to reduce cutting and filling.

Installation

- Construction materials, equipment storage, and parking areas shall be located where they will not cause root compaction.

- Keep equipment away from trees to prevent trunk and root damage.

- Maintain existing irrigation systems.

- Employees and subcontractors shall be trained to perverse protective devices. No heavy equipment, vehicular traffic, or storage piles of any construction materials shall be permitted within the drip line of any tree to be remain. Removed trees shall not be felled, pushed, or pulled into any retained trees. No toxic or construction materials (including paint, acid, nails, gypsum board, chemicals, fuels, and lubricants) shall be stored within 50 feet of the drip line of any retained trees, nor disposed of in any way which would impact vegetation.

Trenching and Tunneling

- Trenching shall be as far away from tree trunks as possible, usually outside of the tree drip line or canopy. Curve trenches around trees to avoid large roots or root concentrations. If roots are encountered, consider tunneling under them. When trenching and/or tunneling near or under trees to be retained, tunnels shall be at least 18 inches below the ground surface, and not below the tree center to minimize impact on the roots.

- Tree roots shall not be left exposed to air; they shall be covered with soil as soon as possible, protected, and kept moistened with wet burlap or peat moss until the tunnel and/or trench can be completed.

- The ends of damaged or cut roots shall be cut off smoothly.
- Trenches and tunnels shall be backfilled as soon as possible. Careful backfilling andcompacting will eliminate air spaces in the soil which can damage roots.
- After all other work is complete, fences and barriers shall be removed last. This is because protected trees may be destroyed by carelessness during the final cleanup and landscaping.

Maintenance and Inspection

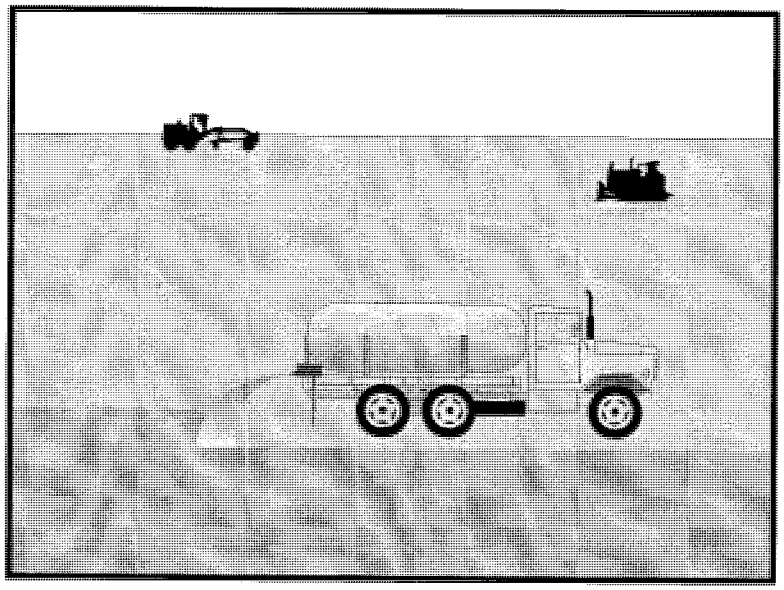
During construction, the limits of disturbance shall remain clearly marked at all times. Irrigation or maintenance of existing vegetation shall conform to the requirements in the landscaping plan. If damage to protected trees still occurs, maintenance guidelines described below shall be followed:

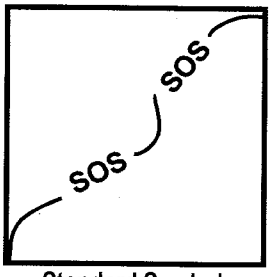
- Verify that protective measures remain in place. Restore damaged protection measures immediately
- Serious tree injuries shall be attended to by an arborist.
- Damage to the crown, trunk, or root system of a retained tree shall be repaired immediately.
- Trench as far from tree trunks as possible, usually outside of the tree drip line or canopy. Curve trenches around trees to avoid large roots or root concentrations. If roots are encountered, consider tunneling under them. When trenching or tunneling near or under trees to be retained, place tunnels at least 18 in. below the ground surface, and not below the tree center to minimize impact on the roots.
- Do not leave tree roots exposed to air. Cover exposed roots with soil as soon as possible. If soil covering is not practical, protect exposed roots with wet burlap or peat moss until the tunnel or trench is ready for backfill.
- Cleanly remove the ends of damaged roots with a smooth cut.
- Remove any trees intended for retention if those trees are damaged seriously enough to affect their survival, as determined by the Engineer. If replacement is required, the new tree shall be of similar species, as required by the contract special provisions or as directed by the Engineer.
- If bark damage occurs, cut back all loosened bark into the undamaged area, with the cut tapered at the top and bottom and drainage provided at the base of the wood. Limit cutting the undamaged area as much as possible.
- Aerate soil that has been compacted over a trees root zone by punching holes 12 in. deep with an iron bar, and moving the bar back and forth until the soil is loosened. Place holes 18 in. apart throughout the area of compacted soil under the tree crown.

- Fertilization
  - Fertilize stressed or damaged broadleaf trees to aid recovery.
  - Fertilize trees in the late fall or early spring.
  - Apply fertilizer to the soil over the feeder roots and in accordance with label instructions, but never closer than 3 ft to the trunk. Increase the fertilized area by one-fourth of the crown area for conifers that have extended root systems.
  - Discontinue the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.
  - Follow WM-1 for storage of fertilizers.
- Retain protective measures until all other construction activity is complete to avoid damage during site cleanup and stabilization.
- Inspect existing vegetation weekly and before and after every rainfall events. During extended rainfall events, inspect existing vegetation at least once every 24 hours.

Soil Binders

SS-5





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ● Wind Erosion Control
- ○ Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

Soil binders consist of applying and maintaining a soil stabilizer to exposed soil surfaces. Soil binders are materials applied to the soil surface to temporarily prevent water-induced erosion of exposed soils on construction sites. Soil binders also provide temporary dust, wind, and soil stabilization (erosion control) benefits. This is one of five temporary soil stabilization alternatives to consider.

Appropriate Applications

Soil binders are typically applied to disturbed areas requiring short-term temporary protection. Because soil binders can often be incorporated into the work, they may be a good choice for areas where grading activities will soon resume. Application on stockpiles to prevent water and wind erosion is an additional appropriate use.

Limitations

- Soil binders are temporary in nature and may need reapplication.
- Soil binders require a minimum curing time until fully effective which may be 24 hours or longer. Soil binders may need reapplication after a storm event.
- Soil binders will generally experience spot failures during heavy rainfall events. If runoff penetrates the soil at the top of a slope treated with a soil binder, it is likely that the runoff will undercut the stabilized soil layer.
- Soil binders do not hold up to pedestrian or vehicular traffic across treated areas.
- Some soil binders are incompatible with existing vegetation.
- Soil binders may not penetrate soil surfaces made up primarily of silt and clay, particularly when compacted.
- Performance of soil binders depends on temperature, humidity, and traffic across treated areas.

Standards and Specifications

General Considerations

- Soil binder shall be approved by the Engineer prior to application.
- Site-specific soil types will dictate the appropriate soil binders to be used.
- A soil binder shall be environmentally benign (non-toxic to plant and animal life), easy to apply, easy to maintain, economical, and shall not stain paved or painted surfaces.
- Avoid over-spray onto the travel way, sidewalks, lined drainage channels, and existing vegetation.

Soil Binders Applications

After selecting an appropriate soil binder, the untreated soil surface must be prepared before applying the soil binder. The untreated soil surface must contain sufficient moisture to assist the agent in achieving uniform distribution. In general, the following steps shall be followed:

- Follow manufacturer's recommendations for application rates, pre-wetting of application area, and cleaning of equipment after use.
- Prior to application, roughen embankment and fill areas by rolling with a crimping or punching type roller or by track walking. Track walking shall only be used where rolling is impractical. Crown or slope ground to avoid ponding.
- Consider the drying time for the selected soil binder and apply with sufficient time before anticipated rainfall. Soil binders shall not be applied during or immediately before rainfall.
- Soil binders shall not be applied to frozen soil, areas with standing water, under freezing or rainy conditions, or when the air temperature is below 4oC (40°F) during the curing period.
- More than one treatment is often necessary, although the second treatment may be diluted or have a lower application rate.
- Generally, soil binders require a minimum curing time before they are fully effective. Refer to manufacturer's recommendations for specific cure times.
- Uniformly pre-wet ground at a rate of 0.03 to 0.3 gal/yd^2 or according to manufacturer's recommendations. In low humidity, reactivate chemicals by re-wetting with water at a rate of 0.1 to 0.2 gal/yd^2.
- Apply soil binder solution under pressure. Overlap spry pattern by 6 to 12 inches.
- Allow treated area to cure for the time recommended by the manufacturer; typically, at least 24 hours.

Selecting a Soil Binder

Properties of common soil binders used for erosion control are provided in Table 1. Use Table 1 to select an appropriate soil binder.

Factors to consider when selecting a soil binder include the following:

- Suitability to situation - Consider where the soil binder will be applied; determine if it needs a high resistance to leaching or abrasion, and whether it needs to be compatible with any existing vegetation. Determine the length of time soil stabilization will be needed, and if the soil binder will be placed in an area where it will degrade rapidly. In general, slope steepness is not a discriminating factor for the listed soil binders.

- Soil types and surface materials - Fines and moisture content are key properties of surface materials. Consider a soil binder's ability to penetrate, leaching potential, and ability to form a surface crust on the surface materials.

- Frequency of application - The frequency of application can be affected by subgrade conditions, surface type, climate, and maintenance schedule. Frequent applications could lead to high costs. Application frequency may be minimized if the soil binder has good penetration, low evaporation, and good longevity. Consider also that frequent application will require frequent equipment clean-up.

After considering the above factors, the soil binders in Table 1 will be generally appropriate as follows:

Plant-Material Based (Short Lived)

-*Guar:* Guar is a non-toxic, biodegradable, natural galactomannan-based hydrocolloid treated with dispersent agents for easy field mixing. It shall be diluted at the rate of 1 to 5 lb per 100 gallons of water, depending on application machine capacity. Recommended minimum application rates are as follows:

Application Rates for Guar Soil Stabilizer

Slope (V:H):	Flat	1:4	1:3	1:2	1:1
lb/ac	40	45	50	60	70

-*Psyllium:* Psyllium is composed of the finely ground muciloid coating of plantago seeds that is applied as a dry powder or in a wet slurry to the surface of the soil. It dries to form a firm but rewettable membrane that binds soil particles together but permits germination and growth of seed. Psyllium requires 12 to 18 hours drying time. Psyllium shall be applied at a rate of 80 to 200 lb/ac, with enough water in solution to allow for a uniform slurry flow.

-*Starch:* Starch is non-ionic, cold-water soluble (pre-gelatinized) granular cornstarch. The material is mixed with water and applied at the rate of 150 lb/ac. Approximate drying time is 9 to 12 hours.

Plant-Material Based (Long Lived)

-*Pitch and Rosin Emulsion:* Generally, a non-ionic pitch and rosin emulsion has a minimum solids content of 48%. The rosin shall be a minimum of 26% of the total solids content. The soil stabilizer shall be non-corrosive, water-dilutable emulsion that upon application cures to a water insoluble binding and cementing agent. For soil erosion control applications, the emulsion is diluted and shall be applied as follows:

For clayey soil:	5 parts water to 1 part emulsion
For sandy soil:	10 parts water to 1 part emulsion

Application can be by water truck or hydraulic seeder with the emulsion/product mixture applied at the rate specified by the manufacturer. Approximate drying time is 19 to 24 hours.

Polymeric Emulsion Blends

-*Acrylic Copolymers and Polymers:* Polymeric soil stabilizers shall consist of a liquid or solid polymer or copolymer with an acrylic base that contains a minimum of 55% solids. The polymeric compound shall be handled and mixed in a manner that will not cause foaming or shall contain an anti-foaming agent. The polymeric emulsion shall not exceed its shelf life or expiration date; manufacturers shall provide the expiration date. Polymeric soil stabilizer shall be readily miscible in water, non-injurious to seed or animal life, non-flammable, shall provide surface soil stabilization for various soil types without totally inhibiting water infiltration, and shall not re-emulsify when cured. The applied compound shall air cure within a maximum of 36 to 48 hours. Liquid copolymer shall be diluted at a rate of 10 parts water to 1 part polymer and applied to soil at a rate of 1,175 gal/ac.

-*Liquid Polymers of Methacrylates and Acrylates:* This material consists of a tackifier/sealer that is a liquid polymer of methacrylates and acrylates. It is an aqueous 100% acrylic emulsion blend of 40% solids by volume that is free from styrene, acetate, vinyl, ethoxylated surfactants or silicates. For soil stabilization applications, it is diluted with water in accordance with manufacturer's recommendations, and applied with a hydraulic seeder at the rate of 20 gal/ac. Drying time is 12 to 18 hours after application.

-*Copolymers of Sodium Acrylates and Acrylamides:* These materials are non-toxic, dry powders that are copolymers of sodium acrylate and acrylamide. They are mixed with water and applied to the soil surface for erosion control at rates that are determined by slope gradient:

Slope Gradient (V:H)	lb/ac
Flat to 1:5	3-5
1:5 to 1:3	5-10
1:2 to 1:1	10-20

-Poly-Acrylamide and Copolymer of Acrylamide: Linear copolymer polyacrylamide is packaged as a dry-flowable solid. When used as a stand-alone stabilizer, it is diluted at a rate of 1 lb/100 gal of water and applied at the rate of 5 lb/ac.

-Hydro-Colloid Polymers: Hydro-Colloid Polymers are various combinations of dry-flowable poly-acrylamides, copolymers and hydro-colloid polymers that are mixed with water and applied to the soil surface at rates of 53 to 62 lb/ac. Drying times are 0 to 4 hours.

Maintenance and Inspection

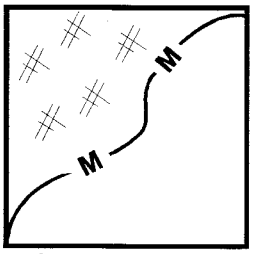
- Inspect slopes stabilized with soil binders weekly and before and after every rainfall events. During extended rainfall events, inspect slopes stabilized with soil binders at least once every 24 hours.
- Reapplying the selected soil binder may be needed for proper maintenance. High traffic areas shall be inspected daily, and lower traffic areas shall be inspected weekly.
- The Contractor is responsible for maintaining all slopes to prevent erosion for the duration of the project or per the contract Special Provisions.
- Maintain an unbroken, temporary stabilized area while disturbed soil areas are nonactive. Repair any damaged stabilized area and re-apply soil binder to exposed areas.

Chemicals	Plant Material Based (Short Lived)	Plant Material Based (Long Lived)	Polymeric Emulsion Blends
Relative Cost	Low	Low	Low
Resistance to Leaching	High	High	Low to Moderate
Resistance to Abrasion	Moderate	Low	Moderate to High
Longevity	Short to Medium	Medium	Medium to Long
Minimum Curing Time before Rain	9 to 18 hours	19 to 24 hours	0 to 24 hours
Compatibility with Existing Vegetation	Good	Poor	Poor
Mode of Degradation	Biodegradable	Biodegradable	Photodegradable/ Chemically Degradable
Labor Intensive	No	No	No
Specialized Application Equipment	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher
Liquid/Powder	Powder	Liquid	Liquid/Powder
Surface Crusting	Yes, but dissolves on rewetting	Yes	Yes, but dissolves on rewetting
Clean-Up	Water	Water	Water
Erosion Control Application Rate	Varies (1)	Varies (1)	Varies (1)

(1) Dependant on product, soil type, and slope inclination

Wood Mulching

SS-8



Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ● Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Wood mulching consists of applying a mixture of shredded wood mulch, bark or compost. Wood mulch is mostly applicable to landscape projects.

The primary function of wood mulching is to reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff.

Appropriate Applications

Wood mulching is considered a temporary soil stabilization (erosion control) alternative in the following situations:

- As a stand-alone temporary surface cover on disturbed areas until soils can be prepared for revegetation and permanent vegetative cover can be established.
- As short term, non-vegetative ground cover on slopes to reduce rainfall impact, decrease the velocity of sheet flow, settle out sediment and reduce wind erosion.

Limitations

- Shredded wood does not withstand concentrated flows and is prone to sheet erosion.
- Green material has the potential for the presence of unwanted weeds and other plant materials. Delivery system is primarily by manual labor, although pneumatic application equipment is available.

Standards and Specifications

Mulch Selection

There are many types of mulches, and selection of the appropriate type shall be based on the type of application and site conditions. Prior to use of wood mulches, there shall be concurrence with the Engineer since some mulch use on construction projects may not be compatible with planned or future projects. Selection of wood mulches by the Contractor must be approved by the Engineer.

Application Procedures

Prior to application, after existing vegetation has been removed, roughen embankment and fill areas by rolling with a punching-type roller or by track walking. The construction-application procedures for mulches vary significantly depending upon the type of mulching method specified. Two (2) methods are highlighted here:

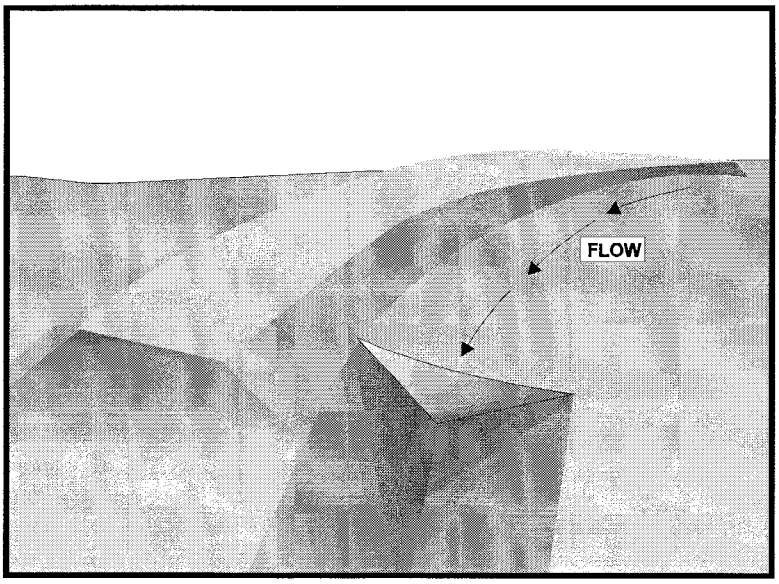
- Green Material: This type of mulch is produced by recycling vegetation trimmings such as grass, shredded shrubs and trees. Methods of application are generally by hand, although pneumatic methods are available. Mulch shall be composted to kill weed seeds.
  - It can be used as a temporary ground cover with or without seeding.
  - The green material shall be evenly distributed on site to a depth of not more than 2 in.
- Shredded Wood: Suitable for ground cover in ornamental or revegetated plantings.
  - Shredded wood/bark is conditionally suitable; see note under limitations.
  - Shall be distributed by hand (although pneumatic methods may be available).
  - The mulch shall be evenly distributed across the soil surface to a depth of 2 in. to 3 in.
- Avoid mulch placement onto the traveled way, sidewalks, lined drainage channels, sound walls, and existing vegetation.
- All material must be removed before re-starting work on the slopes.

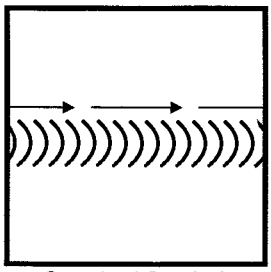
Maintenance and Inspection

- Inspect areas stabilized with wood mulch weekly and before and after every rainfall events. During extended rainfall events, inspect areas stabilized with wood mulch at least once every 24 hours.
- Wood mulch needs to last long enough to achieve erosion-control objectives. If the mulch is applied as a stand-alone erosion control method over disturbed areas (without seed), it shall last the length of time the site will remain barren or until final re-grading and revegetation.
- Where vegetation is not the ultimate cover, such as ornamental and landscape applications of bark or wood chips, inspection and maintenance shall focus on longevity and integrity of the mulch.

Earth Dikes/Drainage Swales and Lined Ditches

SS-9





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

These are structures that intercept, divert and convey surface run-on, generally sheet flow, to prevent erosion.

Appropriate Applications

- Earth dikes/drainage swales and lined ditches may be used to:
  - Convey surface runoff down sloping land.
  - Intercept and divert runoff to avoid sheet flow over sloped surfaces.
  - Divert and direct runoff towards a stabilized watercourse, drainage pipe or channel. Surface water diversion in streambeds or channels shall be in compliance with the contract Special Provisions and regulatory permits.
  - Intercept runoff from paved surfaces.
- Earth dikes/drainage swales and lined ditches also may be used:
  - Below steep grades where runoff begins to concentrate.
  - Along roadways and facility improvements subject to flood drainage.
  - At the top of slopes to divert run-on from adjacent or undisturbed slopes.
  - At bottom and mid-slope locations to intercept sheet flow and convey concentrated flows.
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the Engineer.

Earth Dikes/Drainage Swales and Lined Ditches

SS-9

Limitations

- Earth dikes/drainage swales and lined ditches are not suitable as sediment trapping devices.
- May be necessary to use other soil stabilization and sediment controls, such as check dams, plastics, and blankets, to prevent scour and erosion in newly graded dikes, swales and ditches.

Standards and Specifications

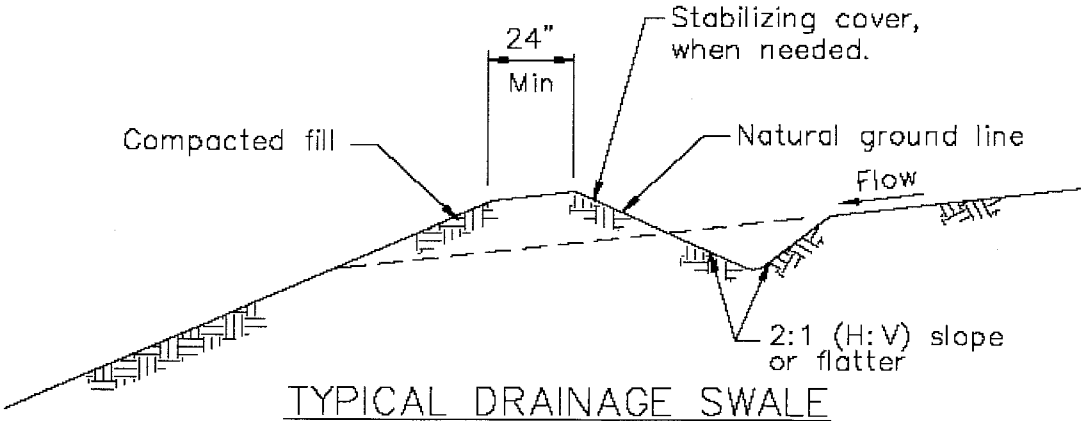
- Care must be applied to correctly size and locate earth dikes, drainage swales and lined ditches. Excessively steep, unlined dikes and swales are subject to erosion and gully formation.
- Conveyances shall be stabilized.
- Use a lined ditch for high flow velocities.
- Select flow velocity based on careful evaluation of the risks due to erosion of the measure, soil types, over topping, flow backups, washout, and drainage flow patterns for each project site.
- Compact any fills to prevent unequal settlement.
- Do not divert runoff from the construction project onto other property.
- When possible, install and utilize permanent dikes, swales and ditches early in the construction process.
- Provide stabilized outlets. Refer to SS-10, "Outlet Protection/Velocity/ Dissipation Devices."

Maintenance and Inspections

- Inspect earth dikes, drainage swales and lined ditches weekly and before and after every rainfall events. During extended rainfall events, inspect earth dikes, drainage swales and lined ditches at least once every 24 hours.
- Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.
- Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment. Remove debris and sediment, and repair linings and embankments as needed or as directed by the Engineer.
- Temporary conveyances shall be completely removed as soon as the surrounding drainage area has been stabilized, or at the completion of construction.

Earth Dikes/Drainage Swales and Lined Ditches

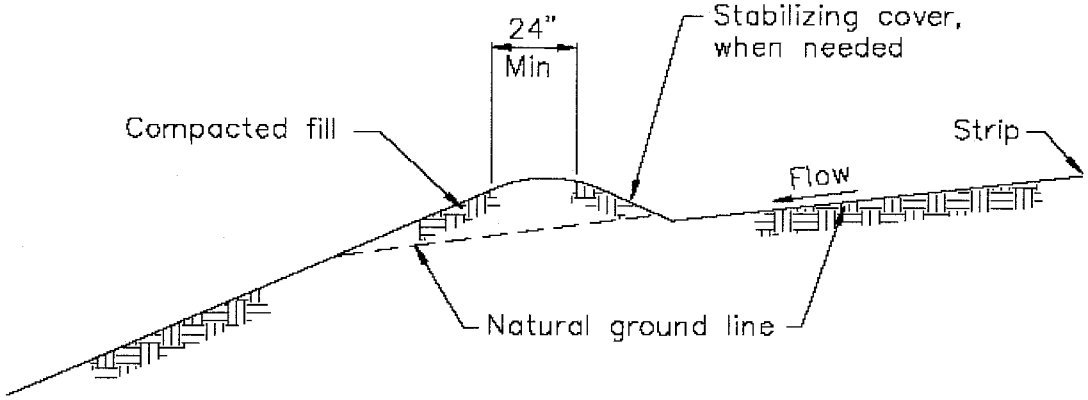
SS-9



TYPICAL DRAINAGE SWALE
NOT TO SCALE

NOTES:

1. Stabilize inlet, outlets and slopes.
2. Properly compact the subgrade.



TYPICAL EARTH DIKE
NOT TO SCALE

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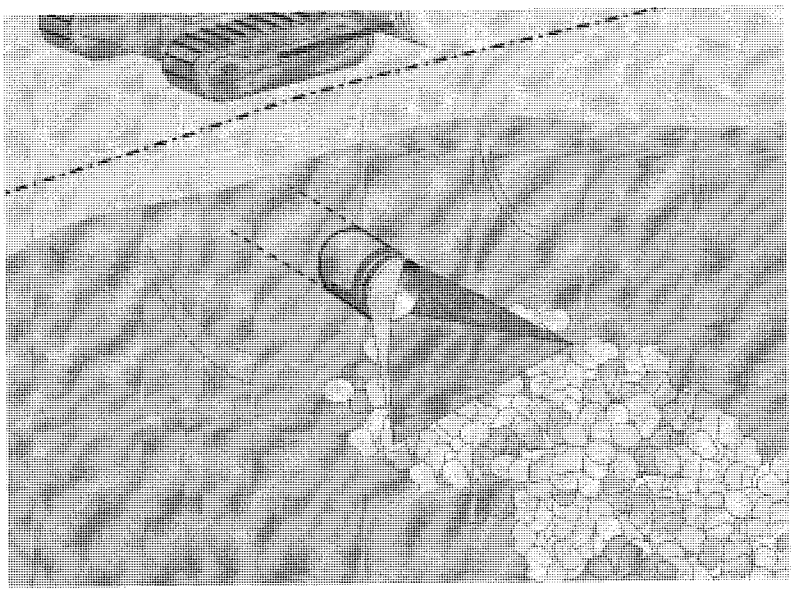
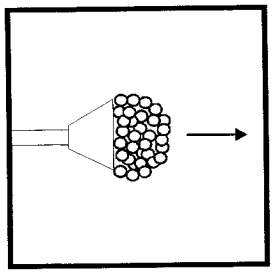
Outlet Protection/Velocity Dissipation Devices

SS-10





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Outlet protection and velocity dissipation devices are placed at pipe outlets to prevent scour and reduce the velocity and/or energy of storm water flows.

Appropriate Applications

- These devices may be used at the following locations:
  - Outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits or channels.
  - Outlets located at the bottom of mild to steep slopes.
  - Points where lined conveyances discharge to unlined conveyances.

Limitations

The use of outlet protection and velocity dissipation devices in streambeds shall be in compliance with the contract Special Provisions and approved by the Engineer.

Standards and Specifications

- There are many types of energy dissipaters, with rock being the one that is represented in the figure on Page 3. Please note that this is only one example and the Engineer may approve other types of devices proposed by the contractor.
- Install riprap, grouted riprap, or concrete apron at selected outlet. Riprap aprons are best suited for temporary use during construction.
- Grouted riprap shall be approved by the Engineer prior to installation.
- Carefully place riprap to avoid damaging the filter fabric.

- For proper operation of apron:
  - Align apron with receiving stream and keep straight throughout its length. If a curve is needed to fit site conditions, place it in upper section of apron.
  - If size of apron riprap is large, protect underlying filter fabric with a gravel blanket.
- Outlets on slopes steeper than 10% shall have additional protection.

Standards and Specifications

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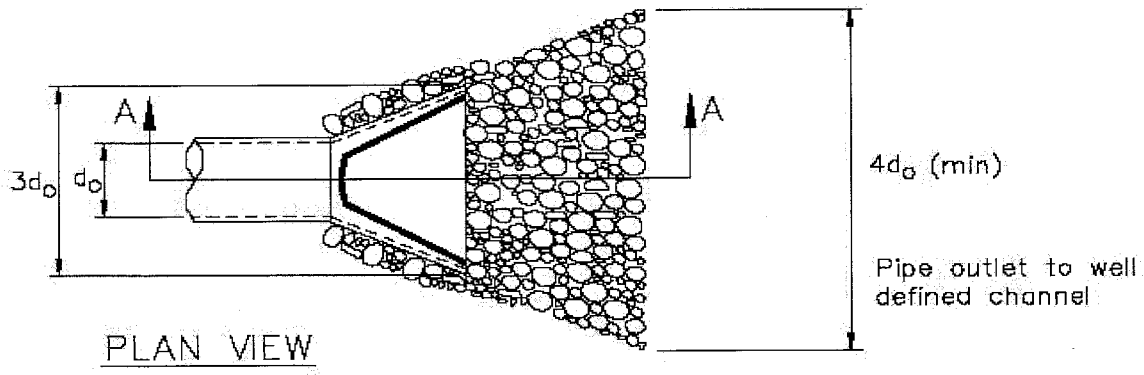
- Outlets on slopes steeper than 10% shall have additional protection.

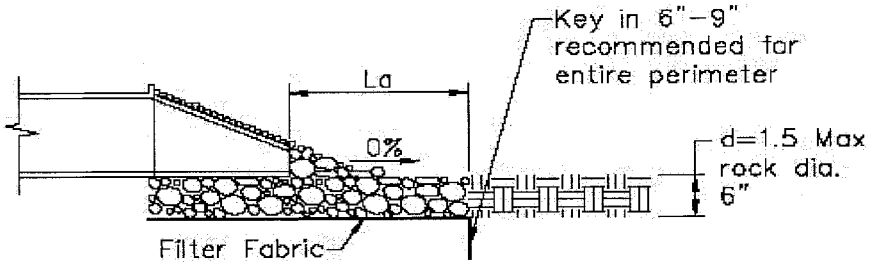
Maintenance and Inspection

- Inspect all outlet protection and velocity dissipation devices weekly and before and after every rainfall events. During extended rainfall events, inspect outlet protection and velocity dissipation devices at least once every 24 hours.
- Inspect apron for displacement of the riprap and/or damage to the underlying fabric. Repair fabric and replace riprap that has washed away.
- Inspect for scour beneath the riprap and around the outlet. Repair damage to slopes or underlying filter fabric immediately.
- Temporary devices shall be completely removed as soon as the surrounding drainage area has been stabilized, or at the completion of construction.

Outlet Protection/Velocity Dissipation Devices

SS-10





Pipe Diameter inches	Discharge ft^3/s	Apron Length, La ft	Rip Rap D_{50} Diameter Min inches
12	5	10	4
	10	13	6
18	10	10	6
	20	16	8
	30	23	12
	40	26	16
24	30	16	8
	40	26	8
	50	26	12
	60	30	16

For larger or higher flows consult a Registered Civil Engineer
Source: USDA - SCS

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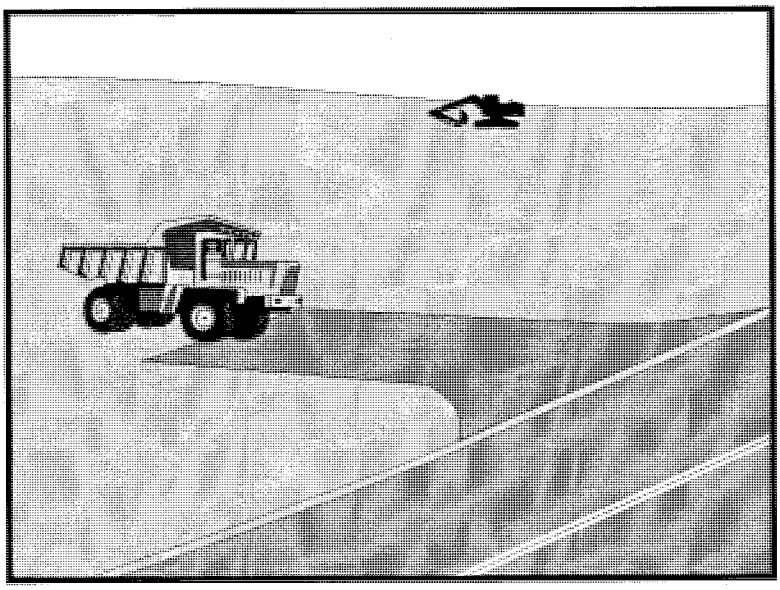
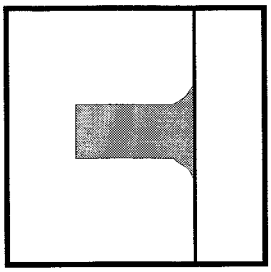
Stabilized Construction Entrance/Exit TC-1





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ○ Sediment Control
- ● Tracking Control
- ● Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto all paved surfaces and paved private and public roads by construction vehicles.

Appropriate Applications

- Use at all construction sites:
  - Where dirt or mud can be tracked onto paved surfaces or paved private or public roads.
  - Adjacent to water bodies.
  - Where poor soils are encountered.
  - Where dust is a problem during dry weather conditions.
- This BMP shall be implemented on all construction sites.

Limitations

- None identified

Standards and Specifications

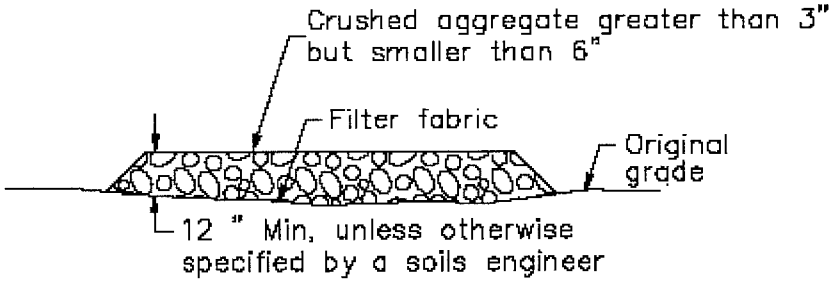
- Stabilize all construction entrances and exits to the construction site.
- Ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent offsite tracking of sediment.
- Prevent the off-site tracking of loose construction and landscape materials.
- Limit speed of vehicles to control dust.
- Properly grade each construction entrance/exit to prevent runoff from leaving the construction site.
- Route runoff from stabilized entrances/exits through a sediment-trapping device before discharge.

- Design stabilized entrance/exit to support the heaviest vehicles and equipment that will use it.
- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. The use of asphalt concrete (AC) grindings for stabilized construction access/roadway is not allowed.
- Use of constructed/manufactured steel plates with ribs for entrance/exit access is allowed with written approval from the Engineer.
- Place crushed aggregate over geotextile fabric to at least 12 in. depth, or place aggregate to a depth recommended by the Engineer. Crushed aggregate greater than 3 inches and smaller than 6 inches shall be used.
- Designate combination or single purpose entrances and exits to the construction site.
- Implement BMP SC-7, "Street Sweeping and Vacuuming" as needed and as required.
- Require all employees, subcontractors, and suppliers to utilize the stabilized construction access.

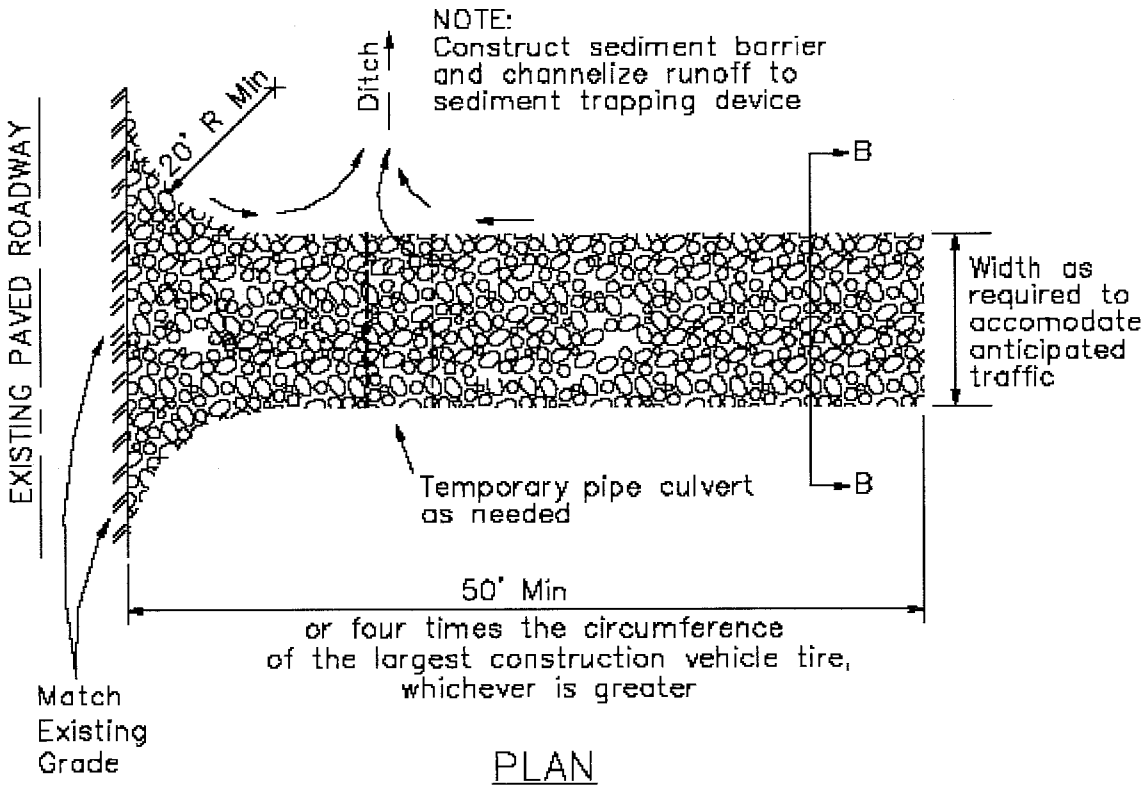
Maintenance and Inspection

- Ensure that all pollutant controls at entrances and exits are maintained and protected from activities that reduce their effectiveness.
- Inspect all entrances, exits, access roads daily and document weekly, and before and after every rainfall events. During extended rainfall events, inspect all entrances, exits, access roads at least once every 24 hours.
- Remove any sediment or other construction activity related materials that are deposited on the roads (by sweeping and vacuuming).
- Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment or as directed by the Engineer.

Stabilized Construction Entrance/Exit TC-1

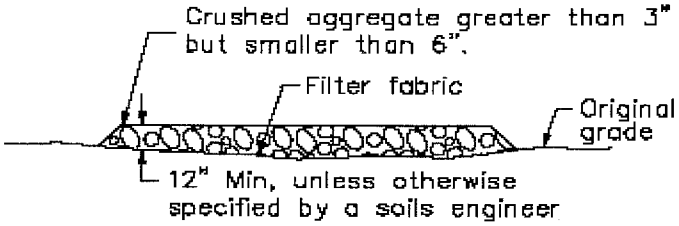


SECTION B–B
NTS



PLAN
NTS

Stabilized Construction Entrance/Exit (Type 1)



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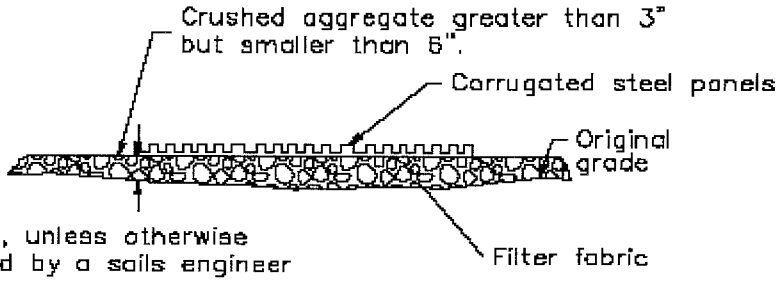
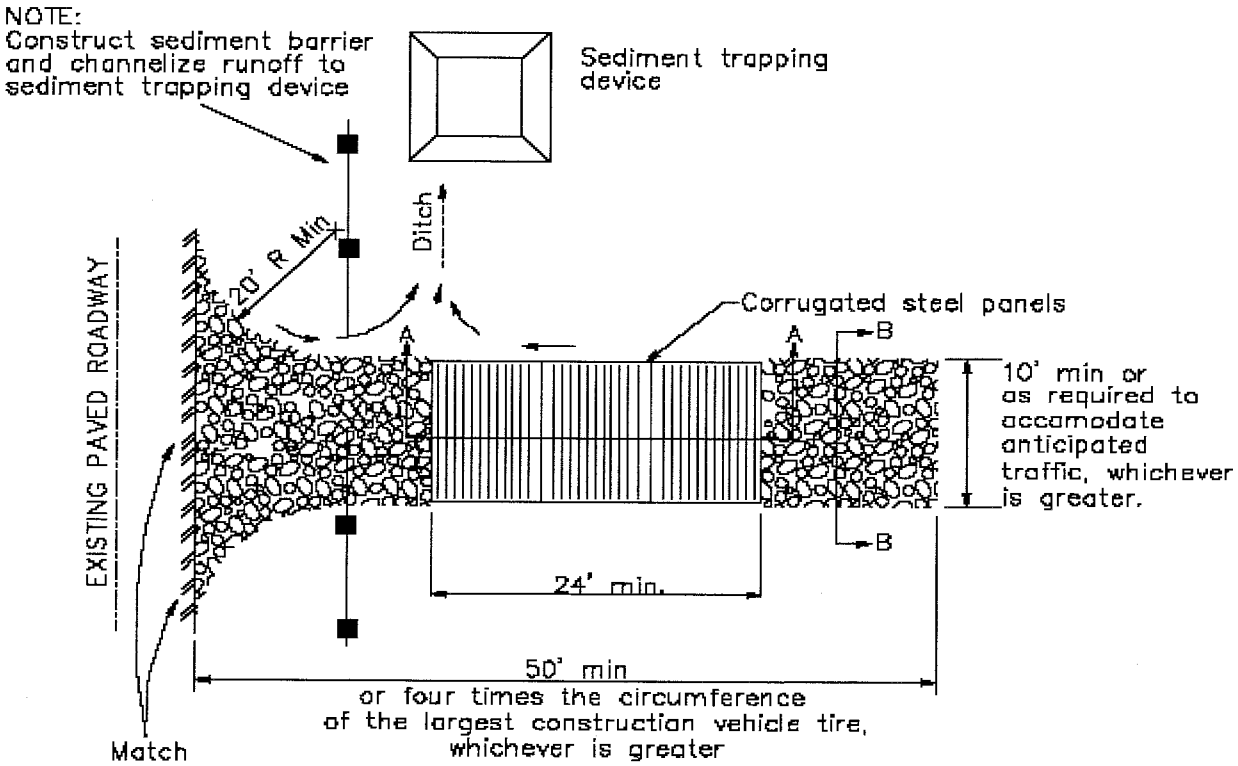


SECTION A–A
NOT TO SCALE



PLAN
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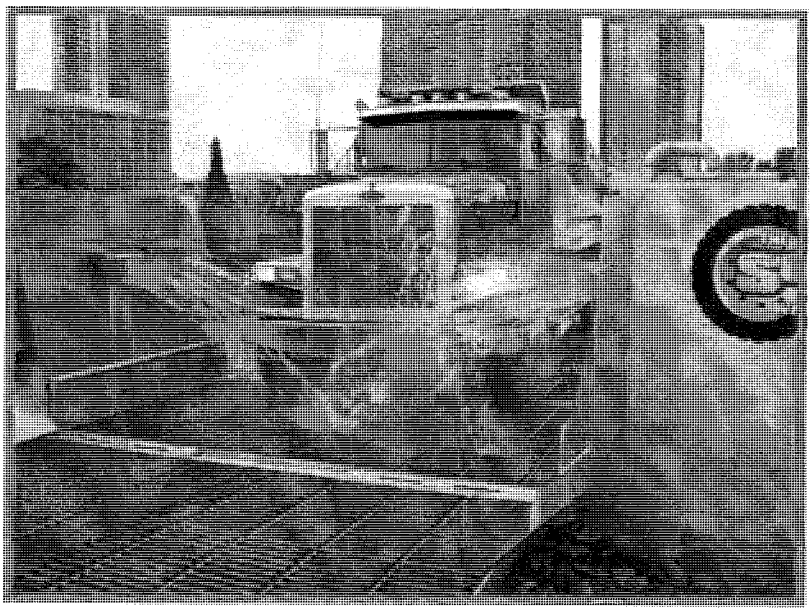
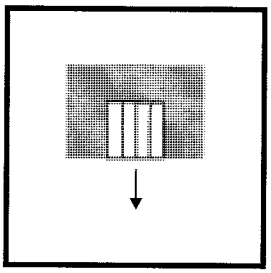
Stabilized Construction Entrance/Exit (Type 2)

Entrance/Outlet Tire Wash

TC-3





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ● Sediment Control
- ● Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

A tire wash is an area located at stabilized construction access points to remove sediment tires and undercarriages, and to prevent sediment from being transported onto paved roadways.

Appropriate Applications

- Tire washes may be used on construction sites where dirt and mud tracking onto paved roads by construction vehicles may occur.
- This BMP may be implemented on a project-by-project basis with other BMPs when determined necessary and feasible by the contract special provisions or Engineer.

Limitations

- Requires a supply of wash water.
- The waste water shall not be disposed of onsite.

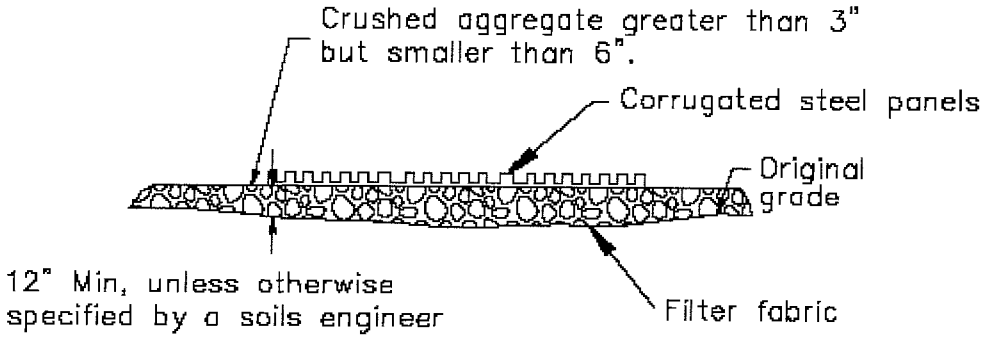
Standards and Specifications

- Incorporate with a stabilized construction entrance/exit. See BMP TC-1, "Stabilized Construction Entrance/Exit" and BMP SC-7, "Street Sweeping and Vacuuming"
- Pre-constructed tire wash systems are available for purchase or lease.
- Construct on level ground when possible, on a pad of coarse aggregate, greater than 3 inches and smaller than 6 inches. A geotextile fabric shall be placed below the aggregate.
- The tire wash shall be designed and constructed/manufactured for anticipated traffic loads.
- The tire wash shall be activated automatically upon vehicle's approach.

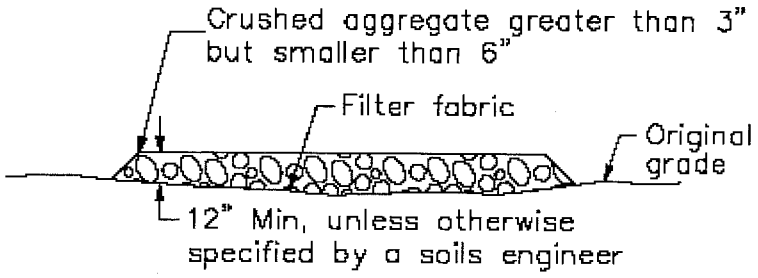
- Tire Wash shall remove all dirt/mud and debris from the tires and tire-grooves, wheel wells and undercarriages of the vehicles.
- The water recycling system shall be capable of processing the water to sufficiently remove mud/silt and debris for re-use. The water shall be replaced as needed or as directed by the engineer.
- The tire wash shall perform so that no visible mud/silt or debris, dried or wet, is observed on the paved road after the tire wash.
- The tire was shall perform so that no visible mud/silt and debris is observed on the truck tires or the undercarriage of the trucks after the tire wash
- Require all employees, subcontractors, and others that leave the site to use the wash facility.
- Implement BMP SC-7, "Street Sweeping and Vacuuming".

Maintenance and Inspection

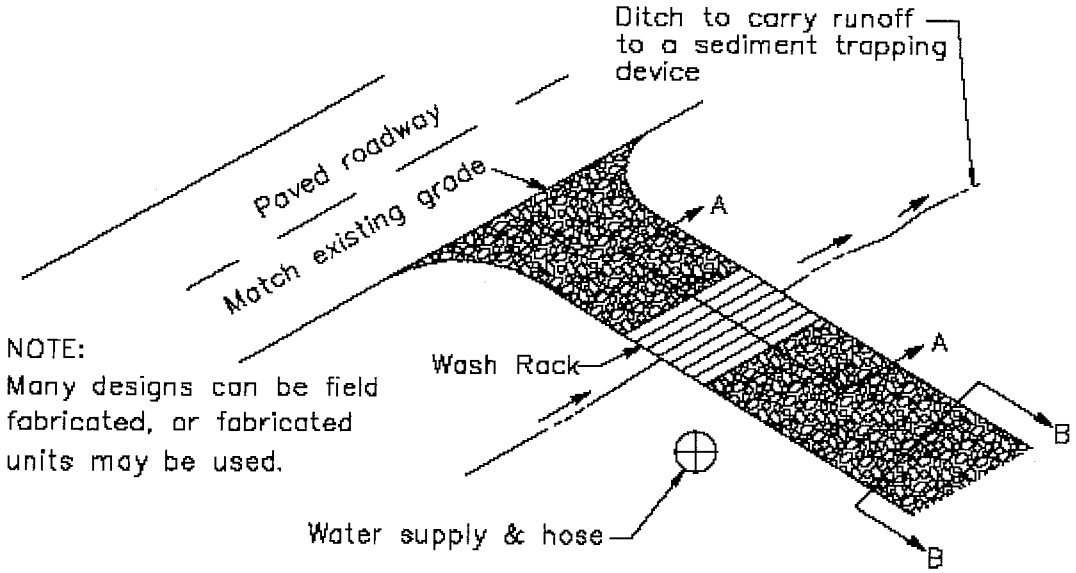
- Inspect tire wash weekly and before and after every rainfall events. During extended rainfall events, inspect tire wash at least once every 24 hours.
- Ensure that all pollutant controls at entrances and exits (e.g. tire wash off locations) are maintained and protected from activities that reduce their effectiveness.
- Remove accumulated sediment in wash rack and/or sediment trap to maintain system performance.



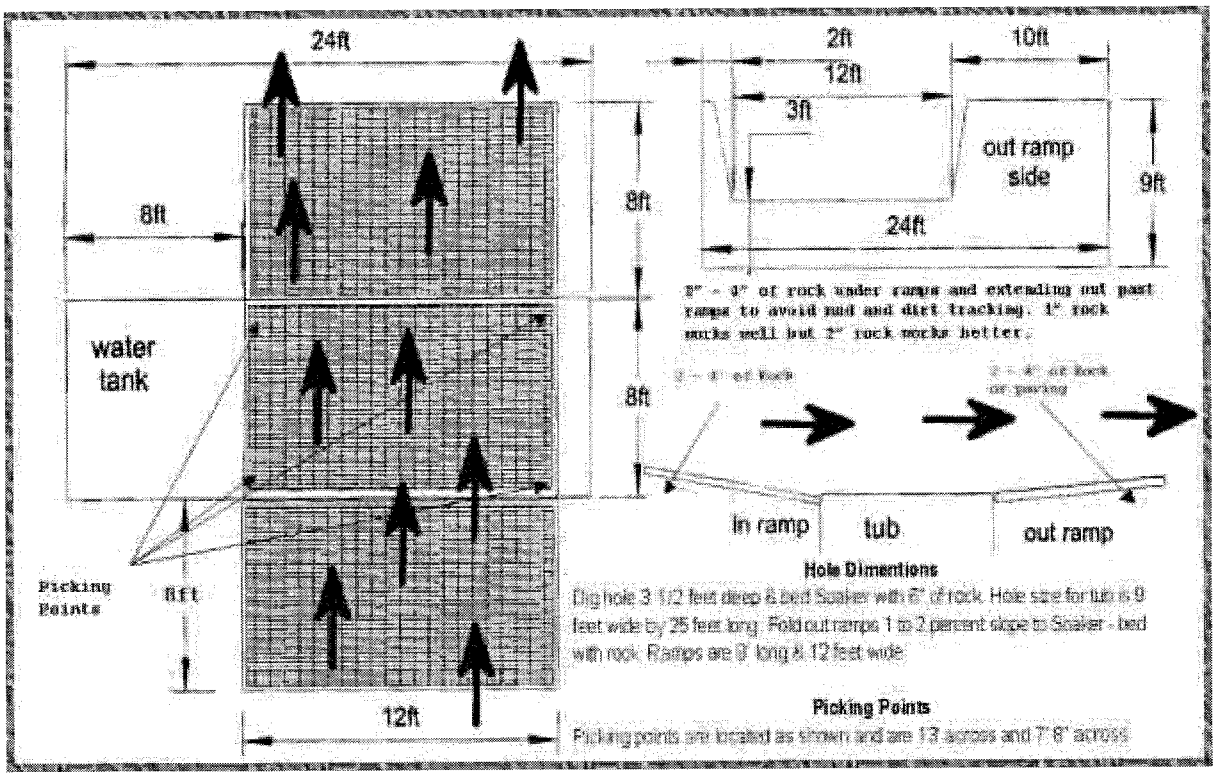
SECTION A–A
NOT TO SCALE



SECTION B–B
NTS



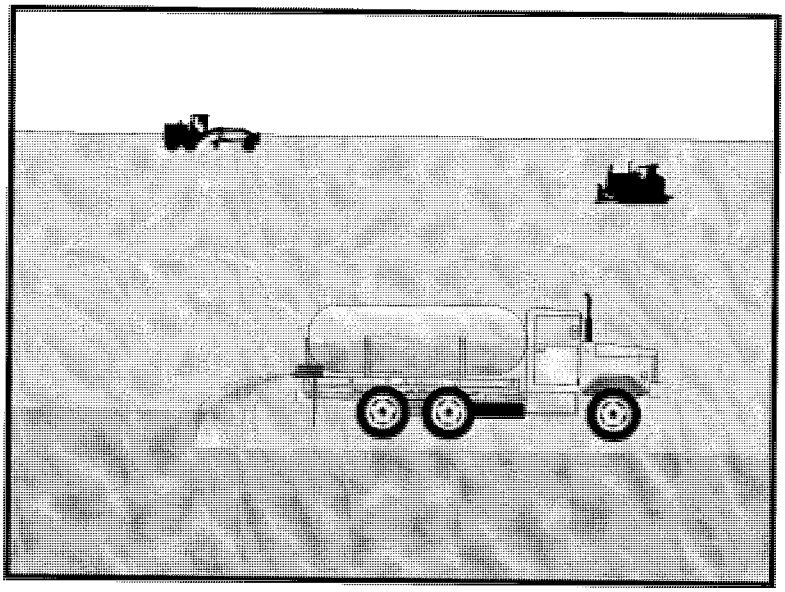
TYPICAL TIRE WASH
NOT TO SCALE

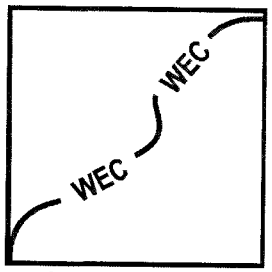


Example Self-Contained Tire Washing System

Wind Erosion Control

WE-1





Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ● Wind Erosion Control
- ○ Non-Storm Water Management
- ○ Materials and Waste Management

Definition and Purpose

Wind erosion control consists of applying water and/or other dust palliatives as necessary to prevent or alleviate erosion by the forces of wind. Covering of all stockpiles is required year round.

Appropriate Applications

This practice is implemented on all exposed soils subject to wind erosion.

Standards and Specifications

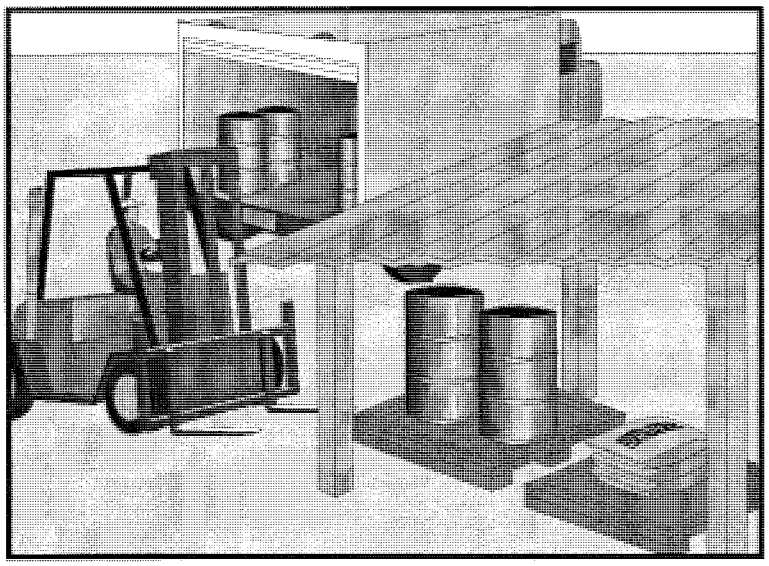
- Effective wind erosion control shall be implemented.
- Implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.
- Water shall be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment shall be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit shall be available at all times to apply water or dust palliative to the project.
- If reclaimed water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality Control Board requirements. Non-potable water shall not be conveyed in tanks or drain pipes that will be used to convey potable water and there shall be no connection between potable and non-potable supplies. Non-potable tanks, pipes and other conveyances shall be marked "NON-POTABLE WATER - DO NOT DRINK."
- Soil stabilization BMPs are also effective as wind erosion control (SS-3, SS-4, SS-5, SS-6, SS-7, and SS-8).

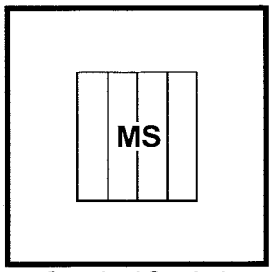
Maintenance and Inspection

- Inspect wind erosion control measures daily and document weekly.
- Check areas that have been protected to ensure coverage and effectiveness of Wind erosion controls. If wind erosion or dust are observed, Contractor shall immediately reapply or implement additional wind erosion control BMPs.

Material Delivery and Storage

WM-1





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
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- ● Materials and Waste Management

Definition and Purpose

Procedures and practices for the proper handling and storage of materials in a manner that minimizes or eliminates the discharge of these materials to the ground, storm drain system or to watercourses.

Appropriate Applications

These procedures are implemented at all construction sites with delivery and storage of but not limited to the following:

- Hazardous chemicals such as:
  - Acids/limes
  - glues,
  - adhesives,
  - paints/solvents, and
  - curing compounds.
- Soil stabilizers and binders.
- Fertilizers.
- Detergents.
- Plaster.
- Petroleum products such as fuel, oil, and grease.
- Asphalt and concrete components.
- Pesticides and herbicides.
- Other materials that may be detrimental if released to the environment.

Limitations

None identified.

Standards and Specifications

General

- Train employees and subcontractors on the proper material delivery and storage practices.
- Temporary storage areas shall be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) shall be supplied to the Engineer for all materials stored or used on the project.

Material Storage Areas and Practices

- Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).
- Minimize exposure of construction materials to precipitation.
- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 shall be stored in approved containers and drums and shall be placed in temporary containment facilities for storage.
- Each temporary containment facility shall have a permanent cover and side wind protection or be covered when not being used and prior to and during rain events.
- A temporary containment facility shall provide for a spill containment volume able to contain precipitation from a 24-hour, 25-year storm event, plus 110% of the capacity of the largest container within its boundary.
- A temporary containment facility shall be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids shall be sent to an approved disposal site in accordance with WM-5 and WM-6.
- Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.
- Materials shall be stored in their original containers and the original product labels shall be maintained in place in a legible condition. Damaged or otherwise illegible labels shall be replaced immediately. Unlabeled containers

shall not be stored onsite and shall be disposed of immediately in accordance with WM-5 and WM-6.

- Bagged and boxed materials shall be stored on pallets and shall not be allowed on the ground. To provide protection from wind and rain, bagged and boxed materials shall be covered when not being actively used and prior to rain events. Broken boxes or bags shall be immediately contained or disposed of properly in accordance with WM-5 and WM-6.
- Stockpiles shall be protected in accordance with BMP WM-3, "Stockpile Management."
- Minimize the material inventory stored on-site (e.g., only a few days supply).
- Have proper storage instructions posted at all times in an open and conspicuous location.
- Do not store hazardous chemicals, drums, or bagged materials directly on the ground. Dry items shall be placed on a pallet and covered. Liquids shall be placed in secondary containment and covered.
- Contain all fertilizers and other landscape materials when they are not actively being used.
- Stack erodible landscape material on pallets and cover stored landscaped materials when not being used or applied.
- Keep ample supply of appropriate spill clean up material near storage areas.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored on-site.
- Employees trained in emergency spill clean-up procedures shall be present when dangerous materials or liquid chemicals are unloaded.

Spill Clean-up

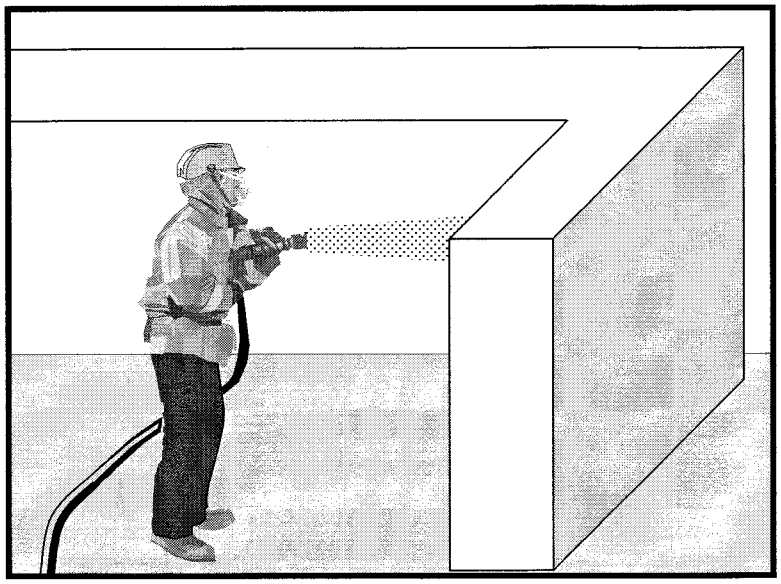
- Contain and clean up all liquid or dry spills or leaked material immediately and dispose of properly in accordance with WM-5 or WM-6.
- If residual materials are on the ground after construction is complete, properly remove and dispose any hazardous materials or contaminated soil in accordance with WM-5 and WM-6.
- Use BMP WM-4, "Spill Prevention and Control," for cleanup procedures of spills of chemicals and/or hazardous materials.

Maintenance and Inspection

- Inspect all material delivery and storage areas weekly, and before and after every rainfall events. During extended rainfall events, inspect all material delivery and storage areas at least once every 24 hours.
- Storage areas shall be kept clean, well organized, and equipped with ample clean-up supplies as appropriate for the materials being stored.
- Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.

Material Use

WM-2



Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

These are procedures and practices for use of construction material in a manner that minimizes or eliminates the discharge of these materials to the ground, storm drain system or to watercourses.

Appropriate Applications

This BMP applies to all construction sites. These procedures apply but are not limited to when the following materials are used or prepared on site:

- Hazardous chemicals such as:

  Acids/lime,

  glues,

  adhesives,

  paints/solvents, and

  curing compounds.
- Soil stabilizers and binders.
- Fertilizers.
- Detergents.
- Plaster.
- Petroleum products such as fuel, oil, and grease.
- Asphalt and concrete components.
- Pesticides and herbicides.
- Other materials that may be detrimental if released to the environment.

Limitations

- Safer alternative building and construction products may not be available or suitable in every instance.

Standards and Specifications

- Material Safety Data Sheets (MSDS) shall be supplied to the Engineer for all materials stored or used on the project.
- Latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, may be disposed of with other construction debris.
- Do not remove the original product label, it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors, or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain or watercourse. Dispose of any paint thinners, residue and sludge(s), that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practical, and rinse to a drain leading to a sanitary sewer where permitted, or into a concrete washout pit. For oil-based paints, clean brushes to the extent practical and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials on-site when practical.
- Do not over-apply fertilizers and pesticides. Prepare only the amount needed. Strictly follow the recommended usage instructions. Apply surface dressings in smaller applications, as opposed to large applications, to allow time for it to work in and to avoid excess materials being carried off-site by runoff.
- Discontinue the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.
- Apply erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.
- Application of herbicides and pesticides shall be performed by a licensed applicator.
- Contractors are required to complete the "Report of Chemical Spray Forms" when spraying herbicides and pesticides.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.

- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.

Maintenance and Inspections

- Inspect all material use areas weekly, and before and after every rainfall events. During extended rainfall events, inspect all material use areas at least once every 24 hours.

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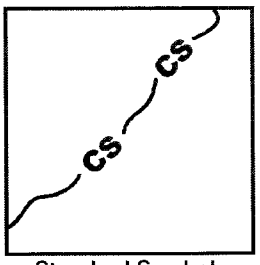
Stockpile Management

WM-3



Standard Symbol

BMP Objectives

- ● Soil Stabilization
- ● Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ○ Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

Stockpile management procedures and practices are designed to reduce or eliminate air and storm water pollution from stockpiles of soil, and paving materials such as portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate subbase or pre-mixed aggregate, asphalt binder (so called "cold mix" asphalt), green waste and other materials and wastes.

Appropriate Applications

Implemented in all projects that stockpile soil and other materials and wastes.

Limitations

- None identified

Standards and Specifications

- Protection of stockpiles is a year-round requirement.
- Locate stockpiles a minimum of 50 ft away from concentrated flows of storm water, drainage courses, and inlets.
- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information see BMP WE-1, "Wind Erosion Control".
- All stockpiles shall comply with AQMD Rule 403 requirements.
- Contaminated soil shall not be stockpiled on the project site and be managed in accordance with BMP WM-7, "Contaminated Soil Management."
- Bagged materials should be placed on pallets and covered.
- Do not stockpile pressure treated wood. Pressure treated wood shall be managed in accordance with the contact Special Provisions.

Protection of Stockpiles not Actively Being Used

- Cover and contain loose stockpiled construction materials that are not actively being used (i.e. soil, aggregate, base materials, green waste, etc.) at all times.

Protection of Active Stockpiles

- ***Soil stockpiles and waste stockpiles:***
  - Soil stockpiles shall be covered and protected with a temporary perimeter sediment barrier.
- ***Stockpiles of portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate subbase:***
  - The stockpiles shall be covered and protected with a temporary perimeter sediment barrier.
- ***Stockpiles of "cold mix":***
  - Cold mix stockpiles shall be placed on and covered with plastic or comparable material.
- ***Stockpiles of green waste:***
  - Green waste shall be covered and protected with a temporary perimeter sediment barrier.

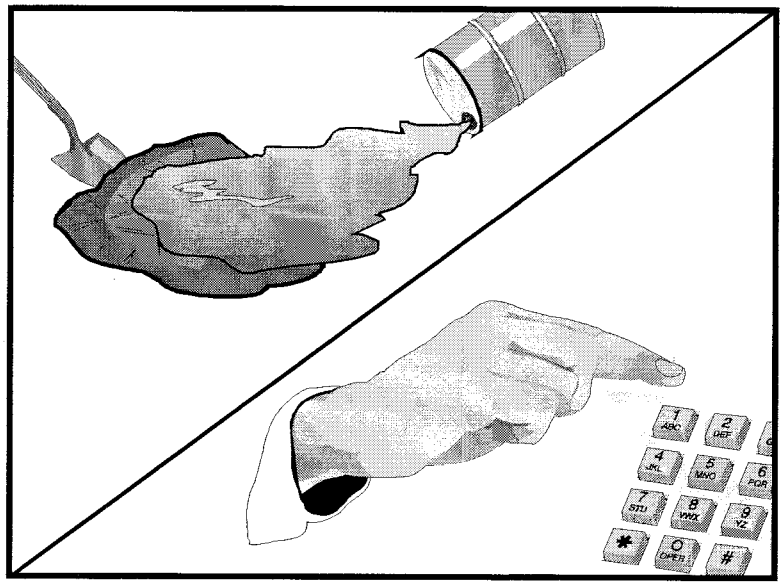
Plastic materials shall be limited when more sustainable products exist. If plastic is used, materials more resistant to photo degradation shall be considered.

Inspection and Maintenance

- Inspect all active and non-active stockpiles weekly, and before and after every rainfall events. During extended rainfall events, inspect all active and non-active stockpiles at least once every 24 hours.
- Repair and/or replace perimeter controls and covers as needed, or as directed by the Engineer, to keep them functioning properly. Sediment shall be removed when sediment accumulation reaches one-third (1/3) of the barrier height. Covers shall be repaired or replaced when they do not cover the entire stockpile or are no longer effective.

Spill Prevention and Control

WM-4



Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

These procedures and practices are implemented to prevent, control and clean-up spills in a manner that minimizes or prevents the discharge of spilled material to the permeable or impermeable ground surface, drainage system or watercourses.

Appropriate Application

This best management practice (BMP) applies to all construction projects. Spill control procedures are implemented anytime liquids or dry materials or wastes (including chemicals, hazardous or non-hazardous substances) are stored or used onsite. Substances may include, but are not limited to:

- Soil stabilization products/binders.
- Dust Palliatives.
- Herbicides/Pesticides, Fertilizers
- Deicing/anti-icing chemicals.
- Sanitary wastes
- Fuels, Lubricants, Other petroleum distillates
- Paint solvents and thinners
- Vehicle fluids
- Asphalt and Portland Cement products

Limitations

- Procedures and practices presented in this BMP are general. The Contractor shall identify appropriate practices for the specific materials or wastes used or stored on-site.

Standards and Specifications

- Spills of materials and wastes shall be contained and cleaned up immediately.
- Spills identified during a rain event shall be covered and protected from storm water run-until they can be cleaned up.
- Spills shall not be buried, or washed or cleaned up with water.
- Water shall not be used to clean up spills. Dry methods such as rags and absorbents shall be used. Water used for decontaminating sampling equipment shall not be allowed to enter storm drains or watercourses and shall be collected.
- All collected spill cleanup waste shall be disposed of in accordance with BMP WM-6, "Hazardous Waste Management."
- Water overflow or minor water spillage shall be contained and shall not be allowed to discharge into drainage facilities or watercourses.
- Proper storage, clean-up and spill reporting instruction for hazardous materials stored or used on the project site shall be posted at all times in an open, conspicuous and accessible location.
- Waste storage areas shall be kept clean, well organized and equipped with ample clean-up supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers and liners shall be repaired or replaced as needed to maintain proper function.

Education

- Educate employees and subcontractors on what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to train new employees.
- The Contractor shall oversee and enforce proper spill prevention and control measures and shall ensure appropriate personnel are assigned and trained for spill cleanup.

Cleanup and Storage Procedures

- Equipment and materials for cleanup of spills shall be available on site and spills and leaks shall be cleaned up immediately and disposed of properly.
- Sewage pipeline breaks or spills shall be handled in accordance with the contract special provisions, if applicable. The required plan for sewage spills shall be referenced and described in Section 500.4.6 of the SWPPP, if applicable.
- Minor Spills
  - Minor spills typically involve small quantities of oil, gasoline, paint, etc., which can be controlled by the first responder at the discovery of the spill.
  - Use absorbent materials on small spills. Water shall not be used to clean up spills. Do not bury the spill or spilled materials.
  - Remove the absorbent materials promptly and dispose of properly.
  - The practice commonly followed for a minor spill is:
    - Contain the spread of the spill.
    - Recover spilled materials.
    - Clean the contaminated area and/or properly dispose of contaminated materials.
- Semi-Significant Spills
  - Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.
  - Clean up spills immediately:
    - Notify the project foreman immediately. The foreman shall notify the Engineer.
    - Contain spread of the spill.
    - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
    - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
    - If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

- Significant/Hazardous Spills
  - For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps shall be taken:
  - Notify the Engineer immediately and follow up with a written report.
  - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site. The Los Angeles County Fire Department Health Hazardous Material Division should be called at (323)890-4317 or after hours Call: 911 or (323)881-2455 (Health Haz Mat).
  - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 117.3 and 302.4, the contractor shall notify the National Response Center at (800) 424-8802.
  - The services of a spills contractor or a Haz-Mat team shall be obtained immediately. Construction personnel shall not attempt to clean up the spill until the appropriate and qualified staff has arrived at the job site.
  - Other agencies which may need to be consulted include, but are not limited to, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, RWQCB, etc.

Disposal Procedures

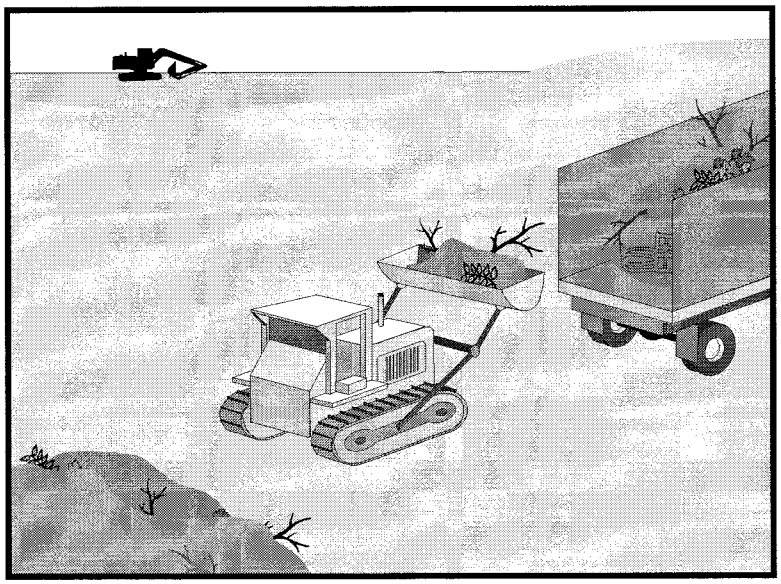
- Proper disposal is disposal offsite in accordance with all applicable laws and regulations.
- Used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose shall be stored and disposed of in accordance with WM-6, "Hazardous Waste Management" BMPs.
- Waste that is not hazardous and is not defined as waste that requires special handling under California Code of Regulations, Title 22 Division 4.5, Title 23, Division 3, Chapter 3, and Title 27, Division 2, Subdivision 1 shall be disposed of in accordance WM-5 Solid Waste Management.

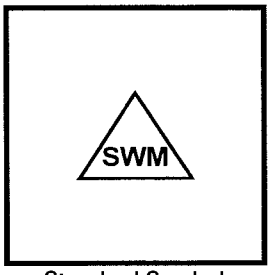
Maintenance and Inspection

- Inspect the project site for spills daily and document weekly, and before and after every rainfall events. During extended rainfall events, inspect project site for spills at least once every 24 hours.
- Verify that spill control clean-up materials are located near material storage, unloading, and use areas.
- Update spill prevention and control plan and stock appropriate clean-up materials whenever changes occur in the types of chemicals used or stored onsite.

Solid Waste Management

WM-5





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

Solid waste management procedures and practices are designed to minimize or eliminate the discharge of pollutants offsite, to the ground, drainage systems or watercourses.

Appropriate Applications

Solid waste management procedures and practices are implemented on all construction sites that generate solid wastes.

Solid wastes include but are not limited to:

- Construction wastes including brick, dry mortar, timber, steel and metal scraps, sawdust, pipe and electrical cuttings, inert equipment parts, styrofoam and other materials used to transport and package construction materials.
- Planting wastes, including vegetative material, plant containers, and packaging materials.
- Litter and debris including food containers, beverage cans, coffee cups, paper bags, plastic wrappers, and smoking materials, including litter generated by the public and other contractors.

Limitations

- Solid waste that requires special handling and disposal because of a potential hazard to human health, the environment, or water quality shall be handled and disposed of in accordance with WM-6.

Standards and Specifications

Education

- The Contractor shall oversee and enforce proper solid waste procedures and practices.
- Educate employees and subcontractors on solid waste storage and disposal procedures. Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Wherever possible, minimize production of solid waste materials.

Collection, Storage, and Disposal

- Prevent discharges from waste disposal containers to the ground, offsite or storm water drainage system or receiving water.
- Litter and debris shall be removed from drainage grates, trash racks, and ditch lines immediately.
- The contractor shall provide covered and watertight dumpsters of sufficient size and numbers to contain the solid waste generated on the construction site including waste generated by the public. Cover waste disposal containers at all times.
- Trash containers/dumpsters shall be provided in the Contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods or where directed by the Engineer. Additional containers and more frequent pickup and removal are required during the demolition phase of construction.
- Trash containers/dumpsters shall be empty once every two weeks. Full trash containers/dumpsters shall be empty within two days of being full. The contents of the containers/dumpsters and all solid waste shall be disposed of outside the right-of-way in conformance with all applicable laws and regulations.
- Litter stored in containers shall be handled and disposed of by licensed disposal contractors.
- Solid waste disposal haulers and facilities shall be approved by the Engineer. The Contractor shall be responsible for signing any manifests for solid waste disposal.
- Solid waste containers shall be located at least 50 ft from drainage facilities and watercourses and shall not be located in areas susceptible to flooding or ponding.
- Waste container washout on the construction site is not allowed.
- Additional containers and more frequent pickup and removal are required during the demolition phase of construction.
- Segregate potentially hazardous waste from non-hazardous construction site waste.

- Liquid wastes (e.g., used oils, solvents, and paints) and chemicals (e.g., acids, pesticides, additives, curing compounds) and solid waste that is hazardous shall not be disposed of in containers designated for solid waste. See BMP WM-6, "Hazardous Waste Management" for proper disposal procedures.
- Salvage or recycle vegetation debris, packaging and/or surplus building materials when practical. Wood pallets, cardboard boxes, and construction scraps can be recycled.

Maintenance and Inspection

- Inspect the project site for solid waste management daily and document weekly, and before and after every rainfall events. During extended rainfall events, inspect project site for solid waste management at least once every 24 hours.
- Inspect solid waste disposal facilities to identify any waste that should be handled and disposed of under WM-6 Hazardous Waste Management. Typically, inspect for used oily rags, used absorbent, used oil containers, and other wastes that require special handling and disposal.

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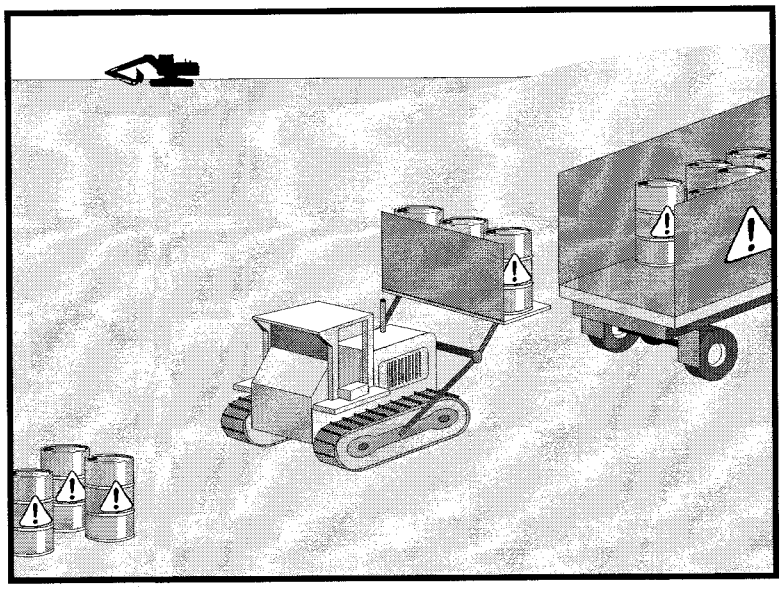
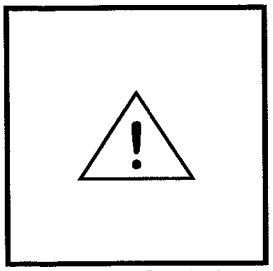
Hazardous Waste Management

WM-6





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

These are procedures and practices to minimize or eliminate the discharge of pollutants from contractor generated waste or waste illegally dumped on site by others, that is hazardous waste, or waste that is otherwise not allowed to be disposed of as solid waste, to the ground, storm drain systems or to watercourses.

Appropriate Applications

- This best management practice (BMP) applies to all construction sites. This applies to hazardous waste, non-hazardous waste, designated waste and any other waste that requires special disposal practices due to a potential threat to human health, the environment, or water quality, or as identified by the Engineer. It can be solid, liquid or gaseous waste that is regulated and requires special handling and disposal.

- Hazardous waste management applies to median and shoulder soils of roadways that have been contaminated by aerially deposited lead (ADL). Refer to contract Special Provisions.

- Hazardous waste management practices are implemented on construction sites that generate waste from but not limited to:
  - Petroleum Products,
  - Asphalt Products,
  - Concrete Curing Compounds,
  - Herbicides/Pesticides,
  - Acids/bases,
  - Paints/Stains,
  - Solvents,
  - Wood Preservatives,

- Any materials deemed a hazardous waste in California Code of Regulations, Title 23, Division 3, Chapter 15, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302, or
- Any materials deemed designated waste or non-hazardous waste in California Code of Regulations, Title 27 Division 2, Subdivision 1.

Limitations

- This BMP does not relieve the Contractor from responsibility for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.
- This BMP does not cover waste addressed specifically by the contract Special Provisions.

Standards and Specifications

Education

- Educate employees and subcontractors on proper hazardous waste storage and disposal procedures.
- Educate employees and subcontractors on safety procedures and potential dangers to humans and the environment from hazardous wastes.
- Educate employees and subcontractors in identification of hazardous and solid waste.
- Hold regular meetings to discuss and reinforce hazardous waste management procedures (incorporate into regular safety meetings).
- The Contractor's Qualified SWPPP Practitioner (QSP) or BMP manager for projects without SWPPPs shall oversee and enforce proper hazardous waste management procedures and practices.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.

Storage Procedures

- All hazardous wastes shall be stored in a secured area and in approved, sealed, and leak-proof containers with sealed lids constructed of a suitable material and shall be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172,173, 178, and 179.
- All hazardous waste shall be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- Waste containers shall be stored in temporary containment facilities that shall comply with the following requirements:
  - Temporary containment facility shall provide a spill containment volume able to contain precipitation from a 24-hour, 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.

- Temporary containment facility shall be impervious to the materials stored there for a minimum contact time of 72 hours.
- Temporary containment facilities shall be covered and maintained free of accumulated rainwater and spills. In the event of spills or leaks accumulated rainwater and spills shall be immediately placed into drums after each rainfall. These liquids shall be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids shall be sent to an approved disposal site.
- Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.
- Temporary containment facilities shall be covered at all times. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs. A storage facility having a solid cover and sides is preferred to a temporary tarp. Storage facilities shall be equipped with adequate ventilation.

- Drums shall not be overfilled and wastes shall not be mixed.
- Containers of dry waste shall be stored on pallets.
- Paint brushes and equipment for water and oil based paints shall be cleaned within a contained area and shall not be allowed to contaminate site soils, watercourses or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused shall be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths shall be disposed of as solid waste.
- Ensure that hazardous waste collection containers and spill kits are available at all hazardous waste storage areas.
- Designate hazardous waste storage areas on site away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills. All hazardous wastes shall be protected from traffic and equipment.
- Minimize production or generation of hazardous materials and hazardous waste on the construction site.
- Use containment berms in fueling and maintenance areas and where the potential for spills is high.
- Segregate potentially hazardous waste from non-hazardous construction site debris.

- Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.
- Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
- Clean up spills of waste immediately.
- Do not mix different types wastes. For example, do not mix solids and liquids and do not mix hazardous and non-hazardous, nor designated and non-hazardous.

Disposal Procedures

- These disposal procedures apply to waste disposal unless specifically stated otherwise in the contract Special Provisions.
- If directed by the Engineer, the Contractor shall collect an appropriate number of samples of waste generated and shall have the sample analyzed by a Department of Health Services (DHS) certified laboratory in order to meet waste profiling requirements of the disposal facility.
- The Contractor shall complete all required waste profile forms. The "Generator" of the hazardous waste shall be identified by the Engineer. If the spill/leak of hazardous water is caused by the Contractor or Contractor's operations, the Contractor shall be identified as the "Generator" of the hazardous waste.
- A copy of a completed and typed draft Hazardous Waste Manifest for the transportation of hazardous waste, including the correct EPA ID Number, shall be submitted to the Engineer for approval prior to transporting the hazardous waste off-site. The Engineer shall provide the EPA ID Number. If the Contractor is identified as the Generator, then the Contractor shall obtain the EPA ID Number. Hazardous waste shall not be transported off-site unless the Hazardous Waste Manifest has been signed by the Generator.
- A copy of a completed and typed draft Non-Hazardous Waste Manifest for the transportation of non-hazardous waste shall be submitted to the Engineer for approval prior to transporting the non-hazardous waste off-site. Non-Hazardous waste shall not be transported off-site unless the Non-Hazardous Waste Manifest has been signed by the Generator.
- Waste shall be transported by a licensed hazardous waste transporter to an authorized and licensed disposal facility or recycling facility.
- Hazardous waste as defined by California Code of Regulations, Title 22 CCR, Division 4.5 and Title 23, Division 3, Chapter 15 or as determined by the Engineer shall not be stored on site unless covered by the contract Special Provisions.

- Hazardous waste, non-hazardous waste, designated waste and other waste that presents a potential threat to human health, the environment or water quality shall be disposed in accordance with all applicable laws and regulations including but not limited to California Code of Regulations, Title 22 Division 4.5, Title 23, Division 3, Chapter 3, and Title 27, Division 2, Subdivision 1.

- Make sure that toxic liquid wastes (e.g., used oils, solvents, and paints), chemicals (e.g., acids, pesticides, additives, curing compounds), and any other wastes that have special handling and disposal requirements under California Code of Regulations, Title 22 Division 4.5, Title 23, Division 3, Chapter 3, and Title 27, Division 2, Subdivision 1 are not disposed of in dumpsters designated for solid waste or construction debris.

- Dispose of rainwater accumulated in secondary containment as hazardous waste.

Maintenance and Inspection

- The Contractor's Site-Specific Health and Safety Officer (SHSO) or Safety Office (based on contract Special Provisions) shall monitor on-site hazardous waste storage and disposal procedures.

- Inspect the project site for non-hazardous and hazardous waste weekly, and before and after every rainfall events. During extended rainfall events, inspect project site for non-hazardous and hazardous waste at least once every 24 hours.

- Waste storage areas shall be kept clean, well organized, and equipped with ample clean-up supplies as appropriate for the materials being stored.

- Storage areas shall be inspected in conformance with the contract Special Provisions and the SWPPP.

- Perimeter controls, containment structures, covers, and liners shall be repaired or replaced as needed to maintain proper function.

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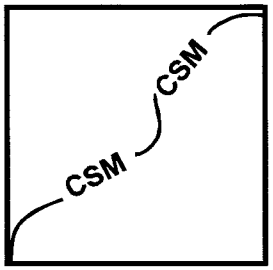
Contaminated Soil Management

WM-7



Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

These are procedures and practices to minimize or eliminate the discharges of pollutants to the drainage system or to watercourses from contaminated soil.

Appropriate Applications

- Contaminated soil management is implemented on construction projects in highly urbanized or industrial areas where soil contamination may have occurred due to spills, illicit discharges, and leaks from underground oil pipelines and storage tanks.

Limitations

- The procedures and practices presented in this best management practice (BMP) are general. The contractor shall identify appropriate practices and procedures for the specific contaminants known to exist or discovered on site.

Standards and Specifications

- Contaminated soils are often identified during project planning and development with known locations identified in the contract Special Provisions.
- If contaminated soils are encountered on the project site and are not identified in the contract Special Provisions. The Engineer shall solely characterize the extent, volume, and type of contaminated soil.
- All soil sampling will be conducted by the Engineer.

Education

- The Contractor shall comply with the Agency-approved Site-Specific Health and Safety Plan (refer to contract Special Provisions).
- Prior to performing any excavation work at the locations containing material classified as hazardous, employees and subcontractors shall complete a safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified.

- Educate employees and subcontractors in identification of contaminated soil.
  - Detected or undetected spills and leaks.
  - Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline forming elements.
  - Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.

Handling Procedures for Contaminated Soils

- To minimize on-site storage, contaminated soil shall be disposed of properly in accordance with all applicable regulations. All hazardous waste storage will comply with the requirements in Title 22, CCR, Sections 6626.250 to 66265.260.
- Contaminated soils or hazardous material shall not be stockpiled on the project site.
- Contaminated material and hazardous material on exteriors of transport vehicles shall be removed and placed either into the current transport vehicle or the excavation prior to the vehicle leaving the exclusion zone.
- Procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material.
- Collect water from decontamination procedures and treat and/or dispose of it at an appropriate disposal site.
- Collect non-reusable protective equipment, once used by any personnel, and dispose of at an appropriate disposal site.
- Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.
- Excavation, transport, and disposal of contaminated material and hazardous material/waste shall be in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP):
  - United States Department of Transportation (USDOT).
  - United States Environmental Protection Agency (USEPA).
  - California Environmental Protection Agency (CAL-EPA).
  - California Division of Occupation Safety and Health Administration (CAL-OSHA).
  - Local regulatory agencies.

Procedures for Underground Storage Tank Removals

- Prior to commencing tank removal operations, obtain the required underground storage tank removal permits and approval from the federal, state, and local agencies, which have jurisdiction over such work.
- Arrange to have tested, as directed by the Engineer, any liquid or sludge found in the underground tank prior to its removal to determine if it contains hazardous substances.
- Following the tank removal, take soil samples beneath the excavated tank and perform analysis as required by the local agency representative(s).
- The underground storage tank, any liquid and/or sludge found within the tank, and all contaminated substances and hazardous substances removed during the tank removal shall be transported to disposal facilities permitted to accept such waste.

Water Control

- Take all necessary precautions and preventive measures to prevent the flow of water, including ground water, from mixing with hazardous substances or underground storage tank excavations. Such preventative measures may consist of, but are not limited to: berms, cofferdams, grout curtains, freeze walls, and seal course concrete or any combination thereof.
- If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, shall be transported off-site and disposed at a recycling or disposal facility approved by the Engineer.

Maintenance and Inspection

- The Contractor's Site-Specific Health and Safety Officer (SHSO) or Safety Office (based on contract Special Provisions) shall monitor contaminated soil excavation and disposal procedures.
- Inspect the areas of known contaminated soil weekly, and before and after every rainfall events. During extended rainfall events, inspect areas of known contaminated soil at least once every 24 hours.
- Confirm that areas of known contaminated soil are secure and not being tracked or impacting water quality.

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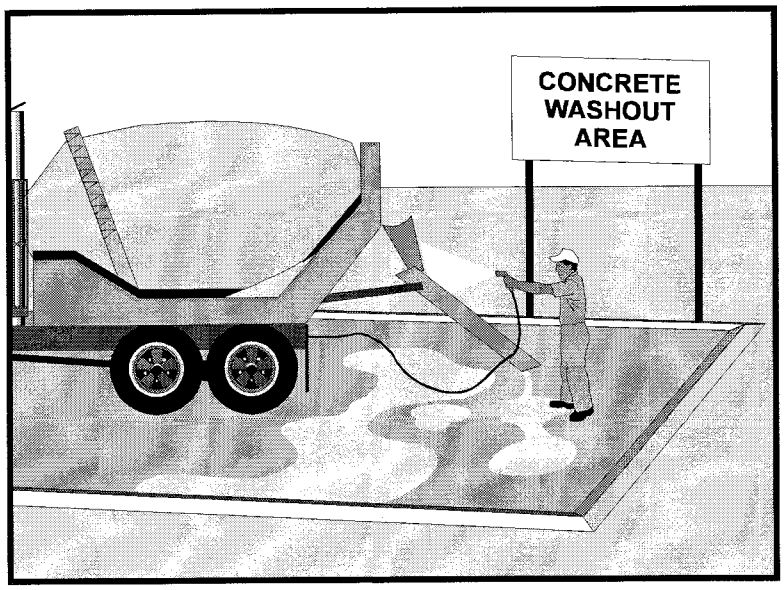
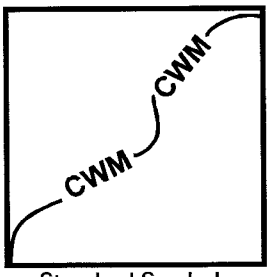
Concrete Waste Management

WM-8





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

These are procedures and practices that are designed to minimize or eliminate the discharge of concrete waste and similar materials to the ground, storm drain systems or watercourses.

Appropriate Applications

- Concrete waste management procedures and practices are implemented on construction projects where concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Where slurries containing Portland cement concrete (PCC) or asphalt concrete (AC) are generated, such as from sawcutting, coring, grinding, grooving, and hydro-concrete demolition.
- Where concrete trucks and equipment are washed on site, when approved by the Engineer. Refer to NS-8, "Vehicle and Equipment Cleaning."
- Where grout and mortar-mixing stations are used.

Limitations

- None identified.

Standards and Specifications

- Concrete washout areas and other washout areas shall not discharge or leak onto the underlying soil or to the surrounding areas.
- Watertight concrete washout bins are recommended.

Education

- Educate all employees, subcontractors, and suppliers on the concrete waste management requirements described herein.
- The Contractor's Qualified SWPPP Practitioner (QSP) or BMP Manager (based on the contract Special Provisions) shall oversee and enforce concrete waste management procedures.

Concrete Demolition Wastes

- Stockpile concrete demolition wastes in accordance with BMP WM-3, "Stockpile Management."
- Disposal of hardened PCC and AC waste outside the site to an appropriate facility (in accordance with WM-5) or as directed by Engineer if allowed to incorporate onsite.

Concrete Slurry Waste Management and Disposal

- PCC and AC waste shall not be allowed to discharge to the ground or enter storm drainage systems or watercourses.
- A sign shall be installed adjacent to each temporary concrete washout facility to inform concrete equipment operators to utilize the proper facilities as shown on Page 6.
- Residue from saw cutting, coring and grinding operations shall be picked up by means of a vacuum device. Residue shall not be allowed to flow across the pavement and shall not be left on the surface of the pavement. See also BMP NS-3, "Paving and Grinding Operations."
- Vacuumed slurry residue shall be disposed of in accordance with BMP WM-5, "Solid Waste Management." Slurry residue shall be disposed of immediately offsite or temporarily stored in a facility as described in "Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures" below), or within an impermeable containment vessel or bin approved by the Engineer.

Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures

- Temporary concrete washout facilities shall be located a minimum of 50 ft from storm drain inlets, open drainage facilities, and watercourses, unless determined infeasible by the Engineer. Each facility shall be located away from construction traffic or access areas to prevent disturbance or tracking.
- A sign shall be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities. The sign shall be installed as shown on page 6.
- Temporary concrete washout facilities shall be constructed above or below grade, or placed in watertight bins or containers. Temporary concrete washout facilities shall be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated.
- Wash concrete from mixer chutes into approved concrete washout facility. Perform washout of concrete mixers, delivery trucks, and other delivery systems in designated areas only.

- Pump excess concrete in concrete pump bin back into concrete mixer truck.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed offsite.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete shall be broken up, removed, and disposed of in conformance with applicable federal, state and local regulations (WM-5).
- Washout facilities will be covered 24 hours prior to a 50% or more chance of rain. If not covered prior to rain, washouts shall be covered during rain event. No water will be allowed to overflow from washout and any accumulated rain water will be handled and disposed of as washout water.

Temporary Concrete Washout Facility Type "Above Grade"

- Temporary concrete washout facility Type "Above Grade" shall be constructed as shown on Page 6 or 7, with a minimum length and minimum width of 10 ft, but with sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations. .
- Straw bales, wood stakes, and sandbag materials shall conform to the provisions in BMP SC-9, "Straw Bale Barrier" and BMP SC-8, "Sandbag Barrier."
- Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material. Liner seams shall be installed in accordance with manufacturers' recommendations. No seams in the plastic are allowed at the bottom of the washout.

Temporary Concrete Washout Facility (Type Below Grade)

- Temporary concrete washout facility Type "Below Grade" shall be constructed as shown on page 7, with a recommended minimum length and minimum width of 10 ft. The quantity and volume shall be sufficient to contain all liquid and concrete waste generated by washout operations. The length and width of a facility may be increased, at the Contractor's expense, upon approval of the Engineer. Lath and flagging shall be commercial type.
- Plastic lining material shall be a minimum of 10-mil polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material. Liner seams shall be installed in accordance with manufacturers' recommendations. No seams in the plastic material are allowed at the bottom of the washout.
- The soil base shall be prepared free of rocks or other debris that may cause tears or holes in the plastic lining material.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work and as washouts are filled, as determined by the Engineer, the hardened concrete shall be removed and disposed of in conformance with applicable federal, state and local regulations. Disposal of PCC dried residues, slurries or liquid waste shall be disposed of in conformance with all applicable laws and regulations. Materials used to construct temporary concrete washout facilities shall become the property of the Contractor, shall be removed from the site of the work, and shall be disposed of in conformance with all applicable laws and regulations.

- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities shall be backfilled and repaired.

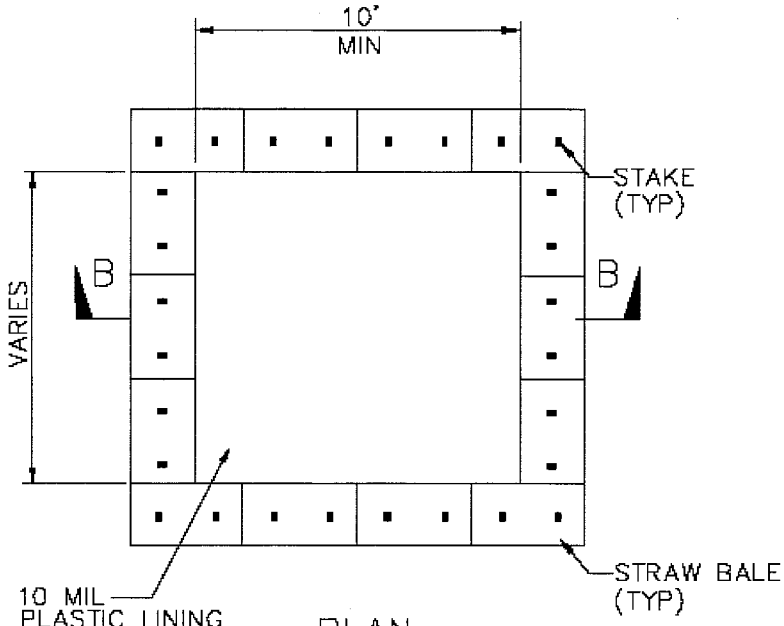
Maintenance and Inspection

- Inspect temporary concrete washout facilities weekly, and before and after every rainfall events. During extended rainfall events, inspect temporary concrete washout facilities at least once every 24 hours.

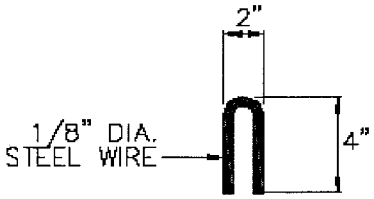
- Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 4 inches for above grade facilities and 12 inches for below grade facilities. Maintaining temporary concrete washout facilities shall include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials shall be removed and disposed of in conformance with applicable federal, state and local regulations.

- Existing facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.

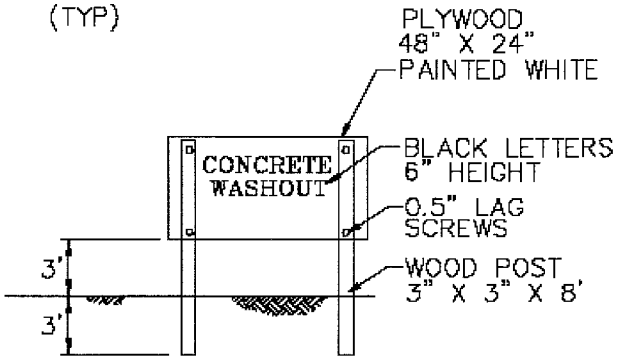
- Temporary concrete washout facilities shall be inspected for damage (i.e. tears in polyethylene liner, missing sandbags, etc.). Damaged facilities shall be repaired immediately.



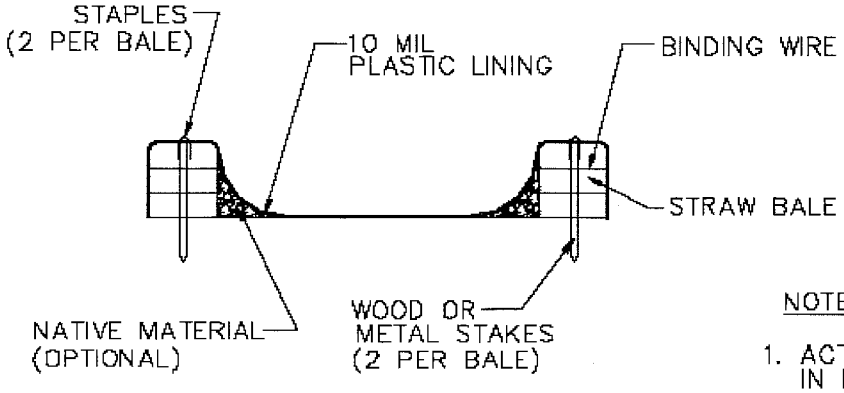
PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"
WITH STRAW BALES



STAPLE DETAIL



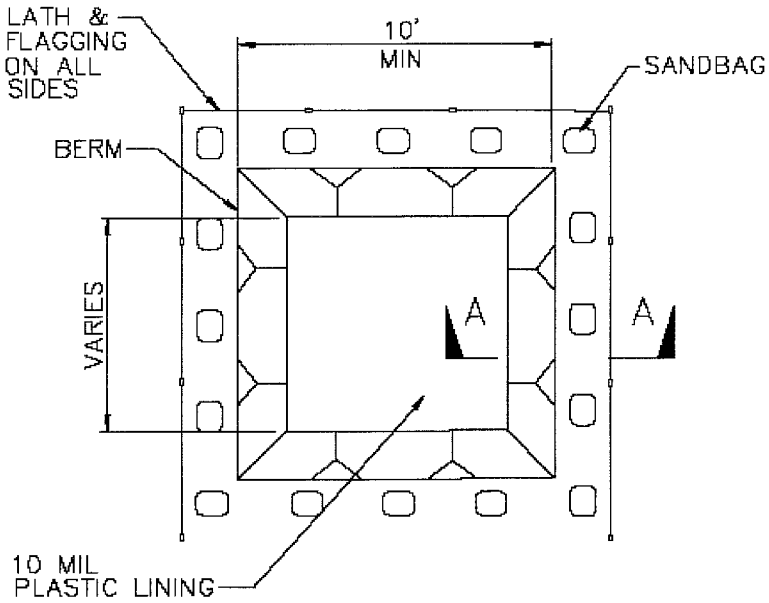
CONCRETE WASHOUT
SIGN DETAIL
(OR EQUIVALENT)



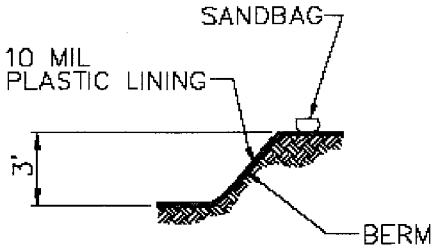
SECTION B–B
NOT TO SCALE

NOTES

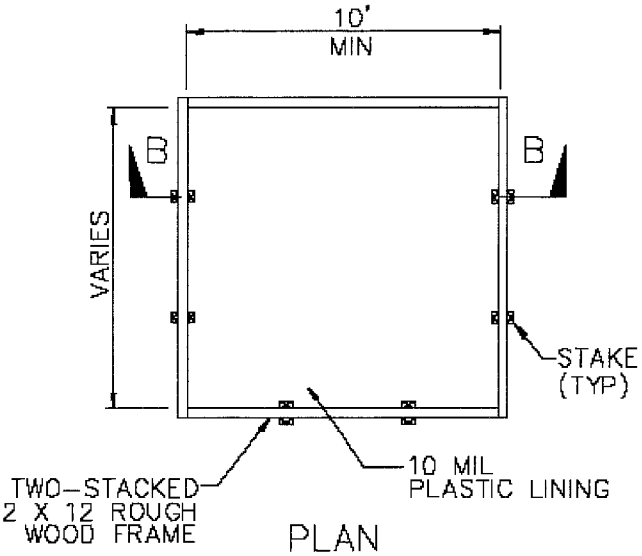
1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.



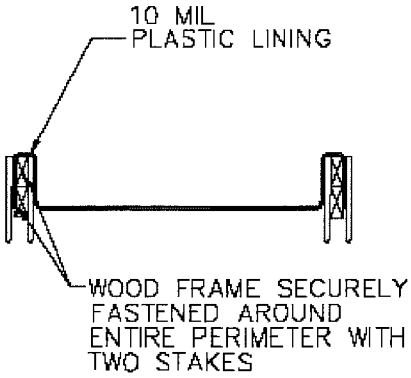
PLAN
NOT TO SCALE
TYPE "BELOW GRADE"



SECTION A–A
NOT TO SCALE



PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"



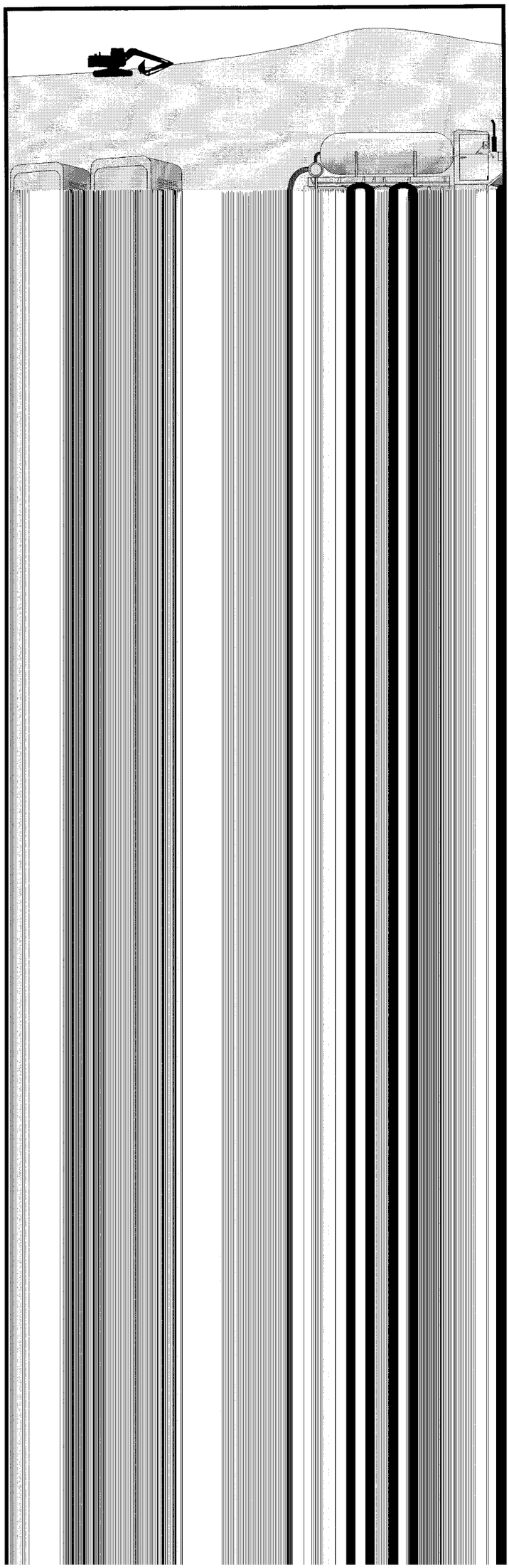
SECTION B–B
NOT TO SCALE

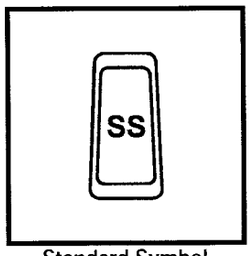
NOTES

1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

Sanitary/Septic Waste Management

WM-9





Standard Symbol

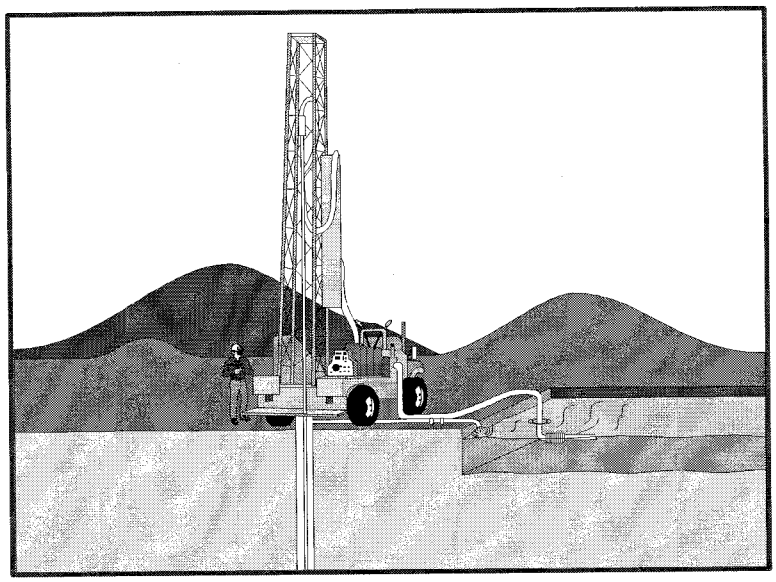
- Wastewater shall not be discharged or buried on the construction site.
- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, shall comply with the local health agency, city, county, and sewer district requirements.
- Properly connect temporary sanitary facilities that discharge to the sanitary sewer system to avoid illicit discharges.
- Ensure that sanitary/septic facilities are maintained in good working order by a licensed service.
- Use only reputable, licensed sanitary/septic waste haulers.
- Clean up spills and leaks immediately. Spills and leaks shall not be covered or buried onsite. Contaminated soil shall be disposed of properly in accordance with permits, laws and regulations.

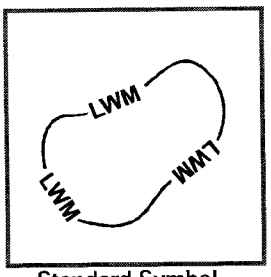
Maintenance and Inspection

- Inspect sanitary and septic waste facilities weekly, and before and after every rainfall events. During extended rainfall events, inspect sanitary and septic waste facilities at least once every 24 hours.

Liquid Waste Management

WM-10





Standard Symbol

BMP Objectives

- ○ Soil Stabilization
- ○ Sediment Control
- ○ Tracking Control
- ○ Wind Erosion Control
- ● Non-Storm Water Management
- ● Materials and Waste Management

Definition and Purpose

Procedures and practices to prevent discharge of pollutants to the ground, storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

Appropriate Applications

Liquid waste management is applicable to construction sites that generate any non-hazardous byproducts, residuals, or wastes not limited to the following:

- Drilling slurries and drilling fluids.
- Grease-free and oil-free wastewater and rinse water.
- Dredgings.
- Other non-storm water liquid discharges not permitted by separate permits.

Limitations

- Disposal of some liquid wastes may be subject to requirements of other permits secured by the Agency (e.g., National Pollutant Discharge Elimination System [NPDES] permits, Army Corps of Engineers permits, RWQCB Water Quality Certifications, Coastal Commission permits, etc.).
- Does not apply to groundwater dewatering operations (refer to contract Special Provisions)
- Does not apply to dewatering operations (see BMP NS-2, "Dewatering Operations"), solid waste management (see BMP WM-5, "Solid Waste Management"), hazardous wastes (see BMP WM-6, "Hazardous Waste Management"), or concrete slurry residue (see BMP WM-8, "Concrete Waste Management").
- Does not apply to approved non-storm water discharges permitted by any NPDES permit secured by the Agency. Typical permitted non-storm water discharges can include: fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust,

uncontaminated ground water from dewatering fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, or water to control dust.

Standards and Specifications

General Practices

- Instruct employees and subcontractors how to safely differentiate between non-hazardous liquid waste and potential or known hazardous liquid waste. Educate employees and subcontractors on liquid waste generating activities, and liquid waste storage and disposal procedures. Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Instruct employees, subcontractors, and suppliers that it is unacceptable for any liquid waste to discharge to the ground, or enter any storm drainage structure, waterway, or receiving water.
- Verify with the Engineer which non-storm water discharges are permitted. Some listed discharges may be prohibited if the Agency determines the discharge to be a source of pollutants.
- Apply the NS-8, "Vehicle and Equipment Cleaning" BMP for managing wash water and rinse water from vehicle and equipment cleaning operations.

Containment of Liquid Wastes

- Drilling residue and drilling fluids shall not be allowed to discharge to the ground, or enter storm drains and watercourses and shall be disposed of in conformance with all applicable laws and regulations.
- Liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud, shall be contained and not allowed to discharge to the ground or to flow into drainage channels or receiving waters prior to treatment and meeting water quality requirements.
- Contain liquid wastes in a controlled area, such as a sediment basin, watertight roll-off bin, or portable tank.
- Containment devices must be structurally sound and leak free.
- Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated.
- Take precautions to avoid spills or accidental releases of contained liquid wastes. Apply the education measures and spill response procedures outlined in BMP WM-4, "Spill Prevention and Control."
- Do not locate containment areas or devices where accidental release of the contained liquid can threaten health or safety, or discharge to water bodies, channels, or storm drains.

- Contain and properly dispose off-site all liquid wastes running off a surface such as wash water and rinse water from cleaning walls or pavement.
- Do not allow liquid wastes to flow or discharge uncontrolled to the ground, storm drain system or watercourse. Use temporary dikes or berms to intercept flows and direct them to a containment area.
- Use a sediment trap (see BMP SC-3, "Sediment Trap") for capturing and treating the liquid waste stream, or capture in a containment device and allow sediment to settle.

Disposal of Liquid Wastes

- All liquid waste must be disposed of offsite. If liquid waste is allowed to be discharged to the storm drain system in accordance with permits, laws and regulations, the discharge shall be approved by the Engineer,
- Dispose of liquid wastes as required in the contract Special Provisions or per the Water Quality Reports, NPDES permits, Environmental Impact Reports, 401 Water Quality Certifications or 404 permits, local agency discharge permits, etc., or as specified in the contract Special Provisions.
- Liquid wastes, such as from dredged material, may require testing and certification whether it is hazardous or not before a disposal method can be determined. Sampling is the responsibility of the Contractor unless specified in the contract Special Provisions.
- For disposal of hazardous waste, see BMP WM-6, "Hazardous Waste Management."
- If necessary, further treat liquid wastes prior to disposal. Treatment may include, though is not limited to, sedimentation, filtration, and chemical neutralization.

Maintenance and Inspection

- Inspect all liquid waste management facilities weekly, and before and after every rainfall events. During extended rainfall events, inspect liquid waste management facilities at least once every 24 hours.
- Inspect containment areas and capturing devices frequently for damage, and repair as needed. Remove deposited solids in containment areas and capturing devices as needed, and at the completion of the task. Dispose of any solids as described in BMP WM-5, "Solid Waste Management."

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APPENDIX I –TANK FARM DETENTION CALCULATIONS

HERMOSA BEACH MAINTENANCE YARD
TANK DISPLACEMENTS AND STORAGE
Phase-3 Calculations

October 12, 2012
Page-4

TANKS

Item	*Size*	*Depth*	*Number*	*Totals*	*Unit*	*Notes*
40' Diameter	1257	6	3	22,626	CF	Tank depressed 6'
30' Diameter	707	6	2	8,484	CF	
Compressors	1020	6	0.5	3,060	CF	Assume 50%
Equipment	996	6	0.5	2,988	CF	by volume.
Sum				37,158	CF	**Displacement**

FOOTINGS

Item	*Size*	*Depth*	*Number*	*Totals*	CF	*Notes*
40' Diameter	1257	0.5	3	1,886	CF	Assume .5' thick
30' Diameter	707	0.5	2	707	CF	
Compressors	1020	0.5	1	510	CF	
Equipment	996	0.5	1	498	CF	
Sum				3,601	CF	**Ftg Displacement**

STORAGE NEEDED

Item	*Size*	*Depth*	*Number*	*Totals*		*Notes*
LARGEST TANK (110%)	1257	16	1.1	22,123	CF	Largest Tank
Other Remaining Tanks	3928	6	1	23,568		Assume 16'H
Equipment and Compressors	2016	6	0.5	6,048		
All Footings	7201	0.5	1	3,601		
RAINWATER-100YR	1	1	1	25,000	CF	Separate Calc.
FREEBOARD	15725	1	1	15,725	CF	
Sum				96,065	CF	**Retention Required**

STORAGE PROVIDED

Item						
Tank Farm Volume				110,089	CF	To Freeboard El.
Retention Required				-96,065	CF	53 Top of Wall
Remainder Available				14,024	CF	Not including the well cellar.s