

APPENDIX A
OR EQUAL SUBSTITUTION REQUEST FORM

APPENDIX A

OR EQUAL SUBSTITUTION REQUEST FORM

Specification No.: _____

Project Name: _____

TO: Port of Long Beach

FROM: _____

1. Section, Paragraph and Page Number of Specification or Drawing to which this "Or Equal Substitution" request applies:

2. Item specified for which the "Or Equal Substitution" is requested:

Name or Brand: _____

Manufacturer: _____

Model No.: _____

3. The proposed "Or Equal Substitution" is:

Name or Brand: _____

Manufacturer: _____

Model No.: _____

4. Contractor shall provide product data for the proposed "Or Equal Substitution" consisting of the description of the material, product and/or equipment item, reference standards and performance test data, together with substantiating data, no later than **fourteen (14) calendar days after** City's issuance of Notice to Proceed, supporting the claim that the non-specified product is equal to that specified. No "Or Equal Substitution" request will be considered by the City without a completed "Or Equal Substitution" request form and substantiating data. Contractor shall attach hereto complete technical data, including technical information, complete manufacturer's catalogs, brochures and drawings, certified laboratory test reports and samples as applicable for the proposed "Or Equal Substitution", installation and operating instructions, manufacturing warranties and other descriptive material. No other "Or Equal Substitution" request submitted after the deadlines referenced in the paragraph will be considered by the City.

5. Reasons for "Or Equal Substitution" request:

6. Detailed comparison of significant qualities and properties (size, weight, durability, performance and similar characteristics) including the visual effect where applicable, for the proposed substitution in comparison with original requirements includes (list detailed comparison with supporting data, use separate sheets if required):

7. Installation changes and changes to Drawings and Specifications required by the proposed "Or Equal Substitution" are (list all required changes, use separate sheets if required):

8. Does the proposed "Or Equal Substitution" affect dimensions shown on Drawings?

Yes _____ No _____

If yes, clearly indicate changes on each Drawing by Sheet No.:

9. List the effects of the proposed "Or Equal Substitution" on other parts of the Work or on separate contracts, including required changes in Drawings, dimensions, engineering and detailing costs and effect on other trades.

10. What effect does the proposed "Or Equal Substitution" have on applicable code requirements?

11. Identify differences between the proposed "Or Equal Substitution" and the specified item.

12. Attach a copy of manufacturer's warranty. Manufacturer's guarantees and warranties of proposed "Or Equal Substitution" and specified items are:

Same _____
Different _____
(Explain on attachment.)

Manufacturer shall provide a letter stating the fitness for intended use, and performance equivalence with the specified item.

13. List the name and address of three (3) similar projects (not necessarily installed by Contractor) on which the proposed product was used and date of installation:

(i) Name of Project: _____

Address: _____

Date of Installation: _____

(ii) Name of Project: _____

Address: _____

Date of Installation: _____

(iii) Name of Project: _____
Address: _____
Date of Installation: _____

14. Use of the proposed "Or Equal Substitution" will cause the Contract Time to be:

Same _____
Less _____
(Explain on attachment, if necessary.)

15. Use of the proposed "Or Equal Substitution" will affect the critical path of the Construction Schedule as follows (identify any proposed adjustment to the Contract Time):

16. Reduction in the Contract Sum of \$ _____ will result from use of the proposed "Or Equal Substitution".

17. Estimated cost of any engineering, design or agency fees required for work of all trades directly or indirectly affected by the proposed "Or Equal Substitution" (which complete cost will be borne by Contractor) is: \$ _____.

18. The date by which City must act on this "Or Equal Substitution" request in order for the time and cost estimates in the preceding Paragraphs to remain valid is:
_____.

19. Contractor Affidavit. The undersigned, having thoroughly investigated the proposed "Or Equal Substitution" represents, certifies and declares, under penalty of perjury under the laws of the State of California that:

- (1) Contractor has personally investigated the proposed "Or Equal Substitution" and determined that it is equal or superior in all respects to the material, product, thing or service specified except as specifically noted: _____
_____;
- (2) Contractor will provide the same warranty and correction responsibility for the proposed "Or Equal Substitution" that the Contractor would have provided for that specified;
- (3) Contractor will pay redesign, engineering, detailing, special inspection costs and agency fees caused by the use of this substitution;
- (4) Contractor will coordinate the installation of the accepted "Or Equal Substitution", making such changes as may be required for the Work to be complete in all respects.
- (5) Contractor waives all claims for additional costs relating to the "Or Equal Substitution" which may subsequently become apparent; and
- (6) Contractor assumes all responsibility for direct or indirect costs and/or time impacts as a result of the use of the "Or Equal Substitution".

Executed this _____ day of _____ 20____, at _____, California.

(type or print name)

Submitted by:

(Firm)

(Address)

For use by City:

___ Accepted ___ Accepted as noted

___ Not Accepted ___ Rejected as late

(By)

(Date)

APPENDIX B

INSURANCE FORMS

General Liability Special Endorsement Instructions

Please read and follow these instructions before completing and submitting this endorsement form.

1. **Endorsement Number:** Fill in the endorsement number if one is issued.
2. **Effective Date:** This field should have the date the endorsement becomes effective. For new contracts, this date must either precede or coincide with the start date of the contract. For renewal policies, this date must coincide with the start date of the policy period.
3. **Producer:** This box should contain the company name, address, and telephone number of the insurance broker or agent that services the policy.
4. **Policy Information:** This box must contain the exact name of the insurance company that issued the policy, the policy number, and the policy period.
5. **Deductible And/Or Self-Insured Retention:** If the policy has a deductible or self-insured retention, these must be shown in this area. If the policy has both, then both need to be shown.
6. **Named Insured & Address:** This field must contain the name of the company that has the contract or agreement with the Port. If the policy is in the name of a parent company, then the parent company should be listed as the first named insured, followed by the name and address of the company contracting with the Port.
7. **Type of Insurance:** The type of insurance policy must be checked, and either claims made or occurrence form must be checked (it cannot be left blank and both cannot be checked). The field for Retroactive Date must be completed for claims made policies, and the retroactive date must either coincide with or precede the start date of the contract. If the policy provides coverage for full prior acts, then that must be indicated.
8. **Applicability:** This field is where you can limit coverage to a specific contract or agreement. In an effort to be “green” and save time for everyone involved, the Port prefers that the document covers all agreements with the Port so that it is not necessary to obtain separate documents for each agreement.
9. **Other Provisions:** This is a free-form text area where additional information can be included if there isn’t another designated place for the information to be provided.
10. **Coverages and Limits:** Check the box for each type of coverage provided under the policy. All limits should be shown in dollars, not thousands of dollars. For each coverage type checked, there needs to be a corresponding entry in both the “occurrence” and “aggregate” columns. If a coverage type does not have a specific limit, the entry should say “included” to indicate that the limit for that coverage is included as part of the overall general liability limit. There should not be any blank entries next to coverage types that are checked.
11. **Claims:** Indicate the name, address, and telephone number of the underwriter’s representative where claims should be submitted (this area must be completed if the information is different than the producer).
12. **Authorized Representative:** The first line should be the printed name of person signing the document. The signature, title, employer of the person signing the form, telephone number, and date signed all need to be completed.

Note: This is a stand-alone endorsement form; it is not a certificate of insurance. Any reference to the policy terms and/or conditions will require that this endorsement form be accompanied by a complete copy of the policy. Any reference to policy forms or other endorsements will require that this endorsement form be accompanied by a copy of the referenced form. The endorsement form may be photocopied; however, it cannot be altered or recreated. The form must be legible and the current version of the form must be submitted. Outdated, incorrectly completed, or incomplete endorsement forms will be rejected and revisions or replacements will need to be provided to the Port. The endorsement form may be saved for future use; however, before using the form, you must ensure that you are using the most current version of the form that is available from the Port’s website (www.polb.com). A link to the list of forms is here: http://www.polb.com/economics/contractors/forms_permits/insurance.asp. The forms may be completed directly on the computer screen, then printed, signed by an authorized representative for the insurance company, and sent to the Port (forms sent via email or fax are acceptable as long as the forms are legible).

Please note that this endorsement form may be photocopied; however, it may not be altered or recreated.

GENERAL LIABILITY SPECIAL ENDORSEMENT		ENDORSEMENT NO.	EFFECTIVE DATE (MM/DD/YY)
FOR THE CITY OF LONG BEACH, HARBOR DEPARTMENT			
PRODUCER Telephone _____	POLICY INFORMATION Insurance Company: _____ Policy No.: _____ Policy Period: (from) _____ (to) _____ <input type="checkbox"/> Deductible \$ _____ OR <input type="checkbox"/> Self-Insured Retention of \$ _____		
NAME INSURED & ADDRESS TYPE OF INSURANCE	APPLICABILITY. This insurance pertains to the operations, products and/or activities of the Named Insured under all written agreements and permits in force with the City unless checked here <input type="checkbox"/> in which case only the following specific agreements and permits with the City are covered: AGREEMENTS/PERMITS: _____		
<input type="checkbox"/> GENERAL LIABILITY <input type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> Claims Made Retroactive Date _____ <input type="checkbox"/> COMPREHENSIVE GENERAL LIABILITY <input type="checkbox"/> Occurrence <input type="checkbox"/> OWNERS & CONTRACTORS PROTECTIVE		OTHER PROVISIONS CLAIMS: Underwriter's Representative for claims pursuant to this Insurance (must be completed if different than producer) Name: _____ Address: _____ Telephone: () _____	
COVERAGES	LIABILITY LIMITS IN \$		
	EACH OCCURRENCE	AGGREGATE	
<input type="checkbox"/> GENERAL LIABILITY <input type="checkbox"/> PRODUCTS/COMPLETED OPERATIONS <input type="checkbox"/> PERSONAL & ADVERTISING INJURY <input type="checkbox"/> FIRE LEGAL LIABILITY <input type="checkbox"/> EXPLOSION, COLLAPSE, UNDERGROUND HAZARDS (XCU) <input type="checkbox"/> CONTRACTUAL LIABILITY – RAILROADS			
In consideration of the premium charged and notwithstanding any inconsistent statement in the policy to which this endorsement is attached or any endorsement now or hereafter attached thereto, it is agreed as follows:			
1. ADDITIONAL INSURED. The City of Long Beach, its Board of Harbor Commissioners, individually and collectively, and their officers and employees ("City") are included as additional insureds with regard to liability and defense of suits or claims arising from the operations, products and/or activities performed by or on behalf of the Named Insured. 2. CONTRIBUTION NOT REQUIRED. This insurance shall be primary. Any other insurance, deductible, or self-insurance available to the insureds added by this endorsement shall be in excess of and shall not contribute with this insurance. 3. CANCELLATION NOTICE. With respect to the interests of City, this insurance shall not be cancelled, or the scope or limits of coverage reduced by endorsement, except after thirty (30) days prior written notice has been given to City at address indicated below. (Except 10 days advance notice shall be allowed for non-payment of premium.) 4. SCOPE OF COVERAGE. This endorsement shall afford coverage at least as broad as Insurance Services Office Commercial General Liability Coverage, "occurrence" form CG 0001.			
Except as stated above, nothing herein shall be held to waive, alter or extend any of the limits, conditions, agreements or exclusions of the policy to which this endorsement is attached.			
ENDORSEMENT HOLDER / ADDITIONAL INSURED			
CITY OF LONG BEACH BOARD OF HARBOR COMMISSIONERS 4801 AIRPORT PLAZA DR. LONG BEACH, CA 90815 ATTENTION: <u>Risk Management Division</u> TELEPHONE: <u>562-283-7475</u> FAX: <u>562-283-7499</u> E-MAIL: <u>riskmgmt@polb.com</u>		AUTHORIZED REPRESENTATIVE I _____ (print/type name), warrant that I have authority to bind the above-mentioned insurance company and by my signature hereon do so bind this company to this endorsement. Signature _____ Title _____ Employer of Signatory _____ Telephone: () _____ Date Signed _____	

Automobile Liability Special Endorsement Instructions

Please read and follow these instructions before completing and submitting this endorsement form.

1. **Endorsement Number:** Fill in the endorsement number if one is issued.
2. **Effective Date:** This field should have the date the endorsement becomes effective. For new contracts, this date must either precede or coincide with the start date of the contract. For renewal policies, this date must coincide with the start date of the policy period.
3. **Producer:** This box should contain the company name, address, and telephone number of the insurance broker or agent that services the policy.
4. **Policy Information:** This box must contain the exact name of the insurance company that issued the policy, the policy number, and the policy period.
5. **Deductible And/Or Self-Insured Retention:** If the policy has a deductible or self-insured retention, these must be shown in this area. If the policy has both, then both need to be shown.
6. **Named Insured & Address:** This field must contain the name of the company that has the contract or agreement with the Port. If the policy is in the name of a parent company, then the parent company should be listed as the first named insured, followed by the name and address of the company contracting with the Port.
7. **Type of Insurance:** The type of insurance policy must be checked.
8. **Applicability:** This field is where you can limit coverage to a specific contract or agreement. In an effort to be “green” and save time for everyone involved, the Port prefers that the document covers all agreements with the Port so that it is not necessary to obtain separate documents for each agreement.
9. **Other Provisions:** This is a free-form text area where additional information can be included if there isn’t another designated place for the information to be provided.
10. **Liability Limit:** The limit should be shown in dollars, not thousands of dollars.
11. **Claims:** Indicate the name, address, and telephone number of the underwriter’s representative where claims should be submitted (this area must be completed if the information is different than the producer).
12. **Scope of Coverage:** Check the box for each type of vehicle covered by the policy.
13. **Authorized Representative:** The first line should be the printed name of person signing the document. The signature, title, employer of the person signing the form, telephone number, and date signed all need to be completed.

Note: This is a stand-alone endorsement form; it is not a certificate of insurance. Any reference to the policy terms and/or conditions will require that this endorsement form be accompanied by a complete copy of the policy. Any reference to policy forms or other endorsements will require that this endorsement form be accompanied by a copy of the referenced form. The endorsement form may be photocopied; however, it cannot be altered or recreated. The form must be legible and the current version of the form must be submitted. Outdated, incorrectly completed, or incomplete endorsement forms will be rejected and revisions or replacements will need to be provided to the Port. The endorsement form may be saved for future use; however, before using the form, you must ensure that you are using the most current version of the form that is available from the Port’s website (www.polb.com). A link to the list of forms is here: http://www.polb.com/economics/contractors/forms_permits/insurance.asp. The forms may be completed directly on the computer screen, then printed, signed by an authorized representative for the insurance company, and sent to the Port (forms sent via email or fax are acceptable as long as the forms are legible).

AUTOMOBILE LIABILITY SPECIAL ENDORSEMENT		ENDORSEMENT NO.	EFFECTIVE DATE (MM/DD/YY)
FOR THE CITY OF LONG BEACH, HARBOR DEPARTMENT			
PRODUCER Telephone _____	POLICY INFORMATION Insurance Company: _____ Policy No.: _____ Policy Period: (from) _____ (to) _____ <input type="checkbox"/> Deductible \$ _____ OR <input type="checkbox"/> Self-Insured Retention of \$ _____		
NAMED INSURED & ADDRESS _____ _____ _____	APPLICABILITY. This insurance pertains to the operations and activities of the Named Insured under all written permits and agreements in force with the City unless checked here <input type="checkbox"/> in which case only the following specific permits and agreements with the City are covered: AGREEMENTS/PERMITS: _____		
TYPE OF INSURANCE	OTHER PROVISIONS		
<input type="checkbox"/> BUSINESS AUTO POLICY <input type="checkbox"/> TRUCKERS AND MOTOR CARRIER LIABILITY POLICY <input type="checkbox"/> GARAGEKEEPERS LIABILITY <input type="checkbox"/> STUNT ACTIVITY <input type="checkbox"/> OTHER _____	CLAIMS: Underwriter's Representative for claims pursuant to this Insurance (must be completed if different than producer) Name: _____ Address: _____ Telephone: () _____		
LIABILITY LIMIT IN \$			
\$ _____ each accident, for bodily injury and property damage liability			
In consideration of the premium charged and notwithstanding any inconsistent statement in the policy to which this endorsement is attached or any endorsement now or hereafter attached thereto, it is agreed as follows:			
<ol style="list-style-type: none"> 1. ADDITIONAL INSURED. The City of Long Beach, its Board of Harbor Commissioners, individually and collectively, and their officers and employees ("City") are included as additional insureds with regard to liability and defense of suits or claims arising from the operations and activities performed by or on behalf of the Named Insured. 2. CONTRIBUTION NOT REQUIRED. This insurance shall be primary. Any other insurance, deductible, or self-insurance available to the insureds added by this endorsement shall be in excess of and shall not contribute with this insurance. 3. CANCELLATION NOTICE. With respect to the interests of City, this insurance shall not be cancelled, or the scope or limits of coverage reduced by endorsement, except after thirty (30) days prior written notice has been given to City at address indicated below. (Except 10 days advance notice shall be allowed for non-payment of premium.) 4. SCOPE OF COVERAGE. This endorsement shall afford coverage at least as broad as Insurance Services Office form number CA0001. <input type="checkbox"/> Symbol 1(any auto) <input type="checkbox"/> Symbol 2 (owned autos) <input type="checkbox"/> Symbol 7 (scheduled autos) <input type="checkbox"/> Symbol 8 (hired autos) <input type="checkbox"/> Symbol 9 (non-owned autos) <p>Except as stated above, nothing herein shall be held to waive, alter or extend any of the limits, conditions, agreements or exclusions of the policy to which this endorsement is attached.</p>			
ENDORSEMENT HOLDER / ADDITIONAL INSURED			
CITY OF LONG BEACH BOARD OF HARBOR COMMISSIONERS 4801 AIRPORT PLAZA DR. LONG BEACH, CA 90815 ATTENTION: <u>Risk Management Division</u> TELEPHONE: <u>562-283-7475</u> FAX: <u>562-283-7499</u> E-MAIL: <u>riskmgmt@polb.com</u>		AUTHORIZED REPRESENTATIVE I _____ (print/type name), warrant that I have authority to bind the above-mentioned insurance company and by my signature hereon do so bind this company to this endorsement. Signature _____ Title _____ Employer of Signatory _____ Telephone: () _____ Date Signed _____	

Pollution Liability Special Endorsement Instructions

Please read and follow these instructions before completing and submitting this endorsement form.

1. **Endorsement Number:** Fill in the endorsement number if one is issued.
2. **Effective Date:** This field should have the date the endorsement becomes effective. For new contracts, this date must either precede or coincide with the start date of the contract. For renewal policies, this date must coincide with the start date of the policy period.
3. **Producer:** This box should contain the company name, address, and telephone number of the insurance broker or agent that services the policy.
4. **Policy Information:** This box must contain the exact name of the insurance company that issued the policy, the policy number, and the policy period.
5. **Deductible, Self-Insured Retention, and Retroactive Date:** If the policy has a deductible or self-insured retention, these must be shown in this area. If the policy has both, then both need to be shown. For claims made policies, the field for Retroactive Date must be completed, and the retroactive date must either coincide with or precede the start date of the contract. If the policy provides coverage for full prior acts, then that must be indicated.
6. **Named Insured & Address:** This field must contain the name of the company that has the contract or agreement with the Port. If the policy is in the name of a parent company, then the parent company should be listed as the first named insured, followed by the name and address of the company contracting with the Port.
7. **Type of Insurance and Limits:** Either the claims made or occurrence form box must be checked (this area cannot be left blank and both cannot be checked). For claims made policies, be sure to include the retroactive date as described in item # 5 above. The type of insurance coverage provided by the policy must also be checked. All limits should be shown in dollars, not thousands of dollars. For each coverage type checked, there needs to be a corresponding entry in both the "occurrence" and "aggregate" columns. There should not be any blank entries next to types of insurance that are checked.
8. **Coverages:** The types of coverage that the policy provides should be checked here. If the policy provides time element coverage, this box will need to be checked, and the time element coverage section must be completed (see item # 10 below).
9. **Applicability:** This field is where you can limit coverage to a specific contract or agreement. In an effort to be "green" and save time for everyone involved, the Port prefers that the document covers all agreements with the Port so that it is not necessary to obtain separate documents for each agreement.
10. **For Time Element Coverage:** This section must be completed if the policy provides time element coverage; otherwise, you can check the box for "not applicable."
11. **Other Provisions:** This is a free-form text area where additional information can be included if there isn't another designated place for the information to be provided.
12. **Claims:** Indicate the name, address, and telephone number of the underwriter's representative where claims should be submitted (this area must be completed if the information is different than the producer).
13. **Scope of Coverage (item # 4 near the bottom of the endorsement form):** Read the definition of pollutants listed for this endorsement form, and if the policy includes coverage for pollutants as defined in this section, check "yes". If the policy does not provide coverage for pollutants as defined in this section, check "no" and complete the next line to indicate which pollutants are excluded.
14. **Authorized Representative:** The first line should be the printed name of person signing the document. The signature, title, employer of the person signing the form, telephone number, and date signed all need to be completed.

Note: This is a stand-alone endorsement form; it is not a certificate of insurance. Any reference to the policy terms and/or conditions will require that this endorsement form be accompanied by a complete copy of the policy. Any reference to policy forms or other endorsements will require that this endorsement form be accompanied by a copy of the referenced form. The endorsement form may be photocopied; however, it cannot be altered or recreated. The form must be legible and the current version of the form must be submitted. Outdated, incorrectly completed, or incomplete endorsement forms will be rejected and revisions or replacements will need to be provided to the Port. The endorsement form may be saved for future use; however, before using the form, you must ensure that you are using the most current version of the form that is available from the Port's website (www.polb.com). A link to the list of forms is here: http://www.polb.com/economics/contractors/forms_permits/insurance.asp. The forms may be completed directly on the computer screen, then printed, signed by an authorized representative for the insurance company, and sent to the Port (forms sent via email or fax are acceptable as long as the forms are legible).

POLLUTION LIABILITY SPECIAL ENDORSEMENT FOR THE CITY OF LONG BEACH, HARBOR DEPARTMENT				ENDORSEMENT NO.	EFFECTIVE DATE (MM/DD/YY)						
PRODUCER Telephone _____		POLICY INFORMATION Insurance Company: _____ Policy No.: _____ Policy Period: (from) _____ (to) _____ <input type="checkbox"/> Deductible \$ _____ OR <input type="checkbox"/> Self-Insured Retention of \$ _____ Retroactive Date _____									
NAMED INSURED & ADDRESS 		APPLICABILITY. This insurance pertains to the operations, activities, and/or products of the Named Insured under all written agreements and permits in force with the City unless checked here <input type="checkbox"/> in which case only the following specific agreements and permits with the City are covered: AGREEMENTS/PERMITS: _____									
TYPE OF INSURANCE <input type="checkbox"/> CLAIMS MADE FORM <input type="checkbox"/> OCCURRENCE FORM <input type="checkbox"/> ENVIRONMENTAL IMPAIRMENT LIABILITY <input type="checkbox"/> POLLUTION LEGAL LIABILITY <input type="checkbox"/> CONTRACTOR'S POLLUTION LEGAL LIABILITY <input type="checkbox"/> MARITIME POLLUTION LIABILITY <input type="checkbox"/> AUTOMOBILE POLLUTION (TRANSIT) LIABILITY <input type="checkbox"/> UNDERGROUND STORAGE TANK COVERAGE <input type="checkbox"/> OTHER _____		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center; padding: 2px;">LIABILITY LIMITS IN \$</th> </tr> <tr> <th style="width: 50%; padding: 2px;">EACH LOSS</th> <th style="width: 50%; padding: 2px;">AGGREGATE</th> </tr> </thead> <tbody> <tr> <td style="height: 100px;"></td> <td style="height: 100px;"></td> </tr> </tbody> </table>		LIABILITY LIMITS IN \$		EACH LOSS	AGGREGATE			FOR TIME ELEMENT COVERAGE: Discovery Required Within ____ day(s) Reporting Required Within ____ day(s) Discharge Period Less Than ____ day(s) <input type="checkbox"/> Not Applicable OTHER PROVISIONS: CLAIMS: Underwriter's Representative for claims pursuant to this Insurance (must be completed if different than producer) Name: _____ Address: _____ Telephone: () _____	
LIABILITY LIMITS IN \$											
EACH LOSS	AGGREGATE										
COVERAGES (check as applicable) <table style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> ON-SITE <input type="checkbox"/> OFF-SITE <input type="checkbox"/> BODILY INJURY (INCLUDING DEATH & MENTAL ANGUISH) <input type="checkbox"/> DEFENSE COSTS </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> CLEAN-UP COSTS <input type="checkbox"/> PROPERTY DAMAGE <input type="checkbox"/> TRANSPORTATION OF WASTE <input type="checkbox"/> TIME ELEMENT </td> </tr> </table>						<input type="checkbox"/> ON-SITE <input type="checkbox"/> OFF-SITE <input type="checkbox"/> BODILY INJURY (INCLUDING DEATH & MENTAL ANGUISH) <input type="checkbox"/> DEFENSE COSTS	<input type="checkbox"/> CLEAN-UP COSTS <input type="checkbox"/> PROPERTY DAMAGE <input type="checkbox"/> TRANSPORTATION OF WASTE <input type="checkbox"/> TIME ELEMENT				
<input type="checkbox"/> ON-SITE <input type="checkbox"/> OFF-SITE <input type="checkbox"/> BODILY INJURY (INCLUDING DEATH & MENTAL ANGUISH) <input type="checkbox"/> DEFENSE COSTS	<input type="checkbox"/> CLEAN-UP COSTS <input type="checkbox"/> PROPERTY DAMAGE <input type="checkbox"/> TRANSPORTATION OF WASTE <input type="checkbox"/> TIME ELEMENT										
In consideration of the premium charged and notwithstanding any inconsistent statement in the policy to which this endorsement is attached or any endorsement now or hereafter attached thereto, it is agreed as follows:											
<ol style="list-style-type: none"> ADDITIONAL INSURED. The City of Long Beach, its Board of Harbor Commissioners, individually and collectively, and their officers and employees ("City") are included as additional insureds with regard to liability and defense of suits or claims arising from the Named Insured's products, or from operations or activities performed by, or on behalf of, the Named Insured. CONTRIBUTION NOT REQUIRED. This insurance shall be primary. Any other insurance, deductible, or self-insurance available to the insureds added by this endorsement shall be in excess of and shall not contribute with this insurance. CANCELLATION NOTICE. With respect to the interests of City, this insurance shall not be cancelled, or the scope or limits of coverage reduced by endorsement, except after thirty (30) days prior written notice has been given to City at address indicated below. (Except 10 days advance notice shall be allowed for non-payment of premium.) SCOPE OF COVERAGE. For the purpose of the insurance required by this endorsement, the definition of "pollutants" shall include at least the following: "any solid, liquid, gaseous or thermal irritant or contaminant, including smoke, vapor, fumes, acids, alkalis, chemicals and waste. Waste includes materials to be recycled, reconditioned, or reclaimed." 											
POLICY INCLUDES COVERAGE FOR POLLUTANTS AS DEFINED ABOVE: <input type="checkbox"/> YES <input type="checkbox"/> NO IF NO, WHAT POLLUTANTS ARE EXCLUDED: _____ Except as stated above, nothing herein shall be held to waive, alter or extend any of the limits, conditions, agreements or exclusions of the policy to which this endorsement is attached.											
ENDORSEMENT HOLDER / ADDITIONAL INSURED											
CITY OF LONG BEACH BOARD OF HARBOR COMMISSIONERS 4801 AIRPORT PLAZA DR. LONG BEACH, CA 90815 ATTENTION: <u>Risk Management Division</u> TELEPHONE: <u>562-283-7475</u> FAX: <u>562-283-7499</u> E-MAIL: <u>riskmgmt@polb.com</u>			I _____ (print/type name), warrant that I have authority to bind the above-mentioned insurance company and by my signature hereon do so bind this company to this endorsement. Signature _____ Title _____ Employer of Signatory _____ Telephone: () _____ Date _____								

Workers' Compensation and Employer's Liability Special Endorsement Instructions

Please read and follow these instructions before completing and submitting this endorsement form.

1. **Endorsement Number:** Fill in the endorsement number if one is issued.
2. **Effective Date:** This field should have the date the endorsement becomes effective. For new contracts, this date must either precede or coincide with the start date of the contract. For renewal policies, this date must coincide with the start date of the policy period.
3. **Producer:** This box should contain the company name, address, and telephone number of the insurance broker or agent that services the policy.
4. **Policy Information:** This box must contain the exact name of the insurance company that issued the policy, the policy number, and the policy period.
5. **Deductible And/Or Self-Insured Retention:** If the policy has a deductible or self-insured retention, these must be shown in this area. If the policy has both, then both need to be shown.
6. **Named Insured & Address:** This field must contain the name of the company that has the contract or agreement with the Port. If the policy is in the name of a parent company, then the parent company should be listed as the first named insured, followed by the name and address of the company contracting with the Port.
7. **Applicability:** This field is where you can limit coverage to a specific contract or agreement. In an effort to be "green" and save time for everyone involved, the Port prefers that the document covers all agreements with the Port so that it is not necessary to obtain separate documents for each agreement.
8. **Other Provisions:** This is a free-form text area where additional information can be included if there isn't another designated place for the information to be provided.
9. **Coverages:** The box needs to be checked for each type of coverage the policy provides. For the Employer's Liability, the limits also need to be completed. The limits should be shown in dollars, not thousands of dollars.
10. **Authorized Representative:** The first line should be the printed name of person signing the document. The signature, title, employer of the person signing the form, telephone number, and date signed all need to be completed.

Note: This is a stand-alone endorsement form; it is not a certificate of insurance. Any reference to the policy terms and/or conditions will require that this endorsement form be accompanied by a complete copy of the policy. Any reference to policy forms or other endorsements will require that this endorsement form be accompanied by a copy of the referenced form. The endorsement form may be photocopied; however, it cannot be altered or recreated. The form must be legible and the current version of the form must be submitted. Outdated, incorrectly completed, or incomplete endorsement forms will be rejected and revisions or replacements will need to be provided to the Port. The endorsement form may be saved for future use; however, before using the form, you must ensure that you are using the most current version of the form that is available from the Port's website (www.polb.com). A link to the list of forms is here: http://www.polb.com/economics/contractors/forms_permits/insurance.asp. The forms may be completed directly on the computer screen, then printed, signed by an authorized representative for the insurance company, and sent to the Port (forms sent via email or fax are acceptable as long as the forms are legible).

WORKERS' COMPENSATION AND EMPLOYER'S LIABILITY SPECIAL ENDORSEMENT

FOR THE CITY OF LONG BEACH, HARBOR DEPARTMENT

ENDORSEMENT NO.

EFFECTIVE DATE (MM/DD/YY)

PRODUCER

Telephone

POLICY INFORMATION

Insurance Company:

Policy No.:

Policy Period: (from) (to)

☐ Deductible \$ or

☐ Self-Insured Retention of \$

APPLICABILITY. This insurance pertains to the operations and activities of the Named Insured under all written agreements and permits in force with the City unless checked here ☐ in which case only the following specific agreements and permits with the City are covered:

AGREEMENTS/PERMITS:

NAMED INSURED & ADDRESS

OTHER PROVISIONS

COVERAGES (check as applicable)

☐ Statutory Workers' Compensation

☐ Employers Liability Limits

Bodily Injury (each accident)

☐ U. S. L. & H.

Bodily Injury by Disease (each employee)

☐ Jones Act

Bodily Injury by Disease (policy limit)

☐ Federal Employers Liability Act (FELA)

In consideration of the premium charged and notwithstanding any inconsistent statement in the policy to which this endorsement is attached or any endorsement now or hereafter attached thereto, it is agreed as follows:

- 1. WAIVER OF SUBROGATION.** The Insurance Company agrees to waive all rights of subrogation against the City of Long Beach, its Board of Harbor Commissioners, individually and collectively, and their officers and employees ("City") for losses paid under the terms of this policy.
- 2. CANCELLATION NOTICE.** With respect to the interests of City, this insurance shall not be cancelled, or the scope or limits of coverage reduced by endorsement, except after thirty (30) days prior written notice has been given to City at address indicated below. (Except 10 days advance notice shall be allowed for non-payment of premium.)

Except as stated above, nothing herein shall be held to waive, alter or extend any of the limits, conditions, agreements or exclusions of the policy to which this endorsement is attached.

ENDORSEMENT HOLDER

CITY OF LONG BEACH
BOARD OF HARBOR COMMISSIONERS
4801 AIRPORT PLAZA DR.
LONG BEACH, CA 90815

ATTENTION: Risk Management Division

TELEPHONE: 562-283-7475

FAX: 562-283-7499

E-MAIL: riskmgmt@polb.com

AUTHORIZED REPRESENTATIVE

I (print/type name), warrant that I have authority to bind the above-mentioned insurance company and by my signature hereon do so bind this company to this endorsement.

Signature

Title

Employer of Signatory

Telephone: () Date Signed

APPENDIX C

PERFORMANCE BOND

**PERFORMANCE BOND
(Bond for Faithful Performance)
APPENDIX C**

WHEREAS, The CITY OF LONG BEACH, a municipal corporation of the State of California and its Board of Harbor Commissioners, hereinafter collectively the "City" or "Obligee," have conditionally awarded to _____ designated as the "Contractor" or "Principal" herein, a contract for the work ("Work") described as follows:

_____, as described in Specification No.: _____, Addenda/Addendum No. _____ and related drawings.

WHEREAS, the Principal is about to enter into a Contract with Obligor for performance of the Work, which Contract, and all Contract Documents set forth therein are incorporated herein by this reference.

WHEREAS, the Principal is required to furnish a bond guaranteeing the prompt, full and faithful performance of its obligations under the Contract Documents concurrently with delivery to Obligor of the executed Contract.

NOW, THEREFORE, we the undersigned Contractor, as Principal, and _____, an admitted surety insurer in the State of California, as Surety, are held and firmly bound unto THE CITY OF LONG BEACH, a municipal corporation of the State of California and its Board of Harbor Commissioners (hereinafter the "City" or "Obligee") in the penal sum of \$ _____ lawful money of the United States, for the payment of which sum, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT:

If the Principal shall promptly, fully and faithfully perform each and all of the obligations and things to be done and performed by the Principal in strict accordance with the terms of the Contract Documents as said Contract Documents may be modified or amended from time to time; and if the Principal shall indemnify and save harmless the Obligor and all of its officers, agents and employees from any and all losses, liability and damages, claims, judgments, stop notices, costs, and fees of every description, whether imposed by law or equity, which may be incurred by the Obligor by reason of the failure or default on the part of the Principal in the performance of any or all of the terms or the obligations of the Contract Documents, as they may be amended and supplemented including, but not limited to, its liability for liquidated damages for delay, all warranties or guarantees required thereunder and indemnity obligations; then this obligation shall be void; otherwise, it shall be, and remain, in full force and effect.

Whenever the Principal shall be, and is declared by the Obligor to be in default under the Contract, which shall include without limitation, any breach or default of the Contract Documents, then, after written notice from the Obligor to the Surety, as provided for below, the Surety shall either remedy the default or breach by the Principal or shall promptly and faithfully take charge of the Work of and complete the Work in accordance with the requirements of the Contract Documents with a contractor other than the Principal at its own expense and make available as work progresses sufficient funds to pay the cost of completion less the balance of the Contract price including other costs and damages for which the surety may be liable hereunder; provided, however, that the procedure by which the Surety undertakes to discharge its obligations under this Bond shall be subject to the advance written approval of the Obligor.

Within fifteen (15) days of Obligor's written notice to the Surety of the failure of performance of the Contract by the Principal, it shall be the duty of the Surety to give to the Obligor an unequivocal notice in writing of the Surety's election to remedy the default(s) of the Principal promptly, or to arrange for performance of the Contract promptly by a Contractor other than the Principal, time being of essence to this Bond. In said Notice of Election, the Surety shall state the date of commencement of its cure or remedy of the Principal's default(s) or its performance of the Contract. The Surety's obligations for cure or remedy, include but are not limited to: correction of defective work and completion of the Contract, additional legal, design professional and delay costs arising from Surety's actions or failure to act; and liquidated damages, or if no liquidated damages are specified in the Contract, actual damages caused by delayed performance or non-performance by the Principal. The Surety shall give prompt written notice to the Obligor upon completion of the cure or remedy of the Principal's default(s) of its performance of the Construction Contract.

If the Surety does issue its Notice of Election and does not proceed to cure or remedy the Principal's default(s) of its performance of the Work with reasonable promptness, the Surety shall be deemed to be in default on this bond fifteen (15) days after receipt of a written notice from Obligor to the Surety demanding that the Surety perform its obligations under this Bond, and the Obligor shall be entitled to enforce any remedy available to Obligor.

The Surety and Principal, for value received, hereby stipulate and agree that no change, extension of time, modification, alteration or addition to the terms of the Contract or Contract Documents or to the Work to be performed thereunder shall in any way affect or release the Principal or Surety or their respective heirs, executors, administrators, successors and assigns from their obligations on this bond, and Surety does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract, or Contract Documents, or to the Work. No premature payment by the City to the Principal shall release or exonerate the Surety, unless the Officer or Board of the City ordering the payment shall have actual notice at the time the order is made that the payment is in fact premature, and then only to the extent that such payment shall result in actual loss to the Surety, but in no event more than the amount of such premature payment.

FURTHER, Principal and Surety agree that if Obligee is required to engage the services of attorneys in connection with enforcement of the bond, each shall pay Obligee's reasonable attorneys' fees incurred, with or without suit, in addition to the above penal sum.

The guarantees contained herein shall survive the final completion of the Work called for in the Contract Documents with respect to the obligations and liabilities of the Principal which survive such final completion.

IN WITNESS WHEREOF, this instrument has been duly executed by the Principal and Surety above-named, on the _____ day of _____, 20__.

_____ Surety Name	_____ Principal Name
_____ Address	By: _____ (Signature)
_____ Telephone	_____ (Printed Name)
By: _____ (Signature)	Its: _____ (President/Vice President/Chairman of the Board)
_____ Attorney-in-Fact	
_____ (Signature)	_____ Principal Name
	By: _____ (Signature)
	_____ (Printed Name)
	Its: _____ (Secretary/Assistant Treasurer)

(Attach Attorney-in-Fact Certificate, Corporate Seal and Surety Seal)

_____, 20__	_____, 20__
Approved as to form.	Approved as to sufficiency.
DAWN MCINTOSH, City Attorney	LONG BEACH HARBOR DEPARTMENT
By: _____ Principal Deputy/Deputy	By: _____ Chief Executive Officer

NOTE:

1. Execution of this bond must be acknowledged by both PRINCIPAL and SURETY before a Notary Public and Notary's certificate of each acknowledgment must be attached.

2. A corporation must execute this bond by duly authorized officers or agents, and a certified copy of a resolution of its Board of Directors authorizing such execution, or other evidence of authority for such execution, must be attached if executed by persons other than the officers listed in Section 313, California Corporations Code.

APPENDIX D

PAYMENT BOND

Payment Bond
No. _____

**PAYMENT BOND
(Labor and Material Bond)
APPENDIX D**

WHEREAS, The CITY OF LONG BEACH, a municipal corporation of the State of California and its Board of Harbor Commissioners, hereinafter collectively the "City" or "Obligee," have conditionally awarded to _____ designated as the "Contractor" or "Principal" herein, a contract for the work ("Work") described as follows:

_____, as described in Specification _____, Addenda/Addendum No. _____ and related drawings.

WHEREAS, the Principal is about to enter into a Contract with the Obligee for the performance of the Work, which Contract and all Contract Documents set forth therein are incorporated herein by this reference.

WHEREAS, by the terms of said Contract Documents, as well as Civil Code Sections 9550 and 9554, Principal is required to furnish a bond for the prompt, full and faithful payment to any Claimant, as hereinafter defined, for all labor, materials or services used or reasonably required for use in the performance of the Work of the Project;

NOW THEREFORE, we the undersigned Contractor, as Principal, and _____ admitted as a surety insurer in the State of California ("Surety"), are held and firmly bound to the City for payment of the penal sum of \$_____ lawful money of the United States, for which payment we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally.

THE CONDITION OF THIS OBLIGATION IS SUCH that if said Principal, shall fail to pay any of the persons named in Civil Code Section 9100 ("Claimants"), for all labor, materials or services used or reasonably required for use in performance of the Work of the Project, or for any amounts due under the Unemployment Insurance Code with respect to work or labor performed by any such Claimant on the Project, or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of the Contractor and subcontractors pursuant to Section 13020 of the Unemployment Insurance Code with respect to such work and labor, that the surety or sureties herein will pay for the same in an amount not exceeding the sum specified in this bond, otherwise the above obligation shall be void.

If suit is brought upon this bond, the said Surety will pay reasonable attorney's fees to be fixed by the court.

This bond shall inure to the benefit of any of the persons named in Civil Code Section 9100 so as to give a right of action to such persons or the assigns in any suit brought upon this bond.

The Surety and Principal, for value received, hereby stipulate and agree that no change, extension of time, modification, alteration or addition to the terms of the Contract or Contract Documents or to the Work to be performed thereunder shall in any way affect or release the Principal or Surety or their respective heirs, executors, administrators, successors and assigns from their obligations on this bond, and Surety does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract, or Contract Documents, or to the Work. No premature payment by the City to the Principal shall release or exonerate the Surety, unless the Officer or Board of the City ordering the payment shall have actual notice at the time the order is made that the payment is in fact premature, and then only to the extent that such payment shall result in actual loss to the Surety, but in no event more than the amount of such premature payment.

IN WITNESS WHEREOF, this instrument has been duly executed by the Principal and Surety above-named, on the _____ day of _____, 20____.

_____ Surety Name	_____ Principal Name
_____ Address	By: _____ (Signature)
_____ Telephone	_____ (Printed Name)
By: _____ (Signature)	Its: _____ (President/Vice President/Chairman of the Board)
_____ Attorney-in-Fact	
_____ (Signature)	_____ Principal Name
	By: _____ (Signature)
	_____ (Printed Name)
	Its: _____ (Secretary/Assistant Treasurer)

(Attach Attorney-in-Fact Certificate, Corporate Seal and Surety Seal)

_____, 20____	_____, 20____
Approved as to form.	Approved as to sufficiency.
DAWN MCINTOSH, City Attorney	LONG BEACH HARBOR DEPARTMENT
By: _____ Principal Deputy/Deputy	By: _____ Chief Executive Officer

NOTE:

1. Execution of this bond must be acknowledged by both PRINCIPAL and SURETY before a Notary Public and Notary's certificate of each acknowledgment must be attached.

2. A corporation must execute this bond by duly authorized officers or agents, and a certified copy of a resolution of its Board of Directors authorizing such execution, or other evidence of authority for such execution, must be attached if executed by persons other than the officers listed in Section 313, California Corporations Code.

APPENDIX E

SBE FORMS

Good Faith Effort (GFE) Evaluation Criteria for Construction Contracts

A bidder whose bid fails to meet the SBE or VSBE participation goal shall be found responsive if an acceptable Good Faith Effort (GFE) is demonstrated. There are 9 criteria varying in value from 5-15 points that will be used to evaluate a Bidder's GFE. The Bidder must achieve a score of 70 out of a possible 100 points in order for the SBE Administrator to determine that the Bidder has made an acceptable GFE.

1. **Attend Pre-Bid Meeting (5 points):** The Bidder submitted written evidence that he/she attended the pre-bid meeting.
2. **Subdivide the Work (10 points):** The Bidder defined the portion of work to be subcontracted that is equal to or greater than the established SBE/VSBE goal based on its bid value. The Bidder has identified the services (work category) intended to be performed by its own workforces and those services identified to be subcontracted/supplied. It shall be identified in any combination of NAICS and/or NIGP codes with dollar values of each item also identified and totaling an amount that equals or exceeds the established SBE/VSBE goal. Evidence demonstrating the effort exerted by the Bidder is provided.
3. **Advertise (10 points):** The Bidder submitted written evidence of commercial advertising for SBE/VSBE contractors at least fourteen (14) calendar days prior to the bid deadline. The advertisement shall identify the project and list the services identified as potential SBE/VSBE work in Criteria 2. Proof of advertising shall include the name of the advertiser(s); a copy of the advertisement(s) showing the date(s) published; and an affidavit from advertiser(s) attesting to the placement of the advertisement(s).
4. **Use of the Port's and State's vendor Databases (15 points):** The Bidder submitted written evidence of using the Port's, <http://www.planetbids.com/portal/portal.cfm?CompanyID=19236#>, and/or the State of California Department of General Services' (DGS), <https://caleprocure.ca.gov/pages/PublicSearch/supplier-search.aspx>, respective online vendor databases.
5. **Directly Solicit Small Businesses (15 points):** The Bidder submitted written evidence of directly soliciting an adequate number of SBE/VSBE contractors and material suppliers certified in the Port's and/or the DGS vendor database(s) at least fourteen (14) calendar days prior to the bid opening. The evidence shall contain names of the contact person(s), addresses, phone numbers, dates of all SBE/VSBE firms contacted, requirements of the contract, and how to obtain plans and specifications.

An adequate number of SBE/VSBE contractors and material suppliers to contact in each work category, as explained in Criteria 2, depend on the total number of contractors certified in the database within that category.

- If the database contains 5 or less contractors, then the Bidder shall contact all of them;
 - If the database contains 6-10 contractors, the Bidder shall contact at least 5;
 - If the database contains 11-50 contractors, the Bidder shall contact at least 50%; or
 - If the database contains 51 or more contractors, the Bidder shall contact at least 25.
6. **Conduct Follow-Up (15 points):** The Bidder submitted written evidence of specific activities (oral and written) used to follow up initial solicitations in preparing the bid. Bidder will submit a contact log with names, contact persons, phone numbers, dates and methods used for follow up. The follow up log should contain a minimum of 75% of the initial solicitations.
 7. **Offer Assistance (5 points):** The Bidder demonstrated that he/she has offered to assist SBEs/VSBEs in obtaining bonding, insurance, lines of credit, equipment or other means of support.
 8. **Negotiate and Document Bid Results (15 points):** The Bidder submitted written evidence of negotiating in good faith with interested SBEs/VSBEs. Negotiations include discussions regarding scope of work, materials, equipment, insurance, bonding, personnel, timing of project, etc. For any negotiations that were unsuccessful, the Bidder submitted the unsuccessful Bidder's company name, telephone number, contact person, price bid (if applicable) and the reason for rejecting the bid. The Port reserves the right to require the Bidder to submit copies of all SBE and non-SBE bids for each item of work before finalizing the score for this criterion.
 9. **Bidder Commitment Value (10 points):** The Bidder's SBE/VSBE Commitment percentage must be equal to or exceed the average SBE/VSBE Commitment percentage of the other two low Bidders.

INSTRUCTIONS AND CRITERIA FOR SBE/VSBE MONITORING AND ACHIEVING CONTRACT COMPLIANCE

1. Contract Compliance

- a. The Contractor shall report the dollar value of payments to small businesses on a monthly basis and at project close-out. The reporting may be accomplished electronically through the Port's designated system or by submitting a completed POLB Form SBE-3C (SBE/VSBE Monthly Utilization Report for Construction Contracts) with every invoice. The Port will instruct the contractor which method to utilize. The reported data will be reviewed for accuracy and completeness.
- b. The Construction Manager, Program Manager, SBE Administrator, or their designee may conduct site visits and Subcontractor/vendor/supplier interviews and telephone calls to verify proper and full utilization of SBEs and VSBEs to meet Contract requirements. Contractors, Subcontractors and Material Suppliers shall fully cooperate with such monitoring.
- c. If a Contractor substitutes an SBE/VSBE Material Supplier, the Contractor shall provide proof, to the satisfaction of the Director of Construction Management, that a good faith effort was made to replace that Material Supplier's participation percentage with another SBE/VSBE firm, to meet the combined SBE/VSBE participation percentage specified on the Contractor's SBE/VSBE Commitment Plan (POLB Form SBE-2C).
- d. If a firm's SBE or VSBE status changes during the term of a Contract, work performed on that Contract after the firm loses its certification will continue to be credited toward meeting the SBE or VSBE participation goal.
- e. At project close-out, if the Contractor fails to meet the combined SBE/VSBE participation percentage specified on its SBE/VSBE Commitment Plan, or fails to provide proof that it made a good faith effort to do so, the Contractor may be considered to be in material breach of Contract (refer to the **Contract Non-Compliance** article herein).

2. Contract Non-Compliance

- a. The Contractor may be considered in material breach of Contract for any one or more of the following violations:
 - i. Failure to report SBE/VSBE utilization with every invoice as prescribed in the **Contract Compliance** article herein, either electronically or by submitting an SBE/VSBE Monthly Utilization Report (POLB Form SBE-3C);

- ii. Failure to correct discrepancies found in the reported SBE/VSBE utilization whether electronically or on POLB Form SBE-3C;
 - iii. Falsifying or misrepresenting any information provided to the Port, including information provided on the Port's online vendor database;
 - iv. Substituting an SBE/VSBE Subcontractor or Material Supplier without prior written Port approval; and/or
 - v. Failure to meet the contracted SBE/VSBE participation percentage(s) by completion of the contract.
- b. In addition to any other remedy the Port may have under the Contract or by operation of law, the Port, in its sole discretion, may impose any or all of the following provisions against a Contractor determined to be in breach of Contract:
- i. Assess the cost of the Port's audit of the books and records of the Contractor, Subcontractors and Material Suppliers, where the Contractor has failed to timely submit a required SBE/VSBE Program report;
 - ii. Withhold up to ten percent (10%) of a monthly progress payment until the Contractor comes into compliance.
- c. Within three (3) working days from the date of written notice from the Port of its intent to impose any of the measures described above, the Contractor may submit in writing, a request for an administrative hearing conducted by the Port's SBE Reconsideration Official. The decision of the Reconsideration Official may be appealed to the Board of Harbor Commissioners. Any appeal of the SBE Reconsideration Official's decision must be made to the Board of Harbor Commissioners in writing, and must be submitted within three (3) working days from the date of written notice of the SBE Reconsideration Officials' decision.

3. Contract Amendments

If the Port approves a Change Order or Contract amendment, the SBE/VSBE participation goals may, at the sole discretion of the Port, apply to the change order or Contract amendment. If additional work can be performed by SBEs/VSBEs that are already part of the Contractor's team, the SBE/VSBE participation goal shall apply to the entire Contract, including the amendment or Change Order.

ORDINANCE NO. HD- 2259

AN ORDINANCE OF THE BOARD OF HARBOR
COMMISSIONERS OF THE CITY OF LONG BEACH
AMENDING AND RESTATING THE SMALL BUSINESS
ENTERPRISES AND VERY SMALL BUSINESS
ENTERPRISES PROGRAM AND MAKING A
DETERMINATION RELATED THERETO

The Board of Harbor Commissioners of the City of Long Beach ("Board")
ordains as follows:

Section 1. The Port of Long Beach's Small Business Enterprises and Very
Small Business Enterprises Program (the "Program") was adopted by Ordinance
HD-1923 and amended by Ordinance HD-1949, HD-2004, and HD-2149.

Sec. 2. The Board hereby adopts a fourth amended and restated version of
the Program which is attached hereto as Exhibit A.

Sec. 3. The Board hereby finds and determines that amending and
restating the Program as set forth in Exhibit A is statutorily exempt from the provisions of
the California Environment Quality Act.

Sec. 4. This ordinance shall be signed by the President or Vice President
of the Board and attested to by the Secretary. The Secretary shall certify to the passage
of this ordinance by the Board, shall cause the same to be posted in three (3)
conspicuous places in the City of Long Beach, and shall cause a certified copy of this

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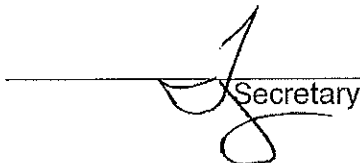
//

OFFICE OF THE CITY ATTORNEY
CHARLES PARKIN, City Attorney
333 West Ocean Boulevard, 11th Floor
Long Beach, CA 90802-4664

1 ordinance to be filed forthwith with the City Clerk of the City of Long Beach. This
2 ordinance shall take effect on the 31st day after its final passage.

3
4 
President

5 ATTEST:

6
7 
Secretary

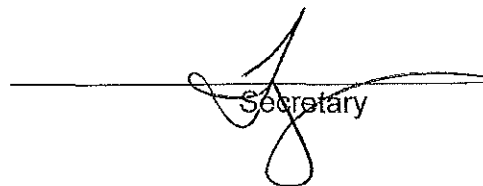
9 I hereby certify that the foregoing ordinance was adopted by the Board of
10 Harbor Commissioners of the City of Long Beach at its meeting of May 25, 2017
11 by the following vote:

12
13 Ayes: Commissioners: Drummond, Egoscue, Bynum

14
15 Noes: Commissioners: _____

16 Absent Commissioners: Dines, Farrell

17 Not Voting: Commissioners: _____

18
19
20 
Secretary

21
22
23
24
25
26
27
28 WRB:jad 05/18/17 #A17-01333
L:\Apps\CityLaw\32\WPDocs\LD018\PO30\00756712.doc

EXHIBIT A

The Port of Long Beach Small Business Enterprises (SBE) and Very Small Business Enterprises (VSBE) Program (the "Program")

1.0 Applicability

The Program shall apply to all applicable Port-wide construction contracts, professional services contracts, and procurement activities funded with Port revenues and/or federal funds, except those subject to 49 CFR 26, "Disadvantaged Business Enterprises (DBE) Program."

2.0 Policy

- 2.1 The Port shall promote utilization of Small Business Enterprises (SBEs) and Very Small Business Enterprises (VSBEs) on construction contracts, professional services contracts, and purchase requisitions.
- 2.2 The goal of the Program is to reduce barriers for small businesses and to take advantage of the economic benefits and better community participation their utilization provides. Studies illustrate that contracting with small businesses provide economic benefits (i.e. new jobs created, additional taxes paid, goods, homes, cars purchased, etc.) that are incremental and over and above what are produced by contracting with large businesses.
- 2.3 The Program shall be administered in a streamlined and cost effective manner by the Port's SBE Administrator, operating under the appropriate bureau managing director, division director, and section manager.
- 2.4 For the Finance & Administration and Trade Relations & Port Operations bureaus, VSBE participation will not be tracked separately from SBE participation, due to the large number of small contracts and the administrative costs of tracking SBEs and VSBEs separately.

3.0 Program Structure

The Program was established by an ordinance (HD-1923) adopted on October 11, 2004 by the Board of Harbor Commissioners, and became effective on November 11, 2004. It has since been amended twice: first by amendment (HD-1949), adopted on September 6, 2005, which became effective on October 7, 2005; second by amendment (HD-2004), adopted on January 7, 2008, which became effective February 7, 2008; and third by amendment (HD-2149), adopted on April 1, 2013, which became effective on May 2, 2013.

4.0 Definitions

- 4.1 **Contractor** - an individual, partnership, corporation or other legal entity that is submitting a bid to perform construction related work. A contractor must have a valid State of California Contractor's License to the extent required by law.
- 4.2 **Consultant** - an individual, partnership, corporation or other legal entity that is submitting a proposal to perform professional services in connection with a project.

EXHIBIT A

- 4.3 **Department of General Services (DGS)** – serves as the business manager for the State of California.
- 4.4 **Good Faith Effort (GFE)** – a prescribed set of actions conducted by bidders to identify SBEs/VSBEs in their attempt to meet the established SBE/VSBE goals for a specific construction bid. See section 10.0 Bidder Compliance with Good Faith Effort Evaluation Criteria.
- 4.5 **National Institute of Governmental Purchasing (NIGP)** – a professional association for public procurement that seeks to develop, support and promote the public procurement profession through educational and research programs, professional support, technical services and advocacy initiatives that benefit members and constituents.
- 4.6 **NIGP Codes** – standardized commodity/service codes developed by the NIGP.
- 4.7 **North American Industrial Classification System (NAICS)** - classifies business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. economy. The NAICS industry codes define establishments based on the activities in which they are primarily engaged.
- 4.8 **NAICS Codes** – used as the certification codes for Small Business Certifications.
- 4.9 **Responsive Construction Bidder** - a bidder whose bid is deemed to have met the submittal requirements by the preliminary bid analysis.
- 4.10 **Small Business Enterprise (SBE)** - eligibility may be determined by either utilizing federal U.S. Small Business Administration (SBA) size standards which are matched to the NAICS codes, or by the SBE standards set by the DGS.
- 4.11 **Subcontractor** - an individual, firm, or entity having a direct contract with the prime contractor or with any other subcontractor to perform a portion of the subject contract. A subcontractor must have a valid State of California Contractor's License to the extent required by law.
- 4.12 **Vendor/Supplier** - an individual, firm or entity providing materials or supplies directly to the subject contract. For a prime contractor to receive participation credit for utilizing an SBE/VSBE vendor or supplier under the Port's SBE/VSBE Program, the materials/supplies must be directly applicable to the subject contract or Port facility.
- 4.13 **Very Small Business Enterprise (VSBE)** - eligibility is determined utilizing maximum allowable annual gross revenues or number of employees (for manufacturers only) consistent with the DGS "micro-business" designation.

5.0 Program Applicability to Construction Bids, Professional Services Proposals and Procurement Activities

- 5.1 {Construction Bids Only}
 - 5.1.1 Non-SBE prime contractors shall meet the combined SBE/VSBE participation goal, or document and submit an acceptable GFE, for their bid to be deemed responsive.
 - 5.1.2 SBE prime contractors, certified through the Port's online SBE/VSBE database and/or the DGS database and verified by the Port, are deemed to

EXHIBIT A

have met the SBE component of the combined SBE/VSBE participation goal, but shall still need to meet the VSBE component of the goal, or document and submit an acceptable GFE, for their bid to be deemed responsive.

- 5.2 {Professional Services Only} Non-SBE and SBE prime consultants' intent to meet the combined SBE/VSBE participation goal shall be rated using the selection criteria assigned to that specific professional services solicitation. SBE primes certified through the Port's online SBE/VSBE database and/or the DGS database and verified by the Port, are deemed to have met the SBE component of the combined SBE/VSBE participation goal, but shall still need to meet the VSBE component of the goal.
- 5.3 Port-certified SBE prime contractors/consultants who also qualify as a Very Small Business Enterprise (VSBE) based upon the SBE Administrator's review of qualifying information are deemed to have met both components of the combined SBE/VSBE participation goal.
- 5.4 The Port encourages all prime contractors/consultants to utilize small business subcontractors and subconsultants, whether at a first tier or lower tier sub level, as well as vendors and suppliers. Lower tier subs, vendors and suppliers must provide services/materials directly related to the project or they will not qualify to meet the goal.
- 5.5 Notwithstanding anything to the contrary herein, if the notice inviting bids imposes a mandatory SBE/VSBE participation goal, then GFE procedures (including but not limited to those found in Sections 8.2 through 8.8 and Section 10) are not available to a bidder and no GFE documentation will be evaluated or considered by the Port. A bidder who fails to meet mandatory SBE/VSBE participation goals will be deemed non-responsive and no contract will be awarded to that bidder. If the next lowest responsive and responsible bidder meets the SBE/VSBE participation goals, it may be awarded the contract.

6.0 Annual SBE/VSBE Goal, Individual Contract Goals, Division Goals

- 6.1 Annual Port-wide SBE/VSBE goals shall be recommended by staff, and shall be approved by the Board.
- 6.2 SBE and VSBE participation goals for each contract will be established with the intent that the total participation for all Port contracts awarded in a fiscal year would meet the Port's annual SBE/VSBE goals. The Manager for each contract will determine individual contract participation goals after consultation with the SBE Administrator. Goals may be either mandatory, aspirational, or eliminated from a contract at the discretion of the Port. Goals may vary with the number of qualified SBE/VSBE firms available to provide the required services. If the dollar value of the work elements of a contract that can be performed by SBEs and/or VSBEs is high, the contract will have a higher SBE and/or VSBE participation goal than one where only a small portion of the work could be performed by SBEs or VSBEs.
- 6.3 The following is a method for determining SBE/VSBE contract goals. Starting with a detailed cost estimate or scope of work for each potential contract, the contract owner will identify the types and amounts of work to be performed in the contract using NAICS and/or NIGP codes. The SBE Administrator will research government and Port databases and locate potential small businesses for each work discipline. The goals are then established based on two primary factors: 1) the number of SBEs/VSBEs

EXHIBIT A

available to perform a work discipline; and 2) the amount of work in the contract scope that the discipline represents. Additionally, past performance of similar contracts and other pertinent practices may also be used to establish the goals.

- 6.4 For Port contracts that do not have an assigned contract-specific SBE/VSBE goal, every effort should be made to award the work to a small business.
- 6.5 Certain categories of work are exempted from the Program requirements for compelling reasons after consultation with the SBE Administrator and approval by the appropriate division director.

7.0 Port's SBE/VSBE Database: Vendor Registration and SBE Certification

- 7.1 All firms (large and small) wishing to do business with the Port are strongly encouraged to register with the Port's online database. Vendor registration is relatively simple and quick. A link to vendor registration is provided from the SBE/VSBE Program page of the Port's website.
- 7.2 All SBE/VSBE firms listed on a Port contract (prime contractor/consultant, subcontractors/subconsultants, vendors and suppliers) are required to register with, and obtain SBE certification through either the Port's online vendor database and/or the DGS database, in order to receive credit toward the established SBE/VSBE goal for that contract.
- 7.3 For the prime contractor/consultant to receive credit for a small business as part of the prime's commitment to meeting the established SBE/VSBE goal for a contract, the SBE must be certified by the due date of the prime's SBE/VSBE Commitment Plan (POLB Form SBE-2C or SBE-2P).
- 7.4 To garner VSBE status, the small business must check the "VSBE" box in its Port database account or possess the DGS Micro-Business certification in its DGS account. Separate VSBE certifications will not be issued. The Port will determine VSBE eligibility at the time of review of the prime contractor's/consultant's SBE/VSBE Commitment Plan.
- 7.5 Prior to contract award, SBE and VSBE status shall be verified and may be audited by the Port.

8.0 {Construction Contracts} Bidders' Commitment to Meeting the Established SBE/VSBE Participation Goals

- 8.1 The three lowest responsive bidders shall submit a completed POLB Form SBE-2C: SBE/VSBE Commitment Plan for Construction Contracts, indicating the dollar value and percentage of SBE/VSBE contract participation, before the bid deadline as part of the bid.
- 8.2 If any of the three lowest bidders deemed responsive by the preliminary bid analysis does not submit its completed POLB Form SBE-2C before the bid deadline, it will then be deemed non-responsive and any GFE documentation submitted shall NOT be evaluated by the Port.

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- 8.3 If any of the completed POLB Form SBE-2Cs submitted by the three lowest responsive bidders does not meet the SBE/VSBE participation goal, that bidder(s) shall submit its GFE documentation no later than 4:00 p.m. on the third business day following bid opening.
- 8.4 The bidder must achieve a minimum score of 70 out of a possible 100 points in order for its GFE to be deemed acceptable.
- 8.5 A bidder that does not meet the SBE/VSBE participation goals and does not submit its GFE documentation or submits the GFE documentation that does not achieve the minimum passing score is declared non-responsive and may forfeit its bidder's bond.
- 8.6 If all three lowest bidders are declared non-responsive, the fourth-lowest bidder shall submit its POLB Form SBE-2C within 48 hours of written request by the Port. The bidder's POLB Form SBE-2C will be evaluated by the SBE Administrator. If the bidder does not meet the combined SBE/VSBE participation goal established for that contract, the bidder shall submit its GFE documentation within 48 hours of request by the Port.
- 8.7 Within three business days of being informed by the Port that a bidder is non-responsive because it has failed to meet the SBE/VSBE participation goal and has not documented an acceptable GFE, the bidder may request administrative reconsideration. The bidder shall make this request in writing to the appropriate Managing Director who will serve as the SBE Reconsideration Official. The SBE Reconsideration Official will not be involved in the initial evaluation of the bidder's GFE. Contractors shall forfeit their right for reconsideration if they fail to act within three business days.
- 8.8 The reconsideration process provides an opportunity for the affected bidder to meet with the SBE Reconsideration Official to discuss the basis of the Port's determination of non-responsiveness. The SBE Reconsideration Official will send the affected bidder a written decision on reconsideration, via certified mail, explaining the basis for finding that the bidder did or did not meet the participation goal or demonstrate an acceptable GFE. Any appeal of the SBE Reconsideration Official's decision must be made to the Board of Harbor Commissioners in writing, and must be submitted within three business days after receiving the SBE Reconsideration Official's decision.

9.0 {Professional Services} Proposers' Commitment to Meeting the Established SBE/VSBE Participation Goals

- 9.1 Where an SBE/VSBE participation goal has been established, proposers shall submit a completed POLB Form SBE-2P: SBE/VSBE Commitment Plan for Professional Services Contracts with their proposal or Statement of Qualifications (SOQ) indicating the estimated percentage of SBE/VSBE participation and dollar value (when applicable). The submittal will be used to demonstrate the proposer's ability or intent to meet the SBE/VSBE participation goals.
- 9.2 The level of SBE/VSBE commitment achieved is one of the selection criterion used during the evaluation process.
- 9.3 If any of the proposers does NOT submit a completed POLB Form SBE-2P, that proposer will receive 0 points on the SBE/VSBE selection criteria.

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- 9.4 After negotiations have been completed and the Consultant contract is executed, achieving the SBE/VSBE goal is a contractual commitment and can only be altered with written approval of the appropriate Port division director for unusual circumstances such as a change in scope of services.

10.0 Bidder Compliance with Good Faith Effort Evaluation Criteria

A bidder whose bid fails to meet the SBE/VSBE participation goal shall be deemed responsive if an acceptable Good Faith Effort (GFE) is demonstrated. There are 9 criteria varying in value from 5-15 points that will be used to evaluate a bidder's GFE. The bidder must achieve a score of 70 out of a possible 100 points in order for the SBE Administrator to determine that the bidder has made an acceptable GFE. The following are the criteria and the assigned number of points that will be used to evaluate the GFE:

- 10.1 **Attend Pre-Bid Meeting (5 points):** The bidder submitted written evidence that he/she attended the pre-bid meeting.
- 10.2 **Subdivide the Work (10 points):** The bidder defined the portion of work to be subcontracted that is equal to or greater than the established SBE/VSBE goal based on its bid value. The bidder has identified the services (work category) intended to be performed by its own workforces and those services identified to be subcontracted/supplied. It shall be identified in any combination of NAICS and/or NIGP codes with dollar values of each item also identified and totaling an amount that equals or exceeds the established SBE/VSBE goal. Evidence demonstrating the effort exerted by the bidder is provided.
- 10.3 **Advertise (10 points):** The Bidder submitted written evidence of commercial advertising for SBE/VSBE contractors at least 14 calendar days prior to the bid deadline. The advertisement shall identify the project and list the services identified as potential SBE/VSBE work in Criteria #10.2. Proof of advertising shall include the name of the advertiser(s); a copy of the advertisement(s) showing the date(s) published; and an affidavit from advertiser(s) attesting to the placement of the advertisement(s).
- 10.4 **Use of the Port's and State's vendor Databases (15 points):** The bidder submitted written evidence of using the Port's and/or the State of California Department of General Services' (DGS) respective online vendor databases.
- 10.5 **Directly Solicit Small Businesses (15 points):** The bidder submitted written evidence of directly soliciting an adequate number of SBE/VSBE contractors and material suppliers certified in the Port's and/or the DGS vendor database(s) at least 14 calendar days prior to the bid opening. The evidence shall contain names, contact persons, addresses, phone numbers and dates of all SBE/VSBE firms contacted; requirements of the contract; and how to obtain plans and specifications.

An adequate number of SBE/VSBE contractors to contact in each work category, as explained in Item #10.2, depends on the total number of contractors certified in the database within that category. If the database contains 5 or less contractors, then the bidder shall contact all of them. If the database contains 6-10 contractors, the bidder shall contact at least 5. If the database contains 11-50 contractors, the bidder shall contact at least 50%. If the database contains 51 or more contractors, the bidder shall contact at least 25.

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- 10.6 **Conduct Follow-Up (15 points):** The bidder submitted written evidence of specific activities (oral and written) used to follow up initial solicitations in preparing the bid. Bidder will submit a contact log with names, contact persons, phone numbers, dates and methods used for follow up. The follow up log should contain a minimum of 75% of the initial solicitations.
- 10.7 **Offer Assistance (5 points):** The bidder demonstrated that he/she has offered to assist SBEs/VSBEs in obtaining bonding, insurance, lines of credit, equipment or other means of support.
- 10.8 **Negotiate and Document Bid Results (15 points):** The bidder submitted written evidence that it has negotiated in good faith with interested SBEs/VSBEs. Negotiations include discussions regarding scope of work, materials, equipment, insurance, bonding, personnel, timing of project, etc. For any negotiations that were unsuccessful, the bidder submitted the unsuccessful bidder's company name, telephone number, contact person, price bid (if applicable) and the reason for rejecting the bid. The Port reserves the right to require the bidder to submit copies of all SBE and non-SBE bids for each item of work before finalizing the score for this criterion.
- 10.9 **Bidder Commitment Value (10 points):** The bidder's SBE/VSBE Commitment percentage must be equal to, or exceed the average SBE/VSBE Commitment percentage of the other two low bidders.

11.0 Utilization/Substitution of SBEs/VSBEs on Construction Contracts

- 11.1 During the term of the contract, the prime Contractor shall be required to utilize all Subcontractors (as defined in Section 4.0 of this document) listed on its SBEs/VSBEs Commitment Plan (POLB Form SBE-2C), in the amount and percentage specified on the form. Any SBE/VSBE subcontractor substitution will require prior written approval by the appropriate Port division director, and must meet all State laws and statutes.
- 11.2 All Subcontractors listed on POLB Form SBE-2C, whose defined work is greater than ½ of one percent of the prime contract value, must be listed on the bidder's list of Subcontractors submitted with the bid documents. If an SBE/VSBE Subcontractor is added after submittal of the bidder's list of Subcontractors, the bidder shall follow Subcontractor listing/substitution procedures pursuant to Section 4107 et seq. of the California Public Contract Code.
- 11.3 If a prime Contractor substitutes an SBE/VSBE vendor/supplier, the Contractor shall provide proof, to the satisfaction of the appropriate Port division director, that a reasonable effort was made to replace that vendor's/supplier's participation percentage with another SBE/VSBE firm, to maintain the combined SBE/VSBE participation percentage specified on the Contractor's POLB Form SBE-2C. At project close-out, if the prime Contractor fails to meet the combined SBE/VSBE participation percentage specified on its POLB Form SBE-2C, or fails to provide proof that it made a good faith effort to do so, the Contractor may be considered to be in material breach of contract (refer to Section 15.0).

12.0 Utilization/Substitution of SBEs/VSBEs on Professional Services Contracts

- 12.1 During the term of the contract, the prime Consultant shall be required to utilize all subconsultants listed on its SBE/VSBE Commitment Plan (POLB Form SBE-2P), unless the Port approves a change in scope of work that would eliminate or reduce the

EXHIBIT A

utilization of an SBE or VSBE subconsultant. Any SBE/VSBE subconsultant substitutions require prior written approval by the appropriate Port division director.

- 12.2 If a prime Consultant substitutes an SBE/VSBE vendor/supplier, the Consultant shall provide proof, to the satisfaction of the appropriate Port division director, that a reasonable effort was made to replace that vendor's/supplier's participation percentage with another SBE/VSBE firm, to maintain the combined SBE/VSBE participation percentage specified on the Consultant's POLB Form SBE-2P.

13.0 Contract Amendments

If the Port approves a change order or contract amendment, the SBE/VSBE participation goals may, at the sole discretion of the appropriate Port division director, apply to the change order or contract amendment. If the additional work includes scope that was initially assigned to SBEs/VSBEs, then those SBEs/VSBEs should receive a proportional amount of the added work.

14.0 Contract Compliance

- 14.1 The prime Contractor/Consultant shall report the dollar value of payments to small businesses on a monthly basis and at project close-out. This data will be verified. Construction contractors shall submit a completed SBE/ VSBE Monthly Utilization Report for Construction Contracts (POLB Form SBE-3C), and consultants shall submit a completed SBE/VSBE Monthly Utilization Report for Professional Services Contracts (POLB Form SBE-3P).
- 14.2 If an SBE or VSBE firm listed on a prime Contractor's/Consultant's POLB Form SBE-2C or SBE-2P loses its SBE or VSBE status prior to contract award, the firm will not receive SBE/VSBE status for that Port contract unless:
- The firm becomes eligible for recertification and is recertified;
 - If the firm is not eligible for recertification, the Contractor/Consultant shall replace the affected SBE/VSBE dollar amount/percentage and shall submit for approval, a revised POLB Form SBE-2C or SBE-2P, in order to proceed with contract award.
- 14.3 If a firm's SBE or VSBE status changes during the term of a contract, work performed on that contract after the firm loses its certification will continue to be credited toward meeting the SBE or VSBE participation goal. However, the firm will not be able to receive SBE/VSBE status on subsequent Port projects unless the firm is subsequently re-certified as an SBE or VSBE.
- 14.4 Substitution of any SBE or VSBE subcontractor/subconsultant listed on a prime Contractor's/Consultant's SBE/VSBE Commitment Plan must be approved by the appropriate Port division director.
- 14.5 {For Construction Contracts only} Nothing herein shall be construed to supersede or limit the requirements for contractor substitutions provided in Section 4100 et seq. of the California Public Contract Code.
- 14.6 The Construction Manager, Program Manager, SBE Administrator, or their designee may conduct site visits and subcontractor/subconsultant/vendor/supplier interviews and

EXHIBIT A

telephone calls to verify proper and full utilization of SBEs and VSBEs to meet contract requirements. Prime contractors/consultants and SBEs/VSBEs shall fully cooperate with such monitoring.

15.0 Contract Non-Compliance

- 15.1 The Prime Contractor/Consultant may be considered in material breach of contract for any one or more of the following violations:
 - 15.1.1 Failure to submit, in a timely manner, an SBE/VSBE Monthly Utilization Report (POLB Form SBE-3C or SBE-3P);
 - 15.1.2 Failure to correct discrepancies found on POLB Form SBE-3C or SBE-3P;
 - 15.1.3 Falsifying or misrepresenting any information provided to the Port, including information provided on the Port's online SBE/VSBE database;
 - 15.1.4 Substituting an SBE/VSBE subcontractor/subconsultant without prior written Port approval; and/or
 - 15.1.5 Failure to meet the committed SBE/VSBE participation percentages as listed on the POLB Form SBE-3C or SBE-3P.
- 15.2 In addition to any other remedy the Port may have under the Contract or by operation of law, the Port, in its sole discretion, may impose any or all of the following provisions against a Contractor/Consultant determined to be in breach of contract:
 - 15.2.1 Assess the cost of the Port's audit of the books and records of the Contractor/Consultant, subcontractors/subconsultants, and all other firms claiming SBE or VSBE status, where such audit is necessary because the Contractor has failed to timely submit a required SBE or VSBE program report;
 - 15.2.2 Withhold payment up to 10 percent of a monthly progress payment until the Contractor/Consultant is brought into compliance.
- 15.3 Within three business days of written notification of the intent to enforce any of the measures described above, the Contractor/Consultant may submit in writing, a request for an administrative hearing conducted by the Port's SBE Reconsideration Official. The decision of the Reconsideration Official may be appealed to the Board of Harbor Commissioners in a similar manner to the process for evaluation of the Good Faith Effort of the Bidder (Section 10.0).

16.0 Small Business Facilitation

- 16.1 To the extent practicable, the Port will endeavor to disassemble larger construction and procurement projects into contract sizes corresponding to prevailing bonding limits for heavy construction SBE contractors so they can bid as primes.
- 16.2 The Port will conduct pre-bid meetings for individual construction projects between advertisements and bid openings. These will provide opportunities to raise questions about the SBE/VSBE Program, plans and specifications, and will also provide an opportunity for primes, subcontractors, vendors and suppliers to meet.

EXHIBIT A

- 16.3 The Port will conduct training forums for businesses interested in providing contracting and/or consulting services to the Port.
- 16.4 The Port will cooperate with other agencies in providing SBE/VSBE contractor and consultant training.
- 16.5 The Port will provide referral information to SBE/VSBE contractors and consultants on available loan, insurance, and bonding programs that could assist small businesses.
- 16.6 The Port will coordinate outreach activities with the appropriate divisions of the City of Long Beach.
- 16.7 The Port will participate in business and vendor fairs directed at local and small businesses.

17.0 Periodic Review

- 17.1 Port staff will seek periodic comments from Port contractors, consultants, and small businesses on the effectiveness of the SBE/VSBE Program.
- 17.2 After each fiscal year, Port staff shall report to the Board of Harbor Commissioners on the effectiveness and progress of the Program. The report shall include information on contracts issued in the preceding twelve months and payments to all SBE and VSBE contractors, consultants, vendors and suppliers.

APPENDIX F

POLB UNIFIER NEW USER REQUEST FORM



Unifier New User Request Form

Please review and fill out the attached form and return to your POLB supervisor for review. Upon approval you will be assigned a User Name, Password and appropriate access rights for Unifier. When your account is activated you will be notified via e-mail so please include a valid e-mail address.

If you have any questions or concerns regarding these items please contact the Information Management Service Desk (imservicedesk@polb.com 562-283-7411).



User Information

Last Name: (Required) First Name: (Required) MI:

Company Name: (Required)

Company Address:

City: State: Zip:

Work Phone #: Fax #:

Mobile Phone #:

E-Mail: (Required)

Position: (Required)

POLB Supervisor Signature: (Required)

Project(s): (Please list the project(s) for which you will need access to by Specification Number)

Administrative Use Only

Unifier User ID:

CM Password:

Added By:

Date Added:

Projects Accessible:

Access Type:

Project Duration:

Access Status:

Notes:

APPENDIX G

ESCROW AGREEMENT FOR SECURITY DEPOSIT

IN LIEU OF RETENTION

OFFICE OF THE CITY ATTORNEY
DAWN MCINTOSH, City Attorney
411 West Ocean Boulevard, 9th Floor
Long Beach, CA 90802-4664

For the consideration hereinafter set forth, the OWNER, CONTRACTOR,
and ESCROW AGENT agree as follows:

2. OWNER shall make progress payments to CONTRACTOR for the funds which otherwise would be withheld from progress payments pursuant to the

1 Contract provisions, provided that ESCROW AGENT holds securities in the form and
2 amount specified above.

3 3. When OWNER makes payment of retentions earned directly to
4 ESCROW AGENT, ESCROW AGENT shall hold them for the benefit of CONTRACTOR
5 until the time that the escrow created under this Agreement is terminated.
6 CONTRACTOR may direct the investment of the payments into securities. All terms and
7 conditions of this Agreement and the rights and responsibilities of the parties shall be
8 equally applicable and binding when OWNER pays ESCROW AGENT directly.

9 4. CONTRACTOR shall be responsible for paying all fees for the
10 expenses incurred by ESCROW AGENT in administering the escrow account and all
11 expenses of OWNER. These expenses and payment terms shall be determined by
12 OWNER, CONTRACTOR and ESCROW AGENT.

13 5. The interest earned on the securities or the money market accounts
14 held in escrow and all interest earned on that interest shall be for the sole account of
15 CONTRACTOR and shall be subject to withdrawal by CONTRACTOR at any time and
16 from time to time without notice to OWNER.

17 6. CONTRACTOR shall have the right to withdraw all or any part of the
18 principal in the escrow account only by written notice to ESCROW AGENT accompanied
19 by written authorization from OWNER to ESCROW AGENT that OWNER consents to the
20 withdrawal of the amount sought to be withdrawn by CONTRACTOR.

21 7. OWNER shall have a right to draw upon the securities in the event of
22 default by CONTRACTOR. Upon seven (7) days' written notice to ESCROW AGENT
23 from OWNER of the default, ESCROW AGENT shall immediately convert the securities
24 to cash and shall distribute the cash as instructed by OWNER.

25 8. Upon receipt of written notification from OWNER certifying that the
26 Contract is final and complete, and that CONTRACTOR has complied with all
27 requirements and procedures applicable to the Contract, ESCROW AGENT shall release
28 to CONTRACTOR all securities and interest on deposit, less escrow fees and charges of

the escrow account. The escrow shall be closed immediately upon disbursement of all moneys and securities on deposit and payment of all fees and charges.

9. ESCROW AGENT shall rely on the written notifications from OWNER and CONTRACTOR pursuant to paragraphs 6 through 8, inclusive, of this Agreement and OWNER and CONTRACTOR shall hold ESCROW AGENT harmless from ESCROW AGENT'S release and disbursement of the securities and interest as set forth above.

10. The name of the persons who are authorized to give written notice or to receive written notice on behalf of OWNER and on behalf of CONTRACTOR in connection with the foregoing, and exemplars of their respective signatures are as follows:

ON BEHALF OF OWNER:

Darrin Lambrigger
Director of Construction Management
Port of Long Beach
P.O. Box 570
Long Beach, California 90801

Laura L. Doud
City Auditor
411 West Ocean Boulevard,
8th Floor
Long Beach, California 90802

SIGNATURE

SIGNATURE

ON BEHALF OF CONTRACTOR:

Title _____
Name _____
Address _____

ON BEHALF OF ESCROW AGENT:

Title _____
Name _____
Address _____

SIGNATURE

SIGNATURE

At the time the Escrow Account is opened, OWNER and CONTRACTOR shall deliver to ESCROW AGENT a fully executed counterpart of this Agreement.

///

OFFICE OF THE CITY ATTORNEY
DAWN MCINTOSH, City Attorney
411 West Ocean Boulevard, 9th Floor
Long Beach, CA 90802-4664

IN WITNESS WHEREOF, the parties have executed this Agreement by
their proper officers on the dates set forth opposite their signatures.

[_____]

_____, 20__

By: _____
Name: _____
Title: _____

ESCROW AGENT

[_____]

_____, 20__

By: _____
Name: _____
Title: _____

CONTRACTOR

CITY OF LONG BEACH, a municipal
corporation, acting by and through its
Board of Harbor Commissioners

_____, 20__

By: _____

Mario Cordero
Executive Director
Long Beach Harbor Department

OWNER

The foregoing document is hereby approved as to form.

DAWN MCINTOSH, City Attorney

_____, 20__

By: _____

Principal Deputy/Deputy

CMG:WRB:LEM:DAM:DRA [date] # (A10-01604 rev 02/11/21)
S:\HARBOR\CURRENT\CONSTRUCTION\ESCROW AGREEMENT 021121.doc

APPENDIX H

CONSTRUCTION ADMINISTRATION FORMS

Appendix H2 CHANGE ORDER FORM

Date

DUPLICATE ORIGINAL

Contractor

Address

Attention: Project Manager

Subject: Project Description
Specification HD-Sxxxx, Contract HD-xxx, CWO HAxxxx

Change Order No. xx

When approved by the Chief Executive Officer, and in accordance with Section 7 of the General Conditions, you are hereby directed to make the herein described changes from the plans and specifications. The following change is hereby made a part of the Contract Documents enumerated in the Agreement between City and Contractor on the date referenced above and shall be performed under the same terms and conditions as required by the original Contract Documents. Except as modified herein, the original Contract Documents and all prior amendments shall remain in full force and effect and all of the terms of the Contract Documents are hereby incorporated in this Change Order.

Descriptions of work to be done, estimates of quantities, prices to be paid, and time extensions:

Item No.1: CO-xx:COR-xx:CPCO-xx (Item Description):

In accordance with RFI/OIC/COR/CPCO No. xx, provide labor, equipment, materials, and incidentals to -----
----- . Net Addition, Lump Sum

\$0.00

Item No.2: CO-xx:COR-xx:CPCO-xx (Item Description):

As directed by the Engineer, provide labor, equipment, materials, and incidentals to -----.

Estimated Addition

\$0.00

<u>Item No.3:</u>	<u>CO-xx:COR-xx:CPCO-xx (Item Description):</u> Adjust previously issued Change Order No. x, Item x, (Item Description), in the amount of x to reflect the actual amount expended. The final agreed amount is x. This results in a credit/addition in the amount of x. Cost Plus Markup, Final Amount	\$0.00
<u>Item No.4:</u>	<u>CO-xx:Bid Item No. xx (Item Description):</u> Adjust Bid Item No. x "Item Description" in the amount of x to reflect the final amount. The final agreed quantity of x (unit) at a bid unit price of \$ per (unit) is \$. This results in a credit/addition in the amount of \$x. Net Deduction/Addition, Unit Price	(\$0.00)
<u>Item No.5:</u>	<u>CO-xx:Bid Item No. xx (Item Description):</u> Adjust Bid Item No. x "Item Description" in the amount of x to reflect the final amount. The final agreed quantity of x (unit) at a bid unit price of \$ per (unit) is \$. This results in a credit in the amount of (\$x). Net Addition, Unit Price	\$0.00
<u>Item No.6:</u>	<u>CO-xx: TIA No. x/ (Item Description) Calendar Days Time Extension to Milestones x, y.:</u> This item provides a ### calendar time extension to Milestone(s) No(s). x, y. The revised completion dates for Mile stones x "(Milestone Description x)", y "(Milestone Description y)" are [Month Day, Year] and [Month Day, Year] respectively. [This item only addresses the time. Any associated costs, if any, with this time extension shall be addressed in a future change order.] Net Addition	\$0.00
<i>Total Addition</i>		\$0.00
<i>Total Deduction</i>		(\$0.00)
NET ADDITION/DEDUCTION.....		\$0.00

[Contract Milestone modification if applicable]

TIME EXTENSION SUMMARY

Milestone # and Description	Original Completion Date	Previous Time Extension (CD)	This Time Extension (CD)	New Completion Date

Regarding CPCO/COR/OIC No. x, x, and x

The above mentioned items are being completed on a "Cost plus Markup" basis pursuant to the provisions of Article 7 and 8 of the General Conditions with an estimated "not to exceed" amount in order to avoid or reduce any impacts to the project schedule. Contractor shall not exceed the estimated amount for individual items without prior written authorization from the Engineer. Additional time, if any, will be evaluated and determined upon completion of the subject work.

Regarding CPCO/COR/OIC No. x, x, and x

While the above mentioned items have been negotiated and a lump-sum cost has been agreed upon, their impact on schedule has not been fully evaluated. The potential schedule impact of this work will be evaluated and determined upon completion of the subject work.

Regarding CPCO/COR/OIC No. x, x, and x

This Change Order is in full compromise and settlement of all adjustments to Contract Time and Contract Price for Item Numbers x, x and x of this Change Order. By execution of this Change Order, Contractor agrees that the above price shall be considered full compensation for all obligations to the Contractor associated with this Change Order, and the City will not be liable for any claim of the Contractor for extra compensation resulting from performance of the requirements of this Change Order, in accordance with section GC-7.2.3.

The Contractor, on behalf of itself, all Subcontractors, and all Suppliers, expressly waives the benefits of the provisions of Section 1542 of the Civil Code, which reads as follows: "A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS WHICH THE CREDITOR DOES NOT KNOW OR SUSPECT TO EXIST IN HIS OR HER FAVOR AT THE TIME OF EXECUTING THE RELEASE, WHICH IF KNOWN BY HIM OR HER MUST HAVE MATERIALLY AFFECTED HIS OR HER SETTLEMENT WITH THE DEBTOR."

All terms and conditions of the Contract, except those modified herein, shall remain in full force and effect.

Project Name
Specification No. HD-Sxxxx, Contract No. HD-xxxx, CWO HAxxxx
Change Order No. xx
Date
Page 4 of 4

Contract Summary, Cost:

Original Contract Amount
Previous Change Orders
Previous Contract Amount
This Change Order
New Contract Amount

Contract Summary, Schedule:

Original Contract Completion Date xx/xx/20xx
(Milestone #__)
Previous Time Extension xx
This Time Extension xx
New Contract Completion Date xx/xx/20xx

CITY:

CONTRACTOR:

Reviewed and Recommended by:

Construction Manager _____

Accepted by: _____

Program Manager _____

Director of Construction Mgmt. _____

Date: _____

Senior Director, Program Delivery _____

Approved by: _____

Chief Executive Director

_____ Date

To Owner: The CITY OF LONG BEACH, a municipal corporation of the State of California and its Board of Harbor Commissioners

App. H Form H3 – Consent of Surety- 06062017

CAPACITY CLAIMED BY SIGNER(S).

- ☐ Individual(s)
- ☐ Corporate
- ☐ Officer(s)
- ☐ Partner(s) ☐ Limited
- ☐ ☐ General
- ☐ Attorney-In-Fact
- ☐ Trustee(s)
- ☐ Guardian/Conservator
- ☐ Other

[attach power of attorney]

Appendix H
Form H4

**CONDITIONAL WAIVER AND RELEASE ON PROGRESS PAYMENT
CIVIL CODE SECTION 8132**

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Identifying Information

Name of Claimant: _____
Name of Customer: _____
Job Location: _____
Owner: _____
Through Date: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: _____
Amount of Check: \$ _____
Check Payable to: _____

Exceptions

This document does not affect any of the following:

- (1) Retentions.
- (2) Extras for which the claimant has not received payment.
- (3) The following progress payments for which the claimant has previously given a conditional waiver and release but has not received payment:

Date(s) of waiver and release: _____

Amount(s) of unpaid progress payment(s): \$ _____

- (4) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Signature

Claimant's Signature: _____
Claimant's Title: _____
Date of Signature: _____

Appendix H
Form H4

**CONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT
CIVIL CODE SECTION 8136**

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Identifying Information

Name of Claimant: _____
Name of Customer: _____
Job Location: _____
Owner: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: _____
Amount of Check: \$ _____
Check Payable to: _____

Exceptions

This document does not affect any of the following:
Disputed claims for extras in the amount of: \$ _____

Signature

Claimant's Signature: _____
Claimant's Title: _____
Date of Signature: _____

Appendix H
Form H4

**UNCONDITIONAL WAIVER AND RELEASE ON PROGRESS PAYMENT
CIVIL CODE SECTION 8134**

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Identifying Information

Name of Claimant: _____
Name of Customer: _____
Job Location: _____
Owner: _____
Through Date: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has received the following progress payment: \$

Exceptions

This document does not affect any of the following:

- (1) Retentions.
- (2) Extras for which the claimant has not received payment.
- (3) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Signature

Claimant's Signature: _____
Claimant's Title: _____
Date of Signature: _____

Appendix H
Form H4

**UNCONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT
CIVIL CODE SECTION 8138**

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Identifying Information

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for all labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has been paid in full.

Exceptions

This document does not affect the following:

Disputed claims for extras in the amount of: \$ _____

Signature

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

Appendix H

FORM H5

AFFIDAVIT OF FINAL COMPLETION, RELEASE, AND CERTIFICATION FOR FINAL PAYMENT

To City:

From Contractor:

Project:

Contract No.:

Contract Execution Date:

I, _____, declare to the best of my knowledge and belief that:

1. I am the person and officer of _____

_____ (“Contractor”) as indicated on the execution line of this affidavit; I am duly authorized to make this affidavit and to execute and deliver the attached Application for Final Payment and I am familiar with the terms and conditions of the construction contract for the Project (“Contract”);

2. The Work of the Contract has been completed in strict accordance with the Contract Documents;

3. No lawful debts of Contractor for labor or materials or other claims are outstanding for the Work.

4. No Federal Excise Tax has been included in the Contract Price;

5. No additional compensation, over and above the amount set forth in the enclosed Application for Final Payment is due Contractor under the Contract for the Work and any changes in the Work;

6. Upon receipt of Final Payment in the amount of \$_____, Contractor, on behalf of itself and its Subcontractors and Material Suppliers acknowledges that City and any and all employees of City and its authorized representatives will thereby be released from any and all Claims or liability for additional

sums for Work or changes in the Work and Contractor encloses herewith an original duly executed and complete unconditional waiver and release upon final payment in accordance with California Civil Code Section 8138 from Contractor and from _____
_____;

OR

Upon receipt of final Payment in the amount of \$_____, Contractor, on behalf of itself and its Subcontractors and Material Suppliers acknowledges that City and any and all employees of City and its authorized representatives will thereby be released from any and all Claims or liability for additional sums for Work or changes in the Work except for those expressly set forth in the enclosed original duly executed and complete conditional waiver and release upon final payment in accordance with California Civil Code Section 8136 from Contractor and from_____;

7. Contractor has obtained release of all claims by Subcontractors, Material Suppliers and others against Contractor and the Project;

8. Contractor has no reason to believe that any third party has a valid claim against the Contractor, the Work, the Project or the City which has not been communicated in writing by the Contractor to City as of the date of this affidavit;

9. Any guarantees and warranties are in full force and effect;

10. I understand that this affidavit is made for the purpose of inducing City to consent to release of retention and to make Final Payment to Contractor and Owner will rely upon the accuracy of the matters stated in this affidavit.

I declare, under penalty of perjury of the laws of the State of California that the foregoing is true and correct.

Executed this _____ day of _____, 20__ at _____,
California.

(Signature)

(Name)

(Title)



Port of
LONG BEACH
The Green Port

APPENDIX H6

CONSTRUCTION MANAGEMENT DIVISION
4801 Airport Plaza Drive Long Beach, CA 90815-1263
Phone: 562-283-7200 **Fax:** 562-283-7201

**CONTRACTOR PROPOSED
CHANGE ORDER No.**
CPCO-00xx-Rxx

To: Contractor

Date: xx/xx/20xx

Title:

Project:

Specification: HD-S

Contract: HD-

CWO: HA

Reference: RFI No./OIC-xxx

DESCRIPTION

The Contractor shall provide all labor, equipment, material, supervision, and incidentals to -----
in accordance with the Engineer's response to RFI No./OIC-xxx (LS price or This work will be tracked on a cost
plus markup basis).

Item	Description	Quantity	Units	Unit Cost	Net Amount
			Cost Plus Markup or LS		

COMPENSATION

Cost Plus Markup or LS

Amount

TIME IMPACT

To be determined

Number of Days - Completion 0.0
Number of Days - Milestone 0.0
Milestone

DISCLOSURE

1. The Contractor shall not conduct work where the costs would exceed the amount authorized above.
2. Cost records shall be submitted at the end of each work shift.



Port of
LONG BEACH
The Green Port

APPENDIX H6

CONSTRUCTION MANAGEMENT DIVISION
4801 Airport Plaza Drive Long Beach, CA 90815-1263
Phone: 562-283-7200 **Fax:** 562-283-7201

**CONTRACTOR PROPOSED
CHANGE ORDER No.**
CPCO-00xx-Rxx

SIGNATURES

Issued by: _____ **Date:** _____
Construction Manager

Authorized by: _____ **Date:** _____
Deputy Chief Harbor Engineer

Approved By: _____ **Date:** _____
Director of Construction Management

Accepted By: _____ **Date:** _____
Project Manager Contractor

CPCO FORM

APPENDIX M

SITE SPECIFIC SAFETY PLAN (SSSP)

Appendix M
Site Specific Safety Plan (SSSP)

SECTION 1 – GENERAL INFORMATION		
Specification Number (HD-SXXXX):	Date Prepared:	
Port Construction Manager:	Phone:	Cell:
Port Job Site Contact:	Phone:	Cell:
Worksite Location:		
Brief Job Description:		
Expected Duration of Job:		
Primary Contractors Name:		
Contractor Foreman:	Phone:	Cell:
Contractor Safety Representative:	Phone:	Cell:
Subcontractor(s) Name: 1. 2. 3. 4. 5.	Subcontractor(s) Trade: 1. 2. 3. 4. 5.	
Are all anticipated subcontractors listed above? <input type="checkbox"/> Yes <input type="checkbox"/> No If no, please submit an updated SSSP when additional subcontractors are employed and at appropriate times to reflect changes on the project (i.e., the site, the work, the means, methods, techniques, sequences, and procedures).		
SECTION 2 – SITE EMERGENCY PROCEDURES		
First Aid/Minor Treatment Facility:	Contact:	Phone:
Emergency Medical Treatment Facility (Local Hospital):	Contact:	Phone:
Emergency Transportation Provider (Attach driving route to this plan):		Phone:
Medical Plan Provider:	Contact:	Phone:
Incident Reporting & Investigation Process (Describe requirements, responsibilities and process.):		
How will you handle medical emergencies (Describe the procedure and responsibilities for employees and supervisors, including names and contact numbers. The Port Site Contact shall also be notified):		
Describe any other site-specific emergency procedures:		

SECTION 3 – JOB SCOPE OVERVIEW (Describe the major elements or phases of the project or job.)		
Phase	Company Performing Task	Activity
Example:		
1	Simple Roofs	1. Remove existing floating roof seals. 2. Demo existing floating roof. 3. Remove existing steam coils and floating roof drain system and stage for re-installation.
SECTION 4 – HAZARD COMMUNICATION		
Chemicals brought on site: (By generic name) 1. 2. 3. 4. 5. 6. 7.		Special PPE or handling requirements: (List for each chemical) 1. 2. 3. 4. 5. 6. 7.
Are SDS's supplied for each chemical brought on site? (Attach SDSs to this plan)		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA

SECTION 5 – SPECIAL EQUIPMENT/CONDITIONS/ACTIVITIES APPLICABLE TO THE JOB (check all that apply and submit the additional required information)		
Equipment/Condition/Activity	Additional items to include in your Submittal	List the names of contractors/subcontractors that will perform this activity
<input type="checkbox"/> Working on/operating a boat	Include a Job Hazard Assessment (JHA) for this activity.	
<input type="checkbox"/> Working over/adjacent to water where falls into water are possible	Include a Job Hazard Assessment (JHA) for this activity.	
<input type="checkbox"/> Confined Space Entry	1. Confined Space Written Program 2. Site specific confined space procedures including: <ul style="list-style-type: none"> ✓ A description of the types of confined spaces that will be entered, ✓ Air monitoring devices and air monitoring procedure, ✓ Ventilation procedure, ✓ Confined space personnel and their roles/responsibilities, ✓ Emergency rescue procedures and equipment that will be used, ✓ Method entrants and attendants will use to communication with each other, ✓ Training records, including the competent person training records, and ✓ First aid/CPR training records for the attendant(s). 	
<input type="checkbox"/> Working 6 feet or greater above the ground	1. Fall Protection Written Program 2. Site specific fall protection procedures including: <ul style="list-style-type: none"> ✓ Description and location of fall hazards including work performed, ✓ Method used to protect personnel, ✓ Type of equipment and tools utilized, including handling, storage, and securing, ✓ Method of prompt rescue, ✓ Method of communication, and ✓ Training records, including the competent person training records. 	
<input type="checkbox"/> Operations or activities where crystalline silica exposure may occur	Submit a Silica Exposure Control Plan with the following information: <ul style="list-style-type: none"> ✓ Description of the crystalline silica containing material, locations, and estimated volume, ✓ Exposure control methods, ✓ Worksite control methods, ✓ Exposure monitoring methods, ✓ Respiratory written program (if applicable), ✓ Medical surveillance records (if applicable), and ✓ Training records. 	
<input type="checkbox"/> Welding, grinding and other hot work	Include a Job Hazard Assessment (JHA) for this activity.	
<input type="checkbox"/> Excavating in contaminated soil or potentially contaminated soil	Follow the submittal instruction contained in Section 2300 Earthwork.	

<input type="checkbox"/> Pipe jacking and boring 30" diameter or larger	<ol style="list-style-type: none"> 1. Include a Job Hazard Assessment (JHA) for this activity. 2. Emergency Plan in accordance with the tunneling safety orders. 3. First aid/CPR training records. 4. Certified safety representative record. 5. Certified Gas Tester record. 	
<input type="checkbox"/> Use of scaffolding (rolling, suspended, fixed, etc.)	<ol style="list-style-type: none"> 1. Scaffold training records, including the competent person training records. 2. Include a Job Hazard Assessment (JHA) for this activity. 	
<input type="checkbox"/> Abating lead/asbestos/PCB's or other hazardous building materials	<ol style="list-style-type: none"> 1. Lead/Asbestos/PCB's or other hazardous materials written safety program. 2. Project specific abatement procedures including: <ul style="list-style-type: none"> ✓ A description of the hazardous material to be removed, including quantity and locations, ✓ The emission mitigation plan, ✓ A list of employees involved in the abatement activities, ✓ A description of decontamination areas and procedures, ✓ The sequencing of work, ✓ A description of how the worksite will be controlled, ✓ The control measures used to protect abatement personnel, ✓ The air monitoring procedures, ✓ A description of waste removal and accumulation procedures, ✓ The training records for abatement personnel, and ✓ Medical surveillance documentation including respiratory fit testing records. 	
<input type="checkbox"/> Setting up traffic control systems and use of flaggers	<ol style="list-style-type: none"> 1. Include a Job Hazard Assessment (JHA) for this activity. 2. Traffic control/flagger training records. 	
<input type="checkbox"/> Trenching/Excavation 5 feet or greater in depth	<ol style="list-style-type: none"> 1. Excavation/Trench Written Program 2. Site specific trenching/excavation procedure including: <ul style="list-style-type: none"> ✓ Information regarding location of excavation/trench and their length, depth, and width, ✓ Current Cal-OSHA excavation permit, ✓ Name and contact information of the designated Competent Person, ✓ Description of the Protective System to be used, ✓ Description of the Work Zone Protections used to prevent entry or disturbance, ✓ Description of Rescue Procedures, and ✓ Trenching/Excavation training records including Competent Person. <p>Note: the majority of soils at the Port are type C soils.</p>	

<input type="checkbox"/> Working on electrical systems	<ol style="list-style-type: none"> 1. Provide equipment information and location. 2. Provide NFPA 70E, First Aid, and CPR training records. 3. Work Condition: <ul style="list-style-type: none"> ✓ Description of whether the systems will be isolated or worked on while energized. ✓ If the systems will be worked on while de-energized include: <ul style="list-style-type: none"> ○ Company's Energy Isolation (LOTO) Program. ○ Specific LOTO procedures. ✓ If worked on while energized include: <ul style="list-style-type: none"> ○ Provide estimated voltage and amperage of systems. ○ Provide the Hazard Risk Category of the electrical systems. ○ PPE that will be used for each system. ○ A description of Work Zone Protections. 	
<input type="checkbox"/> Working on other energy sources (other than electrical) such as gas and potable water systems	<ol style="list-style-type: none"> 1. Energy Isolation (Lockout/Tag Out) Written Program. 2. Site specific LOTO procedures: <ul style="list-style-type: none"> ✓ Provide equipment information and location, ✓ Provide specific LOTO procedures, ✓ Provide diagrams (for multi-energy sources), and ✓ Provide training records. 	
<input type="checkbox"/> Working within 30 feet of oil production or above ground oil production lines	<ol style="list-style-type: none"> 1. Include Hydrogen Sulfide Awareness training records. 2. Include a Job Hazard Assessment (JHA) for this activity and include air monitoring requirements (i.e., what instrument will be used, what action levels will be used and the emergency evacuation procedure). 	
<input type="checkbox"/> Use of aerial lifts	<ol style="list-style-type: none"> 1. Aerial lift operator training records. 2. Include a Job Hazard Assessment (JHA) for this activity. 	
<input type="checkbox"/> Use of forklifts	<ol style="list-style-type: none"> 1. Fork Lift operator training records. 2. Include a Job Hazard Assessment (JHA) for this activity. 	
<input type="checkbox"/> Use of mobile cranes	<ol style="list-style-type: none"> 1. NCCCO certifications for operators. 2. Include a Job Hazard Assessment (JHA) for this activity. 	
<input type="checkbox"/> Performance of a Critical Lift as defined by TS 01 35 23	<p>Submit a Crane Lift Plan with the following information:</p> <ul style="list-style-type: none"> ✓ Total Load Weight with description of items, ✓ Crane Information, ✓ Rigging, ✓ Crane Placement, ✓ Qualifications – Crane Operator and Riggers, ✓ Lift Restrictions, and ✓ Site Plan and Load Calculations. 	
<input type="checkbox"/> Use of hand/power tools	Include a Job Hazard Assessment (JHA) for this activity.	
<input type="checkbox"/> Use of powdered actuated tools	<ol style="list-style-type: none"> 1. Powder Actuated Tool Operator Cards. 2. Include a Job Hazard Assessment (JHA) for this activity. 	

<input type="checkbox"/> Pile Driving Activities	1. Include a Job Hazard Assessment (JHA) for this activity. 2. Define the Danger Zone Area. 3. Submit Competent Person documentation. 4. Crane Operator's License, if applicable.	
---	--	--

SECTION 6 – HAZARD ASSESSMENT (Attach JHA's to this Appendix)

Complete a job hazard assessment (JHA) for ALL tasks performed by each contractor/subcontractor in conjunction with the job. At a minimum, a JHA shall be provided for activities checked in section 5 above.

SECTION 7 - TRAINING

Describe how workplace hazards will be communicated to employees (tailgate meetings, etc.) while on the job:

SECTION 8 - PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE Required Throughout the Job At All Times:

- 1.
- 2.
- 3.
- 4.

EXAMPLE

1. Hardhat 2. Safety Glasses 3. Hearing Protection 4. Safety Toed Shoes

Conditions requiring additional PPE (list the PPE and the condition when the PPE shall be worn):

- 1.
- 2.
- 3.
- 4.

Note: If respirator protection is listed, please submit a written Respiratory Protection Program and relevant medical surveillance and fit testing records for review.

EXAMPLE

1. Hearing protection will be worn in the areas identified during the pre-job hazard review as being above 85db, (Grinding, hammering, high noise equipment, etc.)
2. Face shields will be worn during operations where the potential for eye and face injury has been identified during the pre-job hazard review. (Grinding, welding, etc.)

SECTION 9 – WORKSITE SECURITY

Describe the measures that will be used to secure the worksite:

SECTION 10 – INJURY AND ILLNESS PREVENTION PROGRAM

Submit Contractor's Injury and Illness Prevention Program (IIPP) in compliance with California OSHA Title 8 Section 3205 and 3203, with this Appendix.

APPENDIX N

USE TAX AND TAX REPORTING FORMS

AND INSTRUCTIONS

APPENDIX N

TAXES AND TAX REPORTING.

A. As required by federal and state law, City is obligated to report the payment of compensation to Contractor on Form 1099-Misc. and Contractor acknowledges that Contractor is not entitled to payment under this Contract until it has provided its Employer Identification Number to City. Contractor shall be solely responsible for payment of all federal and state taxes resulting from payments under this Contract.

B. Contractor shall cooperate with City in all matters relating to taxation and the collection of taxes, particularly with respect to the self-accrual of use tax. Contractor shall follow all requirements set forth by California Department of Tax and Fee Administration <https://www.cdtfa.ca.gov/taxes-and-fees/use-tax.htm#Business>.

C. Contractor shall create and operate a buying company, as defined in R&TC regulation 1699, subpart (h), in City if Contractor will purchase over \$10,000,000 in tangible personal property subject to California sales and use tax.

D. In completing the form and obtaining the permit(s), Contractor shall use the address of the Work site as its business address and may use any address for its mailing address. Copies of the form and permit(s) shall also be delivered to the City Engineer. The form must be submitted and the permit(s) obtained as soon as Contractor receives a Notice to Proceed. Contractor shall not order any materials or equipment over \$100,000 from vendors outside California until the form is submitted and the permit(s) obtained and, if

Contractor does so, it shall be a material breach of this Contract. In addition, Contractor shall make all purchases from the Long Beach sales office of its vendors if those vendors have a Long Beach office and all purchases made by Contractor under this Contract which are subject to use tax of \$500,000 or more shall be allocated to the City of Long Beach. Contractor shall require the same cooperation with the City, with regards to subsections B, C and D under this section (including forms and permits), from its subcontractors and any other subcontractors who work directly or indirectly under the overall authority of this Contract.

APPENDIX O

STORM WATER BMP CHECKLIST

Port of Long Beach Stormwater BMP Checklist

The following checklist was developed to determine whether minor Port construction and maintenance projects (both development and maintenance activities that are under one (1) acre) require the implementation of storm water best management practices (BMPs). For each of the questions marked “yes,” the appropriate BMPs must be selected and properly implemented at the project site. The contractor is responsible to implement the appropriate BMPs based on the most recent CASQA guidelines. The number located in the suggested BMPs column corresponds with the CASQA Stormwater BMP Handbook for construction (2015). At least one suggested BMP must be implemented for every “yes” marked.

Please note that the BMP Fact Sheets are general guidance. The Port Engineer or Maintenance Superintendent may require additional BMPs at the project site. If control measures being implemented at the site are determined to be inadequate, the Port Engineer or Maintenance Superintendent may require the contractor to revise operations and/or select new or additional BMP(s). In addition, the contractor shall give immediate notice to the Port Engineer or Maintenance Superintendent whenever a failure of a BMP may occur.

	Yes	No	Suggested BMPs
Will soil be disturbed during the rainy season?			EC-1, EC-7, SE-1, SE-5 , SE-6, SE-7, SE-8, SE-10, TC-2, WM-3, NS-15
Will grading, trenching, and/or minor excavation be conducted as part of this project?			EC-1, EC-7, SE-1, SE-5, SE-6, SE-7, SE-8, SE-10 NS-15,
Will materials and/or equipment be stored overnight at the project site?			WM-1, TC-2, WM-4
Are there any groundwater dewatering activities planned as part of the proposed project?			Contact Environmental Planning
Will the project require the removal of water from trenches or open excavations?			Contact Environmental Planning
Will paving operations be conducted during this project?			NS-3
Is contaminated soil/sediment present at the project site?			SE-5, SE-6, SE-8, SE-10, WM-3, WM-7 Contact Environmental Planning
Is the handling/storage of hazardous materials/waste anticipated at the project site?			NS-6, WM-1, WM-4, WM-5, WM-6, WM-9

Port of Long Beach Stormwater BMP Checklist

	Yes	No	Suggested BMPs
Will concrete material(s) be used or will concrete cutting be conducted as part of the project?			SE-5, SE-6, SE-8, SE-10, NS-12, NS-13, WM-8
Will vehicle/equipment fueling and/or maintenance activities be conducted at the project site?			NS-8, NS-9, NS-10
Is seeding/planting (i.e., landscaping) planned at the proposed project site?			EC-2, EC-3, EC-6, EC-8, EC-16, SE-5, NS-7
Will this project have the potential to track out soils from the site?			SE-1, SE-7, TC-2, SE-10, TC-1
Does the project site drain to surrounding storm drains?			SE-1, SE-5, SE-6, SE-8, SE-10, WM-3
Does the project require dewatering of a utility vault(s)?			Contact Environmental Planning
Will exposed soils exist for extended periods of time?			EC-4, EC-5, EC-7, WE-1

Project Name: _____

Project Location: _____

Project Start Date: _____

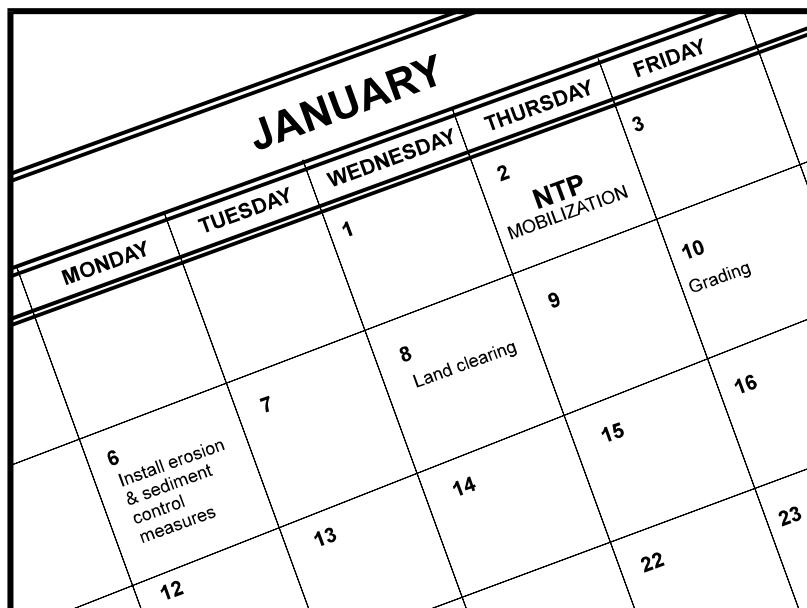
Project Duration: _____

Contractor's Project Manager

Date

Port Engineer/Maintenance Superintendent

Date



Description and Purpose

Scheduling is the development of a written plan that includes sequencing of construction activities and the implementation of BMPs such as erosion control and sediment control while taking local climate (rainfall, wind, etc.) into consideration. 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.

Suitable Applications

Proper sequencing of construction activities to reduce erosion potential should be incorporated into the schedule of every construction project especially during rainy season. Use of other, more costly yet less effective, erosion and sediment control BMPs may often be reduced through proper construction sequencing.

Limitations

- Environmental constraints such as nesting season prohibitions reduce the full capabilities of this BMP.

Implementation

- Avoid rainy periods. Schedule major grading operations during dry months when practical. Allow enough time before rainfall begins to stabilize the soil with vegetation or physical means or to install sediment trapping devices.
- Plan the project and develop a schedule showing each phase of construction. Clearly show how the rainy season relates

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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to soil disturbing and re-stabilization activities. Incorporate the construction schedule into the SWPPP.

- Include on the schedule, details on the rainy season implementation and deployment of:
 - Erosion control BMPs
 - Sediment control BMPs
 - Tracking control BMPs
 - Wind erosion control BMPs
 - Non-stormwater BMPs
 - Waste management and materials pollution control BMPs
- Include dates for activities that may require non-stormwater discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, pavement cleaning, etc.
- Work out the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, foundation pouring utilities installation, etc., to minimize the active construction area during the rainy season.
 - Sequence trenching activities so that most open portions are closed before new trenching begins.
 - Incorporate staged seeding and re-vegetation of graded slopes as work progresses.
 - Schedule establishment of permanent vegetation during appropriate planting time for specified vegetation.
- Non-active areas should be stabilized as soon as practical after the cessation of soil disturbing activities or one day prior to the onset of precipitation.
- Monitor the weather forecast for rainfall.
- When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization and sediment treatment controls on all disturbed areas prior to the onset of rain.
- Be prepared year round to deploy erosion control and sediment control BMPs. Erosion may be caused during dry seasons by un-seasonal rainfall, wind, and vehicle tracking. Keep the site stabilized year round, and retain and maintain rainy season sediment trapping devices in operational condition.
- Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window.

Costs

Construction scheduling to reduce erosion may increase other construction costs due to reduced economies of scale in performing site grading. The cost effectiveness of scheduling techniques should be compared with the other less effective erosion and sedimentation controls to achieve a cost effective balance.

Inspection and Maintenance

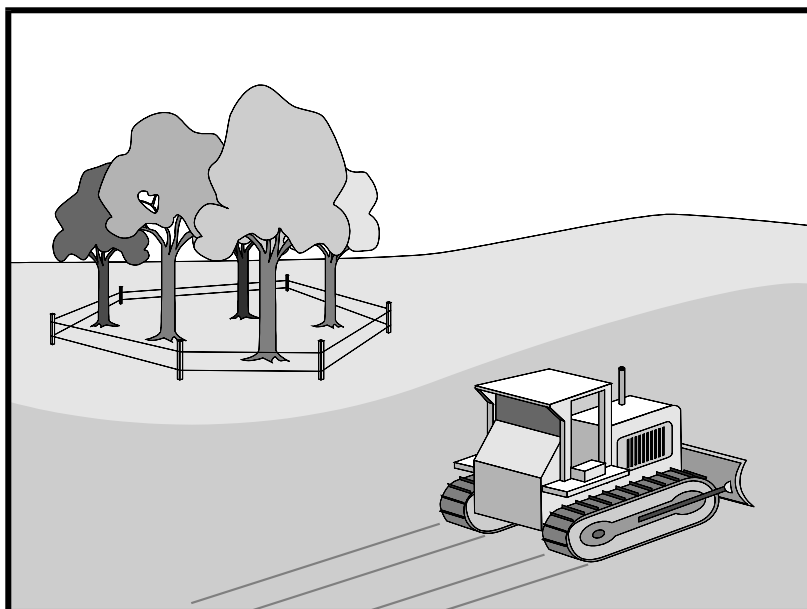
- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Amend the schedule when changes are warranted.
- Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

References

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities Developing Pollution Prevention Plans and Best Management Practices (EPA 832-R-92-005), U.S. Environmental Protection Agency, Office of Water, September 1992.

Preservation Of Existing Vegetation EC-2



Description and Purpose

Carefully planned preservation of existing vegetation minimizes the potential of removing or injuring existing trees, vines, shrubs, and grasses that protect soil from erosion.

Suitable Applications

Preservation of existing vegetation is suitable for use on most projects. Large project sites often provide the greatest opportunity for use of this BMP. Suitable applications include the following:

- Areas within the site where no construction activity occurs, or occurs at a later date. This BMP is especially suitable to multi year projects where grading can be phased.
- Areas where natural vegetation exists and is designated for preservation. Such areas often include steep slopes, watercourse, and building sites in wooded areas.
- Areas where local, state, and federal government require preservation, such as vernal pools, wetlands, marshes, certain oak trees, etc. These areas are usually designated on the plans, or in the specifications, permits, or environmental documents.
- Where vegetation designated for ultimate removal can be temporarily preserved and be utilized for erosion control and sediment control.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☐ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Preservation Of Existing Vegetation EC-2

Limitations

- Requires forward planning by the owner/developer, contractor, and design staff.
- Limited opportunities for use when project plans do not incorporate existing vegetation into the site design.
- For sites with diverse topography, it is often difficult and expensive to save existing trees while grading the site satisfactory for the planned development.

Implementation

The best way to prevent erosion is to not disturb the land. In order to reduce the impacts of new development and redevelopment, projects may be designed to avoid disturbing land in sensitive areas of the site (e.g., natural watercourses, steep slopes), and to incorporate unique or desirable existing vegetation into the site's landscaping plan. Clearly marking and leaving a buffer area around these unique areas during construction will help to preserve these areas as well as take advantage of natural erosion prevention and sediment trapping.

Existing vegetation to be preserved on the site must be protected from mechanical and other injury while the land is being developed. The purpose of protecting existing vegetation is to ensure the survival of desirable vegetation for shade, beautification, and erosion control. Mature vegetation has extensive root systems that help to hold soil in place, thus reducing erosion. In addition, vegetation helps keep soil from drying rapidly and becoming susceptible to erosion. To effectively save existing vegetation, no disturbances of any kind should be allowed within a defined area around the vegetation. For trees, no construction activity should occur within the drip line of the tree.

Timing

- Provide for preservation of existing vegetation prior to the commencement of clearing and grubbing operations or other soil disturbing activities in areas where no construction activity is planned or will occur at a later date.

Design and Layout

- Mark areas to be preserved with temporary fencing. Include sufficient setback to protect roots.
 - Orange colored plastic mesh fencing works well.
 - Use appropriate fence posts and adequate post spacing and depth to completely support the fence in an upright position.
- Locate temporary roadways, stockpiles, and layout areas to avoid stands of trees, shrubs, and grass.
- Consider the impact of grade changes to existing vegetation and the root zone.
- Maintain existing irrigation systems where feasible. Temporary irrigation may be required.
- Instruct employees and subcontractors to honor protective devices. Prohibit heavy equipment, vehicular traffic, or storage of construction materials within the protected area.

Preservation Of Existing Vegetation EC-2

Costs

There is little cost associated with preserving existing vegetation if properly planned during the project design, and these costs may be offset by aesthetic benefits that enhance property values. During construction, the cost for preserving existing vegetation will likely be less than the cost of applying erosion and sediment controls to the disturbed area. Replacing vegetation inadvertently destroyed during construction can be extremely expensive, sometimes in excess of \$10,000 per tree.

Inspection and Maintenance

During construction, the limits of disturbance should remain clearly marked at all times. Irrigation or maintenance of existing vegetation should be described in the landscaping plan. If damage to protected trees still occurs, maintenance guidelines described below should 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.
- Fill trenches and tunnels as soon as possible. Careful filling and tamping will eliminate air spaces in the soil, which can damage roots.
- 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.

Preservation Of Existing Vegetation EC-2

- 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.
- Retain protective measures until all other construction activity is complete to avoid damage during site cleanup and stabilization.

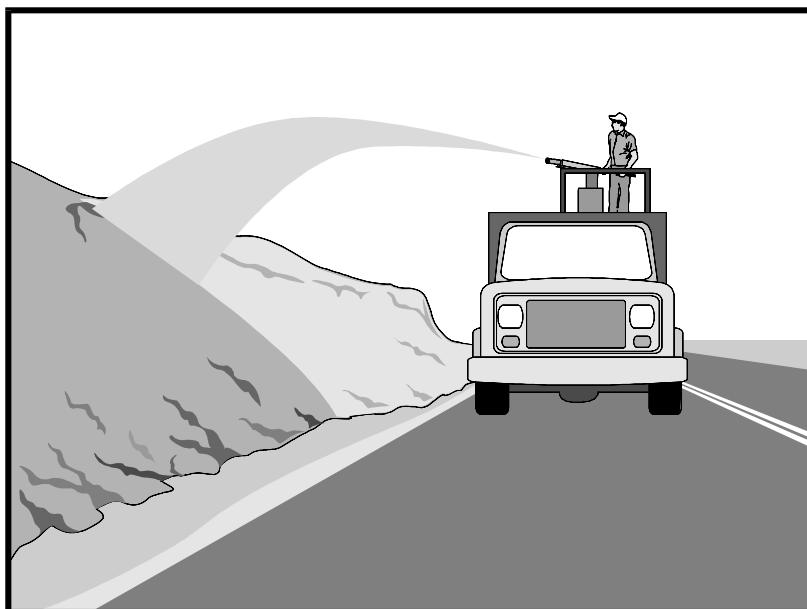
References

County of Sacramento Tree Preservation Ordinance, September 1981.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for The Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



Description and Purpose

Hydraulic Mulch consists of various types of fibrous materials mixed with water and sprayed onto the soil surface in slurry form to provide a layer of temporary protection from wind and water erosion.

Suitable Applications

Hydraulic mulch as a temporary, stand alone, erosion control BMP is suitable for disturbed areas that require temporary protection from wind and water erosion until permanent soil stabilization activities commence. Examples include:

- Rough-graded areas that will remain inactive for longer than permit-required thresholds (e.g., 14 days) or otherwise require stabilization to minimize erosion or prevent sediment discharges.
- Soil stockpiles.
- Slopes with exposed soil between existing vegetation such as trees or shrubs.
- Slopes planted with live, container-grown vegetation or plugs.
- Slopes burned by wildfire.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-4 Hydroseeding
- EC-5 Soil Binders
- EC-6 Straw Mulch
- EC-7 Geotextiles and Mats
- EC-8 Wood Mulching
- EC-14 Compost Blanket
- EC-16 Non-Vegetative Stabilization

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Hydraulic mulch can also be applied to augment other erosion control BMPs such as:

- In conjunction with straw mulch (see EC-6 Straw Mulch) where the rate of hydraulic mulch is reduced to 100-500 lbs per acre and the slurry is applied over the straw as a tackifying agent to hold the straw in place.
- Supplemental application of soil amendments, such as fertilizer, lime, gypsum, soil bio-stimulants or compost.

Limitations

In general, hydraulic mulch is not limited by slope length, gradient or soil type. However, the following limitations typically apply:

- Most hydraulic mulch applications, particularly bonded fiber matrices (BFMs), require at least 24 hours to dry before rainfall occurs.
- Temporary applications (i.e., without a vegetative component) may require a second application in order to remain effective for an entire rainy season.
- Treatment areas must be accessible to hydraulic mulching equipment.
- Availability of water sources in remote areas for mixing and application.
- As a stand-alone temporary BMP, hydraulic mulches may need to be re-applied to maintain their erosion control effectiveness, typically after 6-12 months depending on the type of mulch used.
- Availability of hydraulic mulching equipment may be limited just prior to the rainy season and prior to storms due to high demand.
- Cellulose fiber mulches alone may not perform well on steep slopes or in coarse soils.
- This BMP consists of a mixture of several constituents (e.g., fibers/mulches, tackifiers, and other chemical constituents), some of which may be proprietary and may come pre-mixed by the manufacturer. The water quality impacts of these constituents are relatively unknown and some may have water quality impacts due to their chemical makeup. Refer to specific chemical properties identified in the product Material Safety Data Sheet; products should be evaluated for project-specific implementation by the SWPPP Preparer. Refer to factsheet EC-05 for further guidance on selecting soil binders.

Implementation

- Where feasible, it is preferable to prepare soil surfaces prior to application by roughening embankments and fill areas with a crimping or punching type roller or by track walking.
- The majority of hydraulic mulch applications do not necessarily require surface/soil preparation (See EC-15 Soil Preparation) although in almost every case where re-vegetation is included as part of the practice, soil preparation can be beneficial. One of the advantages of hydraulic mulch over other erosion control methods is that it can be applied in areas where soil preparation is precluded by site conditions, such as steep slopes, rocky soils, or inaccessibility.

- Avoid mulch over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.
- Hydraulic mulching is generally performed utilizing specialized machines that have a large water-holding/mixing tank and some form of mechanical agitation or other recirculation method to keep water, mulch and soil amendments in suspension. The mixed hydraulic slurry can be applied from a tower sprayer on top of the machine or by extending a hose to areas remote from the machine.
- Where possible apply hydraulic mulch from multiple directions to adequately cover the soil. Application from a single direction can result in shadowing, uneven coverage and failure of the BMP.
- Hydraulic mulch can also include a vegetative component, such as seed, rhizomes, or stolons (see EC-4 Hydraulic Seed).
- Typical hydraulic mulch application rates range from 2,000 pounds per acre for standard mulches (SMs) to 3,500 pounds per acre for BFMs. However, the required amount of hydraulic mulch to provide adequate coverage of exposed topsoil may appear to exceed the standard rates when the roughness of the soil surface is changed due to soil preparation methods (see EC-15 Soil Preparation) or by slope gradient.
- Other factors such as existing soil moisture and soil texture can have a profound effect on the amount of hydraulic mulch required (i.e. application rate) applied to achieve an erosion-resistant covering.
- Avoid use of mulch without a tackifier component, especially on slopes.
- Mulches used in the hydraulic mulch slurry can include:
 - Cellulose fiber
 - Thermally-processed wood fibers
 - Cotton
 - Synthetics
 - Compost (see EC-14, Compost Blanket)
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Categories of Hydraulic Mulches

Standard Hydraulic Mulch (SM)

Standard hydraulic mulches are generally applied at a rate of 2,000 pounds per acre and are manufactured containing around 5% tackifier (i.e. soil binder), usually a plant-derived guar or psyllium type. Most standard mulches are green in color derived from food-color based dyes.

Hydraulic Matrices (HM) and Stabilized Fiber Matrices (SFM)

Hydraulic matrices and stabilized fiber matrices are slurries which contain increased levels of tackifiers/soil binders; usually 10% or more by weight. HMs and SFMs have improved performance compared to a standard hydraulic mulch (SM) because of the additional percentage of tackifier and because of their higher application rates, typically 2,500 – 4,000 pounds per acre. Hydraulic matrices can include a mixture of fibers, for example, a 50/50 blend of paper and wood fiber. In the case of an SFM, the tackifier/soil binder is specified as a polyacrylamide (PAM).

Bonded Fiber Matrix (BFM)

Bonded fiber matrices (BFMs) are hydraulically-applied systems of fibers, adhesives (typically guar based) and chemical cross-links. Upon drying, the slurry forms an erosion-resistant blanket that prevents soil erosion and promotes vegetation establishment. The cross-linked adhesive in the BFM should be biodegradable and should not dissolve or disperse upon re-wetting. BFMs are typically applied at rates from 3,000 to 4,000 lbs/acre based on the manufacturer's recommendation. BFMs should not be applied immediately before, during or immediately after rainfall or if the soil is saturated. Depending on the product, BFMs typically require 12 to 24 hours to dry and become effective.

Mechanically-Bonded Fiber Matrices (MBFM)

Mechanically-bonded fiber matrices (MBFMs) are hydraulically applied systems similar to BFM that use crimped synthetic fibers and PAM and are typically applied to a slope at a higher application rate than a standard BFM.

Hydraulic Compost Matrix (HCM)

Hydraulic compost matrix (HCM) is a field-derived practice whereby finely graded or sifted compost is introduced into the hydraulic mulch slurry. A guar-type tackifier can be added for steeper slope applications as well as any specified seed mixtures. A HCM can help to accelerate seed germination and growth. HCMs are particularly useful as an in-fill for three-dimensional re-vegetation geocomposites, such as turf reinforcement mats (TRM) (see EC-7 Geotextiles and Mats).

Costs

Average installed costs for hydraulic mulch categories are provided in Table 1, below.

Table 1
HYDRAULIC MULCH BMPs
INSTALLED COSTS

BMP	Installed Cost/Acre
Standard Hydraulic Mulching (SM)	\$1,700 - \$3,600 per acre
Hydraulic Matrices (HM) and Stabilized Fiber Matrices	
Guar-based	\$2,000 - \$4,000 per acre
PAM-based	\$2,500 - \$5,610 per acre
Bonded Fiber Matrix (BFM)	\$3,900 - \$6,900 per acre
Mechanically Bonded Fiber Matrix (MBFM)	\$4,500 - \$6,000 per acre
Hydraulic Compost Matrix (HCM)	\$3,000 - \$3,500 per acre

Source: Cost information received from individual product manufacturers solicited by Geosyntec Consultants (2004)

Inspection and Maintenance

- Maintain an unbroken, temporary mulched ground cover throughout the period of construction when the soils are not being reworked.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- Compare the number of bags or weight of applied mulch to the area treated to determine actual application rates and compliance with specifications.

References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Controlling Erosion of Construction Sites, Agricultural Information #347, U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service – SCS).

Guides for Erosion and Sediment Control in California, USDA Soils Conservation Service, January 1991.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Sedimentation and Erosion Control, An Inventory of Current Practices Draft, US EPA, April 1990.

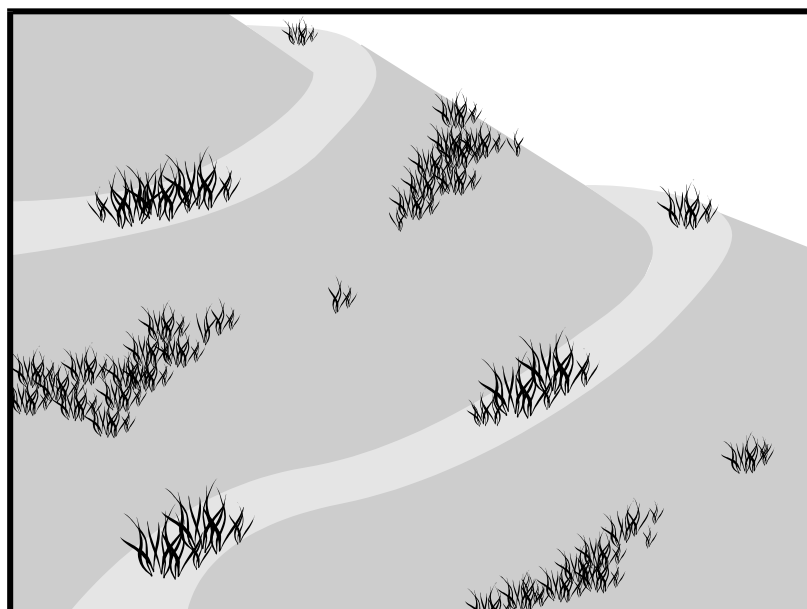
Soil Erosion by Water, Agriculture Information Bulletin #513, U.S. Department of Agriculture, Soil Conservation Service.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



Description and Purpose

Hydroseeding typically consists of applying a mixture of a hydraulic mulch, seed, fertilizer, and stabilizing emulsion with a hydraulic mulcher, to temporarily protect exposed soils from erosion by water and wind. Hydraulic seeding, or hydroseeding, is simply the method by which temporary or permanent seed is applied to the soil surface.

Suitable Applications

Hydroseeding is suitable for disturbed areas requiring temporary protection until permanent stabilization is established, for disturbed areas that will be re-disturbed following an extended period of inactivity, or to apply permanent stabilization measures. Hydroseeding without mulch or other cover (e.g. EC-7, Erosion Control Blanket) is not a stand-alone erosion control BMP and should be combined with additional measures until vegetation establishment.

Typical applications for hydroseeding include:

- Disturbed soil/graded areas where permanent stabilization or continued earthwork is not anticipated prior to seed germination.
- Cleared and graded areas exposed to seasonal rains or temporary irrigation.
- Areas not subject to heavy wear by construction equipment or high traffic.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-5 Soil Binders
- EC-6 Straw Mulch
- EC-7 Geotextiles and Mats
- EC-8 Wood Mulching
- EC-14 Compost Blanket
- EC-16 Non-Vegetative Stabilization

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Limitations

- Availability of hydroseeding equipment may be limited just prior to the rainy season and prior to storms due to high demand.
- Hydraulic seed should be applied with hydraulic mulch or a stand-alone hydroseed application should be followed by one of the following:
 - Straw mulch (see Straw Mulch EC-6)
 - Rolled erosion control products (see Geotextiles and Mats EC-7)
 - Application of Compost Blanket (see Compost Blanket EC-14)

Hydraulic seed may be used alone only on small flat surfaces when there is sufficient time in the season to ensure adequate vegetation establishment and coverage to provide adequate erosion control.

- Hydraulic seed without mulch does not provide immediate erosion control.
- Temporary seeding may not be appropriate for steep slopes (i.e., slopes readily prone to rill erosion or without sufficient topsoil).
- Temporary seeding may not be appropriate in dry periods without supplemental irrigation.
- Temporary vegetation may have to be removed before permanent vegetation is applied.
- Temporary vegetation may not be appropriate for short term inactivity (i.e. less than 3-6 months).
- This BMP consists of a mixture of several constituents (e.g., fibers/mulches, tackifiers, and other chemical constituents), some of which may be proprietary and may come pre-mixed by the manufacturer. The water quality impacts of these constituents are relatively unknown and some may have water quality impacts due to their chemical makeup. Additionally these constituents may require non-visible pollutant monitoring. Refer to specific chemical properties identified in the product Material Safety Data Sheet; products should be evaluated for project-specific implementation by the SWPPP Preparer. Refer to factsheet EC-05 for further guidance on selecting soil binders.

Implementation

In order to select appropriate hydraulic seed mixtures, an evaluation of site conditions should be performed with respect to:

- | | |
|---|----------------------------------|
| - Soil conditions | - Maintenance requirements |
| - Site topography and exposure (sun/wind) | - Sensitive adjacent areas |
| - Season and climate | - Water availability |
| - Vegetation types | - Plans for permanent vegetation |

The local office of the U.S.D.A. Natural Resources Conservation Service (NRCS), Resource Conservation Districts and Agricultural Extension Service can provide information on appropriate seed mixes.

The following steps should be followed for implementation:

- Where appropriate or feasible, soil should be prepared to receive the seed by disking or otherwise scarifying (See EC-15, Soil Preparation) the surface to eliminate crust, improve air and water infiltration and create a more favorable environment for germination and growth.
- Avoid use of hydraulic seed in areas where the BMP would be incompatible with future earthwork activities.
- Hydraulic seed can be applied using a multiple step or one step process.
 - In a multiple step process, hydraulic seed is applied first, followed by mulch or a Rolled Erosion Control Product (RECP).
 - In the one step process, hydraulic seed is applied with hydraulic mulch in a hydraulic matrix. When the one step process is used to apply the mixture of fiber, seed, etc., the seed rate should be increased to compensate for all seeds not having direct contact with the soil.
- All hydraulically seeded areas should have mulch, or alternate erosion control cover to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow.
- All seeds should be in conformance with the California State Seed Law of the Department of Agriculture. Each seed bag should be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee, and dates of test. The container should be labeled to clearly reflect the amount of Pure Live Seed (PLS) contained. All legume seed should be pellet inoculated. Inoculant sources should be species specific and should be applied at a rate of 2 lb of inoculant per 100 lb seed.
- Commercial fertilizer should conform to the requirements of the California Food and Agricultural Code, which can be found at http://www.leginfo.ca.gov/.html/fac_table_of_contents.html. Fertilizer should be pelleted or granular form.
- Follow up applications should be made as needed to cover areas of poor coverage or germination/vegetation establishment and to maintain adequate soil protection.
- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Costs

Average cost for installation and maintenance may vary from as low as \$1,900 per acre for flat slopes and stable soils, to \$4,000 per acre for moderate to steep slopes and/or erosive soils. Cost of seed mixtures vary based on types of required vegetation.

BMP	Installed Cost per Acre
Hydraulic Seed	\$1,900-\$4,000

Source: Cost information received from individual product manufacturers solicited by Geosyntec Consultants (2004).

Inspection and Maintenance

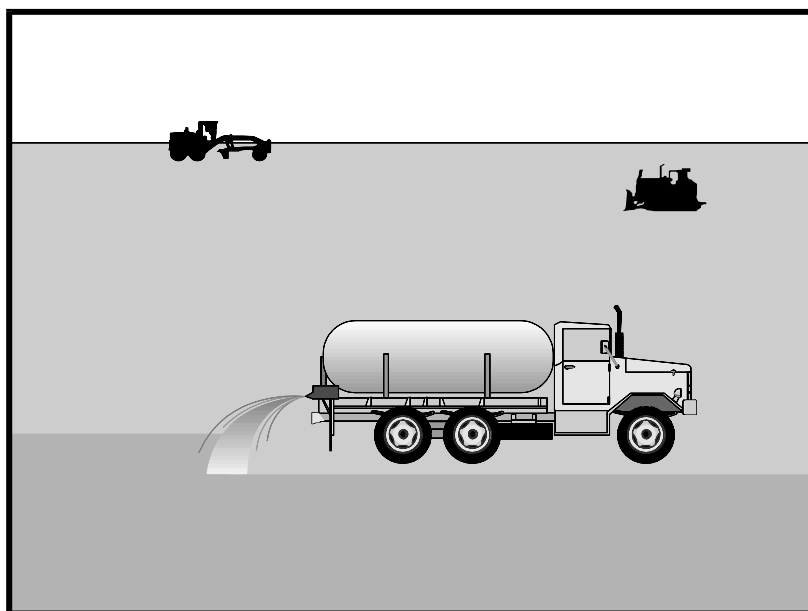
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- Where seeds fail to germinate, or they germinate and die, the area must be re-seeded, fertilized, and mulched within the planting season, using not less than half the original application rates.
- Irrigation systems, if applicable, should be inspected daily while in use to identify system malfunctions and line breaks. When line breaks are detected, the system must be shut down immediately and breaks repaired before the system is put back into operation.
- Irrigation systems should be inspected for complete coverage and adjusted as needed to maintain complete coverage.

References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.



Description and Purpose

Soil binding consists of application and maintenance of a soil stabilizer to exposed soil surfaces. Soil binders are materials applied to the soil surface to temporarily prevent water and wind induced erosion of exposed soils on construction sites.

Suitable Applications

Soil binders are typically applied to disturbed areas requiring temporary protection. Because soil binders, when used as a stand-alone practice, can often be incorporated into the soil, they are a good alternative to mulches in areas where grading activities will soon resume. Soil binders are commonly used in the following areas:

- Rough graded soils that will be inactive for a short period of time
- Soil stockpiles
- Temporary haul roads prior to placement of crushed rock
- Compacted soil road base
- Construction staging, materials storage, and layout areas

Limitations

- Soil binders are temporary in nature and may need reapplication.
- Soil binders require a minimum curing time until fully effective, as prescribed by the manufacturer. Curing time

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-4 Hydroseeding
- EC-6 Straw Mulch
- EC-7 Geotextiles and Mats
- EC-8 Wood Mulching

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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 and discharge at a point further down slope.
- Plant-material-based soil binders do not generally hold up to pedestrian or vehicular traffic across treated areas as well as polymeric emulsion blends or cementitious-based binders.
- Soil binders may not sufficiently penetrate compacted soils.
- Some soil binders are soil texture specific in terms of their effectiveness. For example, polyacrylamides (PAMs) work very well on silt and clayey soils but their performance decreases dramatically in sandy soils.
- Some soil binders may not perform well with low relative humidity. Under rainy conditions, some agents may become slippery or leach out of the soil.
- Soil binders may not cure if low temperatures occur within 24 hours of application.
- The water quality impacts of some chemical soil binders are relatively unknown and some may have water quality impacts due to their chemical makeup. Additionally, these chemical may require non-visible pollutant monitoring. Products should be evaluated for project-specific implementation by the SWPPP Preparer. Refer to the product Material Safety Data Sheet for chemical properties.

Implementation

General Considerations

- Soil binders should conform to local municipality specifications and requirements.
- Site soil types will dictate appropriate soil binders to be used.
- A soil binder must be environmentally benign (non-toxic to plant and animal life), easy to apply, easy to maintain, economical, and should not stain paved or painted surfaces. Soil binders should not pollute stormwater when cured. Obtain a Material Safety Data Sheet (MSDS) from the manufacturer to ensure non-toxicity.
- Stormwater runoff from PAM treated soils should pass through one of the following sediment control BMP prior to discharging to surface waters.
 - When the total drainage area is greater than or equal to 5 acres, PAM treated areas should drain to a sediment basin.
 - Areas less than 5 acres should drain to sediment control BMPs, such as a sediment trap, or a series of check dams. The total number of check dams used should be maximized to achieve the greatest amount of settlement of sediment prior to discharging from the site. Each check dam should be spaced evenly in the drainage channel through which stormwater flows are discharged off site.

- Performance of soil binders depends on temperature, humidity, and traffic across treated areas.
- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Selecting a Soil Binder

Properties of common soil binders used for erosion control are provided on Table 1 at the end of this Fact Sheet. Use Table 1 to select an appropriate soil binder. Refer to WE-1, Wind Erosion Control, for dust control soil binders.

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

- Suitability to situation - Consider where the soil binder will be applied, 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, likelihood of leaching, and ability to form a surface crust on the surface materials.
- Frequency of application - The frequency of application is related to the functional longevity of the binder, which 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.

Plant-Material-Based (Short Lived, <6 months) Binders

Guar: Guar is a non-toxic, biodegradable, natural galactomannan-based hydrocolloid treated with dispersant agents for easy field mixing. It should be mixed with water at the rate of 11 to 15 lb per 1,000 gallons. Recommended minimum application rates are as follows:

Application Rates for Guar Soil Stabilizer

Slope (H:V):	Flat	4:1	3:1	2:1	1:1
lb/acre:	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. Application rates should be from 80 to 200 lb/acre, 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/acre. Approximate drying time is 9 to 12 hours.

Plant-Material-Based (Long Lived, 6-12 months) Binders

Pitch and Rosin Emulsion: Generally, a non-ionic pitch and rosin emulsion has a minimum solids content of 48%. The rosin should be a minimum of 26% of the total solids content. The soil stabilizer should 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 should 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 and product mixture applied at the rate specified by the manufacturer.

Polymeric Emulsion Blend Binders

Acrylic Copolymers and Polymers: Polymeric soil stabilizers should consist of a liquid or solid polymer or copolymer with an acrylic base that contains a minimum of 55% solids. The polymeric compound should be handled and mixed in a manner that will not cause foaming or should contain an anti-foaming agent. The polymeric emulsion should not exceed its shelf life or expiration date; manufacturers should provide the expiration date. Polymeric soil stabilizer should be readily miscible in water, non-injurious to seed or animal life, non-flammable, should provide surface soil stabilization for various soil types without totally inhibiting water infiltration, and should not re-emulsify when cured. The applied compound typically requires 12 to 24 hours drying time. Liquid copolymer should be diluted at a rate of 10 parts water to 1 part polymer and the mixture applied to soil at a rate of 1,175 gallons/acre.

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 the manufacturer's recommendations, and applied with a hydraulic seeder at the rate of 20 gallons/acre. 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 (H:V)	lb/acre
Flat to 5:1	3.0 – 5.0
5:1 to 3:1	5.0 – 10.0
2:1 to 1:1	10.0 – 20.0

Poly-Acrylamide (PAM) and Copolymer of Acrylamide: Linear copolymer polyacrylamide for use as a soil binder is packaged as a dry flowable solid, as a liquid. Refer to the manufacturer's recommendation for dilution and application rates as they vary based on liquid or dry form, site conditions and climate.

- Limitations specific to PAM are as follows:
 - Do not use PAM on a slope that flows into a water body without passing through a sediment trap or sediment basin.
 - The specific PAM copolymer formulation must be anionic. Cationic PAM should not be used in any application because of known aquatic toxicity problems. Only the highest drinking water grade PAM, certified for compliance with ANSI/NSF Standard 60 for drinking water treatment, should be used for soil applications.
 - PAM designated for erosion and sediment control should be "water soluble" or "linear" or "non-cross linked".
 - PAM should not be used as a stand-alone BMP to protect against water-based erosion. When combined with mulch, its effectiveness increases dramatically.

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 55 to 60 lb/acre. Drying times are 0 to 4 hours.

Cementitious-Based Binders

Gypsum: This is a formulated gypsum based product that readily mixes with water and mulch to form a thin protective crust on the soil surface. It is composed of high purity gypsum that is ground, calcined and processed into calcium sulfate hemihydrate with a minimum purity of 86%. It is mixed in a hydraulic seeder and applied at rates 4,000 to 12,000 lb/acre. Drying time is 4 to 8 hours.

Applying Soil Binders

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 should be followed:

- Follow manufacturer's written recommendations for application rates, pre-wetting of application area, and cleaning of equipment after use.
- Prior to application, roughen embankment and fill areas.
- Consider the drying time for the selected soil binder and apply with sufficient time before anticipated rainfall. Soil binders should not be applied during or immediately before rainfall.
- Avoid over spray onto roads, sidewalks, drainage channels, sound walls, existing vegetation, etc.

- Soil binders should not be applied to frozen soil, areas with standing water, under freezing or rainy conditions, or when the temperature is below 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 of 24 hours before they are fully effective. Refer to manufacturer's instructions for specific cure time.
- For liquid agents:
 - Crown or slope ground to avoid ponding.
 - Uniformly pre-wet ground at 0.03 to 0.3 gal/yd² or according to manufacturer's recommendations.
 - Apply solution under pressure. Overlap solution 6 to 12 in.
 - Allow treated area to cure for the time recommended by the manufacturer; typically at least 24 hours.
 - Apply second treatment before first treatment becomes ineffective, using 50% application rate.
 - In low humidities, reactivate chemicals by re-wetting with water at 0.1 to 0.2 gal/yd².

Costs

Costs vary according to the soil stabilizer selected for implementation. The following are approximate installed costs:

Soil Binder	Cost per Acre (2004) ¹	Estimated Cost per Acre (2009) ²
Plant-Material-Based (Short Lived) Binders	\$700-\$900	\$770-\$990
Plant-Material-Based (Long Lived) Binders	\$1,200-\$1,500	\$1,320-\$1,650
Polymeric Emulsion Blend Binders	\$700-\$1,500	\$770-\$1,650
Cementitious-Based Binders	\$800-\$1,200	\$880-\$1,350

1. Source: Cost information received from individual product manufacturers solicited by Geosyntec Consultants (2004).

2. 2009 costs reflect a 10% escalation over year 2004 costs. Escalation based on informal survey of industry trends. Note: Expected cost increase is offset by competitive economic conditions.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- Reapply the selected soil binder as needed to maintain effectiveness.

Table 1 Properties of Soil Binders for Erosion Control				
Evaluation Criteria	Binder Type			
	Plant Material Based (Short Lived)	Plant Material Based (Long Lived)	Polymeric Emulsion Blends	Cementitious-Based Binders
Relative Cost	Low	Moderate to High	Low to High	Low to Moderate
Resistance to Leaching	High	High	Low to Moderate	Moderate
Resistance to Abrasion	Moderate	Low	Moderate to High	Moderate to High
Longevity	Short to Medium	Medium	Medium to Long	Medium
Minimum Curing Time before Rain	9 to 18 hours	19 to 24 hours	0 to 24 hours	4 to 8 hours
Compatibility with Existing Vegetation	Good	Poor	Poor	Poor
Mode of Degradation	Biodegradable	Biodegradable	Photodegradable/ Chemically Degradable	Photodegradable/ Chemically Degradable
Labor Intensive	No	No	No	No
Specialized Application Equipment	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher
Liquid/Powder	Powder	Liquid	Liquid/Powder	Powder
Surface Crusting	Yes, but dissolves on rewetting	Yes	Yes, but dissolves on rewetting	Yes
Clean Up	Water	Water	Water	Water
Erosion Control Application Rate	Varies ⁽¹⁾	Varies ⁽¹⁾	Varies ⁽¹⁾	4,000 to 12,000 lbs/acre

(1) See Implementation for specific rates.

References

Erosion Control Pilot Study Report, State of California Department of Transportation (Caltrans), June 2000.

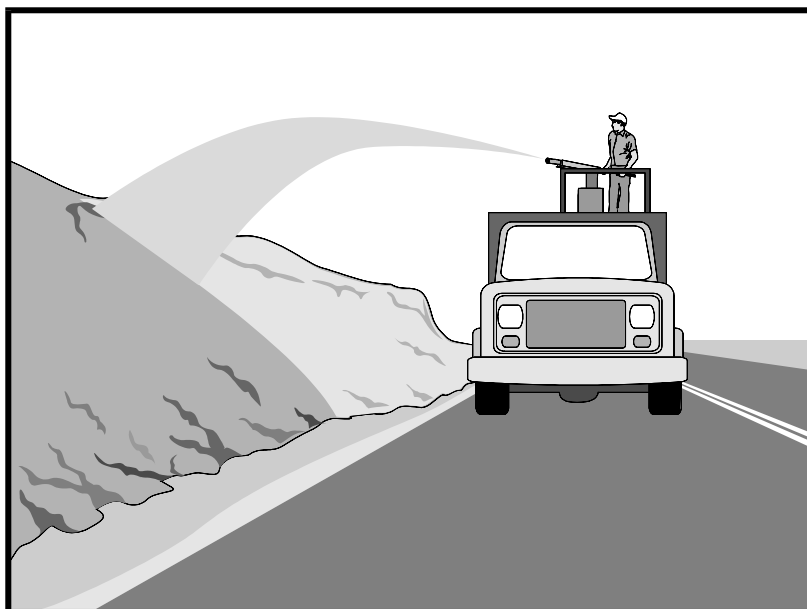
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Sedimentation and Erosion Control, An Inventory of Current Practices Draft, US EPA, April 1990.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or crimper, or anchoring it with a tackifier or stabilizing emulsion. Straw mulch protects the soil surface from the impact of rain drops, preventing soil particles from becoming dislodged.

Suitable Applications

Straw mulch is suitable for disturbed areas requiring temporary protection until permanent stabilization is established. Straw mulch can be specified for the following applications:

- As a stand-alone BMP on disturbed areas until soils can be prepared for permanent vegetation. The longevity of straw mulch is typically less than six months.
- Applied in combination with temporary seeding strategies
- Applied in combination with permanent seeding strategies to enhance plant establishment and final soil stabilization
- Applied around containerized plantings to control erosion until the plants become established to provide permanent stabilization

Limitations

Availability of straw and straw blowing equipment may be limited just prior to the rainy season and prior to storms due to high demand.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-4 Hydroseeding
- EC-5 Soil Binders
- EC-7 Geotextiles and Mats
- EC-8 Wood Mulching
- EC-14 Compost Blanket

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- There is a potential for introduction of weed seed and unwanted plant material if weed-free agricultural straw is not specified.
- Straw mulch applied by hand is more time intensive and potentially costly.
- Wind may limit application of straw and blow straw into undesired locations.
- May have to be removed prior to permanent seeding or prior to further earthwork.
- “Punching” of straw does not work in sandy soils, necessitating the use of tackifiers.
- Potential fugitive dust control issues associated with straw applications can occur. Application of a stabilizing emulsion or a water stream at the same time straw is being blown can reduce this problem.
- Use of plastic netting should be avoided in areas where wildlife may be entrapped and may be prohibited for projects in certain areas with sensitive wildlife species, especially reptiles and amphibians.

Implementation

- Straw should be derived from weed-free wheat, rice, or barley. Where required by the plans, specifications, permits, or environmental documents, native grass straw should be used.
- Use tackifier to anchor straw mulch to the soil on slopes.
- Crimping, punch roller-type rollers, or track walking may also be used to incorporate straw mulch into the soil on slopes. Track walking can be used where other methods are impractical.
- Avoid placing straw onto roads, sidewalks, drainage channels, sound walls, existing vegetation, etc.
- Straw mulch with tackifier should not be applied during or immediately before rainfall.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Application Procedures

- When using a tackifier to anchor the straw mulch, roughen embankment or fill areas by rolling with a crimping or punching-type roller or by track walking before placing the straw mulch. Track walking should only be used where rolling is impractical.
- Apply straw at a rate of between 3,000 and 4,000 lb/acre, either by machine or by hand distribution and provide 100% ground cover. A lighter application is used for flat surfaces and a heavier application is used for slopes.
- Evenly distribute straw mulch on the soil surface.
- Anchoring straw mulch to the soil surface by “punching” it into the soil mechanically (incorporating) can be used in lieu of a tackifier.

- Methods for holding the straw mulch in place depend upon the slope steepness, accessibility, soil conditions, and longevity.
 - A tackifier acts to glue the straw fibers together and to the soil surface. The tackifier should be selected based on longevity and ability to hold the fibers in place. A tackifier is typically applied at a rate of 125 lb/acre. In windy conditions, the rates are typically 180 lb/acre.
 - On very small areas, a spade or shovel can be used to punch in straw mulch.
 - On slopes with soils that are stable enough and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be "punched" into the ground using a knife blade roller or a straight bladed coultter, known commercially as a "crimper."

Costs

Average annual cost for installation and maintenance is included in the table below. Application by hand is more time intensive and potentially more costly.

BMP	Unit Cost per Acre
Straw mulch, crimped or punched	\$2,458-\$5,375
Straw mulch with tackifier	\$1,823-\$4,802

Source: Cost information received from individual product suppliers solicited by Geosyntec Consultants (2004).

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- The key consideration in inspection and maintenance is that the straw needs to last long enough to achieve erosion control objectives. Straw mulch as a stand-alone BMP is temporary and is not suited for long-term erosion control.
- Maintain an unbroken, temporary mulched ground cover while disturbed soil areas are inactive. Repair any damaged ground cover and re-mulch exposed areas.
- Reapplication of straw mulch and tackifier may be required to maintain effective soil stabilization over disturbed areas and slopes.

References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Controlling Erosion of Construction Sites, Agricultural Information Bulletin #347, U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service – SCS).

Guides for Erosion and Sediment Control in California, USDA Soils Conservation Service, January 1991.

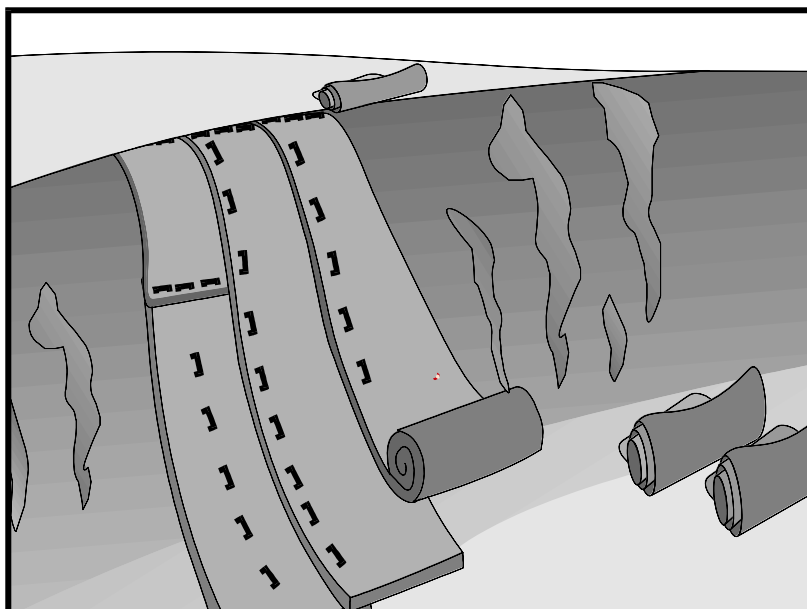
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Soil Erosion by Water, Agricultural Information Bulletin #513, U.S. Department of Agriculture, Soil Conservation Service.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



Description and Purpose

Matings, or Rolled Erosion Control Products (RECPs), can be made of natural or synthetic materials or a combination of the two. RECPs are used to cover the soil surface to reduce erosion from rainfall impact, hold soil in place, and absorb and hold moisture near the soil surface. Additionally, RECPs may be used to stabilize soils until vegetation is established or to reinforce non-woody surface vegetation.

Suitable Applications

RECPs are typically applied on slopes where erosion hazard is high and vegetation will be slow to establish. Matings are also used on stream banks, swales and other drainage channels where moving water at velocities between 3 ft/s and 6 ft/s are likely to cause scour and wash out new vegetation, and in areas where the soil surface is disturbed and where existing vegetation has been removed. RECPs may also be used when seeding cannot occur (e.g., late season construction and/or the arrival of an early rain season). RECPs should be considered when the soils are fine grained and potentially erosive. RECPs should be considered in the following situations.

- Steep slopes, generally steeper than 3:1 (H:V)
- Slopes where the erosion potential is high
- Slopes and disturbed soils where mulch must be anchored
- Disturbed areas where plants are slow to develop

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
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Legend:

- ☒ **Primary Category**
- ☒ **Secondary Category**

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-4 Hydroseeding

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- Channels with flows exceeding 3.3 ft/s
- Channels to be vegetated
- Stockpiles
- Slopes adjacent to water bodies

Limitations

- RECP installed costs are generally higher than other erosion control BMPs, limiting their use to areas where other BMPs are ineffective (e.g. channels, steep slopes).
- RECPs may delay seed germination, due to reduction in soil temperature.
- RECPs are generally not suitable for excessively rocky sites or areas where the final vegetation will be mowed (since staples and netting can catch in mowers). If a staple or pin cannot be driven into the soil because the underlying soil is too hard or rocky, then an alternative BMP should be selected.
- If used for temporary erosion control, RECPs should be removed and disposed of prior to application of permanent soil stabilization measures.
- The use of plastic should be limited to covering stockpiles or very small graded areas for short periods of time (such as through one imminent storm event) until more environmentally friendly measures, such as seeding and mulching, may be installed.
 - Plastic sheeting is easily vandalized, easily torn, photodegradable, and must be disposed of at a landfill.
 - Plastic sheeting results in 100% runoff, which may cause serious erosion problems in the areas receiving the increased flow.
- RECPs may have limitations based on soil type, slope gradient, or channel flow rate; consult the manufacturer for proper selection.
- Not suitable for areas that have foot traffic (tripping hazard) – e.g., pad areas around buildings under construction.
- RECPs that incorporate a plastic netting (e.g. straw blanket typically uses a plastic netting to hold the straw in place) may not be suitable near known wildlife habitat. Wildlife can become trapped in the plastic netting.
- RECPs may have limitations in extremely windy climates. However, when RECPs are properly trenched at the top and bottom and stapled in accordance with the manufacturer's recommendations, problems with wind can be minimized.

Implementation

Material Selection

- Natural RECPs have been found to be effective where re-vegetation will be provided by re-seeding. The choice of material should be based on the size of area, side slopes, surface conditions such as hardness, moisture, weed growth, and availability of materials.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.
- The following natural and synthetic RECPs are commonly used:

Geotextiles

- Material can be a woven or a non-woven polypropylene fabric with minimum thickness of 0.06 in., minimum width of 12 ft and should have minimum tensile strength of 150 lbs (warp), 80 lbs (fill) in conformance with the requirements in ASTM Designation: D 4632. The permittivity of the fabric should be approximately 0.07 sec^{-1} in conformance with the requirements in ASTM Designation: D4491. The fabric should have an ultraviolet (UV) stability of 70 percent in conformance with the requirements in ASTM designation: D4355. Geotextile blankets must be secured in place with wire staples or sandbags and by keying into tops of slopes to prevent infiltration of surface waters under geotextile. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- Geotextiles may be reused if they are suitable for the use intended.

Plastic Covers

- Generally plastic sheeting should only be used as stockpile covering or for very small graded areas for short periods of time (such as through one imminent storm event). If plastic sheeting must be used, choose a plastic that will withstand photo degradation.
- Plastic sheeting should have a minimum thickness of 6 mils, and must be keyed in at the top of slope (when used as a temporary slope protection) and firmly held in place with sandbags or other weights placed no more than 10 ft apart. Seams are typically taped or weighted down their entire length, and there should be at least a 12 in. to 24 in. overlap of all seams. Edges should be embedded a minimum of 6 in. in soil (when used as a temporary slope protection).
- All sheeting must be inspected periodically after installation and after significant rainstorms to check for erosion, undermining, and anchorage failure. Any failures must be repaired immediately. If washout or breakages occur, the material should be re-installed after repairing the damage to the slope.

Erosion Control Blankets/Mats

- Biodegradable RECPs are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. In order for an RECP to be considered 100% biodegradable, the netting, sewing or adhesive system that holds the biodegradable mulch fibers together must also be biodegradable. See typical installation details at the end of this fact sheet.

- **Jute** is a natural fiber that is made into a yarn that is loosely woven into a biodegradable mesh. The performance of jute as a stand-alone RECP is low. Most other RECPs outperform jute as a temporary erosion control product and therefore jute is not commonly used. It is designed to be used in conjunction with vegetation. The material is supplied in rolled strips, which should be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Excelsior** (curled wood fiber) blanket material should consist of machine produced mats of curled wood excelsior with 80 percent of the fiber 6 in. or longer. The excelsior blanket should be of consistent thickness. The wood fiber must be evenly distributed over the entire area of the blanket. The top surface of the blanket should be covered with a photodegradable extruded plastic mesh. The blanket should be smolder resistant without the use of chemical additives and should be non-toxic and non-injurious to plant and animal life. Excelsior blankets should be furnished in rolled strips, a minimum of 48 in. wide, and should have an average weight of 0.8 lb/yd², ± 10 percent, at the time of manufacture. Excelsior blankets must be secured in place with wire staples. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- **Straw blanket** should be machine produced mats of straw with a lightweight biodegradable netting top layer. The straw should be attached to the netting with biodegradable thread or glue strips. The straw blanket should be of consistent thickness. The straw should be evenly distributed over the entire area of the blanket. Straw blanket should be furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd². Straw blankets must be secured in place with wire staples. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- **Wood fiber blanket** is composed of biodegradable fiber mulch with extruded plastic netting held together with adhesives. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which must be secured to the ground with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Coconut fiber blanket** should be a machine produced mat of 100 percent coconut fiber with biodegradable netting on the top and bottom. The coconut fiber should be attached to the netting with biodegradable thread or glue strips. The coconut fiber blanket should be of consistent thickness. The coconut fiber should be evenly distributed over the entire area of the blanket. Coconut fiber blanket should be furnished in rolled strips with a minimum of 6.5 ft wide, a minimum of 80 ft. long and a minimum of 0.5 lb/yd². Coconut fiber blankets must be secured in place with wire staples. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- **Coconut fiber mesh** is a thin permeable membrane made from coconut or corn fiber that is spun into a yarn and woven into a biodegradable mat. It is designed to be used in conjunction with vegetation and typically has longevity of several years. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Straw coconut fiber blanket** should be machine produced mats of 70 percent straw and 30 percent coconut fiber with a biodegradable netting top layer and a biodegradable bottom net. The straw and coconut fiber should be attached to the netting with biodegradable thread or glue strips. The straw coconut fiber blanket should be of consistent thickness. The straw and coconut fiber should be evenly distributed over the entire area of the blanket. Straw coconut fiber blanket should be furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd². Straw coconut fiber blankets must be secured in place with wire staples. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- Non-biodegradable RECPs are typically composed of polypropylene, polyethylene, nylon or other synthetic fibers. In some cases, a combination of biodegradable and synthetic fibers is used to construct the RECP. Netting used to hold these fibers together is typically non-biodegradable as well.
- **Plastic netting** is a lightweight biaxially oriented netting designed for securing loose mulches like straw or paper to soil surfaces to establish vegetation. The netting is photodegradable. The netting is supplied in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Plastic mesh** is an open weave geotextile that is composed of an extruded synthetic fiber woven into a mesh with an opening size of less than 1/4 in. It is used with re-vegetation or may be used to secure loose fiber such as straw to the ground. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Synthetic fiber with netting** is a mat that is composed of durable synthetic fibers treated to resist chemicals and ultraviolet light. The mat is a dense, three dimensional mesh of synthetic (typically polyolefin) fibers stitched between two polypropylene nets. The mats are designed to be re-vegetated and provide a permanent composite system of soil, roots, and geomatrix. The material is furnished in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Bonded synthetic fibers** consist of a three dimensional geomatrix nylon (or other synthetic) matting. Typically it has more than 90 percent open area, which facilitates root growth. It's tough root reinforcing system anchors vegetation and protects against hydraulic lift and shear forces created by high volume discharges. It can be installed over prepared soil, followed by seeding into the mat. Once vegetated, it becomes an invisible composite system of soil, roots, and geomatrix. The material is furnished in rolled strips that must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Combination synthetic and biodegradable RECPs** consist of biodegradable fibers, such as wood fiber or coconut fiber, with a heavy polypropylene net stitched to the top and a high strength continuous filament geomatrix or net stitched to the bottom. The material is designed to enhance re-vegetation. The material is furnished in rolled strips,

which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

Site Preparation

- Proper soil preparation is essential to ensure complete contact of the RECP with the soil. Soil Roughening is not recommended in areas where RECPs will be installed.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil.
- Prepare seedbed by loosening 2 to 3 in. of topsoil.

Seeding/Planting

Seed the area before blanket installation for erosion control and re-vegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all areas disturbed during blanket installation must be re-seeded. Where soil filling is specified for turf reinforcement mats (TRMs), seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

Fertilize and seed in accordance with seeding specifications or other types of landscaping plans. The protective matting can be laid over areas where grass has been planted and the seedlings have emerged. Where vines or other ground covers are to be planted, lay the protective matting first and then plant through matting according to design of planting.

Check Slots

Check slots shall be installed as required by the manufacturer.

Laying and Securing Matting

- Before laying the matting, all check slots should be installed and the seedbed should be friable, made free from clods, rocks, and roots. The surface should be compacted and finished according to the requirements of the manufacturer's recommendations.
- Mechanical or manual lay down equipment should be capable of handling full rolls of fabric and laying the fabric smoothly without wrinkles or folds. The equipment should meet the fabric manufacturer's recommendations or equivalent standards.

Anchoring

- U-shaped wire staples, metal geotextile stake pins, or triangular wooden stakes can be used to anchor mats and blankets to the ground surface.
- Wire staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- Metal stake pins should be 0.188 in. diameter steel with a 1.5 in. steel washer at the head of the pin, and 8 in. in length.
- Wire staples and metal stakes should be driven flush to the soil surface.

Installation on Slopes

Installation should be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Begin at the top of the slope and anchor the blanket in a 6 in. deep by 6 in. wide trench. Backfill trench and tamp earth firmly.
- Unroll blanket down slope in the direction of water flow.
- Overlap the edges of adjacent parallel rolls 2 to 3 in. and staple every 3 ft (or greater, per manufacturer's specifications).
- When blankets must be spliced, place blankets end over end (shingle style) with 6 in. overlap. Staple through overlapped area, approximately 12 in. apart.
- Lay blankets loosely and maintain direct contact with the soil. Do not stretch.
- Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples should be placed down the center and staggered with the staples placed along the edges. Steep slopes, 1:1 (H:V) to 2:1 (H:V), require a minimum of 2 staples/yd². Moderate slopes, 2:1 (H:V) to 3:1 (H:V), require a minimum of 1 1/2 staples/yd². Check manufacturer's specifications to determine if a higher density staple pattern is required.

Installation in Channels

Installation should be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Dig initial anchor trench 12 in. deep and 6 in. wide across the channel at the lower end of the project area.
- Excavate intermittent check slots, 6 in. deep and 6 in. wide across the channel at 25 to 30 ft intervals along the channels.
- Cut longitudinal channel anchor trenches 4 in. deep and 4 in. wide along each side of the installation to bury edges of matting, whenever possible extend matting 2 to 3 in. above the crest of the channel side slopes.
- Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices at 12 in. intervals. Note: matting will initially be upside down in anchor trench.
- In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 3 in.
- Secure these initial ends of mats with anchors at 12 in. intervals, backfill and compact soil.
- Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench. Unroll adjacent mats upstream in similar fashion, maintaining a 3 in. overlap.

- Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot then fold back against itself. Anchor through both layers of mat at 12 in. intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.
- Alternate method for non-critical installations: Place two rows of anchors on 6 in. centers at 25 to 30 ft. intervals in lieu of excavated check slots.
- Staple shingled lap spliced ends a minimum of 12 in. apart on 12 in. intervals.
- Place edges of outside mats in previously excavated longitudinal slots; anchor using prescribed staple pattern, backfill, and compact soil.
- Anchor, fill, and compact upstream end of mat in a 12 in. by 6 in. terminal trench.
- Secure mat to ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.
- Seed and fill turf reinforcement matting with soil, if specified.

Soil Filling (if specified for turf reinforcement mat (TRM))

Installation should be in accordance with the manufacturer's recommendations. Typical installation guidelines are as follows:

- After seeding, spread and lightly rake 1/2-3/4 inches of fine topsoil into the TRM apertures to completely fill TRM thickness. Use backside of rake or other flat implement.
- Alternatively, if allowed by product specifications, spread topsoil using lightweight loader, backhoe, or other power equipment. Avoid sharp turns with equipment.
- Always consult the manufacturer's recommendations for installation.
- Do not drive tracked or heavy equipment over mat.
- Avoid any traffic over matting if loose or wet soil conditions exist.
- Use shovels, rakes, or brooms for fine grading and touch up.
- Smooth out soil filling just exposing top netting of mat.

Temporary Soil Stabilization Removal

- Temporary soil stabilization removed from the site of the work must be disposed of if necessary.

Costs

Installed costs can be relatively high compared to other BMPs. Approximate costs for installed materials are shown below:

Rolled Erosion Control Products		Installed Cost per Acre (2004) ¹	Estimated Cost per Acre (2009) ²
Biodegradable	Jute Mesh	\$6,000-\$7,000	\$6,600-\$7,700
	Curled Wood Fiber	\$8,000-\$10,500	\$8,800-\$11,050
	Straw	\$8,000-\$10,500	\$8,800-\$11,050
	Wood Fiber	\$8,000-\$10,500	\$8,800-\$11,050
	Coconut Fiber	\$13,000-\$14,000	\$14,300-\$15,400
	Coconut Fiber Mesh	\$30,000-\$33,000	\$33,000-\$36,300
	Straw Coconut Fiber	\$10,000-\$12,000	\$11,000-\$13,200
Non-Biodegradable	Plastic Netting	\$2,000-\$2,200	\$2,200-\$2,220
	Plastic Mesh	\$3,000-\$3,500	\$3,300-\$3,850
	Synthetic Fiber with Netting	\$34,000-\$40,000	\$37,400-\$44,000
	Bonded Synthetic Fibers	\$45,000-\$55,000	\$49,500-\$60,500
	Combination with Biodegradable	\$30,000-\$36,000	\$33,000-\$39,600

1. Source: Cost information received from individual product manufacturers solicited by Geosyntec Consultants (2004).

2. 2009 costs reflect a 10% escalation over year 2004 costs. Escalation based on informal survey of industry trends. Note: Expected cost increase is offset by competitive economic conditions.

Inspection and Maintenance

- RECPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident shall be repaired and BMPs reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.
- If washout or breakage occurs, re-install the material after repairing the damage to the slope or channel.
- Make sure matting is uniformly in contact with the soil.
- Check that all the lap joints are secure.
- Check that staples are flush with the ground.

References

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005

Erosion Control Pilot Study Report, State of California Department of Transportation (Caltrans), June 2000.

Guides for Erosion and Sediment Controls in California, USDA Soils Conservation Service, January 1991.

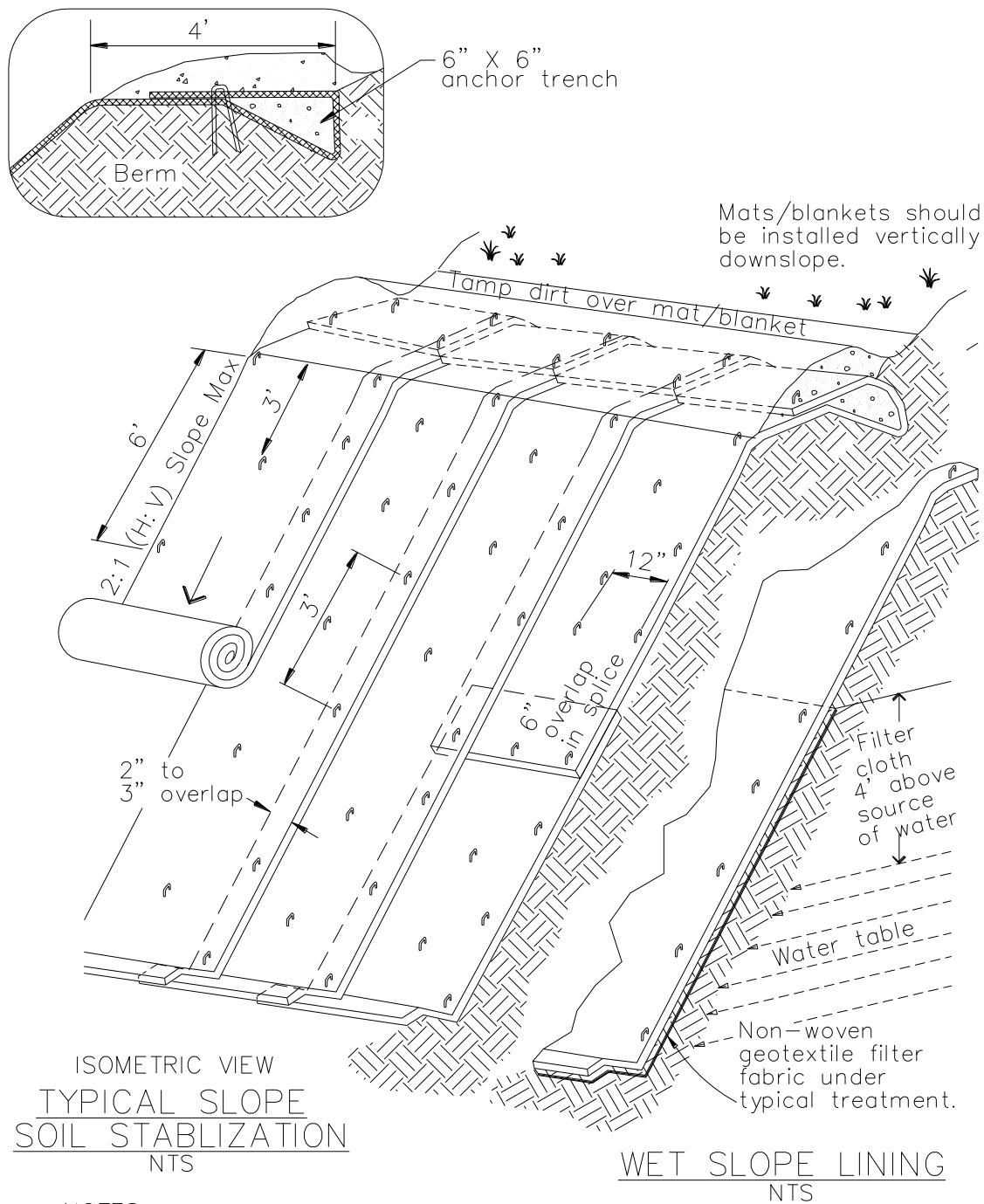
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Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

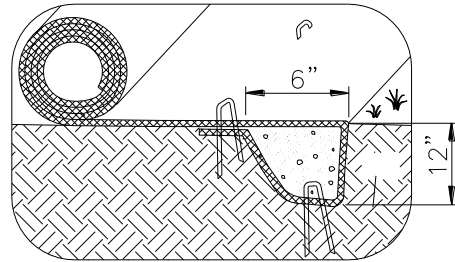
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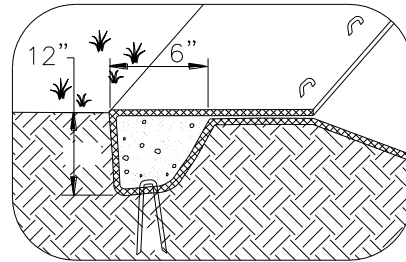
NOTES:

1. Slope surface shall be free of rocks, clods, sticks and grass. Mats/blankets shall have good soil contact.
2. Lay blankets loosely and stake or staple to maintain direct contact with the soil. Do not stretch.
3. Install per manufacturer's recommendations

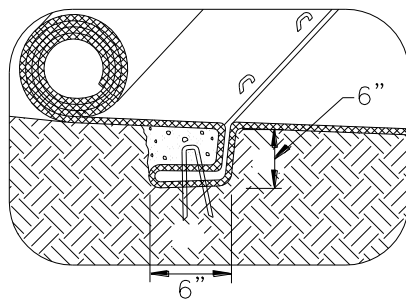
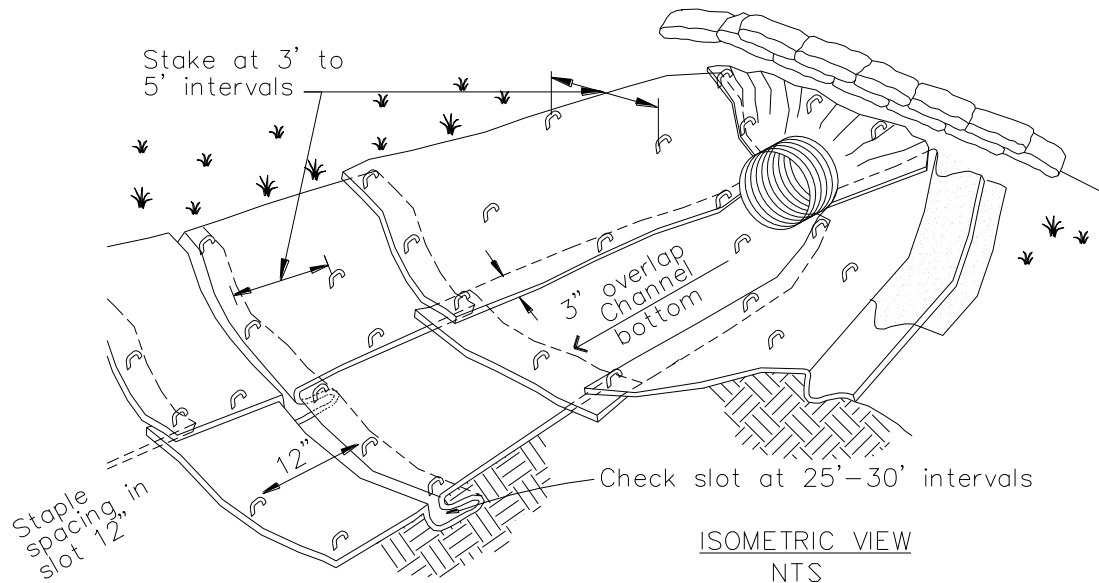
TYPICAL INSTALLATION DETAIL



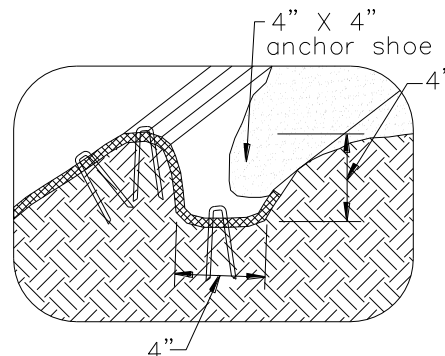
INITIAL CHANNEL ANCHOR TRENCH
NTS



TERMINAL SLOPE AND CHANNEL
ANCHOR TRENCH
NTS



INTERMITTENT CHECK SLOT
NTS



LONGITUDINAL ANCHOR TRENCH
NTS

NOTES:

1. Check slots to be constructed per manufacturers specifications.
2. Staking or stapling layout per manufacturers specifications.
3. Install per manufacturer's recommendations

TYPICAL INSTALLATION DETAIL



Description and Purpose

Wood mulching consists of applying a mixture of shredded wood mulch, bark or compost to disturbed soils. The primary function of wood mulching is to reduce erosion by protecting bare soil from rainfall impact, increasing infiltration, and reducing runoff.

Suitable Applications

Wood mulching is suitable for disturbed soil areas requiring temporary protection until permanent stabilization is established.

Limitations

- Not suitable for use on slopes steeper than 3:1 (H:V). Best suited to flat areas or gentle slopes or 5:1 (H:V) or flatter.
- Wood mulch and compost may introduce unwanted species.
- Not suitable for areas exposed to concentrated flows.
- May need to be removed prior to further earthwork.

Implementation

Mulch Selection

There are many types of mulches. Selection of the appropriate type of mulch should be based on the type of application, site conditions, and compatibility with planned or future uses.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- EC-3 Hydraulic Mulch
- EC-4 Hydroseeding
- EC-5 Soil Binders
- EC-6 Straw Mulch
- EC-7 Geotextiles and Mats

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Application Procedures

Prior to application, after existing vegetation has been removed, roughen embankment and fill areas by rolling with a device such as 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 methods are highlighted here:

- **Green Material:** This type of mulch is produced by the recycling of vegetation trimmings such as grass, shredded shrubs, and trees. Methods of application are generally by hand although pneumatic methods are available.
 - Green material can be used as a temporary ground cover with or without seeding.
 - The green material should 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.
 - Distribute by hand or use pneumatic methods.
 - Evenly distribute the mulch across the soil surface to a depth of 2 to 3 in.
- Avoid mulch placement onto roads, sidewalks, drainage channels, existing vegetation, etc.

Costs

Average annual cost for installation and maintenance (3-4 months useful life) is around \$4,000 per acre, but cost can increase if the source is not close to the project site.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident shall be repaired and BMPs reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.
- Regardless of the mulching technique selected, the key consideration in inspection and maintenance is that the 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 should 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 should focus on longevity and integrity of the mulch.
- Reapply mulch when bare earth becomes visible.

References

Controlling Erosion of Construction Sites Agriculture Information Bulletin #347, U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service – SCS).

Guides for Erosion and Sediment Control in California, USDA Soils Conservation Service, January 1991.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April 1992.

Sedimentation and Erosion Control, An Inventory of Current Practices Draft, U.S. EPA, April 1990.

Soil Erosion by Water Agricultural Information Bulletin #513, U.S. Department of Agriculture, Soil Conservation Service.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



Description and Purpose

Non-vegetative stabilization methods are used for temporary or permanent stabilization of areas prone to erosion and should be used only where vegetative options are not feasible; examples include:

- Areas of vehicular or pedestrian traffic such as roads or paths;
- Arid environments where vegetation would not provide timely ground coverage, or would require excessive irrigation;
- Rocky substrate, infertile or droughty soils where vegetation would be difficult to establish; and
- Areas where vegetation will not grow adequately within the construction time frame.

There are several non-vegetative stabilization methods and selection should be based on site-specific conditions.

Decomposed Granite (DG) is a permanent erosion protection method that consists of a layer of stabilized decomposed granite placed over an erodible surface.

Degradable Mulches of various types (see EC-3, EC-6, EC-8) can be used for temporary non-vegetative stabilization; examples include straw mulch, compost, wood chips or hydraulic mulch.

Geotextiles and Mats can be used for temporary non-vegetative stabilization (see EC-7). These BMPs are typically manufactured from degradable or synthetic materials and are

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TR	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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designed and specified based on their functional longevity, i.e., how long they will persist and provide erosion protection. All geotextiles and mats should be replaced when they exceed their functional longevity or when permanent stabilization methods are instituted.

Gravel Mulch is a non-degradable erosion control product that is composed of washed and screened coarse to very coarse gravel, 16 mm to 64 mm (0.6" - 2.5"), similar to an AASHTO No. 3 coarse aggregate.

Rock Slope Protection consists of utilizing large rock or rip-rap (4" - 24") to stabilize slopes with a high erosion potential and those subject to scour along waterways.

Soil Binders can be used for temporary non-vegetative stabilization (see EC-5). The key to their use is functional longevity. In most cases, the soil binder will need to be routinely monitored and re-applied to maintain an erosion-resistant coverage.

Suitable Applications

Non-vegetated stabilization methods are suitable for use on disturbed soil areas and on material stockpiles that need to be temporarily or permanently protected from erosion by water and wind. Non-vegetated stabilization should only be utilized when vegetation cannot be established in the required timeframe, due to soil or climactic conditions, or where vegetation may be a potential fire hazard.

Decomposed Granite (DG) and Gravel Mulch are suitable for use in areas where vegetation establishment is difficult, on flat surfaces, trails and pathways, and when used in conjunction with a stabilizer or tackifier, on shallow slopes (i.e., 10:1 [H:V]). DG and gravel can also be used on shallow rocky slopes where vegetation cannot be established for permanent erosion control.

Degradable Mulches can be used to cover and protect soil surfaces from erosion both in temporary and permanent applications. In many cases, the use of mulches by themselves requires routine inspection and re-application. See EC-3 Hydraulic Mulch, EC-6 Straw Mulch, EC-8 Wood Mulch, or EC-14 Compost Blankets for more information.

Geotextiles and Mats can be used as a temporary stand-alone soil stabilization method. Depending on material selection, geotextiles and mats can be a short-term (3 mos – 1 year) or long-term (1-2 years) temporary stabilization method. For more information on geotextiles and mats see EC-7 Geotextiles and Mats.

Rock Slope Protection can be used when the slopes are subject to scour or have a high erosion potential, such as slopes adjacent to flowing waterways or slopes subject to overflow from detention facilities (spillways).

Soil Binders can be used for temporary stabilization of stockpiles and disturbed areas not subject to heavy traffic. See EC-5 Soil Binders for more information.

Limitations

General

- Refer to EC-3, EC-6, EC-8, and EC-14 for limitations on use of mulches. Refer to EC-7 for limitations on use of geotextiles and mats. Refer to EC-5 for limitations on use of Soil Binders.

Decomposed Granite

- Not available in some geographic regions.
- If not tackified, material may be susceptible to erosion even on slight slopes (e.g., 30:1 [H:V]).
- Installed costs may be more expensive than vegetative stabilization methods.

Gravel Mulch

- Availability is limited in some geographic regions.
- If not properly screened and washed, can contain fine material that can erode and/or create dust problems.
- If inadequately sized, material may be susceptible to erosion on sloped areas.
- Pore spaces fill with dirt and debris over time; may provide a growing medium for weeds.

Rock Slope Protection

- Installation is labor intensive.
- Installed costs can be significantly higher than vegetative stabilization methods.
- Rounded stones may not be used on slopes greater than 2:1 [H:V].

Implementation

General

Non-vegetated stabilization should be used in accordance with the following general guidance:

- Should be used in conjunction with other BMPs, including drainage, erosion controls and sediment controls.
- Refer to EC-3, EC-6, EC-8, and EC-14 for implementation details for mulches. Refer to EC-7 for implementation details for geotextiles and mats. Refer to EC-5 for implementation details for soil binders.
- Non-vegetated stabilization measures should be implemented as soon as the disturbance in the areas they are intended to protect has ceased.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Decomposed Granite Stabilization

- If used for a road or path should be installed on a prepared base.
- Should be mixed with a stabilizer if used for roads or pathways, or on slope applications.
- Though porous it is recommended to prevent standing water on or next to a decomposed granite road or pathway.

Gravel Mulch

- Should be sized based on slope, rainfall, and upgradient run-on conditions. Stone size should be increased as potential for erosion increases (steeper slopes, high intensity rainfall).
- If permanent, a weed control fabric should be placed prior to installation.
- Should be installed at a minimum 2" depth.
- Should completely cover all exposed surfaces.

Rock Slope Protection

- Rock slope protection installation should follow Caltrans Standard Specification 72-2: Rock Slope Protection. Refer to the specification for rock conformity requirements and installation methods.
- When using rock slope protection, rock size and installation method should be specified by an Engineer.
- A geotextile fabric should be placed prior to installation.

Costs

- Costs are highly variable depending not only on technique chosen, but also on materials chosen within specific techniques. In addition, availability of certain materials will vary by region/location, which will also affect the cost. Costs of mulches, geotextiles and mats, and soil binders are presented in their respective fact sheets. Costs for decomposed granite, gravel mulch stabilization and rock slope protection may be higher depending on location and availability of materials. Caltrans has provided an estimate for gravel mulch of \$10 - \$15/yd² in flat areas and \$11 - \$23/yd² on side slopes.

Inspection and Maintenance

General

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- For permanent installation, require inspection periodically and after major storm events to look for signs of erosion or damage to the stabilization.
- All damage should be repaired immediately.
- Refer to EC-3, EC-6, EC-8, and EC-14 for inspection and maintenance requirements for mulches. Refer to EC-7 for inspection and maintenance requirements for geotextiles and mats. Refer to EC-5 for inspection and maintenance requirements for soil binders.

Decomposed Granite and Gravel Mulch Stabilization

- Rake out and add decomposed granite or gravel as needed to areas subject to rill erosion. Inspect upgradient drainage controls and repair/modify as necessary.

- Should remain stable under loose surface material. Any significant problem areas should be repaired to restore uniformity to the installation.

References

Arid Zone Forestry: A Guide for Field Technicians. Food and Agriculture Organization of the United Nations, 1989.

Design of Roadside Channels with Flexible Linings, Hydraulic Engineering Circular Number 15, Third Edition, Federal Highway Administration, 2007.

Design Standards for Urban Infrastructure - Soft Landscape Design, Department of Territory and Municipal Services - Australian Capital Territory http://www.tams.act.gov.au/work/standards_and_procedures/design_standards_for_urban_infrastructure

Erosion and Sediment Control Handbook: A Guide for Protection of State Waters through the use of Best Management Practices during Land Disturbing Activities, Tennessee Department of Environment and Conservation, 2002.

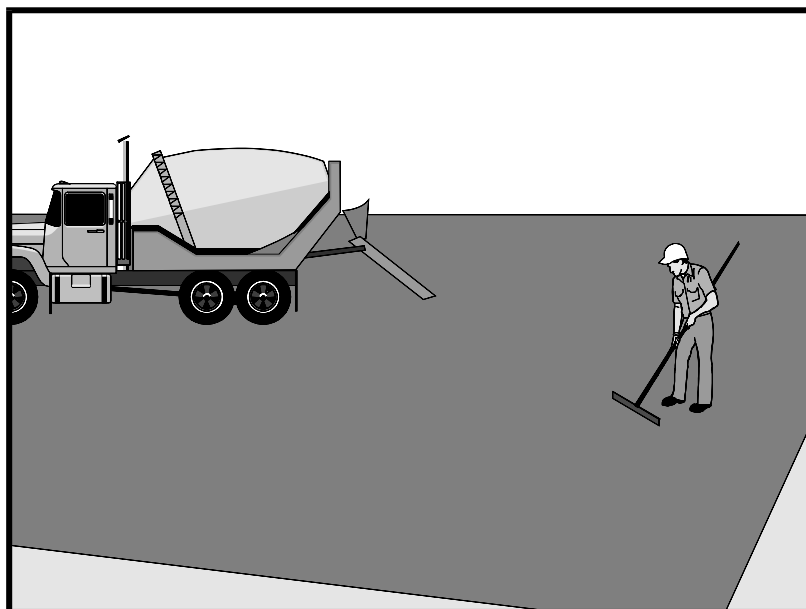
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Maine Erosion and Sediment Control BMPs, DEPLW0588, Maine Department of Environmental Protection: Bureau of Land and Water Quality, 2003.

National Menu of Best Management Practices, US Environmental Protection Agency, 2006.

Standard Specification 72-2: Rock Slope Protection. California Department of Transportation, 2006.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.



Description and Purpose

Prevent or reduce the discharge of pollutants from paving operations, using measures to prevent runoff and runoff pollution, properly disposing of wastes, and training employees and subcontractors.

The General Permit incorporates Numeric Action Levels (NAL) for pH and turbidity (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials associated with paving and grinding operations, including mortar, concrete, and cement and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

These procedures are implemented where paving, surfacing, resurfacing, or sawcutting, may pollute stormwater runoff or discharge to the storm drain system or watercourses.

Limitations

- Paving opportunities may be limited during wet weather.

Discharges of freshly paved surfaces may raise pH to environmentally harmful levels and trigger permit violations.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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Implementation

General

- Avoid paving during the wet season when feasible.
- Reschedule paving and grinding activities if rain is forecasted.
- Train employees and sub-contractors in pollution prevention and reduction.
- Store materials away from drainage courses to prevent stormwater runoff (see WM-1, Material Delivery and Storage).
- Protect drainage courses, particularly in areas with a grade, by employing BMPs to divert runoff or to trap and filter sediment.
- Stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses. These materials should be stored consistent with WM-3, Stockpile Management.
- Disposal of PCC (Portland cement concrete) and AC (asphalt concrete) waste should be in conformance with WM-8, Concrete Waste Management.

Saw Cutting, Grinding, and Pavement Removal

- Shovel or vacuum saw-cut slurry and remove from site. Cover or barricade storm drains during saw cutting to contain slurry.
- When paving involves AC, the following steps should be implemented to prevent the discharge of grinding residue, uncompacted or loose AC, tack coats, equipment cleaners, or unrelated paving materials:
 - AC grindings, pieces, or chunks used in embankments or shoulder backing should not be allowed to enter any storm drains or watercourses. Install inlet protection and perimeter controls until area is stabilized (i.e. cutting, grinding or other removal activities are complete and loose material has been properly removed and disposed of) or permanent controls are in place. Examples of temporary perimeter controls can be found in EC-9, Earth Dikes and Drainage Swales; SE-1, Silt Fence; SE-5, Fiber Rolls, or SE-13 Compost Socks and Berms
 - Collect and remove all broken asphalt and recycle when practical. Old or spilled asphalt should be recycled or disposed of properly.
- Do not allow saw-cut slurry to enter storm drains or watercourses. Residue from grinding operations should be picked up by a vacuum attachment to the grinding machine, or by sweeping, should not be allowed to flow across the pavement, and should not be left on the surface of the pavement. See also WM-8, Concrete Waste Management, and WM-10, Liquid Waste Management.
- Pavement removal activities should not be conducted in the rain.
- Collect removed pavement material by mechanical or manual methods. This material may be recycled for use as shoulder backing or base material.

- If removed pavement material cannot be recycled, transport the material back to an approved storage site.

Asphaltic Concrete Paving

- If paving involves asphaltic cement concrete, follow these steps:
 - Do not allow sand or gravel placed over new asphalt to wash into storm drains, streets, or creeks. Vacuum or sweep loose sand and gravel and properly dispose of this waste by referring to WM-5, Solid Waste Management.
 - Old asphalt should be disposed of properly. Collect and remove all broken asphalt from the site and recycle whenever possible.

Portland Cement Concrete Paving

- Do not wash sweepings from exposed aggregate concrete into a storm drain system. Collect waste materials by dry methods, such as sweeping or shoveling, and return to aggregate base stockpile or dispose of properly. Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in WM-8, Concrete Waste Management, or pump the water to the sanitary sewer if authorized by the local wastewater authority.

Sealing Operations

- During chip seal application and sweeping operations, petroleum or petroleum covered aggregate should not be allowed to enter any storm drain or water courses. Apply temporary perimeter controls until structure is stabilized (i.e. all sealing operations are complete and cured and loose materials have been properly removed and disposed).
- Inlet protection (SE-10, Storm Drain Inlet Protection) should be used during application of seal coat, tack coat, slurry seal, and fog seal.
- Seal coat, tack coat, slurry seal, or fog seal should not be applied if rainfall is predicted to occur during the application or curing period.

Paving Equipment

- Leaks and spills from paving equipment can contain toxic levels of heavy metals and oil and grease. Place drip pans or absorbent materials under paving equipment when not in use. Clean up spills with absorbent materials and dispose of in accordance with the applicable regulations. See NS-10, Vehicle and Equipment Maintenance, WM-4, Spill Prevention and Control, and WM-10, Liquid Waste Management.
- Substances used to coat asphalt transport trucks and asphalt spreading equipment should not contain soap and should be non-foaming and non-toxic.
- Paving equipment parked onsite should be parked over plastic to prevent soil contamination.
- Clean asphalt coated equipment offsite whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in WM-5, Solid Waste Management. Any cleaning onsite should follow NS-8, Vehicle and Equipment Cleaning.

Thermoplastic Striping

- Thermoplastic striper and pre-heater equipment shutoff valves should be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the stormwater drainage system, or watercourses.
- Pre-heaters should 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.
- Do 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.

Raised/Recessed Pavement Marker Application and Removal

- Do not transfer or load bituminous material near drain inlets, the stormwater drainage system, or watercourses.
- Melting tanks should be loaded with care and not filled to beyond six inches from the top to leave room for splashing.
- When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.
- On large-scale projects, use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.

Costs

- All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of paving and grinding operations.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Sample stormwater runoff required by the General Permit.
- Keep ample supplies of drip pans or absorbent materials onsite.
- Inspect and maintain machinery regularly to minimize leaks and drips.

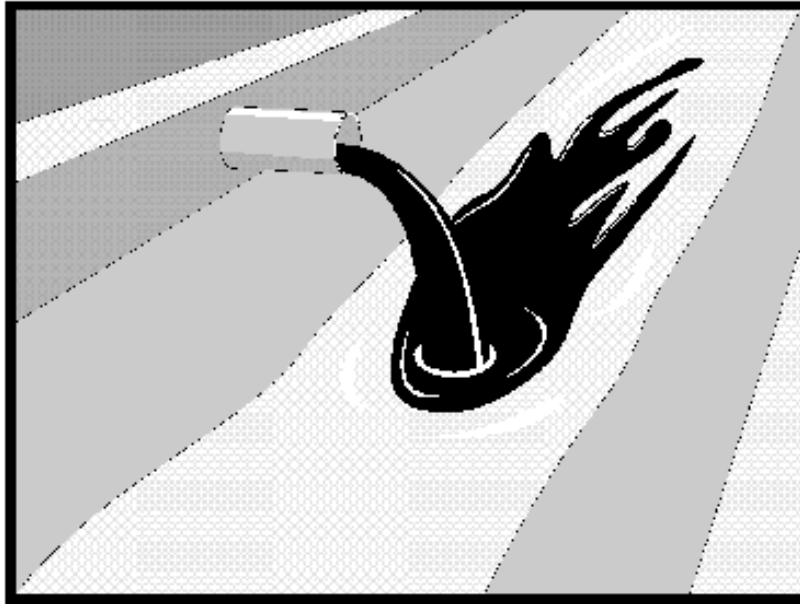
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Hot Mix Asphalt-Paving Handbook AC 150/5370-14, Appendix I, U.S. Army Corps of Engineers, July 1991.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

Description 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.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Illicit connection/discharge and reporting is applicable anytime an illicit connection or discharge is discovered or illegally dumped material is found on the construction site.

Limitations

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. If pre-existing hazardous materials or wastes are known to exist onsite, they should be identified in the SWPPP and handled as set forth in the SWPPP.

Implementation

Planning

- Review the SWPPP. Pre-existing areas of contamination should be identified and documented in the SWPPP.
- Inspect site before beginning the job for evidence of illicit connections, illegal dumping or discharges. Document any pre-existing conditions and notify the owner.

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

Identification of Illicit Connections and Illegal Dumping or Discharges

- **General** – unlabeled and unidentifiable material should be treated as 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 from the traveled way.
- **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 sub drain 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 active offsite construction projects
- **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 non-irrigation season
 - Non-standard junction structures
 - Broken concrete or other disturbances at or near junction structures

Reporting

Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery. For illicit connections or discharges to the storm drain system, notify the local stormwater management agency. For illegal dumping, notify the local law enforcement agency.

Cleanup and Removal

The responsibility for cleanup and removal of illicit or illegal dumping or discharges will vary by location. Contact the local stormwater management agency for further information.

Costs

Costs to look for and report illicit connections and illegal discharges and dumping are low. The best way to avoid costs associated with illicit connections and illegal discharges and dumping is to keep the project perimeters secure to prevent access to the site, to observe the site for vehicles that should not be there, and to document any waste or hazardous materials that exist onsite before taking possession of the site.

Inspection and Maintenance

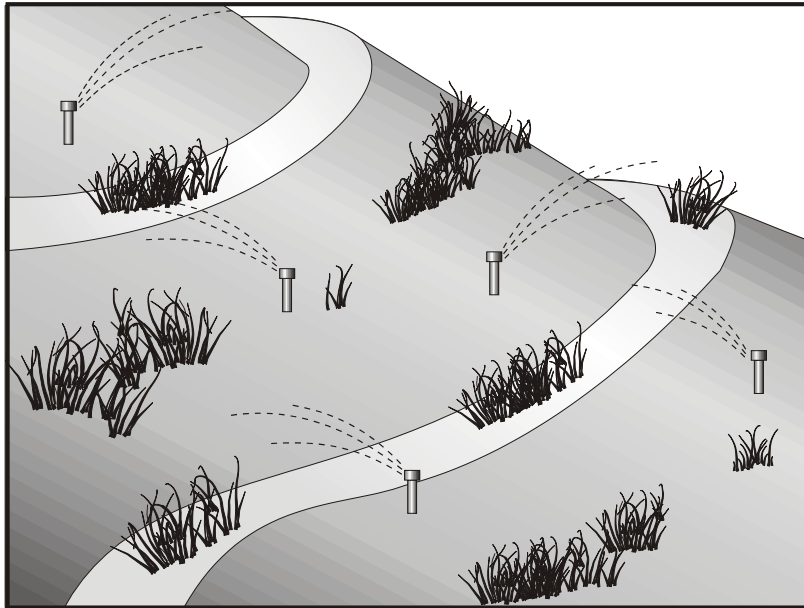
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect the site regularly to check for any illegal dumping or discharge.
- Prohibit employees and subcontractors from disposing of non-job related debris or materials at the construction site.
- Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Potable Water/Irrigation 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, and hydrant flushing.

Suitable Applications

Implement this BMP whenever potable water or irrigation water discharges occur at or enter a construction site.

Limitations

None identified.

Implementation

- Direct water from offsite sources around or through a construction site, where feasible, in a way that minimizes contact with the construction site.
- Discharges from water line flushing should be reused for landscaping purposes where feasible.
- Shut off the water source to broken lines, sprinklers, or valves as soon as possible to prevent excess water flow.
- Protect downstream stormwater drainage systems and watercourses from water pumped or bailed from trenches excavated to repair water lines.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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- 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.

Costs

Cost to manage potable water and irrigation are low and generally considered to be a normal part of related activities.

Inspection and Maintenance

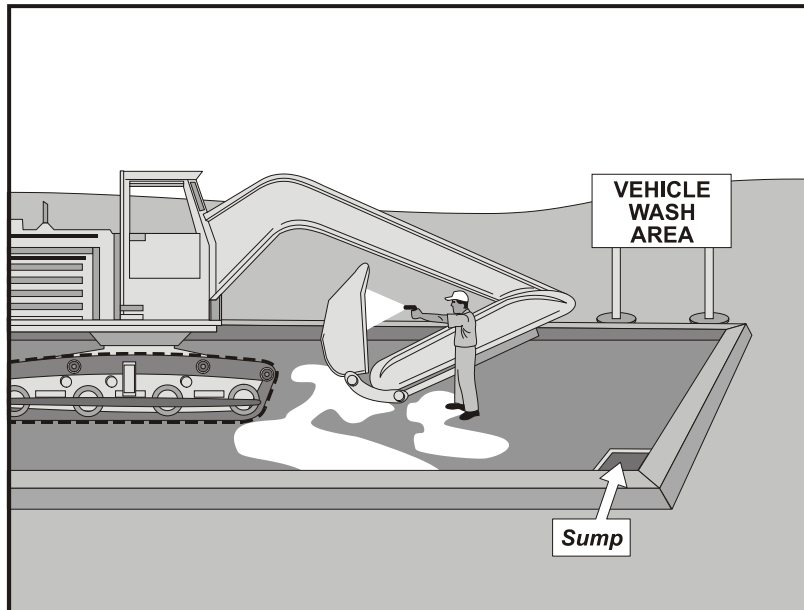
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events..
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Repair broken water lines as soon as possible.
- Inspect irrigated areas regularly for signs of erosion and/or discharge.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Vehicle and equipment cleaning procedures and practices eliminate or reduce the discharge of pollutants to stormwater from vehicle and equipment cleaning operations. Procedures and practices include but are not limited to: using offsite facilities; washing in designated, contained areas only; eliminating discharges to the storm drain by infiltrating the wash water; and training employees and subcontractors in proper cleaning procedures.

Suitable Applications

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

Limitations

Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Implementation

Other options to washing equipment onsite include contracting with either an offsite or mobile commercial washing business. These businesses may be better equipped to handle and dispose of the wash waters properly. Performing this work offsite can also be economical by eliminating the need for a separate washing operation onsite.

If washing operations are to take place onsite, then:

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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- Use phosphate-free, biodegradable soaps.
- Educate employees and subcontractors on pollution prevention measures.
- Do not permit steam cleaning onsite. Steam cleaning can generate significant pollutant concentrates.
- Cleaning of vehicles and equipment with soap, solvents or steam should not occur on the project site unless resulting wastes are fully contained and disposed of. Resulting wastes should not be discharged or buried, and must be captured and recycled or disposed according to the requirements of WM-10, Liquid Waste Management or WM-6, Hazardous Waste Management, depending on the waste characteristics. Minimize use of solvents. Use of diesel for vehicle and equipment cleaning is prohibited.
- All vehicles and equipment that regularly enter and leave the construction site must be cleaned offsite.
- When vehicle and equipment washing and cleaning must occur onsite, and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area should have the following characteristics:
 - Located away from storm drain inlets, drainage facilities, or watercourses
 - Paved with concrete or asphalt and bermed to contain wash waters and to prevent runoff
 - Configured with a sump to allow collection and disposal of wash water
 - No discharge of wash waters to storm drains or watercourses
 - Used only when necessary
- When cleaning vehicles and equipment with water:
 - Use as little water as possible. High-pressure sprayers may use less water than a hose and should be considered
 - Use positive shutoff valve to minimize water usage
 - Facility wash racks should discharge to a sanitary sewer, recycle system or other approved discharge system and must not discharge to the storm drainage system, watercourses, or to groundwater

Costs

Cleaning vehicles and equipment at an offsite facility may reduce overall costs for vehicle and equipment cleaning by eliminating the need to provide similar services onsite. When onsite cleaning is needed, the cost to establish appropriate facilities is relatively low on larger, long-duration projects, and moderate to high on small, short-duration projects.

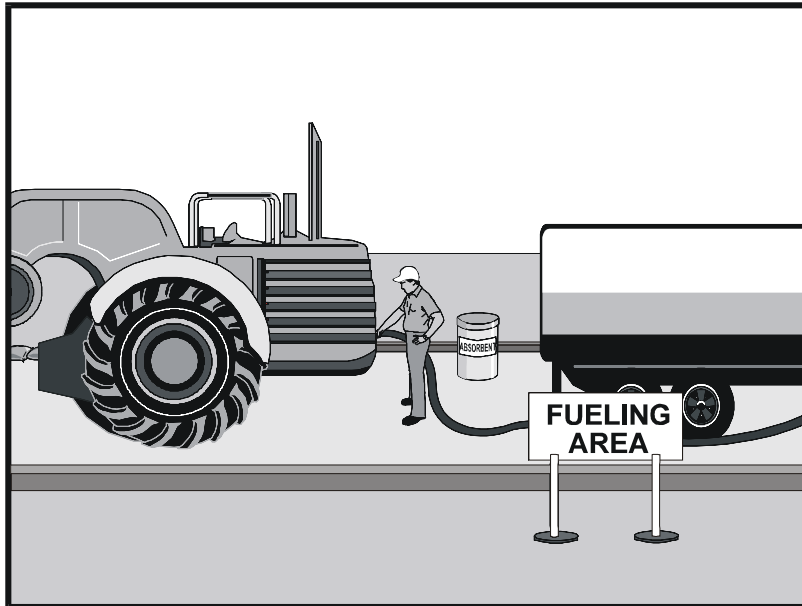
Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspection and maintenance is minimal, although some berm repair may be necessary.
- Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.
- Inspect sump regularly and remove liquids and sediment as needed.
- Prohibit employees and subcontractors from washing personal vehicles and equipment on the construction site.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Swisher, R.D. Surfactant Biodegradation, Marcel Decker Corporation, 1987.



Description and Purpose

Vehicle equipment fueling procedures and practices are designed to prevent fuel spills and leaks, and reduce or eliminate contamination of stormwater. This can be accomplished by using offsite facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors in proper fueling procedures.

Suitable Applications

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

Limitations

Onsite vehicle and equipment fueling should only be used where it is impractical to send vehicles and equipment offsite for fueling. Sending vehicles and equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/ Exit.

Implementation

- Use offsite fueling stations as much as possible. These businesses are better equipped to handle fuel and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate fueling area at a site.
- Discourage “topping-off” of fuel tanks.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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- Absorbent spill cleanup materials and spill kits should be available in fueling areas and on fueling trucks, and should be disposed of properly after use.
- Drip pans or absorbent pads should be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Use absorbent materials on small spills. Do not hose down or bury the spill. Remove the adsorbent materials promptly and dispose of properly.
- Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and large excavators, most vehicles should be able to travel to a designated area with little lost time.
- Train employees and subcontractors in proper fueling and cleanup procedures.
- When fueling must take place onsite, designate an area away from drainage courses to be used. Fueling areas should be identified in the SWPPP.
- Dedicated fueling areas should be protected from stormwater runoff and should be located at least 50 ft away from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Protect fueling areas with berms and dikes to prevent runoff, and to contain spills.
- Nozzles used in vehicle and equipment fueling should be equipped with an automatic shutoff to control drips. Fueling operations should not be left unattended.
- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD).
- Federal, state, and local requirements should be observed for any stationary above ground storage tanks.

Costs

- All of the above measures are low cost except for the capital costs of above ground tanks that meet all local environmental, zoning, and fire codes.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Vehicles and equipment should be inspected each day of use for leaks. Leaks should be repaired immediately or problem vehicles or equipment should be removed from the project site.
- Keep ample supplies of spill cleanup materials onsite.

- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.

References

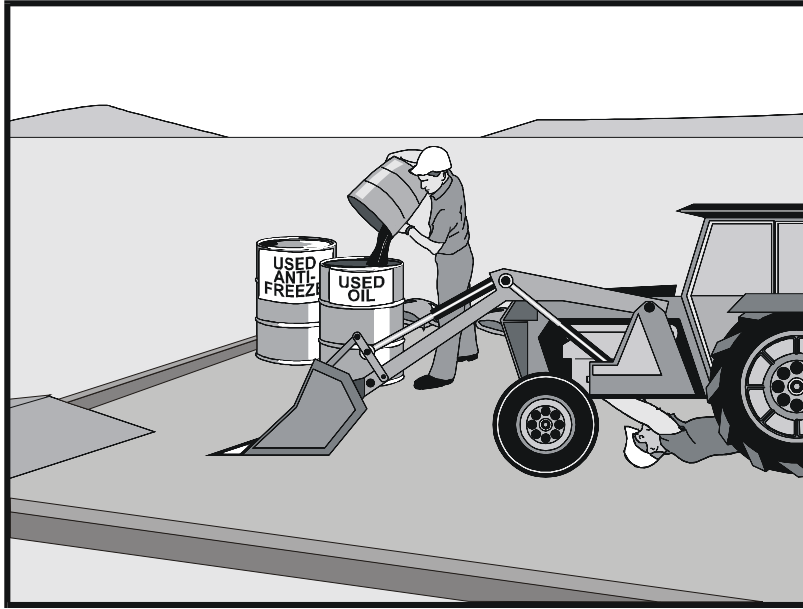
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle & Equipment Maintenance NS-10



Description and Purpose

Prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a “dry and clean site”. The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. Employees and subcontractors must be trained in proper procedures.

Suitable Applications

These procedures are suitable on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

Onsite vehicle and equipment maintenance should only be used where it is impractical to send vehicles and equipment offsite for maintenance and repair. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Outdoor vehicle or equipment maintenance is a potentially significant source of stormwater pollution. Activities that can contaminate stormwater include engine repair and service, changing or replacement of fluids, and outdoor equipment storage and parking (engine fluid leaks). For further information on vehicle or equipment servicing, see NS-8,

Categories

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WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Vehicle & Equipment Maintenance NS-10

Vehicle and Equipment Cleaning, and NS-9, Vehicle and Equipment Fueling.

Implementation

- Use offsite repair shops as much as possible. These businesses are better equipped to handle vehicle fluids and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate maintenance area.
- If maintenance must occur onsite, use designated areas, located away from drainage courses. Dedicated maintenance areas should be protected from stormwater runoff and runoff, and should be located at least 50 ft from downstream drainage facilities and watercourses.
- Drip pans or absorbent pads should be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices.
- Use adsorbent materials on small spills. Remove the absorbent materials promptly and dispose of properly.
- Inspect onsite vehicles and equipment daily at startup for leaks, and repair immediately.
- Keep vehicles and equipment clean; do not allow excessive build-up of oil and grease.
- Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic and transmission fluids. Provide secondary containment and covers for these materials if stored onsite.
- Train employees and subcontractors in proper maintenance and spill cleanup procedures.
- Drip pans or plastic sheeting should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.
- For long-term projects, consider using portable tents or covers over maintenance areas if maintenance cannot be performed offsite.
- Consider use of new, alternative greases and lubricants, such as adhesive greases, for chassis lubrication and fifth-wheel lubrication.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose of or recycle used batteries.
- Do not bury used tires.

Vehicle & Equipment Maintenance NS-10

- Repair leaks of fluids and oil immediately.

Listed below is further information if you must perform vehicle or equipment maintenance onsite.

Safer Alternative Products

- Consider products that are less toxic or hazardous than regular products. These products are often sold under an “environmentally friendly” label.
- Consider use of grease substitutes for lubrication of truck fifth-wheels. Follow manufacturers label for details on specific uses.
- Consider use of plastic friction plates on truck fifth-wheels in lieu of grease. Follow manufacturers label for details on specific uses.

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, trichloroethane, or methylene chloride. Many of these cleaners are listed in California Toxic Rule as priority pollutants. These materials are harmful and must not contaminate stormwater. They must be disposed of as a hazardous waste. Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Often, one solvent can perform a job as well as two different solvents. Also, if possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous materials. For example, replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check the list of active ingredients to see whether it contains chlorinated solvents. The “chlor” term indicates that the solvent is chlorinated. Also, try substituting a wire brush for solvents to clean parts.

Recycling and Disposal

Separating wastes allows for easier recycling and may reduce disposal costs. Keep hazardous wastes separate, do not mix used oil solvents, and keep chlorinated solvents (like, -trichloroethane) separate from non-chlorinated solvents (like kerosene and mineral spirits). Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around. Provide cover and secondary containment until these materials can be removed from the site.

Oil filters can be recycled. Ask your oil supplier or recycler about recycling oil filters.

Do not dispose of extra paints and coatings by dumping liquid onto the ground or throwing it into dumpsters. Allow coatings to dry or harden before disposal into covered dumpsters.

Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Costs

All of the above are low cost measures. Higher costs are incurred to setup and maintain onsite maintenance areas.

Vehicle & Equipment Maintenance NS-10

Inspection and Maintenance

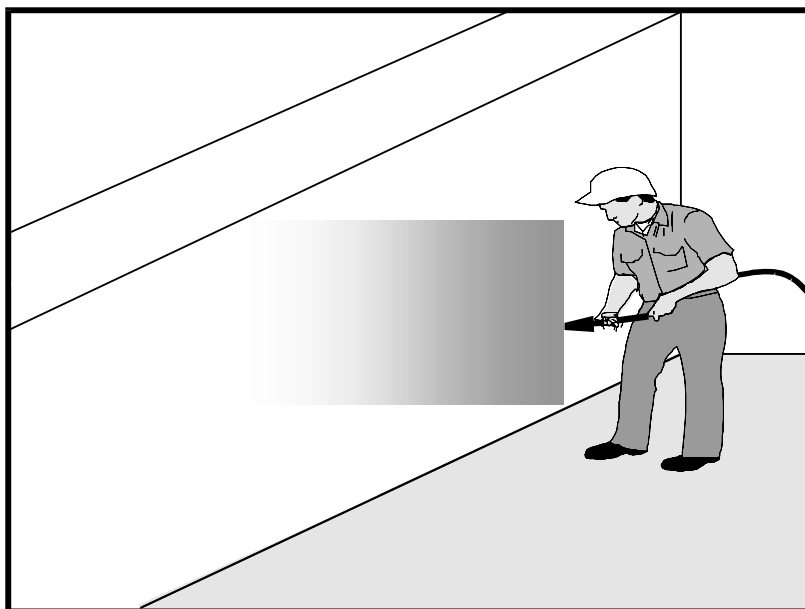
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Keep ample supplies of spill cleanup materials onsite.
- Maintain waste fluid containers in leak proof condition.
- Vehicles and equipment should be inspected on each day of use. Leaks should be repaired immediately or the problem vehicle(s) or equipment should be removed from the project site.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



Description and Purpose

Concrete curing is used in the construction of structures such as bridges, retaining walls, pump houses, large slabs, and structured foundations. Concrete curing includes the use of both chemical and water methods.

Concrete and its associated curing materials have basic chemical properties that can raise the pH of water to levels outside of the permitted range. Discharges of stormwater and non-stormwater exposed to concrete during curing may have a high pH and may contain chemicals, metals, and fines. The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Proper procedures and care should be taken when managing concrete curing materials to prevent them from coming into contact with stormwater flows, which could result in a high pH discharge.

Suitable Applications

Suitable applications include all projects where Portland Cement Concrete (PCC) and concrete curing chemicals are placed where they can be exposed to rainfall, runoff from other areas, or where runoff from the PCC will leave the site.

Limitations

- Runoff contact with concrete waste can raise pH levels in the water to environmentally harmful levels and trigger permit violations.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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Implementation

Chemical Curing

- Avoid over spray of curing compounds.
- Minimize the drift 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 WM-1, Material Delivery and Storage.
- Protect drain inlets prior to the application of curing compounds.
- Refer to WM-4, Spill Prevention and Control.

Water Curing for Bridge Decks, Retaining Walls, and other Structures

- Direct cure water away from inlets and watercourses to collection areas for evaporation or other means of removal in accordance with all applicable permits. See WM-8 Concrete Waste Management.
- Collect cure water at the top of slopes and transport to a concrete waste management area in a non-erosive manner. See EC-9 Earth Dikes and Drainage Swales, EC-10, Velocity Dissipation Devices, and EC-11, Slope Drains.
- Utilize wet blankets or a similar method that maintains moisture while minimizing the use and possible discharge of water.

Education

- Educate employees, subcontractors, and suppliers on proper concrete curing techniques to prevent contact with discharge as described herein.
- Arrange for the QSP or the appropriately trained contractor's superintendent or representative to oversee and enforce concrete curing procedures.

Costs

All of the above measures are generally low cost.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Sample non-stormwater discharges and stormwater runoff that contacts uncured and partially cured concrete as required by the General Permit.
- Ensure that employees and subcontractors implement appropriate measures for storage, handling, and use of curing compounds.
- Inspect cure containers and spraying equipment for leaks.

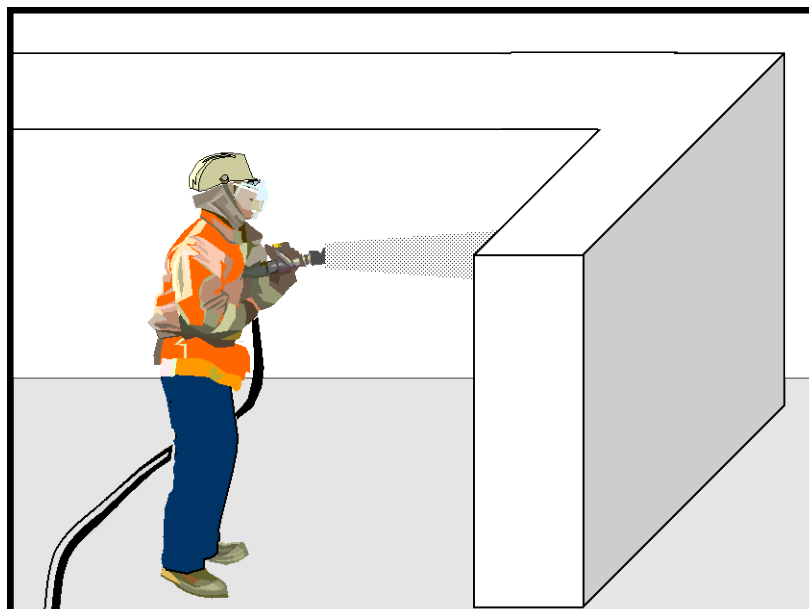
References

Blue Print for a Clean Bay-Construction-Related Industries: Best Management Practices for Stormwater Pollution Prevention; Santa Clara Valley Non Point Source Pollution Control Program, 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



Description and Purpose

Concrete finishing methods are used for bridge deck rehabilitation, paint removal, curing compound removal, and final surface finish appearances. Methods include sand blasting, shot blasting, grinding, or high pressure water blasting. Stormwater and non-stormwater exposed to concrete finishing by-products may have a high pH and may contain chemicals, metals, and fines. Proper procedures and implementation of appropriate BMPs can minimize the impact that concrete-finishing methods may have on stormwater and non-stormwater discharges.

The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Concrete and its associated curing materials have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

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

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Limitations

- Runoff contact with concrete waste can raise pH levels in the water to environmentally harmful levels and trigger permit violations.

Implementation

- Collect and properly dispose of water from high-pressure water blasting operations.
- Collect contaminated water from blasting operations at the top of slopes. Transport or dispose of contaminated water while using BMPs such as those for erosion control. Refer to EC-9, Earth Dikes and Drainage Swales, EC-10, Velocity Dissipation Devices, and EC-11, Slope Drains.
- Direct water from blasting operations away from inlets and watercourses to collection areas for infiltration or other means of removal (dewatering). Refer to NS-2 Dewatering Operations.
- Protect inlets during sandblasting operations. Refer to SE-10, Storm Drain Inlet Protection.
- Refer to WM-8, Concrete Waste Management for disposal of concrete debris.
- 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 WM-6, Hazardous Waste Management.

Education

- Educate employees, subcontractors, and suppliers on proper concrete finishing techniques to prevent contact with discharge as described herein.
- Arrange for the QSP or the appropriately trained contractor's superintendent or representative to oversee and enforce concrete finishing procedures.

Costs

These measures are generally of low cost.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Sample non-stormwater discharges and stormwater runoff that contacts concrete dust and debris as required by the General Permit.

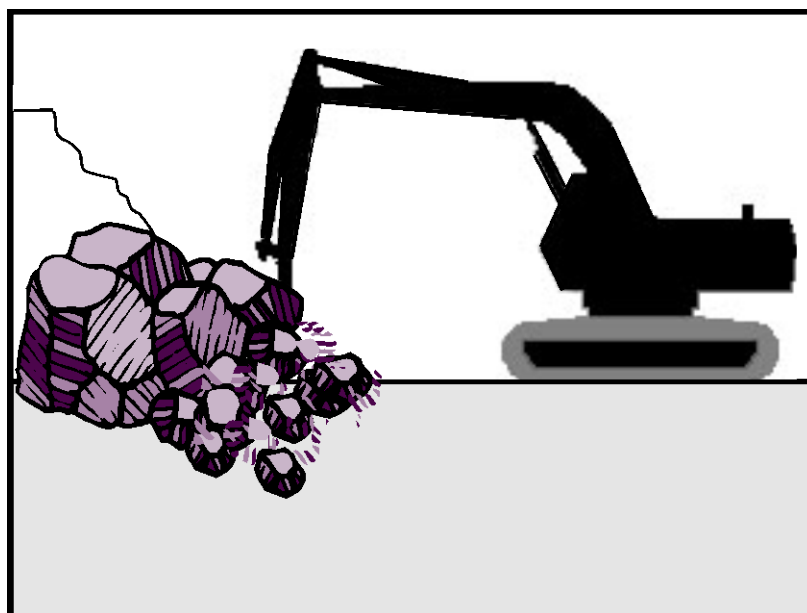
- Sweep or vacuum up debris from sandblasting at the end of each shift.
- At the end of each work shift, remove and contain liquid and solid waste from containment structures, if any, and from the general work area.
- Inspect containment structures for damage prior to use and prior to onset of forecasted rain.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Procedures to protect water bodies from debris and wastes associated with structure demolition or removal over or adjacent to watercourses.

Suitable Applications

Full bridge demolition and removal, partial bridge removal (barrier rail, edge of deck) associated with bridge widening projects, concrete channel removal, or any other structure removal that could potentially affect water quality.

Limitations

None identified.

Implementation

- Refer to NS-5, Clear Water Diversion, to direct water away from work areas.
- Use attachments on construction equipment such as backhoes to catch debris from small demolition operations.
- Use covers or platforms to collect debris.
- Platforms and covers are to be approved by the owner.
- Stockpile accumulated debris and waste generated during demolition away from watercourses and in accordance with WM-3, Stockpile Management.
- Ensure safe passage of wildlife, as necessary.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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- Discharges to waterways shall be reported to the Regional Water Quality Control Board immediately upon discovery. A written discharge notification must follow within 7 days. Follow the spill reporting procedures in the SWPPP.
- For structures containing hazardous materials, i.e., lead paint or asbestos, refer to BMP WM-6, Hazardous Waste Management. For demolition work involving soil excavation around lead-painted structures, refer to WM-7, Contaminated Soil Management.

Costs

Cost may vary according to the combination of practices implemented.

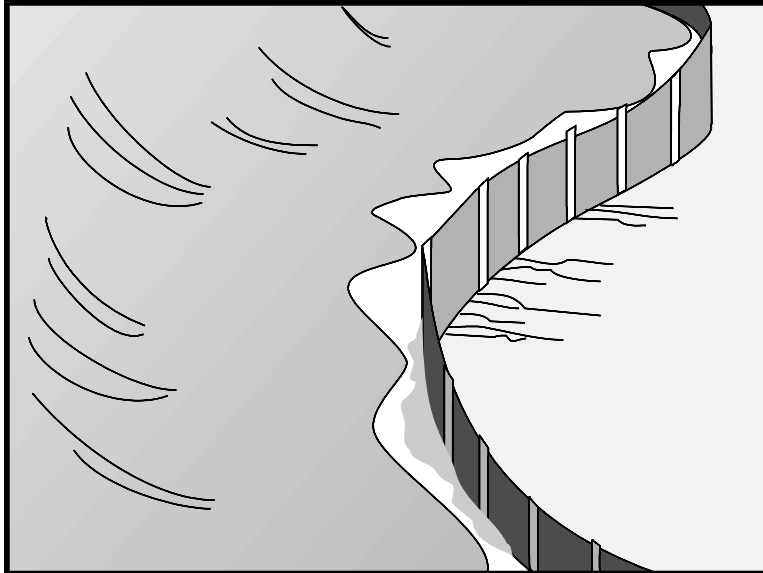
Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Any debris-catching devices shall be emptied regularly. Collected debris shall be removed and stored away from the watercourse and protected from runoff and runoff.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

A silt fence is made of a woven geotextile that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support. The silt fence detains water, promoting sedimentation of coarse sediment behind the fence. Silt fence does not retain soil fine particles like clays or silts.

Suitable Applications

Silt fences are suitable for perimeter control, placed below areas where sheet flows discharge from the site. They could also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion and around inlets within disturbed areas (SE-10). Silt fences should not be used in locations where the flow is concentrated. Silt fences should always be used in combination with erosion controls. Suitable applications include:

- At perimeter of a project.
- Below the toe or down slope of exposed and erodible slopes.
- Along streams and channels.
- Around temporary spoil areas and stockpiles.
- Around inlets.
- Below other small cleared areas.

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ **Primary Category**
- ☒ **Secondary Category**

Targeted Constituents

Sediment (coarse sediment)	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-5 Fiber Rolls
- SE-6 Gravel Bag Berm
- SE-12 Manufactured Linear Sediment Controls
- SE-13 Compost Socks and Berms
- SE-14 Biofilter Bags

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Limitations

- Do not use in streams, channels, drain inlets, or anywhere flow is concentrated.
- Do not use in locations where ponded water may cause a flooding hazard.
- Do not use silt fence to divert water flows or place across any contour line.
- Improperly installed fences are subject to failure from undercutting, overtopping, or collapsing.
- Must be trenched and keyed in.
- Not intended for use as a substitute for Fiber Rolls (SE-5), when fiber rolls are being used as a slope interruption device.
- Do not use on slopes subject to creeping, slumping, or landslides.

Implementation

General

A silt fence is a temporary sediment barrier consisting of woven geotextile stretched across and attached to supporting posts, trenched-in, and, depending upon the strength of fabric used, supported with plastic or wire mesh fence. Silt fences trap coarse sediment by intercepting and detaining sediment-laden runoff from disturbed areas in order to promote sedimentation behind the fence.

The following layout and installation guidance can improve performance and should be followed:

- Silt fence should be used in combination with erosion controls up-slope in order to provide the most effective sediment control.
- Silt fence alone is not effective at reducing turbidity. (Barrett and Malina, 2004)
- Designers should consider diverting sediment laden water to a temporary sediment basin or trap. (EPA, 2012)
- Use principally in areas where sheet flow occurs.
- Install along a level contour, so water does not pond more than 1.5 ft at any point along the silt fence.
- Provide sufficient room for runoff to pond behind the fence and to allow sediment removal equipment to pass between the silt fence and toes of slopes or other obstructions. About 1200 ft² of ponding area should be provided for every acre draining to the fence.
- Efficiency of silt fences is primarily dependent on the detention time of the runoff behind the control. (Barrett and Malina, 2004)
- The drainage area above any fence should not exceed a quarter of an acre. (Rule of Thumb- 100-feet of silt fence per 10,000 square feet of disturbed area.) (EPA 2012)

- The maximum length of slope draining to any point along the silt fence should be 100 ft per foot of silt fence.
- Turn the ends of the filter fence uphill to prevent stormwater from flowing around the fence.
- Leave an undisturbed or stabilized area immediately down slope from the fence where feasible.
- Silt fences should remain in place until the disturbed area draining to the silt fence is permanently stabilized, after which, the silt fence fabric and posts should be removed and properly disposed.
- J-Hooks, which have ends turning up the slope to break up long runs of fence and provide multiple storage areas that work like mini-retention areas, may be used to increase the effectiveness of silt fence.
- Be aware of local regulations regarding the type and installation requirements of silt fence, which may differ from those presented in this fact sheet.

Design and Layout

In areas where high winds are anticipated the fence should be supported by a plastic or wire mesh. The geotextile fabric of the silt fence should contain ultraviolet inhibitors and stabilizers to provide longevity equivalent to the project life or replacement schedule.

- Layout in accordance with the attached figures.
- For slopes that contain a high number of rocks or large dirt clods that tend to dislodge, it may be necessary to protect silt fence from rocks (e.g., rockfall netting) ensure the integrity of the silt fence installation.

Standard vs. Heavy Duty Silt Fence

Standard Silt Fence

- Generally applicable in cases where the area draining to fence produces moderate sediment loads.

Heavy Duty Silt Fence

- Heavy duty silt fence usually has 1 or more of the following characteristics, not possessed by standard silt fence.
 - Fabric is reinforced with wire backing or additional support.
 - Posts are spaced closer than pre-manufactured, standard silt fence products.
- Use is generally limited to areas affected by high winds.
- Area draining to fence produces moderate sediment loads.

Materials

Standard Silt Fence

- Silt fence material should be woven geotextile with a minimum width of 36 in. The fabric should conform to the requirements in ASTM designation D6461.
- Wooden stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should 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.

- Staples used to fasten the fence fabric to the stakes should be not less than 1.75 in. long and should 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 should be 9 gauge or heavier wire. Galvanizing of the fastening wire will not be required.

Heavy-Duty Silt Fence

- Some silt fence has a wire backing to provide additional support, and there are products that may use prefabricated plastic holders for the silt fence and use metal posts instead of wood stakes.

Installation Guidelines – Traditional Method

Silt fences are to be constructed on a level contour. Sufficient area should exist behind the fence for ponding to occur without flooding or overtopping the fence.

- A trench should be excavated approximately 6 in. wide and 6 in. deep along the line of the proposed silt fence (trenches should not be excavated wider or deeper than necessary for proper silt fence installation).
- Bottom of the silt fence should be keyed-in a minimum of 12 in.
- Posts should be spaced a maximum of 6 ft apart and driven securely into the ground a minimum of 18 in. or 12 in. below the bottom of the trench.
- When standard strength geotextile is used, a plastic or wire mesh support fence should be fastened securely to the upslope side of posts using heavy-duty wire staples at least 1 in. long. The mesh should extend into the trench.
- When extra-strength geotextile and closer post spacing are used, the mesh support fence may be eliminated.
- Woven geotextile should be purchased in a long roll, then cut to the length of the barrier. When joints are necessary, geotextile should be spliced together only at a support post, with a minimum 6 in. overlap and both ends securely fastened to the post.
- The trench should be backfilled with native material and compacted.
- Construct the length of each reach so that the change in base elevation along the reach does not exceed $\frac{1}{3}$ the height of the barrier; in no case should the reach exceed 500 ft.
- Cross barriers should be a minimum of $\frac{1}{3}$ and a maximum of $\frac{1}{2}$ the height of the linear barrier.
- See typical installation details at the end of this fact sheet.

Installation Guidelines - Static Slicing Method

- Static Slicing is defined as insertion of a narrow blade pulled behind a tractor, similar to a plow blade, at least 10 inches into the soil while at the same time pulling silt geotextile fabric into the ground through the opening created by the blade to the depth of the blade. Once the geotextile is installed, the soil is compacted using tractor tires.
- This method will not work with pre-fabricated, wire backed silt fence.
- Benefits:
 - Ease of installation (most often done with a 2 person crew).
 - Minimal soil disturbance.
 - Better level of compaction along fence, less susceptible to undercutting
 - Uniform installation.
- Limitations:
 - Does not work in shallow or rocky soils.
 - Complete removal of geotextile material after use is difficult.
 - Be cautious when digging near potential underground utilities.

Costs

- It should be noted that costs vary greatly across regions due to available supplies and labor costs.
- Average annual cost for installation using the traditional silt fence installation method (assumes 6 month useful life) is \$7 per linear foot based on vendor research. Range of cost is \$3.50 - \$9.10 per linear foot.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair undercut silt fences.
- Repair or replace split, torn, slumping, or weathered fabric. The lifespan of silt fence fabric is generally 5 to 8 months.
- Silt fences that are damaged and become unsuitable for the intended purpose should be removed from the site of work, disposed, and replaced with new silt fence barriers.
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches 1/3 of the barrier height.
- Silt fences should be left in place until the upgradient area is permanently stabilized. Until then, the silt fence should be inspected and maintained regularly.

- Remove silt fence when upgradient areas are stabilized. Fill and compact post holes and anchor trench, remove sediment accumulation, grade fence alignment to blend with adjacent ground, and stabilize disturbed area.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Monitoring Data on Effectiveness of Sediment Control Techniques, Proceedings of World Water and Environmental Resources Congress, Barrett M. and Malina J. 2004.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group-Working Paper, USEPA, April 1992.

Sedimentation and Erosion Control Practices, and Inventory of Current Practices (Draft), USEPA, 1990.

Southeastern Wisconsin Regional Planning Commission (SWRPC). Costs of Urban Nonpoint Source Water Pollution Control Measures. Technical Report No. 31. Southeastern Wisconsin Regional Planning Commission, Waukesha, WI. 1991.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.

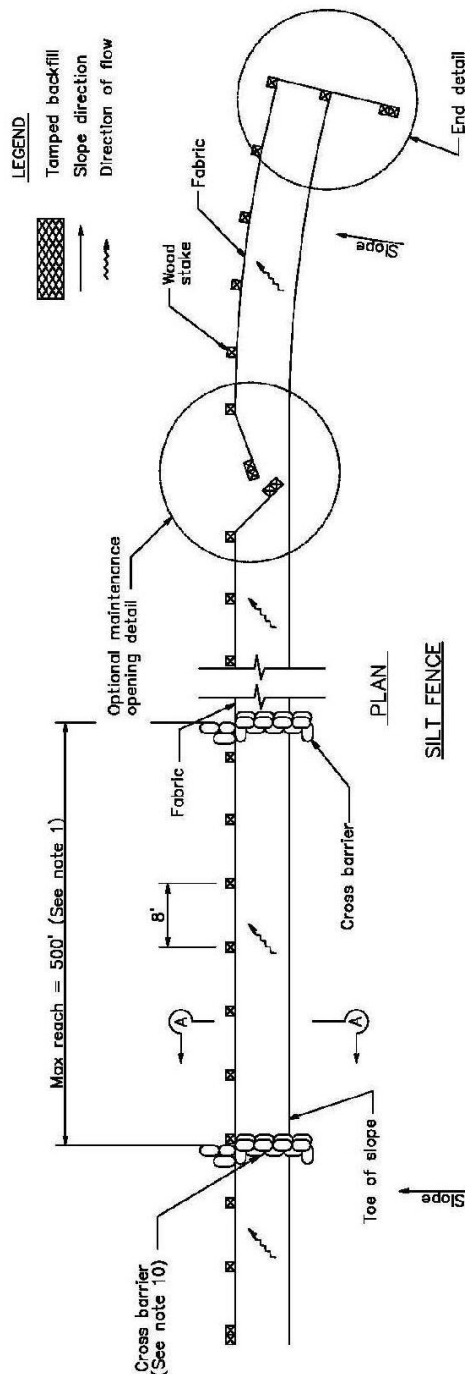
U.S. Environmental Protection Agency (USEPA). Stormwater Best Management Practices: Silt Fences. U.S. Environmental Protection Agency, Office of Water, Washington, DC, 2012.

U.S. Environmental Protection Agency (USEPA). Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices. U.S. Environmental Protection Agency, Office of Water, Washington, DC, 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

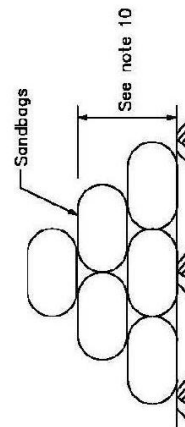
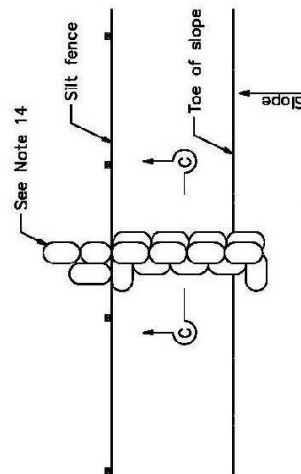
Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



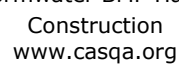
SILT FENCE

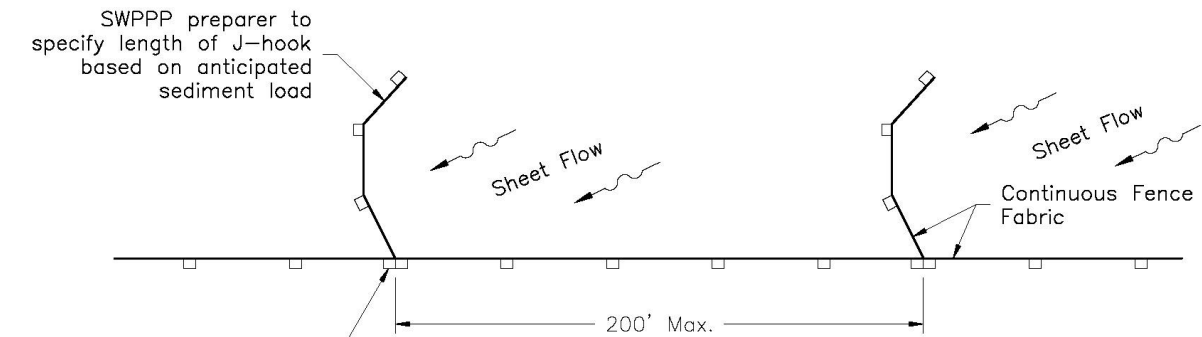
NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed $\frac{1}{3}$ 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 two 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 $\frac{1}{3}$ and a maximum of $\frac{1}{2}$ 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.
14. Add 3-4 bags to cross barrier on downstream side of silt fence as needed to prevent bypass or undermining and as allowable based on site limits of disturbance.



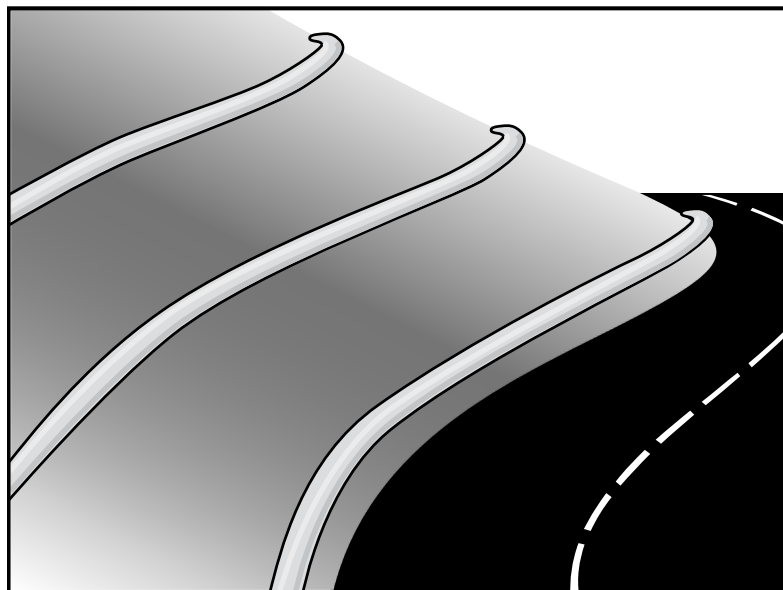
SE-1





Plan

J-HOOK



Description and Purpose

A fiber roll consists of straw, coir, or other biodegradable materials bound into a tight tubular roll wrapped by netting, which can be photodegradable or natural. Additionally, gravel core fiber rolls are available, which contain an imbedded ballast material such as gravel or sand for additional weight when staking the rolls are not feasible (such as use as inlet protection). When fiber rolls are placed at the toe and on the face of slopes along the contours, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff (through sedimentation). By interrupting the length of a slope, fiber rolls can also reduce sheet and rill erosion until vegetation is established.

Suitable Applications

Fiber rolls may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
- At the end of a downward slope where it transitions to a steeper slope.
- Along the perimeter of a project.
- As check dams in unlined ditches with minimal grade.
- Down-slope of exposed soil areas.
- At operational storm drains as a form of inlet protection.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-6 Gravel Bag Berm
- SE-8 Sandbag Barrier
- SE-12 Manufactured Linear Sediment Controls
- SE-14 Biofilter Bags

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- Around temporary stockpiles.

Limitations

- Fiber rolls are not effective unless trenched in and staked.
- Not intended for use in high flow situations.
- Difficult to move once saturated.
- If not properly staked and trenched in, fiber rolls could be transported by high flows.
- Fiber rolls have a very limited sediment capture zone.
- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.
- Rolls typically function for 12-24 months depending upon local conditions.

Implementation

Fiber Roll Materials

- Fiber rolls should be prefabricated.
- Fiber rolls may come manufactured containing polyacrylamide (PAM), a flocculating agent within the roll. Fiber rolls impregnated with PAM provide additional sediment removal capabilities and should be used in areas with fine, clayey or silty soils to provide additional sediment removal capabilities. Monitoring may be required for these installations.
- Fiber rolls are made from weed free rice straw, flax, or a similar agricultural material bound into a tight tubular roll by netting.
- Typical fiber rolls vary in diameter from 9 in. to 20 in. Larger diameter rolls are available as well.

Installation

- Locate fiber rolls on level contours spaced as follows:
 - Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.
 - Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).
 - Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).
- Prepare the slope before beginning installation.
- Dig small trenches across the slope on the contour. The trench depth should be $\frac{1}{4}$ to $\frac{1}{3}$ of the thickness of the roll, and the width should equal the roll diameter, in order to provide area to backfill the trench.

- It is critical that rolls are installed perpendicular to water movement, and parallel to the slope contour.
- Start building trenches and installing rolls from the bottom of the slope and work up.
- It is recommended that pilot holes be driven through the fiber roll. Use a straight bar to drive holes through the roll and into the soil for the wooden stakes.
- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.
- Stake fiber rolls into the trench.
 - Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center.
 - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.
- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.
- See typical fiber roll installation details at the end of this fact sheet.

Removal

- Fiber rolls can be left in place or removed depending on the type of fiber roll and application (temporary vs. permanent installation). Typically, fiber rolls encased with plastic netting are used for a temporary application because the netting does not biodegrade. Fiber rolls used in a permanent application are typically encased with a biodegradable material and are left in place. Removal of a fiber roll used in a permanent application can result in greater disturbance.
- Temporary installations should only be removed when up gradient areas are stabilized per General Permit requirements, and/or pollutant sources no longer present a hazard. But, they should also be removed before vegetation becomes too mature so that the removal process does not disturb more soil and vegetation than is necessary.

Costs

Material costs for regular fiber rolls range from \$20 - \$30 per 25 ft roll.

Material costs for PAM impregnated fiber rolls range between 7.00-\$9.00 per linear foot, based upon vendor research.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates in the BMP should be periodically removed

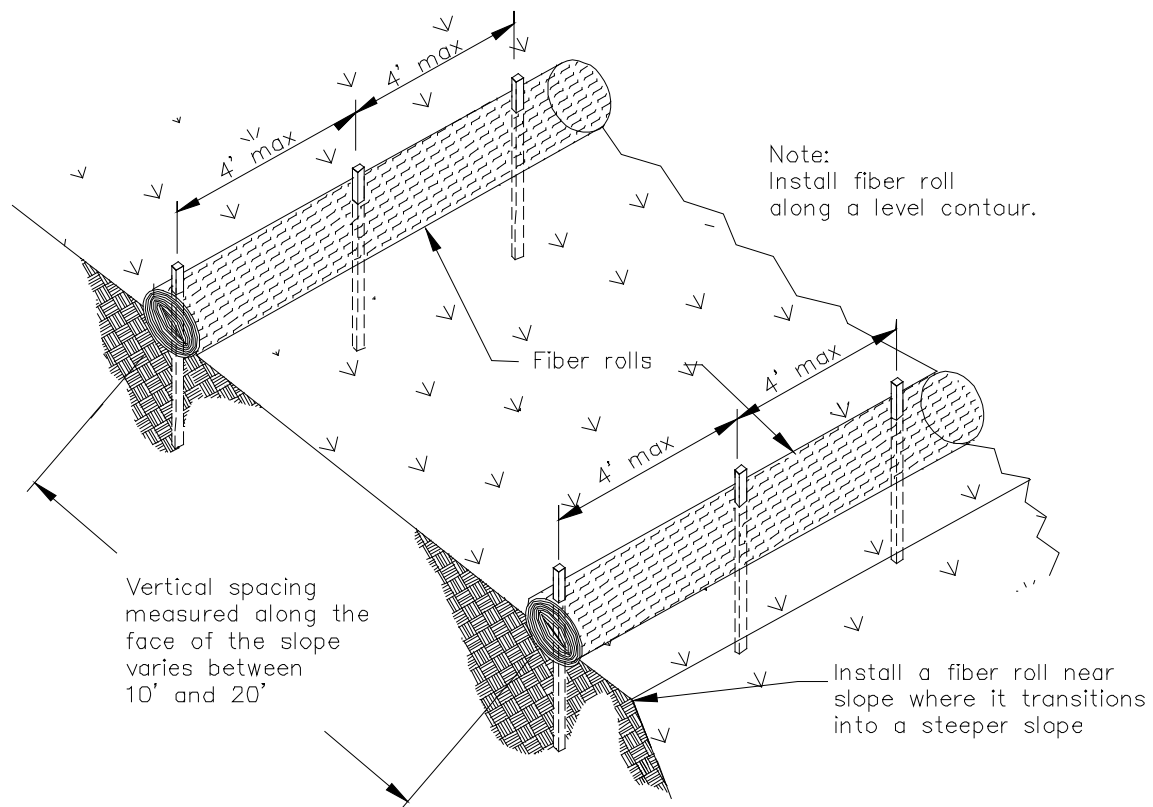
in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-third the designated sediment storage depth.

- If fiber rolls are used for erosion control, such as in a check dam, sediment removal should not be required as long as the system continues to control the grade. Sediment control BMPs will likely be required in conjunction with this type of application.
- Repair any rills or gullies promptly.

References

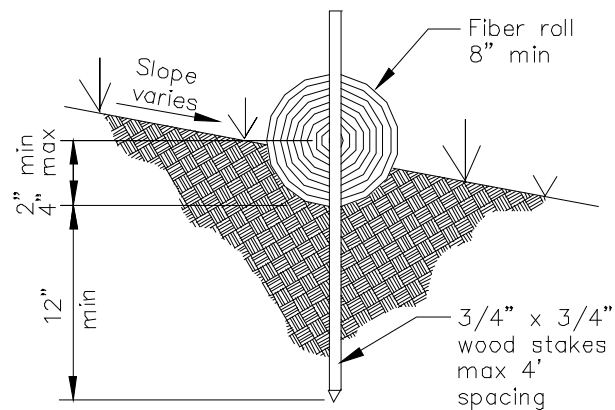
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



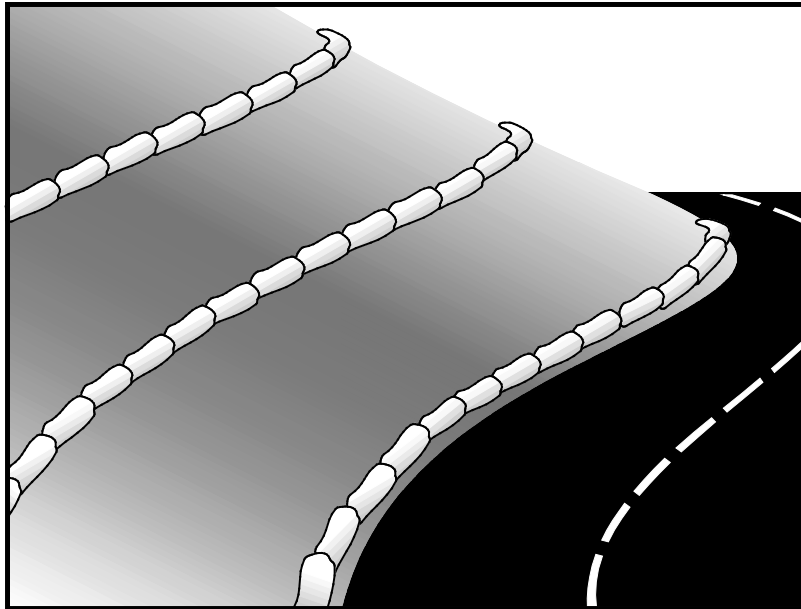
TYPICAL FIBER ROLL INSTALLATION

N.T.S.



ENTRENCHMENT DETAIL

N.T.S.



Description and Purpose

A gravel bag berm is a series of gravel-filled bags placed on a level contour to intercept sheet flows. Gravel bags pond sheet flow runoff, allowing sediment to settle out, and release runoff slowly as sheet flow, preventing erosion.

Suitable Applications

Gravel bag berms may be suitable:

- As a linear sediment control measure:
 - Below the toe of slopes and erodible slopes
 - As sediment traps at culvert/pipe outlets
 - Below other small cleared areas
 - Along the perimeter of a site
 - Down slope of exposed soil areas
 - Around temporary stockpiles and spoil areas
 - Parallel to a roadway to keep sediment off paved areas
 - Along streams and channels
- As a linear erosion control measure:
 - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-5 Fiber Roll
- SE-8 Sandbag Barrier
- SE-12 Temporary Silt Dike
- SE-14 Biofilter Bags

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- At the top of slopes to divert runoff away from disturbed slopes.
- As chevrons (small check dams) across mildly sloped construction roads. For use check dam use in channels, see SE-4, Check Dams.

Limitations

- Gravel berms may be difficult to remove.
- Removal problems limit their usefulness in landscaped areas.
- Gravel bag berm may not be appropriate for drainage areas greater than 5 acres.
- Runoff will pond upstream of the berm, possibly causing flooding if sufficient space does not exist.
- Degraded gravel bags may rupture when removed, spilling contents.
- Installation can be labor intensive.
- Durability of gravel bags is somewhat limited and bags may need to be replaced when installation is required for longer than 6 months.
- Easily damaged by construction equipment.
- When used to detain concentrated flows, maintenance requirements increase.

Implementation

General

A gravel bag berm consists of a row of open graded gravel-filled bags placed on a level contour. When appropriately placed, a gravel bag berm intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding allows sediment to settle. The open graded gravel in the bags is porous, which allows the ponded runoff to flow slowly through the bags, releasing the runoff as sheet flows. Gravel bag berms also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils. Gravel bag berms are similar to sand bag barriers, but are more porous. Generally, gravel bag berms should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

Design and Layout

- Locate gravel bag berms on level contours.
- When used for slope interruption, the following slope/sheet flow length combinations apply:
 - Slope inclination of 4:1 (H:V) or flatter: Gravel bags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
 - Slope inclination between 4:1 and 2:1 (H:V): Gravel bags should be placed at a maximum interval of 15 ft. (a closer spacing is more effective), with the first row near the slope toe.

Slope inclination 2:1 (H:V) or greater: Gravel bags should be placed at a maximum interval of 10 ft. (a closer spacing is more effective), with the first row near the slope toe.

- Turn the ends of the gravel bag barriers up slope to prevent runoff from going around the berm.
- Allow sufficient space up slope from the gravel bag berm to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, gravel bag barriers should be set back from the slope toe to facilitate cleaning. Where specific site conditions do not allow for a set-back, the gravel bag barrier may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- In Non-Traffic Areas:
 - Height = 18 in. maximum
 - Top width = 24 in. minimum for three or more layer construction
 - Top width = 12 in. minimum for one or two layer construction
 - Side slopes = 2:1 (H:V) or flatter
- In Construction Traffic Areas:
 - Height = 12 in. maximum
 - Top width = 24 in. minimum for three or more layer construction.
 - Top width = 12 in. minimum for one or two layer construction.
 - Side slopes = 2:1 (H:V) or flatter.
- Butt ends of bags tightly.
- On multiple row, or multiple layer construction, overlap butt joints of adjacent row and row beneath.
- Use a pyramid approach when stacking bags.

Materials

- **Bag Material:** Bags should be woven polypropylene, polyethylene or polyamide fabric or burlap, minimum unit weight of 4 ounces/yd², Mullen burst strength exceeding 300 lb/in² in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.

- **Bag Size:** Each gravel-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal, and may vary based on locally available materials.
- **Fill Material:** Fill material should be 0.5 to 1 in. crushed rock, clean and free from clay, organic matter, and other deleterious material, or other suitable open graded, non-cohesive, porous gravel.

Costs

Material costs for gravel bags are average and are dependent upon material availability. \$2.50-3.00 per filled gravel bag is standard based upon vendor research.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Gravel bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.
- Reshape or replace gravel bags as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove gravel bag berms when no longer needed and recycle gravel fill whenever possible and properly dispose of bag material. Remove sediment accumulation and clean, re-grade, and stabilize the area.

References

Handbook of Steel Drainage and Highway Construction, American Iron and Steel Institute, 1983.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Pollution Plan Handbook, First Edition, State of California, Department of Transportation Division of New Technology, Materials and Research, October 1992.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



Description and Purpose

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways, and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Suitable Applications

Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Limitations

Sweeping and vacuuming may not be effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).

Implementation

- Controlling the number of points where vehicles can leave the site will allow sweeping and vacuuming efforts to be focused, and perhaps save money.
- Inspect potential sediment tracking locations daily.
- Visible sediment tracking should be swept or vacuumed on a daily basis.

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	

Potential Alternatives

None

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- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.
- If not mixed with debris or trash, consider incorporating the removed sediment back into the project

Costs

Rental rates for self-propelled sweepers vary depending on hopper size and duration of rental. Expect rental rates from \$58/hour (3 yd³ hopper) to \$88/hour (9 yd³ hopper), plus operator costs. Hourly production rates vary with the amount of area to be swept and amount of sediment. Match the hopper size to the area and expect sediment load to minimize time spent dumping.

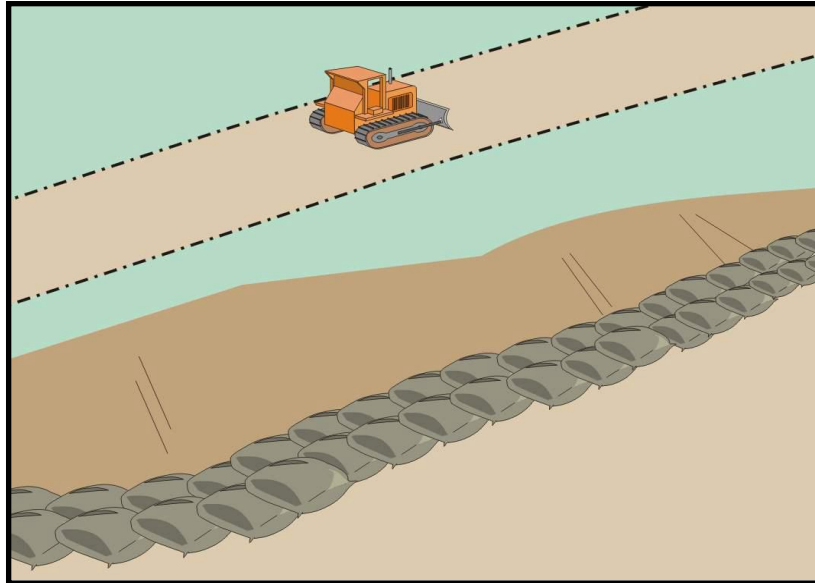
Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- When actively in use, points of ingress and egress must be inspected daily.
- When tracked or spilled sediment is observed outside the construction limits, it must be removed at least daily. More frequent removal, even continuous removal, may be required in some jurisdictions.
- 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.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Labor Surcharge and Equipment Rental Rates, State of California Department of Transportation (Caltrans), April 1, 2002 – March 31, 2003.



Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

<input checked="" type="checkbox"/>	Primary Category
<input checked="" type="checkbox"/>	Secondary Category

Description and Purpose

A sandbag barrier is a series of sand-filled bags placed on a level contour to intercept or to divert sheet flows. Sandbag barriers placed on a level contour pond sheet flow runoff, allowing sediment to settle out.

Suitable Applications

Sandbag barriers may be a suitable control measure for the applications described below. It is important to consider that sand bags are less porous than gravel bags and ponding or flooding can occur behind the barrier. Also, sand is easily transported by runoff if bags are damaged or ruptured. The SWPPP Preparer should select the location of a sandbag barrier with respect to the potential for flooding, damage, and the ability to maintain the BMP.

- As a linear sediment control measure:
 - Below the toe of slopes and erodible slopes.
 - As sediment traps at culvert/pipe outlets.
 - Below other small cleared areas.
 - Along the perimeter of a site.
 - Down slope of exposed soil areas.
 - Around temporary stockpiles and spoil areas.
 - Parallel to a roadway to keep sediment off paved areas.
 - Along streams and channels.

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-5 Fiber Rolls
- SE-6 Gravel Bag Berm
- SE-12 Manufactured Linear Sediment Controls
- SE-14 Biofilter Bags

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- As linear erosion control measure:
 - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
 - At the top of slopes to divert runoff away from disturbed slopes.
 - As check dams across mildly sloped construction roads.

Limitations

- It is necessary to limit the drainage area upstream of the barrier to 5 acres.
- Sandbags are not intended to be used as filtration devices.
- Easily damaged by construction equipment.
- Degraded sandbags may rupture when removed, spilling sand.
- Installation can be labor intensive.
- Durability of sandbags is somewhat limited and bags will need to be replaced when there are signs of damage or wear.
- Burlap should not be used for sandbags.

Implementation

General

A sandbag barrier consists of a row of sand-filled bags placed on a level contour. When appropriately placed, a sandbag barrier intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding allows sediment to settle. Sand-filled bags have limited porosity, which is further limited as the fine sand tends to quickly plug with sediment, limiting or completely blocking the rate of flow through the barrier. If a porous barrier is desired, consider SE-1, Silt Fence, SE-5, Fiber Rolls, SE-6, Gravel Bag Berms or SE-14, Biofilter Bags. Sandbag barriers also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets which erode rills, and ultimately gullies, into disturbed, sloped soils. Sandbag barriers are similar to gravel bag berms, but less porous. Generally, sandbag barriers should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

Design and Layout

- Locate sandbag barriers on a level contour.
- When used for slope interruption, the following slope/sheet flow length combinations apply:
 - Slope inclination of 4:1 (H:V) or flatter: Sandbags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
 - Slope inclination between 4:1 and 2:1 (H:V): Sandbags should be placed at a maximum interval of 15 ft. (a closer spacing is more effective), with the first row near the slope toe.

- Slope inclination 2:1 (H:V) or greater: Sandbags should be placed at a maximum interval of 10 ft. (a closer spacing is more effective), with the first row near the slope toe.
- Turn the ends of the sandbag barrier up slope to prevent runoff from going around the barrier.
- Allow sufficient space up slope from the barrier to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, sand bag barriers should be set back from the slope toe to facilitate cleaning. Where specific site conditions do not allow for a set-back, the sand bag barrier may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- Butt ends of bags tightly.
- Overlap butt joints of row beneath with each successive row.
- Use a pyramid approach when stacking bags.
- In non-traffic areas
 - Height = 18 in. maximum
 - Top width = 24 in. minimum for three or more layer construction
 - Side slope = 2:1 (H:V) or flatter
- In construction traffic areas
 - Height = 12 in. maximum
 - Top width = 24 in. minimum for three or more layer construction.
 - Side slopes = 2:1 (H:V) or flatter.
- See typical sandbag barrier installation details at the end of this fact sheet.

Materials

- **Sandbag Material:** Sandbag should be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight of 4 ounces/yd², Mullen burst strength exceeding 300 lb/in² 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 an acceptable substitute, as sand can more easily mobilize out of burlap.
- **Sandbag Size:** Each sand-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal, and may vary based on locally available materials.

- **Fill Material:** All sandbag fill material should be non-cohesive, Class 3 (Caltrans Standard Specification, Section 25) or similar permeable material free from clay and deleterious material, such as recycled concrete or asphalt.

Costs

Empty sandbags cost \$0.25 - \$0.75. Average cost of fill material is \$8 per yd³. Additional labor is required to fill the bags. Pre-filled sandbags are more expensive at \$1.50 - \$2.00 per bag. These costs are based upon vendor research.

Inspection and Maintenance

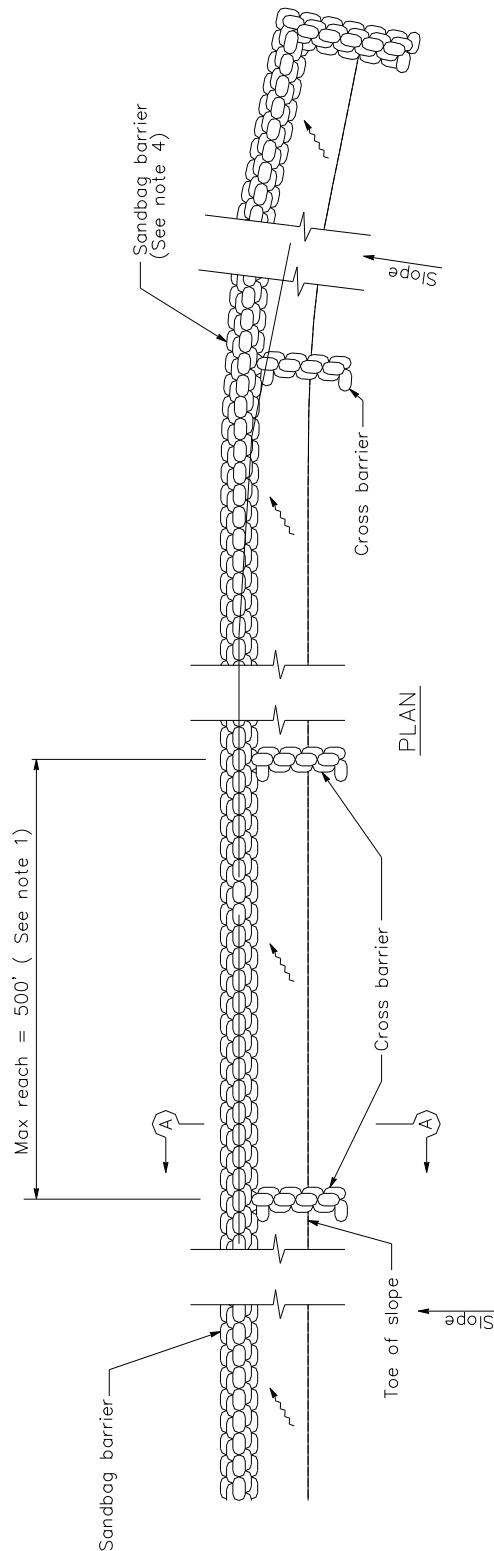
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Sandbags exposed to sunlight will need to be replaced every two to three months due to degradation of the bags.
- Reshape or replace sandbags as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates behind the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove sandbags when no longer needed and recycle sand fill whenever possible and properly dispose of bag material. Remove sediment accumulation, and clean, re-grade, and stabilize the area.

References

Standard Specifications for Construction of Local Streets and Roads, California Department of Transportation (Caltrans), July 2002.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

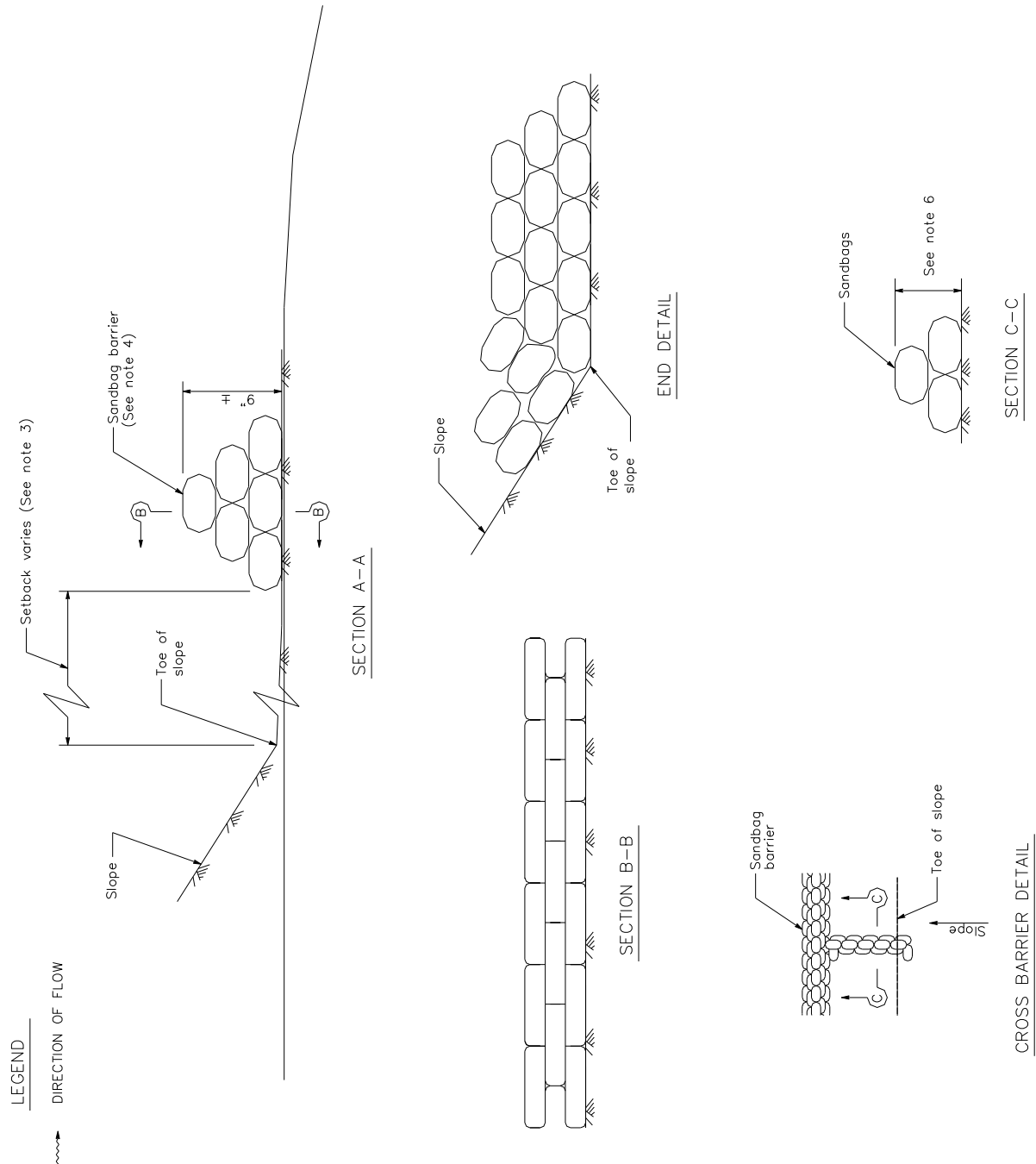
Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

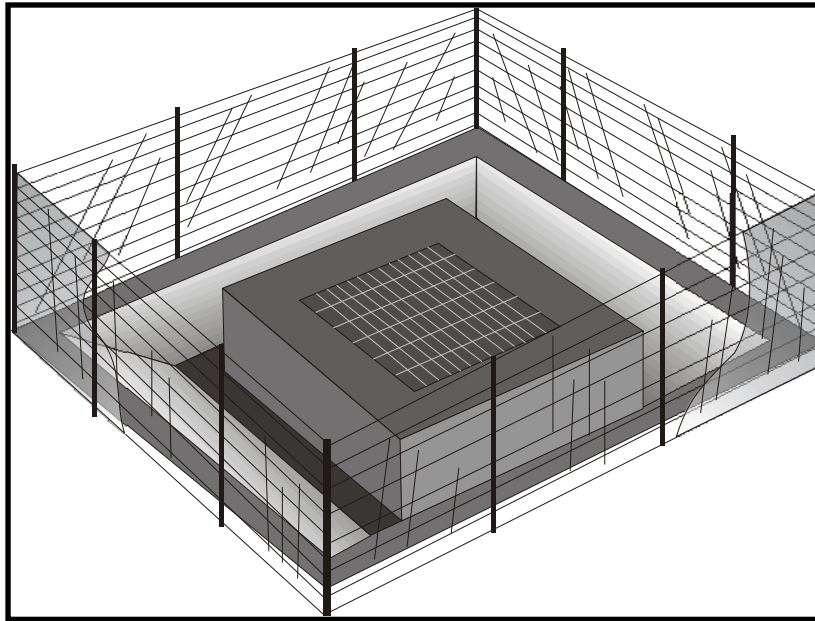


SANDBAG BARRIER

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.





Description and Purpose

Storm drain inlet protection consists of a sediment filter or an impounding area in, around or upstream of a storm drain, drop inlet, or curb inlet. Storm drain inlet protection measures temporarily pond runoff before it enters the storm drain, allowing sediment to settle. Some filter configurations also remove sediment by filtering, but usually the ponding action results in the greatest sediment reduction. Temporary geotextile storm drain inserts attach underneath storm drain grates to capture and filter storm water.

Suitable Applications

- Every storm drain inlet receiving runoff from unstabilized or otherwise active work areas should be protected. Inlet protection should be used in conjunction with other erosion and sediment controls to prevent sediment-laden stormwater and non-stormwater discharges from entering the storm drain system.

Limitations

- Drainage area should not exceed 1 acre.
- In general straw bales should not be used as inlet protection.
- Requires an adequate area for water to pond without encroaching into portions of the roadway subject to traffic.
- Sediment removal may be inadequate to prevent sediment discharges in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are expected, use

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ **Primary Category**
- ☒ **Secondary Category**

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

- SE-1 Silt Fence
- SE-5 Fiber Rolls
- SE-6 Gravel Bag Berm
- SE-8 Sandbag Barrier
- SE-14 Biofilter Bags
- SE-13 Compost Socks and Berms

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other onsite sediment trapping techniques in conjunction with inlet protection.

- Frequent maintenance is required.
- Limit drainage area to 1 acre maximum. For drainage areas larger than 1 acre, runoff should be routed to a sediment-trapping device designed for larger flows. See BMPs SE-2, Sediment Basin, and SE-3, Sediment Traps.
- Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected, and overflow capability is needed.

Implementation

General

Inlet control measures presented in this handbook should not be used for inlets draining more than one acre. Runoff from larger disturbed areas should be first routed through SE-2, Sediment Basin or SE-3, Sediment Trap and/or used in conjunction with other drainage control, erosion control, and sediment control BMPs to protect the site. Different types of inlet protection are appropriate for different applications depending on site conditions and the type of inlet. Alternative methods are available in addition to the methods described/shown herein such as prefabricated inlet insert devices, or gutter protection devices.

Design and Layout

Identify existing and planned storm drain inlets that have the potential to receive sediment-laden surface runoff. Determine if storm drain inlet protection is needed and which method to use.

- The key to successful and safe use of storm drain inlet protection devices is to know where runoff that is directed toward the inlet to be protected will pond or be diverted as a result of installing the protection device.
 - Determine the acceptable location and extent of ponding in the vicinity of the drain inlet. The acceptable location and extent of ponding will influence the type and design of the storm drain inlet protection device.
 - Determine the extent of potential runoff diversion caused by the storm drain inlet protection device. Runoff ponded by inlet protection devices may flow around the device and towards the next downstream inlet. In some cases, this is acceptable; in other cases, serious erosion or downstream property damage can be caused by these diversions. The possibility of runoff diversions will influence whether or not storm drain inlet protection is suitable; and, if suitable, the type and design of the device.
- The location and extent of ponding, and the extent of diversion, can usually be controlled through appropriate placement of the inlet protection device. In some cases, moving the inlet protection device a short distance upstream of the actual inlet can provide more efficient sediment control, limit ponding to desired areas, and prevent or control diversions.
- Seven types of inlet protection are presented below. However, it is recognized that other effective methods and proprietary devices exist and may be selected.

- Silt Fence: Appropriate for drainage basins with less than a 5% slope, sheet flows, and flows under 0.5 cfs.
 - Excavated Drop Inlet Sediment Trap: An excavated area around the inlet to trap sediment (SE-3).
 - Gravel bag barrier: Used to create a small sediment trap upstream of inlets on sloped, paved streets. Appropriate for sheet flow or when concentrated flow may exceed 0.5 cfs, and where overtopping is required to prevent flooding.
 - Block and Gravel Filter: Appropriate for flows greater than 0.5 cfs.
 - Temporary Geotextile Storm drain Inserts: Different products provide different features. Refer to manufacturer details for targeted pollutants and additional features.
 - Biofilter Bag Barrier: Used to create a small retention area upstream of inlets and can be located on pavement or soil. Biofilter bags slowly filter runoff allowing sediment to settle out. Appropriate for flows under 0.5 cfs.
 - Compost Socks: Allow filtered run-off to pass through the compost while retaining sediment and potentially other pollutants (SE-13). Appropriate for flows under 1.0 cfs.
- Select the appropriate type of inlet protection and design as referred to or as described in this fact sheet.
 - Provide area around the inlet for water to pond without flooding structures and property.
 - Grates and spaces around all inlets should be sealed to prevent seepage of sediment-laden water.
 - Excavate sediment sumps (where needed) 1 to 2 ft with 2:1 side slopes around the inlet.

Installation

- **DI Protection Type 1 - Silt Fence** - Similar to constructing a silt fence; see BMP SE-1, Silt Fence. Do not place fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced and water flow through the grate will be blocked resulting in flooding. See typical Type 1 installation details at the end of this fact sheet.
 1. Excavate a trench approximately 6 in. wide and 6 in. deep along the line of the silt fence inlet protection device.
 2. Place 2 in. by 2 in. wooden stakes around the perimeter of the inlet a maximum of 3 ft apart and drive them at least 18 in. into the ground or 12 in. below the bottom of the trench. The stakes should be at least 48 in.
 3. Lay fabric along bottom of trench, up side of trench, and then up stakes. See SE-1, Silt Fence, for details. The maximum silt fence height around the inlet is 24 in.
 4. Staple the filter fabric (for materials and specifications, see SE-1, Silt Fence) to wooden stakes. Use heavy-duty wire staples at least 1 in. in length.

5. Backfill the trench with gravel or compacted earth all the way around.
- **DI Protection Type 2 - Excavated Drop Inlet Sediment Trap** - Install filter fabric fence in accordance with DI Protection Type 1. Size excavated trap to provide a minimum storage capacity calculated at the rate 67 yd³/acre of drainage area. See typical Type 2 installation details at the end of this fact sheet.
 - **DI Protection Type 3 - Gravel bag** - Flow from a severe storm should not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct gravel bags in accordance with SE-6, Gravel Bag Berm. Gravel bags should be used due to their high permeability. See typical Type 3 installation details at the end of this fact sheet.
 1. Construct on gently sloping street.
 2. Leave room upstream of barrier for water to pond and sediment to settle.
 3. Place several layers of gravel bags – overlapping the bags and packing them tightly together.
 4. Leave gap of one bag on the top row to serve as a spillway. Flow from a severe storm (e.g., 10 year storm) should not overtop the curb.
 - **DI Protection Type 4 – Block and Gravel Filter** - Block and gravel filters are suitable for curb inlets commonly used in residential, commercial, and industrial construction. See typical Type 4 installation details at the end of this fact sheet.
 1. 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 woven geotextile over the wire mesh.
 2. 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.
 3. 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.
 4. Pile washed stone against the wire mesh to the top of the blocks. Use 0.75 to 3 in.
 - **DI Protection Type 5 – Temporary Geotextile Insert (proprietary)** – Many types of temporary inserts are available. Most inserts fit underneath the grate of a drop inlet or inside of a curb inlet and are fastened to the outside of the grate or curb. These inserts are removable and many can be cleaned and reused. Installation of these inserts differs between manufacturers. Please refer to manufacturer instruction for installation of proprietary devices.

- **DI Protection Type 6 - Biofilter bags** – Biofilter bags may be used as a substitute for gravel bags in low-flow situations. Biofilter bags should conform to specifications detailed in SE-14, Biofilter bags.
 1. Construct in a gently sloping area.
 2. Biofilter bags should be placed around inlets to intercept runoff flows.
 3. All bag joints should overlap by 6 in.
 4. Leave room upstream for water to pond and for sediment to settle out.
 5. Stake bags to the ground as described in the following detail. Stakes may be omitted if bags are placed on a paved surface.
- **DI Protection Type 7 – Compost Socks** – A compost sock can be assembled on site by filling a mesh sock (e.g., with a pneumatic blower). Compost socks do not require special trenching compared to other sediment control methods (e.g., silt fence). Compost socks should conform to specification detailed in SE-13, Compost Socks and Berms.

Costs

- Average annual cost for installation and maintenance of DI Type 1-4 and 6 (one year useful life) is \$200 per inlet.
- Temporary geotextile inserts are proprietary and cost varies by region. These inserts can often be reused and may have greater than 1 year of use if maintained and kept undamaged. Average cost per insert ranges from \$50-75 plus installation, but costs can exceed \$100. This cost does not include maintenance.
- See SE-13 for Compost Sock cost information.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Silt Fences. If the fabric becomes clogged, torn, or degrades, it should be replaced. Make sure the stakes are securely driven in the ground and are in good shape (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes. At a minimum, remove the sediment behind the fabric fence when accumulation reaches one-third the height of the fence or barrier height.
- Gravel Filters. If the gravel becomes clogged with sediment, it should be carefully removed from the inlet and either cleaned or replaced. Since cleaning gravel at a construction site may be difficult, consider using the sediment-laden stone as fill material and put fresh stone around the inlet. Inspect bags for holes, gashes, and snags, and replace bags as needed. Check gravel bags for proper arrangement and displacement.

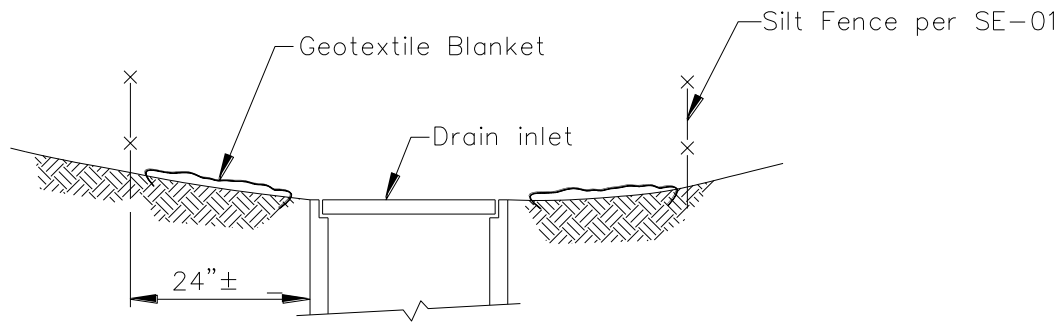
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Inspect and maintain temporary geotextile insert devices according to manufacturer's specifications.
- Remove storm drain inlet protection once the drainage area is stabilized.
 - Clean and regrade area around the inlet and clean the inside of the storm drain inlet, as it should be free of sediment and debris at the time of final inspection.

References

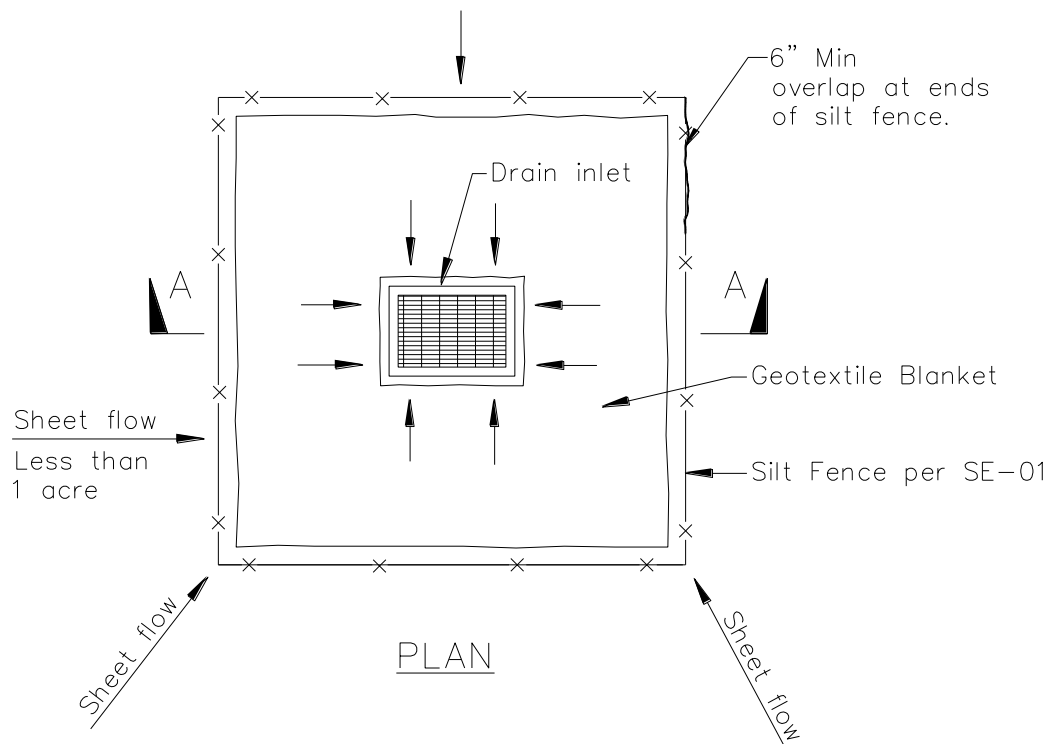
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SECTION A-A

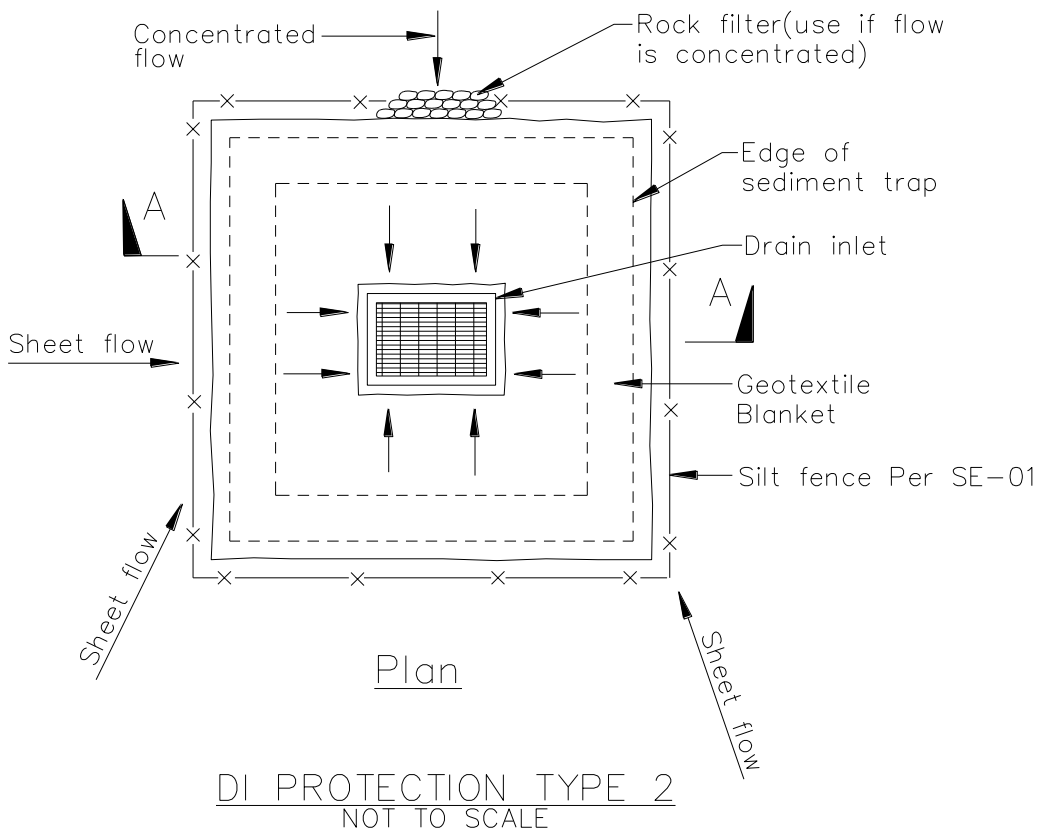
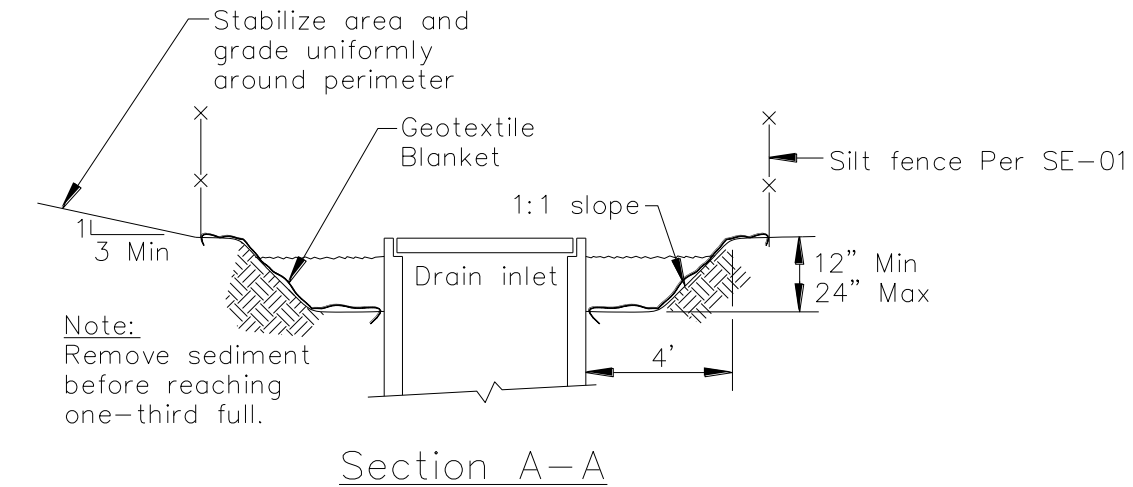


PLAN

DI PROTECTION TYPE 1
NOT TO SCALE

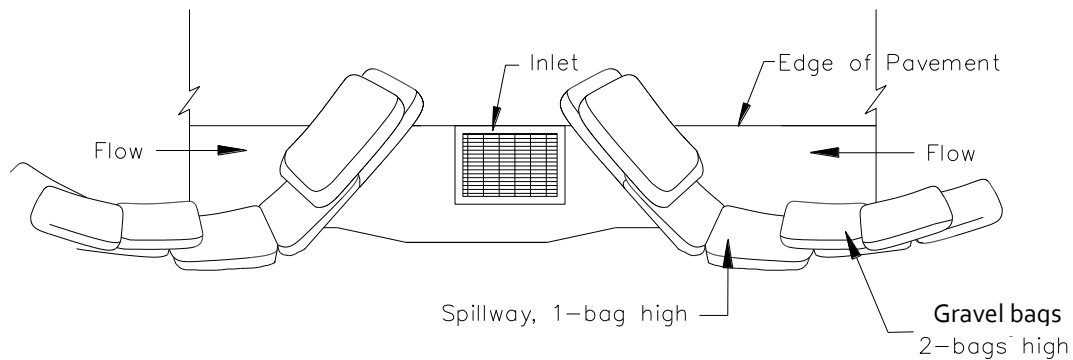
NOTES:

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.

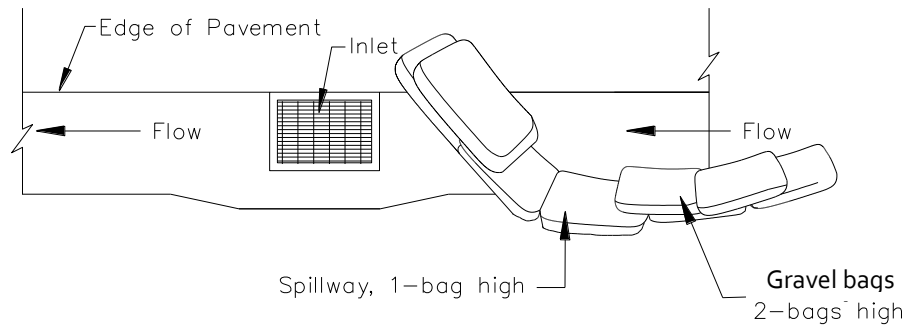


Notes

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 ON SUMP

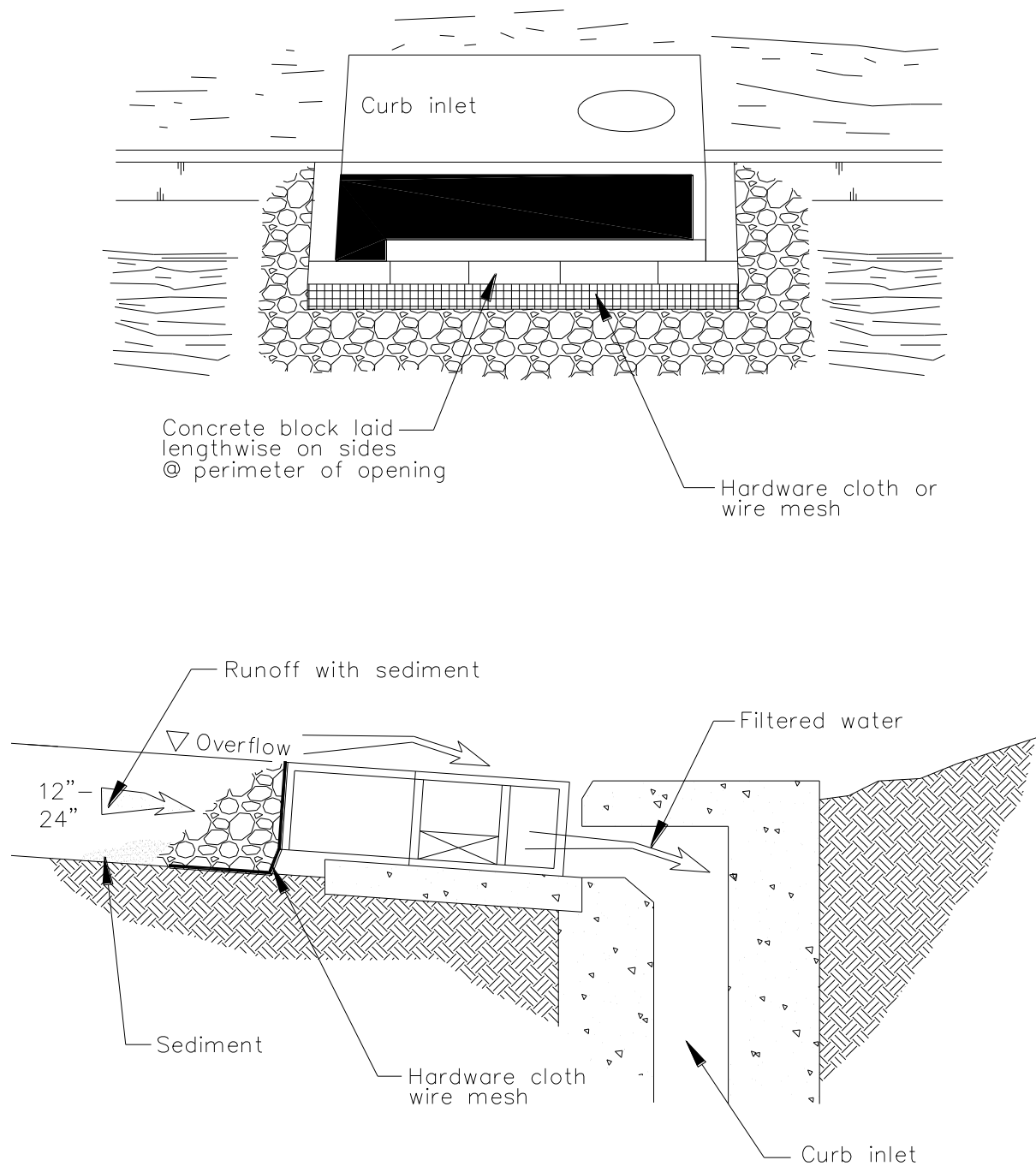


TYPICAL PROTECTION FOR INLET ON GRADE

NOTES:

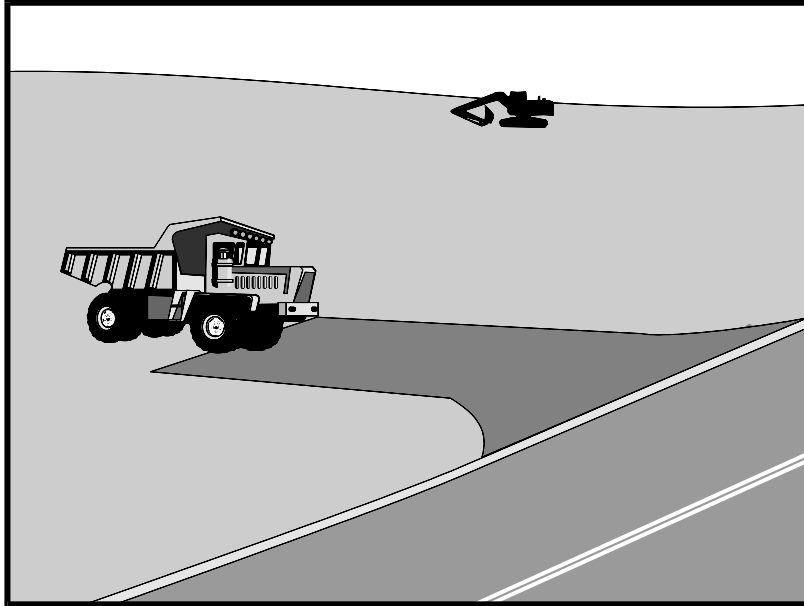
1. Intended for short-term use.
2. Use to inhibit non-storm water flow.
3. Allow for proper maintenance and cleanup.
4. Bags must be removed after adjacent operation is completed
5. Not applicable in areas with high silts and clays without filter fabric.
6. Protection can be effective even if it is not immediately adjacent to the inlet provided that the inlet is protected from potential sources of pollution.

DI PROTECTION TYPE 3
NOT TO SCALE



DI PROTECTION — TYPE 4
NOT TO SCALE

Stabilized Construction Entrance/Exit TC-1



Description 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 public roads by construction vehicles.

Suitable Applications

Use at construction sites:

- Where dirt or mud can be tracked onto public roads.
- Adjacent to water bodies.
- Where poor soils are encountered.
- Where dust is a problem during dry weather conditions.

Limitations

- Entrances and exits require periodic top dressing with additional stones.
- This BMP should be used in conjunction with street sweeping on adjacent public right of way.
- Entrances and exits should be constructed on level ground only.
- Stabilized construction entrances are rather expensive to construct and when a wash rack is included, a sediment trap of some kind must also be provided to collect wash water runoff.

Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Stabilized Construction Entrance/Exit TC-1

Implementation

General

A stabilized construction entrance is a pad of aggregate underlain with filter cloth located at any point where traffic will be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights of way or streets. Reducing tracking of sediments and other pollutants onto paved roads helps prevent deposition of sediments into local storm drains and production of airborne dust.

Where traffic will be entering or leaving the construction site, a stabilized construction entrance should be used. NPDES permits require that appropriate measures be implemented to prevent tracking of sediments onto paved roadways, where a significant source of sediments is derived from mud and dirt carried out from unpaved roads and construction sites.

Stabilized construction entrances are moderately effective in removing sediment from equipment leaving a construction site. The entrance should be built on level ground. Advantages of the Stabilized Construction Entrance/Exit is that it does remove some sediment from equipment and serves to channel construction traffic in and out of the site at specified locations. Efficiency is greatly increased when a washing rack is included as part of a stabilized construction entrance/exit.

Design and Layout

- Construct on level ground where possible.
- Select 3 to 6 in. diameter stones.
- Use minimum depth of stones of 12 in. or as recommended by soils engineer.
- Construct length of 50 ft or maximum site will allow, and 10 ft minimum width or to accommodate traffic.
- Rumble racks constructed of steel panels with ridges and installed in the stabilized entrance/exit will help remove additional sediment and to keep adjacent streets clean.
- Provide ample turning radii as part of the entrance.
- Limit the points of entrance/exit to the construction site.
- 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 heaviest vehicles and equipment that will use it.

Stabilized Construction Entrance/Exit TC-1

- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. Do not use asphalt concrete (AC) grindings for stabilized construction access/roadway.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth, or place aggregate to a depth recommended by a geotechnical engineer. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.
- Designate combination or single purpose entrances and exits to the construction site.
- Require that all employees, subcontractors, and suppliers utilize the stabilized construction access.
- Implement SE-7, Street Sweeping and Vacuuming, as needed.
- All exit locations intended to be used for more than a two-week period should have stabilized construction entrance/exit BMPs.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMPs are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect local roads adjacent to the site daily. Sweep or vacuum to remove visible accumulated sediment.
- Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment.
- Keep all temporary roadway ditches clear.
- Check for damage and repair as needed.
- Replace gravel material when surface voids are visible.
- Remove all sediment deposited on paved roadways within 24 hours.
- Remove gravel and filter fabric at completion of construction

Costs

Average annual cost for installation and maintenance may vary from \$1,200 to \$4,800 each, averaging \$2,400 per entrance. Costs will increase with addition of washing rack, and sediment trap. With wash rack, costs range from \$1,200 - \$6,000 each, averaging \$3,600 per entrance.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Stabilized Construction Entrance/Exit TC-1

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, USEPA Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April 1992.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

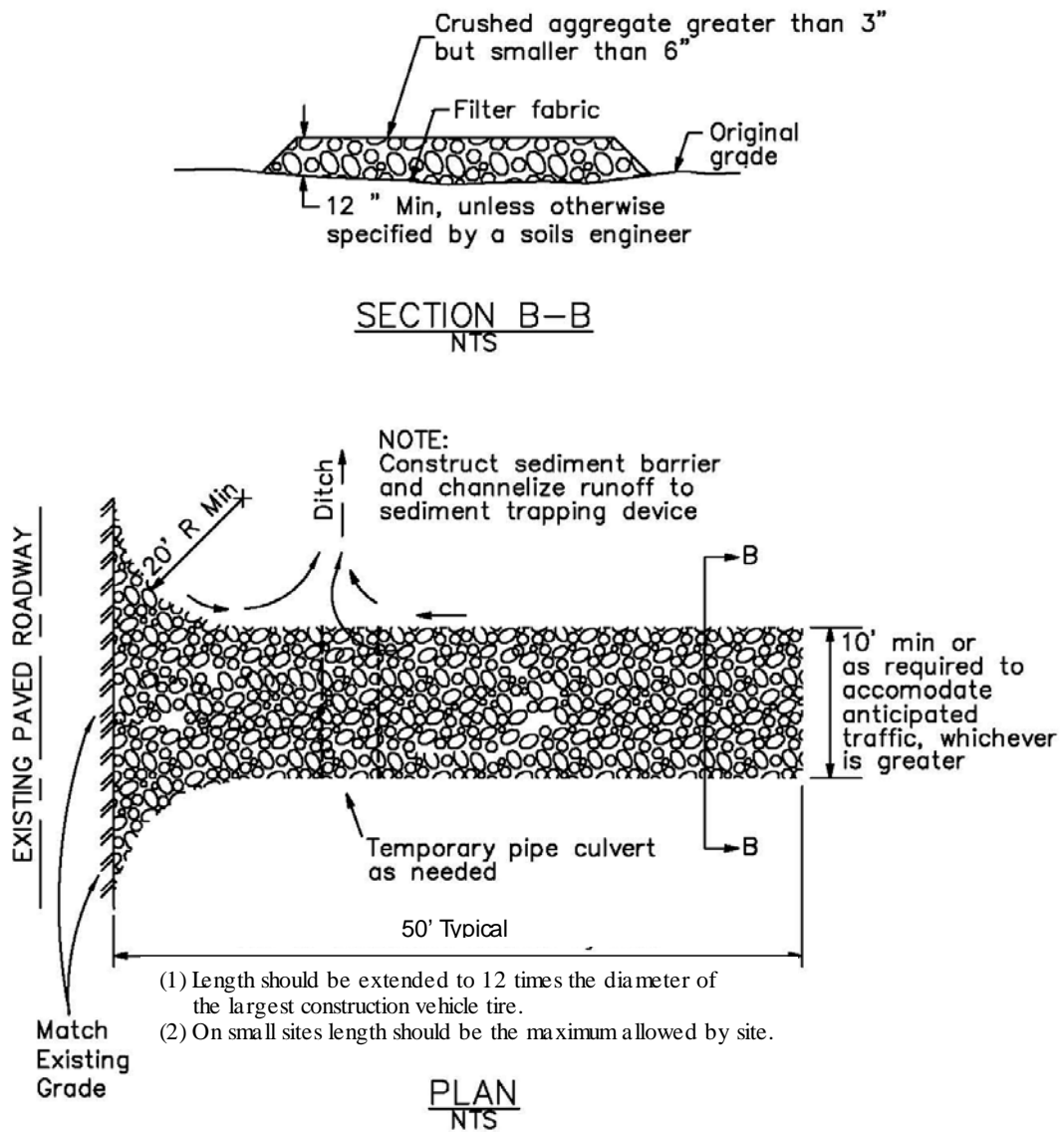
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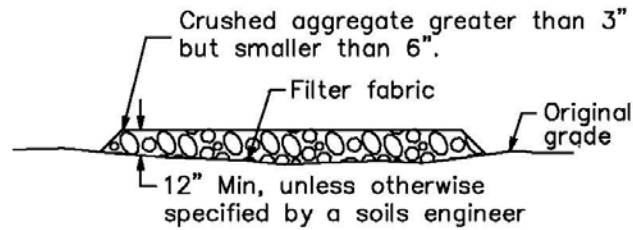
Guidance Specifying Management Measures for Nonpoint Pollution in Coastal Waters, EPA 840-B-9-002, USEPA, Office of Water, Washington, DC, 1993.

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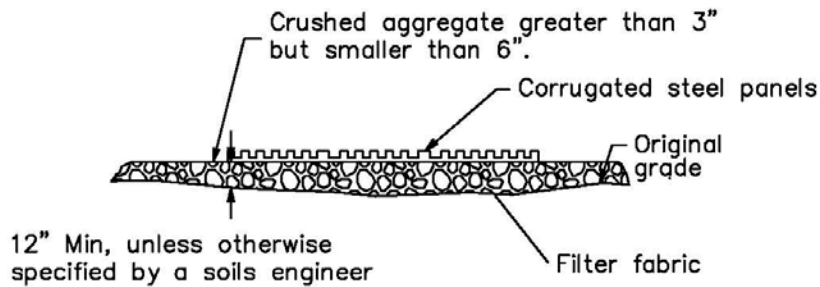
Stabilized Construction Entrance/Exit TC-1



Stabilized Construction Entrance/Exit TC-1

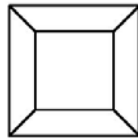


SECTION B-B
NTS

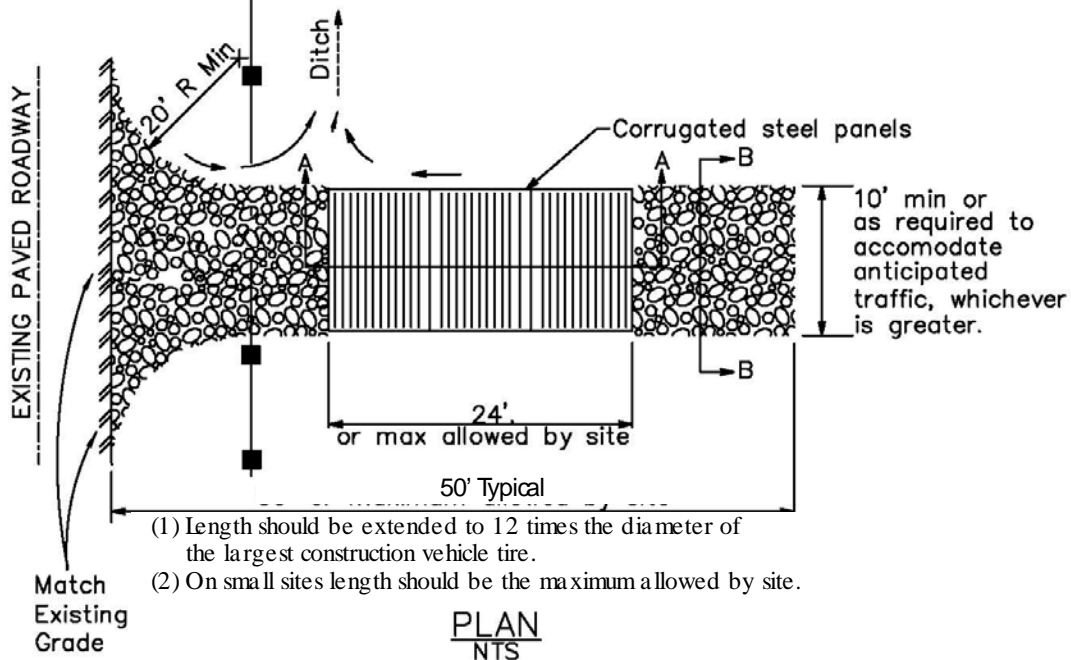


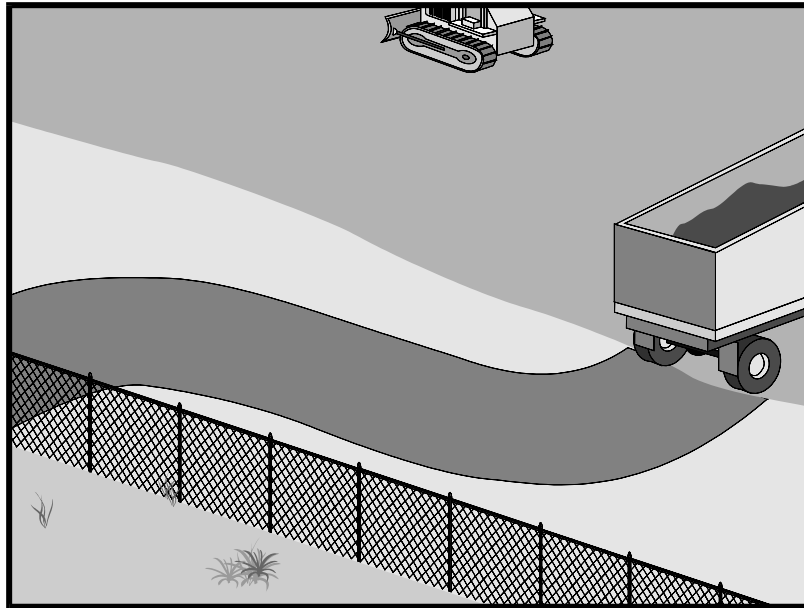
SECTION A-A
NOT TO SCALE

NOTE:
Construct sediment barrier and channelize runoff to sediment trapping device



Sediment trapping device





Categories

EC	Erosion Control	<input checked="" type="checkbox"/>
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	<input checked="" type="checkbox"/>
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Access roads, subdivision roads, parking areas, and other onsite vehicle transportation routes should be stabilized immediately after grading, and frequently maintained to prevent erosion and control dust.

Suitable Applications

This BMP should be applied for the following conditions:

- Temporary Construction Traffic:
 - Phased construction projects and offsite road access
 - Construction during wet weather
- Construction roadways and detour roads:
 - Where mud tracking is a problem during wet weather
 - Where dust is a problem during dry weather
 - Adjacent to water bodies
 - Where poor soils are encountered

Limitations

- The roadway must be removed or paved when construction is complete.

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- Certain chemical stabilization methods may cause stormwater or soil pollution and should not be used. See WE-1, Wind Erosion Control.
- Management of construction traffic is subject to air quality control measures. Contact the local air quality management agency.
- Materials will likely need to be removed prior to final project grading and stabilization.
- Use of this BMP may not be applicable to very short duration projects.

Implementation

General

Areas that are graded for construction vehicle transport and parking purposes are especially susceptible to erosion and dust. The exposed soil surface is continually disturbed, leaving no opportunity for vegetative stabilization. Such areas also tend to collect and transport runoff waters along their surfaces. During wet weather, they often become muddy quagmires that generate significant quantities of sediment that may pollute nearby streams or be transported offsite on the wheels of construction vehicles. Dirt roads can become so unstable during wet weather that they are virtually unusable.

Efficient construction road stabilization not only reduces onsite erosion but also can significantly speed onsite work, avoid instances of immobilized machinery and delivery vehicles, and generally improve site efficiency and working conditions during adverse weather

Installation/Application Criteria

Permanent roads and parking areas should be paved as soon as possible after grading. As an alternative where construction will be phased, the early application of gravel or chemical stabilization may solve potential erosion and stability problems. Temporary gravel roadway should be considered during the rainy season and on slopes greater than 5%.

Temporary roads should follow the contour of the natural terrain to the maximum extent possible. Slope should not exceed 15%. Roadways should be carefully graded to drain transversely. Provide drainage swales on each side of the roadway in the case of a crowned section or one side in the case of a super elevated section. Simple gravel berms without a trench can also be used.

Installed inlets should be protected to prevent sediment laden water from entering the storm sewer system (SE-10, Storm Drain Inlet Protection). In addition, the following criteria should be considered.

- Road should follow topographic contours to reduce erosion of the roadway.
- The roadway slope should not exceed 15%.
- Chemical stabilizers or water are usually required on gravel or dirt roads to prevent dust (WE-1, Wind Erosion Control).
- Properly grade roadway to prevent runoff from leaving the construction site.
- Design stabilized access to support heaviest vehicles and equipment that will use it.

- Stabilize roadway using aggregate, asphalt concrete, or concrete based on longevity, required performance, and site conditions. The use of cold mix asphalt or asphalt concrete (AC) grindings for stabilized construction roadway is not allowed.
- Coordinate materials with those used for stabilized construction entrance/exit points.
- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Keep all temporary roadway ditches clear.
- When no longer required, remove stabilized construction roadway and re-grade and repair slopes.
- Periodically apply additional aggregate on gravel roads.
- Active dirt construction roads are commonly watered three or more times per day during the dry season.

Costs

Gravel construction roads are moderately expensive, but cost is often balanced by reductions in construction delay. No additional costs for dust control on construction roads should be required above that needed to meet local air quality requirements.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

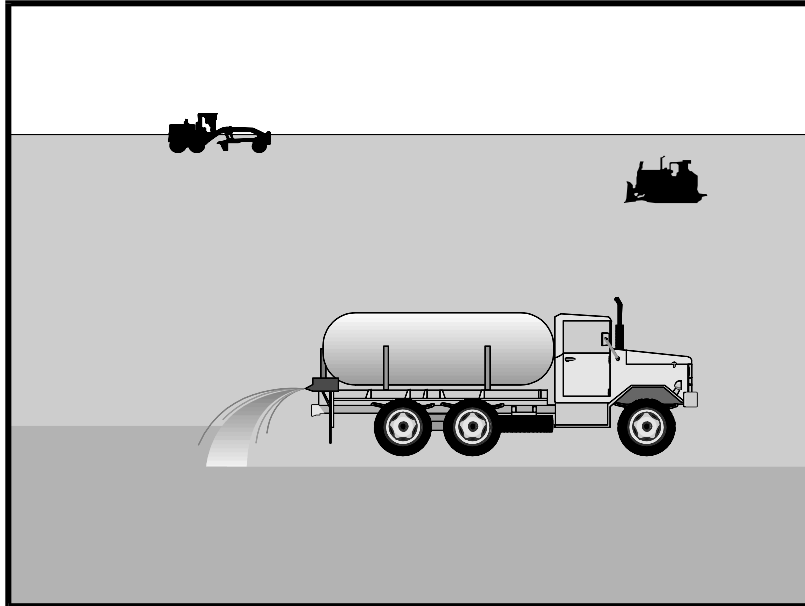
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Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.



Description and Purpose

Wind erosion or dust control consists of applying water or other chemical dust suppressants as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

California's Mediterranean climate, with a short "wet" season and a typically long, hot "dry" season, allows the soils to thoroughly dry out. During the dry season, construction activities are at their peak, and disturbed and exposed areas are increasingly subject to wind erosion, sediment tracking and dust generated by construction equipment. Site conditions and climate can make dust control more of an erosion problem than water based erosion. Additionally, many local agencies, including Air Quality Management Districts, require dust control and/or dust control permits in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. Wind erosion control is required to be implemented at all construction sites greater than 1 acre by the General Permit.

Suitable Applications

Most BMPs that provide protection against water-based erosion will also protect against wind-based erosion and dust control requirements required by other agencies will generally meet wind erosion control requirements for water quality protection. Wind erosion control BMPs are suitable during the following construction activities:

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	<input checked="" type="checkbox"/>
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-5 Soil Binders

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- Construction vehicle traffic on unpaved roads
- Drilling and blasting activities
- Soils and debris storage piles
- Batch drop from front-end loaders
- Areas with unstabilized soil
- Final grading/site stabilization

Limitations

- Watering prevents dust only for a short period (generally less than a few hours) and should be applied daily (or more often) to be effective.
- Over watering may cause erosion and track-out.
- Oil or oil-treated subgrade should not be used for dust control because the oil may migrate into drainageways and/or seep into the soil.
- Chemical dust suppression agents may have potential environmental impacts. Selected chemical dust control agents should be environmentally benign.
- Effectiveness of controls depends on soil, temperature, humidity, wind velocity and traffic.
- Chemical dust suppression agents should not be used within 100 feet of wetlands or water bodies.
- Chemically treated subgrades may make the soil water repellant, interfering with long-term infiltration and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.
- If the soil surface has minimal natural moisture, the affected area may need to be pre-wetted so that chemical dust control agents can uniformly penetrate the soil surface.

Implementation

Dust Control Practices

Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. The following table presents dust control practices that can be applied to varying site conditions that could potentially cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching can be employed for areas of occasional or no construction traffic. Preventive measures include minimizing surface areas to be disturbed, limiting onsite vehicle traffic to 15 mph or less, and controlling the number and activity of vehicles on a site at any given time.

Chemical dust suppressants include: mulch and fiber based dust palliatives (e.g. paper mulch with gypsum binder), salts and brines (e.g. calcium chloride, magnesium chloride), non-petroleum based organics (e.g. vegetable oil, lignosulfonate), petroleum based organics (e.g. asphalt emulsion, dust oils, petroleum resins), synthetic polymers (e.g. polyvinyl acetate, vinyls, acrylic), clay additives (e.g. bentonite, montmorillonite) and electrochemical products (e.g. enzymes, ionic products).

Site Condition	Dust Control Practices							
	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt	Temporary Gravel Construction Entrances/Equipment Wash Down	Synthetic Covers	Minimize Extent of Disturbed Area
Disturbed Areas not Subject to Traffic	X	X	X	X	X			X
Disturbed Areas Subject to Traffic			X	X	X	X		X
Material Stockpiles		X	X	X			X	X
Demolition			X			X	X	
Clearing/Excavation			X	X				X
Truck Traffic on Unpaved Roads			X	X	X	X	X	
Tracking					X	X		

Additional preventive measures include:

- Schedule construction activities to minimize exposed area (see EC-1, Scheduling).
- Quickly treat exposed soils using water, mulching, chemical dust suppressants, or stone/gravel layering.
- Identify and stabilize key access points prior to commencement of construction.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Restrict construction traffic to stabilized roadways within the project site, as practicable.
- Water should 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 should be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the project.
- If reclaimed waste water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality

Control Board (RWQCB) requirements. Non-potable water should not be conveyed in tanks or drain pipes that will be used to convey potable water and there should be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances should be marked, "NON-POTABLE WATER - DO NOT DRINK."

- Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances and wheel wash areas.
- Stabilize inactive areas of construction sites using temporary vegetation or chemical stabilization methods.

For chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. If chemical stabilization is used, the chemicals should not create any adverse effects on stormwater, plant life, or groundwater and should meet all applicable regulatory requirements.

Costs

Installation costs for water and chemical dust suppression vary based on the method used and the length of effectiveness. Annual costs may be high since some of these measures are effective for only a few hours to a few days.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Check areas protected to ensure coverage.
- Most water-based dust control measures require frequent application, often daily or even multiple times per day. Obtain vendor or independent information on longevity of chemical dust suppressants.

References

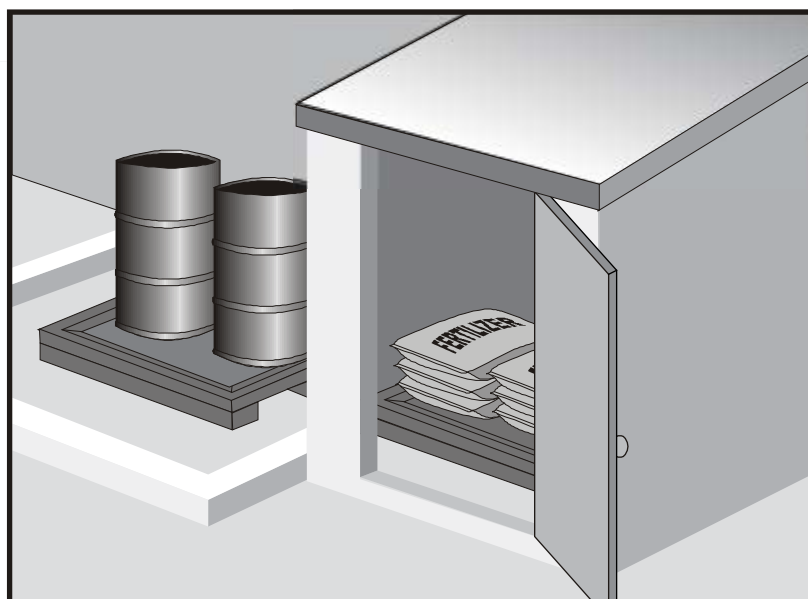
Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

California Air Pollution Control Laws, California Air Resources Board, updated annually.

Construction Manual, Chapter 4, Section 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative", California Department of Transportation (Caltrans), July 2001.

Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Description and Purpose

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in watertight containers and/or a completely enclosed designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

Suitable Applications

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease

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- Asphalt and concrete components
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds often must meet building and fire code requirements.

Implementation

The following steps should be taken to minimize risk:

- Chemicals must be stored in water tight containers with appropriate secondary containment or in a storage shed.
- When a material storage area is located on bare soil, the area should be lined and bermed.
- Use containment pallets or other practical and available solutions, such as storing materials within newly constructed buildings or garages, to meet material storage requirements.
- Stack erodible landscape material on pallets and cover when not in use.
- Contain all fertilizers and other landscape materials when not in use.
- Temporary storage areas should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) should be available on-site for all materials stored that have the potential to effect water quality.
- Construction site areas should be designated for material delivery and storage.
- Material delivery and storage areas should be located away from waterways, if possible.
 - Avoid transport near drainage paths or waterways.
 - Surround with earth berms or other appropriate containment BMP. See EC-9, Earth Dikes and Drainage Swales.
 - Place in an area that will be paved.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- An up to date inventory of materials delivered and stored onsite should be kept.

- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- Keep ample spill cleanup supplies appropriate for the materials being stored. Ensure that cleanup supplies are in a conspicuous, labeled area.
- Employees and subcontractors should be trained on the proper material delivery and storage practices.
- Employees trained in emergency spill cleanup procedures must be present when dangerous materials or liquid chemicals are unloaded.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose of materials and any contaminated soil. See WM-7, Contaminated Soil Management. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 should be stored in approved containers and drums and should not be overfilled. Containers and drums should be placed in temporary containment facilities for storage.
- A temporary containment facility should provide for a spill containment volume able to contain precipitation from a 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.
- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be collected and placed into drums. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids should be sent to an approved disposal site.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Materials should be covered prior to, and during rain events.
- Materials should be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels should be replaced immediately.

- Bagged and boxed materials should be stored on pallets and should not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials should be covered during non-working days and prior to and during rain events.
- Stockpiles should be protected in accordance with WM-3, Stockpile Management.
- Materials should be stored indoors within existing structures or completely enclosed storage sheds when available.
- Proper storage instructions should be posted at all times in an open and conspicuous location.
- An ample supply of appropriate spill clean up material should be kept near storage areas.
- Also see WM-6, Hazardous Waste Management, for storing of hazardous wastes.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored onsite.
- Arrange for employees trained in emergency spill cleanup procedures to be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- Contain and clean up any spill immediately.
- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See WM-7, Contaminated Soil Management.
- See WM-4, Spill Prevention and Control, for spills of chemicals and/or hazardous materials.
- If spills or leaks of materials occur that are not contained and could discharge to surface waters, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

Cost

- The largest cost of implementation may be in the construction of a materials storage area that is covered and provides secondary containment.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Keep storage areas clean and well organized, including a current list of all materials onsite.
- Inspect labels on containers for legibility and accuracy.

- Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

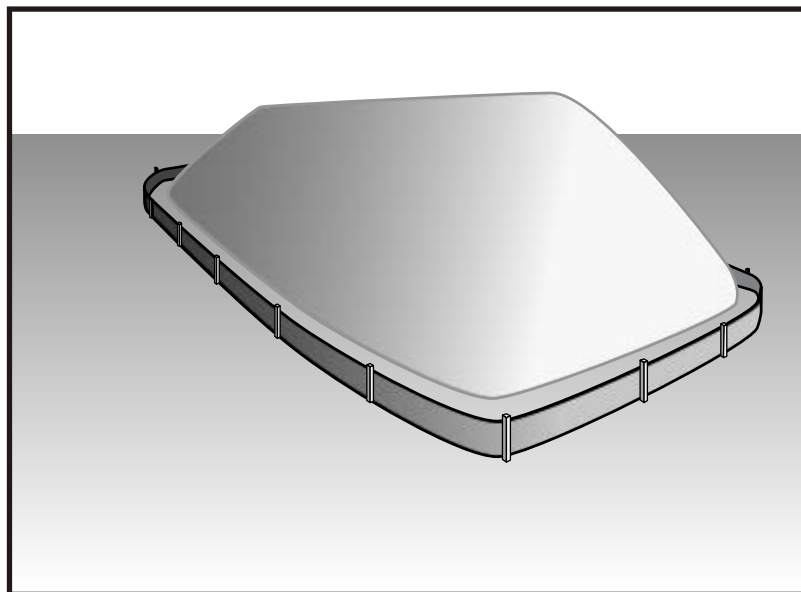
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Stockpile management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, soil amendments, sand, paving materials such as portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called “cold mix” asphalt), and pressure treated wood.

Suitable Applications

Implement in all projects that stockpile soil and other loose materials.

Limitations

- Plastic sheeting as a stockpile protection is temporary and hard to manage in windy conditions. Where plastic is used, consider use of plastic tarps with nylon reinforcement which may be more durable than standard sheeting.
- Plastic sheeting can increase runoff volume due to lack of infiltration and potentially cause perimeter control failure.
- Plastic sheeting breaks down faster in sunlight.
- The use of Plastic materials and photodegradable plastics should be avoided.

Implementation

Protection of stockpiles is a year-round requirement. To properly manage stockpiles:

Categories

EC	Erosion Control	
SE	Sediment Control	<input checked="" type="checkbox"/>
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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- On larger sites, a minimum of 50 ft separation from concentrated flows of stormwater, drainage courses, and inlets is recommended.
- After 14 days of inactivity, a stockpile is non-active and requires further protection described below. All stockpiles are required to be protected as non-active stockpiles immediately if they are not scheduled to be used within 14 days.
- Protect all stockpiles from stormwater runoff using temporary perimeter sediment barriers such as compost berms (SE-13), temporary silt dikes (SE-12), fiber rolls (SE-5), silt fences (SE-1), sandbags (SE-8), gravel bags (SE-6), or biofilter bags (SE-14). Refer to the individual fact sheet for each of these controls for installation information.
- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-1, Wind Erosion Control.
- Manage stockpiles of contaminated soil in accordance with WM-7, Contaminated Soil Management.
- Place bagged materials on pallets and under cover.
- Ensure that stockpile coverings are installed securely to protect from wind and rain.
- Some plastic covers withstand weather and sunlight better than others. Select cover materials or methods based on anticipated duration of use.

Protection of Non-Active Stockpiles

A stockpile is considered non-active if it either is not used for 14 days or if it is scheduled not to be used for 14 days or more. Stockpiles need to be protected immediately if they are not scheduled to be used within 14 days. Non-active stockpiles of the identified materials should be protected as follows:

Soil stockpiles

- Soil stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.
- Temporary vegetation should be considered for topsoil piles that will be stockpiled for extended periods.

Stockpiles of Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate sub base

- Stockpiles should be covered and protected with a temporary perimeter sediment barrier at all times.

Stockpiles of “cold mix”

- Cold mix stockpiles should be placed on and covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Stockpiles of fly ash, stucco, hydrated lime

- Stockpiles of materials that may raise the pH of runoff (i.e., basic materials) should be covered with plastic and surrounded by a berm.

Stockpiles/Storage of wood (Pressure treated with chromated copper arsenate or ammoniacal copper zinc arsenate)

- Treated wood should be covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Protection of Active Stockpiles

A stockpile is active when it is being used or is scheduled to be used within 14 days of the previous use. Active stockpiles of the identified materials should be protected as follows:

- All stockpiles should be covered and protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of “cold mix” and treated wood, and basic materials should be placed on and covered with plastic sheeting or comparable material and surrounded by a berm prior to the onset of precipitation.
- The downstream perimeter of an active stockpile should be protected with a linear sediment barrier or berm and runoff should be diverted around or away from the stockpile on the upstream perimeter.

Costs

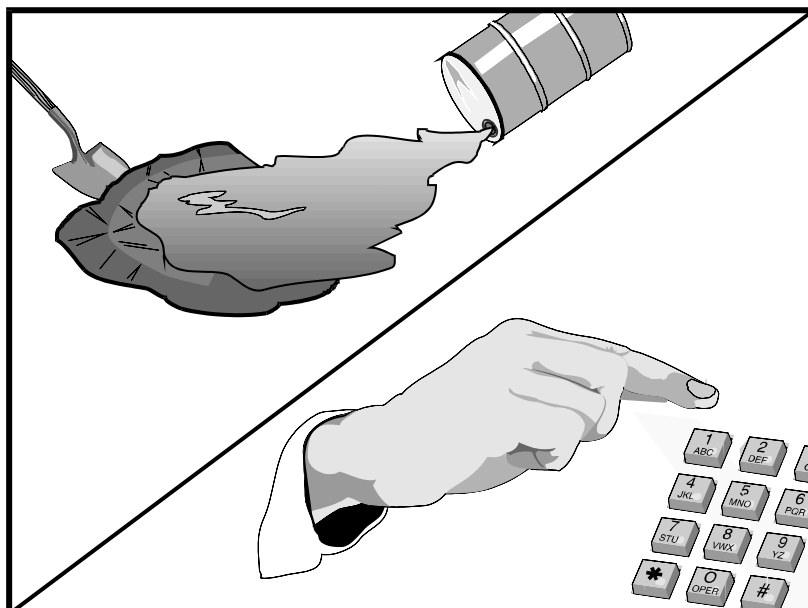
For cost information associated with stockpile protection refer to the individual erosion or sediment control BMP fact sheet considered for implementation (For example, refer to SE-1 Silt Fence for installation of silt fence around the perimeter of a stockpile.)

Inspection and Maintenance

- Stockpiles must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- It may be necessary to inspect stockpiles covered with plastic sheeting more frequently during certain conditions (for example, high winds or extreme heat).
- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.
- Sediment shall be removed when it reaches one-third of the barrier height.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.



Description and Purpose

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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- Fuels
- Lubricants
- Other petroleum distillates

Limitations

- In some cases it may be necessary to use a private spill cleanup company.
- This BMP applies to spills caused by the contractor and subcontractors.
- Procedures and practices presented in this BMP are general. Contractor should identify appropriate practices for the specific materials used or stored onsite

Implementation

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

- Be aware that different materials pollute in different amounts. Make sure that each employee knows 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 indoctrinate new employees.
- Have contractor’s superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

- To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.
- Designate responsible individuals to oversee and enforce control measures.
- Spills should be covered and protected from stormwater runoff during rainfall to the extent that it doesn’t compromise clean up activities.
- Do not bury or wash spills with water.

- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.
- Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with WM-10, Liquid Waste Management.
- Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.
- Place proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.
- Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

- Clean up leaks and spills immediately.
- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.
- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

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 rather than hosing down or burying the spill.
- Absorbent materials should be promptly removed and disposed of properly.
- Follow the practice below for a minor spill:
 - Contain the spread of the spill.
 - Recover spilled materials.
 - Clean the contaminated area and 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.

- Spills should be cleaned up immediately:
 - Contain spread of the spill.
 - Notify the project foreman immediately.
 - 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 should be taken:
 - 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.
 - Notify the Governor's Office of Emergency Services Warning Center, (916) 845-8911.
 - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110, 119, and 302, the contractor should notify the National Response Center at (800) 424-8802.
 - Notification should first be made by telephone and followed up with a written report.
 - The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
 - Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

Reporting

- Report significant spills to local agencies, such as the Fire Department; they can assist in cleanup.
- Federal regulations require that any significant oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hours).

Use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runoff of stormwater and the runoff of spills.
- Regularly inspect onsite vehicles and equipment for leaks and repair immediately
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under paving equipment when not in use.
- Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around
- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- If fueling must occur onsite, use designate areas, located away from drainage courses, to prevent the runoff of stormwater and the runoff of spills.
- Discourage "topping off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

Costs

Prevention of leaks and spills is inexpensive. Treatment and/ or disposal of contaminated soil or water can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

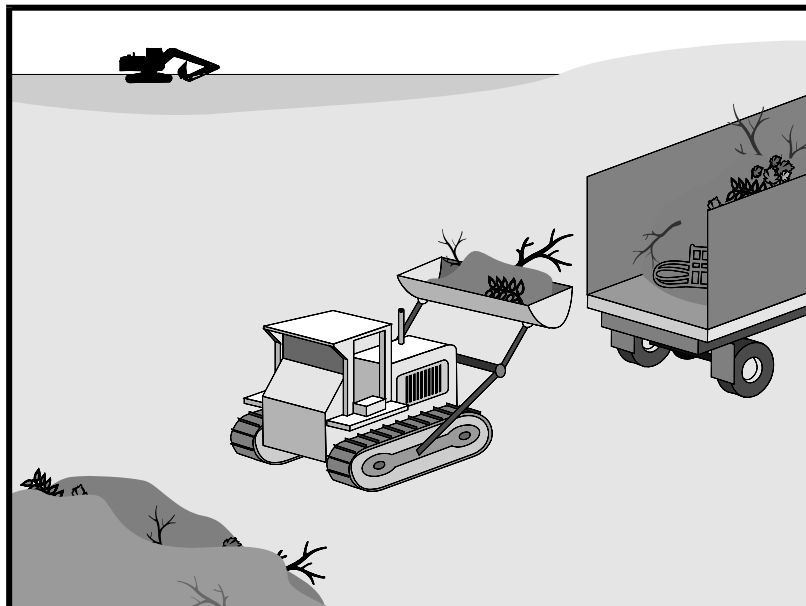
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Keep ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.
- Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- Packaging materials including wood, paper, and plastic
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces, and masonry products
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials

Categories

EC	Erosion Control	
SE	Sediment Control	
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WE	Wind Erosion Control	
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WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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- Highway planting wastes, including vegetative material, plant containers, and packaging materials

Limitations

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Implementation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Locate containers in a covered area or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Cover waste containers at the end of each work day and when it is raining.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Remove this solid waste promptly since erosion and sediment control devices tend to collect litter.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

Education

- Have the contractor's superintendent or representative oversee and enforce proper solid waste management procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- 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.
- Minimize production of solid waste materials wherever possible.

Collection, Storage, and Disposal

- Littering on the project site should be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater runoff should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters should be securely covered from wind and rain by covering the waste with tarps or plastic.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management. Have hazardous waste hauled to an appropriate disposal and/or recycling facility.
- Salvage or recycle useful vegetation debris, packaging and surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Costs

All of the above are low cost measures.

Inspection and Maintenance

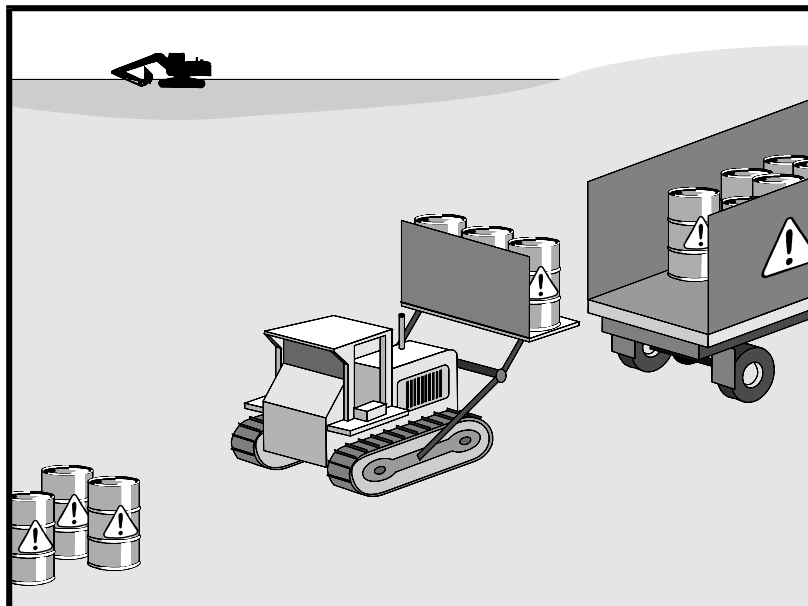
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Inspect construction waste area regularly.
- Arrange for regular waste collection.

References

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Hazardous waste management practices are implemented on construction projects that generate waste from the use of:

- Petroleum Products
- Concrete Curing Compounds
- Palliatives
- Septic Wastes
- Stains
- Wood Preservatives
- Asphalt Products
- Pesticides
- Acids
- Paints
- Solvents
- Roofing Tar
- Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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In addition, sites with existing structures may contain wastes, which must be disposed of in accordance with federal, state, and local regulations. These wastes include:

- Sandblasting grit mixed with lead-, cadmium-, or chromium-based paints
- Asbestos
- PCBs (particularly in older transformers)

Limitations

- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
- Nothing in this BMP relieves 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 aerially deposited lead (ADL) soils. For ADL soils refer to WM-7, Contaminated Soil Management.

Implementation

The following steps will help reduce stormwater pollution from hazardous wastes:

Material Use

- Wastes should be stored in sealed containers constructed of a suitable material and should be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172, 173, 178, and 179.
- All hazardous waste should be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- Waste containers should be stored in temporary containment facilities that should comply with the following requirements:
 - Temporary containment facility should provide for a spill containment volume equal to 1.5 times the volume of all containers able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater.
 - Temporary containment facility should be impervious to the materials stored there for a minimum contact time of 72 hours.
 - Temporary containment facilities should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be placed into drums after each rainfall. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids should be sent to an approved disposal site.
 - Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.

- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Throughout the rainy season, temporary containment facilities should be covered during non-working days, and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs.
- Drums should not be overfilled and wastes should not be mixed.
- Unless watertight, containers of dry waste should be stored on pallets.
- Do not over-apply herbicides and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over application is expensive and environmentally harmful. Apply surface dressings in several smaller applications, as opposed to one large application. Allow time for infiltration and avoid excess material being carried offsite by runoff. Do not apply these chemicals just before it rains. People applying pesticides must be certified in accordance with federal and state regulations.
- Paint brushes and equipment for water and oil based paints should be cleaned within a contained area and should not be allowed to contaminate site soils, watercourses, or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused should be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths should be disposed of as solid waste.
- Do not clean out brushes or rinse paint containers into the dirt, street, gutter, storm drain, or stream. "Paint out" brushes as much as possible. Rinse water-based paints to the sanitary sewer. Filter and reuse thinners and solvents. Dispose of excess oil-based paints and sludge as hazardous waste.
- The following actions should be taken with respect to temporary contaminant:
 - Ensure that adequate hazardous waste storage volume is available.
 - Ensure that hazardous waste collection containers are conveniently located.
 - Designate hazardous waste storage areas onsite away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.
 - Minimize production or generation of hazardous materials and hazardous waste on the job 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.
- Place hazardous waste containers in secondary containment.
- Do not allow potentially hazardous waste materials to accumulate on the ground.
- Do not mix wastes.
- Use all of the product before disposing of the container.
- Do not remove the original product label; it contains important safety and disposal information.

Waste Recycling Disposal

- Select designated hazardous waste collection areas onsite.
- Hazardous materials and wastes should be stored in covered containers and protected from vandalism.
- Place hazardous waste containers in secondary containment.
- Do not mix wastes, this can cause chemical reactions, making recycling impossible and complicating disposal.
- Recycle any useful materials such as used oil or water-based paint.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Arrange for regular waste collection before containers overflow.
- Make sure that hazardous waste (e.g., excess oil-based paint and sludge) is collected, removed, and disposed of only at authorized disposal areas.

Disposal Procedures

- Waste should be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Hazardous Waste Manifest forms.
- A Department of Health Services certified laboratory should sample waste to determine the appropriate disposal facility.
- Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.
- Attention is directed to "Hazardous Material", "Contaminated Material", and "Aerially Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.

Education

- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Educate employees and subcontractors on potential dangers to humans and the environment from hazardous wastes.
- Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.
- Instruct 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 superintendent or representative should 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.
- Warning signs should be placed in areas recently treated with chemicals.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- If a container does spill, clean up immediately.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events..
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Hazardous waste should be regularly collected.
- A foreman or construction supervisor should monitor onsite hazardous waste storage and disposal procedures.
- Waste storage areas should be kept clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.
- Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

- Hazardous spills should be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site.
- The National Response Center, at (800) 424-8802, should be notified of spills of federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302. Also notify the Governors Office of Emergency Services Warning Center at (916) 845-8911.
- A copy of the hazardous waste manifests should be provided.

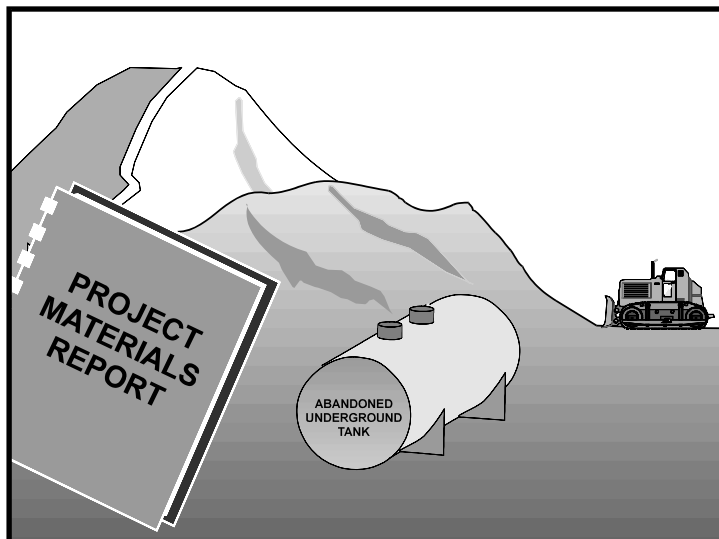
References

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Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Objective
- ☒ Secondary Objective

Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from contaminated soil and highly acidic or alkaline soils by conducting pre-construction surveys, inspecting excavations regularly, and remediating contaminated soil promptly.

Suitable 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, aerial deposition, past use and leaks from underground storage tanks.

Limitations

Contaminated soils that cannot be treated onsite must be disposed of offsite by a licensed hazardous waste hauler. The presence of contaminated soil may indicate contaminated water as well. See NS-2, Dewatering Operations, for more information.

The procedures and practices presented in this BMP are general. The contractor should identify appropriate practices and procedures for the specific contaminants known to exist or discovered onsite.

Implementation

Most owners and developers conduct pre-construction environmental assessments as a matter of routine. Contaminated soils are often identified during project planning and development with known locations identified in the plans, specifications and in the SWPPP. The contractor should review applicable reports and investigate appropriate call-outs in the

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	<input checked="" type="checkbox"/>
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	<input checked="" type="checkbox"/>
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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plans, specifications, and SWPPP. Recent court rulings holding contractors liable for cleanup costs when they unknowingly move contaminated soil highlight the need for contractors to confirm a site assessment is completed before earth moving begins.

The following steps will help reduce stormwater pollution from contaminated soil:

- Conduct thorough, pre-construction inspections of the site and review documents related to the site. If inspection or reviews indicated presence of contaminated soils, develop a plan before starting work.
- Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
- Prevent leaks and spills. Contaminated soil can be expensive to treat and dispose of properly. However, addressing the problem before construction is much less expensive than after the structures are in place.
- The contractor may further identify contaminated soils by investigating:
 - Past site uses and activities
 - Detected or undetected spills and leaks
 - Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline forming elements
 - Contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
 - Suspected soils should be tested at a certified laboratory.

Education

- Have employees and subcontractors complete a safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified, prior to performing any excavation work at the locations containing material classified as hazardous.
- Educate employees and subcontractors in identification of contaminated soil and on contaminated soil handling and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

Handling Procedures for Material with Aerially Deposited Lead (ADL)

- Materials from areas designated as containing (ADL) may, if allowed by the contract special provisions, be excavated, transported, and used in the construction of embankments and/or backfill.
- Excavation, transportation, and placement operations should result in no visible dust.
- Caution should be exercised to prevent spillage of lead containing material during transport.

- Quality should be monitored during excavation of soils contaminated with lead.

Handling Procedures for Contaminated Soils

- Minimize onsite storage. Contaminated soil should be disposed of properly in accordance with all applicable regulations. All hazardous waste storage will comply with the requirements in Title 22, CCR, Sections 66265.250 to 66265.260.
- Test suspected soils at an approved certified laboratory.
- Work with the local regulatory agencies to develop options for treatment or disposal if the soil is contaminated.
- Avoid temporary stockpiling of contaminated soils or hazardous material.
- Take the following precautions if temporary stockpiling is necessary:
 - Cover the stockpile with plastic sheeting or tarps.
 - Install a berm around the stockpile to prevent runoff from leaving the area.
 - Do not stockpile in or near storm drains or watercourses.
- Remove contaminated material and hazardous material on exteriors of transport vehicles and place either into the current transport vehicle or into the excavation prior to the vehicle leaving the exclusion zone.
- Monitor the air quality continuously during excavation operations at all locations containing hazardous material.
- 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 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.
- Excavate, transport, and dispose of contaminated material and hazardous material 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 that have jurisdiction over such work.
- To determine if it contains hazardous substances, arrange to have tested, any liquid or sludge found in the underground tank prior to its removal.
- 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 or sludge found within the tank, and all contaminated substances and hazardous substances removed during the tank removal and transported to disposal facilities permitted to accept such waste.

Water Control

- All necessary precautions and preventive measures should be taken 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, should be discharged to clean, closed top, watertight transportable holding tanks, treated, and disposed of in accordance with federal, state, and local laws.

Costs

Prevention of leaks and spills is inexpensive. Treatment or disposal of contaminated soil can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Arrange for contractor's Water Pollution Control Manager, foreman, and/or construction supervisor to monitor onsite contaminated soil storage and disposal procedures.
- Monitor air quality continuously during excavation operations at all locations containing hazardous material.
- Coordinate contaminated soils and hazardous substances/waste management with the appropriate federal, state, and local agencies.

- Implement WM-4, Spill Prevention and Control, to prevent leaks and spills as much as possible.

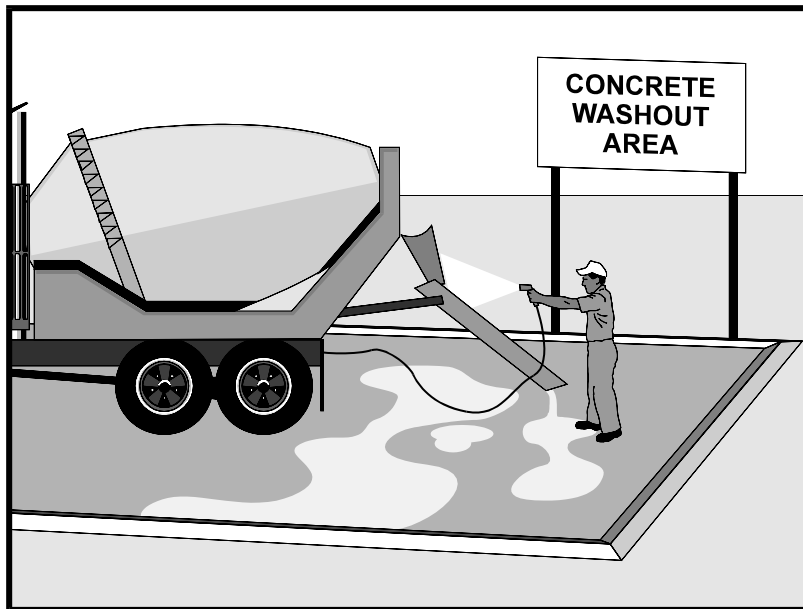
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Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Prevent the discharge of pollutants to stormwater from concrete waste by conducting washout onsite or offsite in a designated area, and by employee and subcontractor training.

The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials, including mortar, concrete, stucco, cement and block and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows and raising pH to levels outside the accepted range.

Suitable 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.
- Slurries containing portland cement concrete (PCC) are generated, such as from saw cutting, coring, grinding, grooving, and hydro-concrete demolition.
- Concrete trucks and other concrete-coated equipment are washed onsite.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	<input checked="" type="checkbox"/>
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	<input checked="" type="checkbox"/>
Nutrients	
Trash	
Metals	<input checked="" type="checkbox"/>
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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- Mortar-mixing stations exist.
- Stucco mixing and spraying.
- See also NS-8, Vehicle and Equipment Cleaning.

Limitations

- Offsite washout of concrete wastes may not always be possible.
- Multiple washouts may be needed to assure adequate capacity and to allow for evaporation.

Implementation

The following steps will help reduce stormwater pollution from concrete wastes:

- Incorporate requirements for concrete waste management into material supplier and subcontractor agreements.
- Store dry and wet materials under cover, away from drainage areas. Refer to WM-1, Material Delivery and Storage for more information.
- Avoid mixing excess amounts of concrete.
- Perform washout of concrete trucks in designated areas only, where washout will not reach stormwater.
- Do not wash out concrete trucks into storm drains, open ditches, streets, streams or onto the ground. Trucks should always be washed out into designated facilities.
- Do not allow excess concrete to be dumped onsite, except in designated areas.
- For onsite washout:
 - On larger sites, it is recommended to locate washout areas at least 50 feet from storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
 - Washout wastes into the temporary washout where the concrete can set, be broken up, and then disposed properly.
 - Washouts shall be implemented in a manner that prevents leaching to underlying soils. Washout containers must be water tight and washouts on or in the ground must be lined with a suitable impervious liner, typically a plastic type material.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile or dispose in the trash.
- See typical concrete washout installation details at the end of this fact sheet.

Education

- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.

- Arrange for contractor's superintendent or representative to oversee and enforce concrete waste management procedures.
- Discuss the concrete management techniques described in this BMP (such as handling of concrete waste and washout) with the ready-mix concrete supplier before any deliveries are made.

Concrete Demolition Wastes

- Stockpile concrete demolition waste in accordance with BMP WM-3, Stockpile Management.
- Dispose of or recycle hardened concrete waste in accordance with applicable federal, state or local regulations.

Concrete Slurry Wastes

- PCC and AC waste should not be allowed to enter storm drains or watercourses.
- PCC and AC waste should be collected and disposed of or placed in a temporary concrete washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below).
- A foreman or construction supervisor should monitor onsite concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.
- Saw-cut concrete slurry should not be allowed to enter storm drains or watercourses. Residue from grinding operations should be picked up by means of a vacuum attachment to the grinding machine or by sweeping. Saw cutting residue should not be allowed to flow across the pavement and should not be left on the surface of the pavement. See also NS-3, Paving and Grinding Operations; and WM-10, Liquid Waste Management.
- Concrete slurry residue should be disposed in a temporary washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below) and allowed to dry. Dispose of dry slurry residue in accordance with WM-5, Solid Waste Management.

Onsite Temporary Concrete Washout Facility, Transit Truck Washout Procedures

- Temporary concrete washout facilities should be located a minimum of 50 ft from storm drain inlets, open drainage facilities, and watercourses. Each facility should be located away from construction traffic or access areas to prevent disturbance or tracking.
- A sign should be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.
- Temporary concrete washout facilities should be constructed above grade or below grade at the option of the contractor. Temporary concrete washout facilities should be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

- Temporary washout facilities should have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.
- Temporary washout facilities should be lined to prevent discharge to the underlying ground or surrounding area.
- Washout of concrete trucks should be performed in designated areas only.
- Only concrete from mixer truck chutes should be washed into concrete wash out.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of or recycled offsite.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete should be broken up, removed, and disposed of per WM-5, Solid Waste Management. Dispose of or recycle hardened concrete on a regular basis.
- Temporary Concrete Washout Facility (Type Above Grade)
 - Temporary concrete washout facility (type above grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft; however, smaller sites or jobs may only need a smaller washout facility. With any washout, always maintain a sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
 - Materials used to construct the washout area should conform to the provisions detailed in their respective BMPs (e.g., SE-8 Sandbag Barrier).
 - Plastic lining material should be a minimum of 10 mil in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
 - Alternatively, portable removable containers can be used as above grade concrete washouts. Also called a “roll-off”; this concrete washout facility should be properly sealed to prevent leakage, and should be removed from the site and replaced when the container reaches 75% capacity.
- Temporary Concrete Washout Facility (Type Below Grade)
 - Temporary concrete washout facilities (type below grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft. The quantity and volume should be sufficient to contain all liquid and concrete waste generated by washout operations.
 - Lath and flagging should be commercial type.
 - Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

- The base of a washout facility should be free of rock or debris that may damage a plastic liner.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, the hardened concrete should be removed and properly disposed or recycled in accordance with federal, state or local regulations. Materials used to construct temporary concrete washout facilities should be removed from the site of the work and properly disposed or recycled in accordance with federal, state or local regulations..
- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities should be backfilled and repaired.

Costs

All of the above are low cost measures. Roll-Off concrete washout facilities can be more costly than other measures due to removal and replacement; however, provide a cleaner alternative to traditional washouts. The type of washout facility, size, and availability of materials will determine the cost of the washout.

Inspection and Maintenance

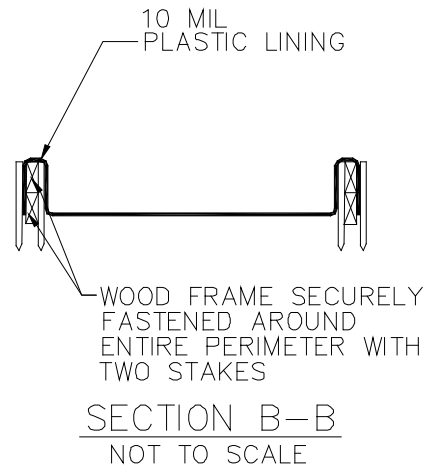
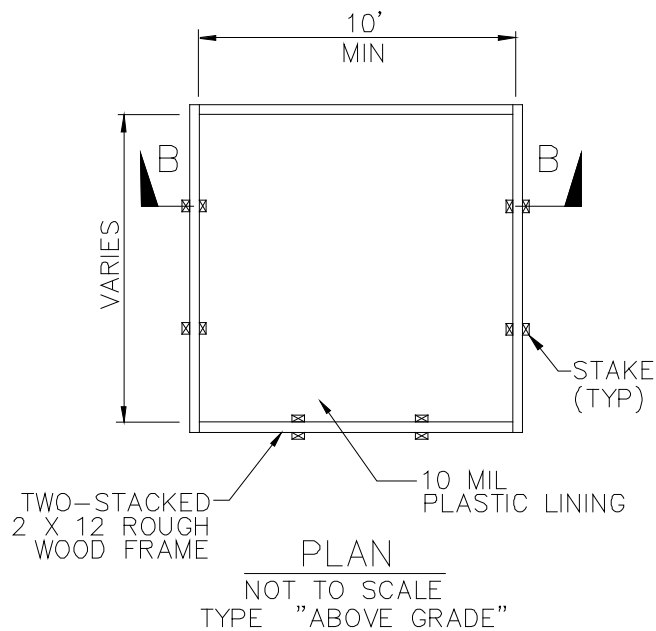
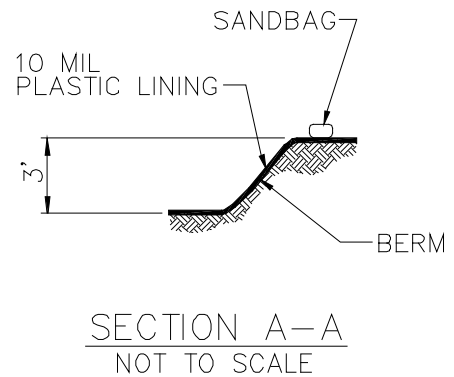
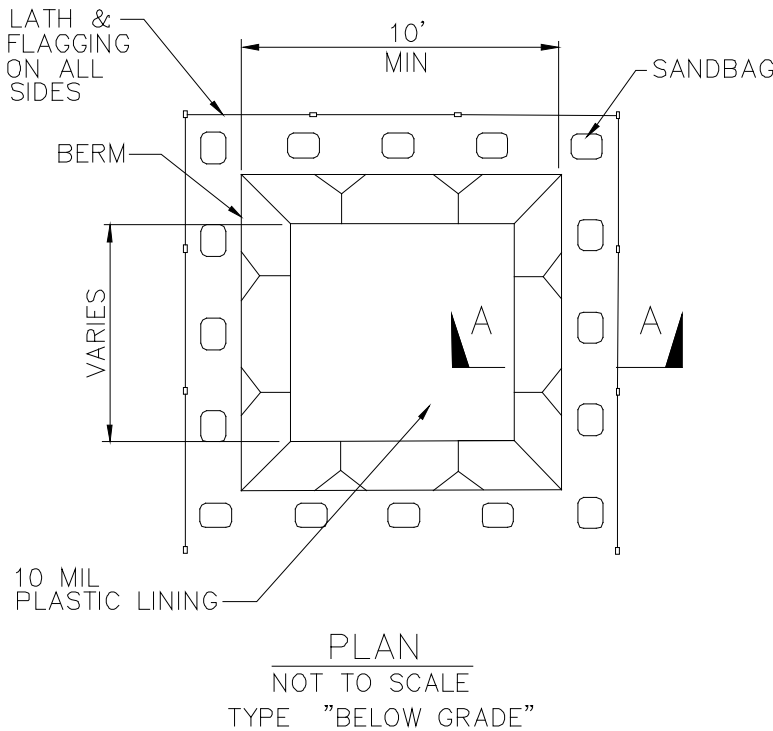
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Temporary concrete washout facilities should be maintained to provide adequate holding capacity with a minimum freeboard of 4 in. for above grade facilities and 12 in. for below grade facilities. Maintaining temporary concrete washout facilities should include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials should be removed and properly disposed or recycled in accordance with federal, state or local regulations.
- Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.
- Inspect washout facilities for damage (e.g. torn liner, evidence of leaks, signage, etc.). Repair all identified damage.

References

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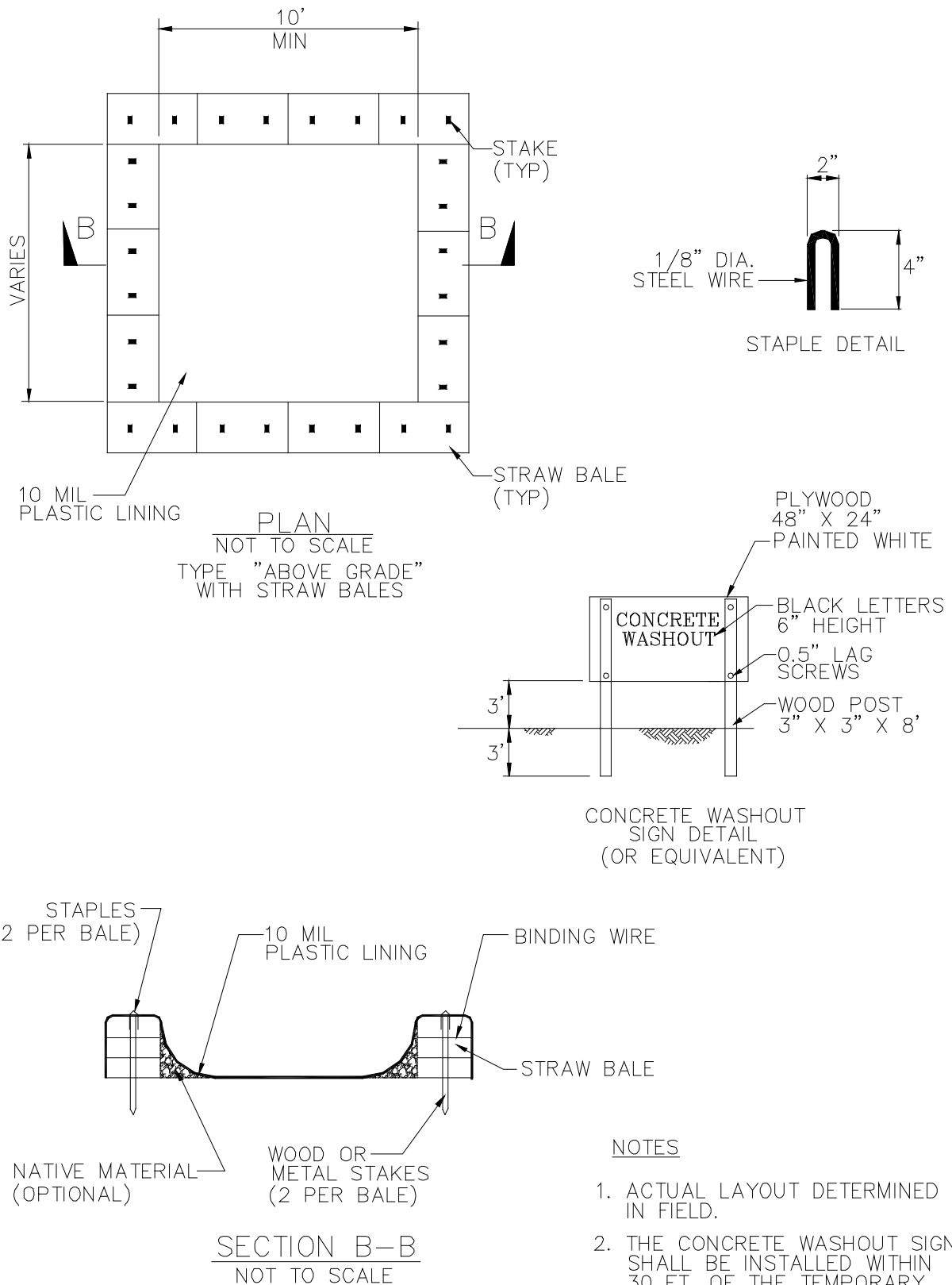
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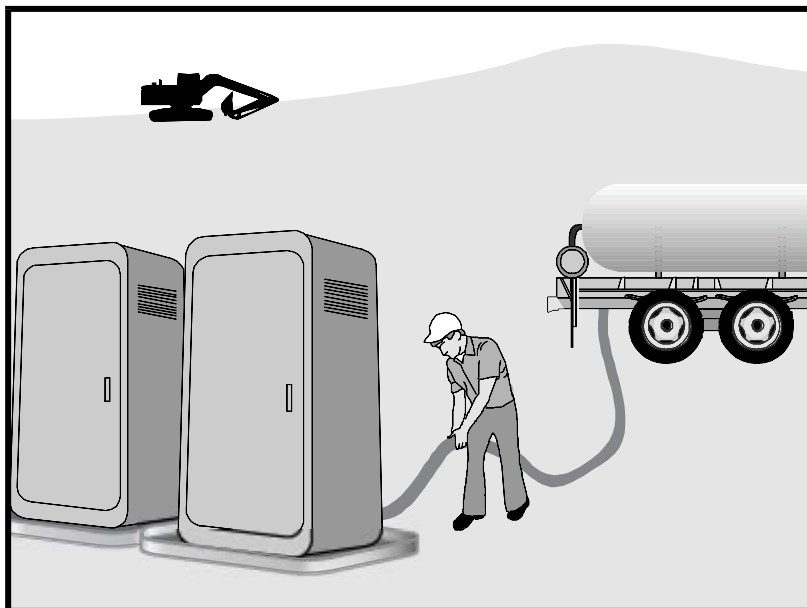


NOTES

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



Description and Purpose

Proper sanitary and septic waste management prevent the discharge of pollutants to stormwater from sanitary and septic waste by providing convenient, well-maintained facilities, and arranging for regular service and disposal.

Suitable Applications

Sanitary septic waste management practices are suitable for use at all construction sites that use temporary or portable sanitary and septic waste systems.

Limitations

None identified.

Implementation

Sanitary or septic wastes should be treated or disposed of in accordance with state and local requirements. In many cases, one contract with a local facility supplier will be all that it takes to make sure sanitary wastes are properly disposed.

Storage and Disposal Procedures

- Temporary sanitary facilities should be located away from drainage facilities, watercourses, and from traffic circulation. If site conditions allow, place portable facilities a minimum of 50 feet from drainage conveyances and traffic areas. When subjected to high winds or risk of high winds, temporary sanitary facilities should be secured to prevent overturning.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	<input checked="" type="checkbox"/>

Legend:

- ☒ Primary Category
- ☒ Secondary Category

Targeted Constituents

Sediment	
Nutrients	<input checked="" type="checkbox"/>
Trash	<input checked="" type="checkbox"/>
Metals	
Bacteria	<input checked="" type="checkbox"/>
Oil and Grease	
Organics	<input checked="" type="checkbox"/>

Potential Alternatives

None

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Sanitary/Septic Waste Management WM-9

- Temporary sanitary facilities must be equipped with containment to prevent discharge of pollutants to the stormwater drainage system of the receiving water.
- Consider safety as well as environmental implications before placing temporary sanitary facilities.
- Wastewater should not be discharged or buried within the project site.
- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, should comply with the local health agency, city, county, and sewer district requirements.
- Only reputable, licensed sanitary and septic waste haulers should be used.
- Sanitary facilities should be located in a convenient location.
- Temporary septic systems should treat wastes to appropriate levels before discharging.
- If using an onsite disposal system (OSDS), such as a septic system, local health agency requirements must be followed.
- Temporary sanitary facilities that discharge to the sanitary sewer system should be properly connected to avoid illicit discharges.
- Sanitary and septic facilities should be maintained in good working order by a licensed service.
- Regular waste collection by a licensed hauler should be arranged before facilities overflow.
- If a spill does occur from a temporary sanitary facility, follow federal, state and local regulations for containment and clean-up.

Education

- Educate employees, subcontractors, and suppliers on sanitary and septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary and septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary and septic waste.
- Hold regular meetings to discuss and reinforce the use of sanitary facilities (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

Costs

All of the above are low cost measures.

Sanitary/Septic Waste Management WM-9

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Arrange for regular waste collection.
- If high winds are expected, portable sanitary facilities must be secured with spikes or weighed down to prevent over turning.
- If spills or leaks from sanitary or septic facilities occur that are not contained and discharge from the site, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

APPENDIX P
POLB RUBBLE SITE

Recycling Concrete Program

The City is currently operating the POLB Rubble Site that collects concrete and asphalt rubble materials from various City projects, and produces base products such as Crushed Miscellaneous Base (CMB) and 2-inch crushed concrete for use on City projects. The POLB Rubble Site is located at 421 N. Henry Ford Ave, Wilmington, CA 90744 (see the POLB Rubble Site Location Map). The Contractor shall be prepared to utilize the Rubble Site, as designated by the Engineer, to support City Projects.

Rubble authorized to be received at the POLB Rubble Site is inspected upon arrival, and any oversize or non-compliant material will be rejected and sent back to the Contractor at the Contractor's expense. Use of the POLB Rubble Site for disposal of rubble and/or removal of CMB and crushed concrete must be requested two (2) working days in advance to confirm space and material availability. Operational efficiency at the POLB Rubble Site is not guaranteed, and the Contractor shall expect occasional delays in rubble disposal or CMB and 2-inch crushed concrete removal at the POLB Rubble Site. The following authorization forms are required for corresponding requests:

1. Rubble Disposal Authorization Request Form
2. CMB Removal Authorization Form
3. 2" Crushed Concrete Removal Authorization Form

Rubble Disposal Authorization

The City has instituted a program to control access to the POLB Rubble Site. Each truck entering the POLB Rubble Site must present to the City's Load Checker, a copy of an approved Rubble Disposal Authorization Request Form. The form shall be submitted with the Contractor's required information to the Engineer a minimum of two (2) working days prior to the hauling of rubble to the POLB Rubble Site. The Engineer will return the form to the Contractor to issue to each truck.

Only Portland cement concrete and asphalt concrete generated from City projects shall be accepted at the POLB Rubble Site. No fill, base, or ballast material will be accepted. All loads will be inspected at the POLB Rubble Site and any loads not complying with these Specifications will be denied access.

Rubble shall be sized and transported to the POLB Rubble Site at the Contractor's expense and under the following conditions:

Rubble shall be broken into pieces no larger than 2 feet x 2 feet x 2 feet and all reinforcement shall be cut off flush with the surface of the rubble.

All marine growth, aggregate base, and fill material shall be removed from the rubble prior to transporting to the POLB Rubble Site. Pulverized asphalt, asphalt grindings, geosynthetics, soil material, base material, ballast, concrete rubble from wheel stops and other rubble material including trash and debris will not be accepted. All loads will be inspected at the POLB Rubble Site. Loads containing unacceptable materials mixed with Portland cement concrete and asphalt concrete will be denied access and the Contractor shall legally dispose of such material outside of the Harbor District at an approved disposal facility according to federal, state, and local laws by the Contractor and at the Contractor's expense.

Concrete previously exposed to the marine environment shall be cleaned of any debris and growth prior to break up and delivery.

Contaminated materials cannot be taken to the POLB Rubble Site.

CMB and 2" Crushed Concrete Removal Authorization

CMB and 2" Crushed Concrete for removal must be requested in advance; these materials are produced in limited quantities and are only available on a first come, first served basis. The Engineer shall track requested quantities as soon as identified to properly project supply and demand. The supply of material is authorized using the CMB or 2" Crushed Concrete Removal Authorization forms.

The City will furnish the fine-graded crushed miscellaneous base (CMB) material at no cost to the Contractor at the POLB Rubble Site. The City furnished CMB is of "fine" gradation as defined by SSPWC Section 200-2.4. The Fine-Graded Granular Material is a clean mixture of crushed stone, crushed gravel, and manufactured or natural sand. Sizing of material produced at the POLB Rubble Site conforms to SSPWC 200-2.2.1 and 200-2.2.2.

Contractor shall provide all labor and equipment to haul, handle, unload and place material at the Project site. Contractor shall be responsible for paying all required transportation costs, loading and unloading costs, ancillary storage costs, and disposal fees and tipping fees. Contractor shall notify the Engineer a minimum of two (2) working days prior to planned arrival at the POLB Rubble Site to obtain CMB or 2" Crushed Concrete material.

The Contractor shall submit the CMB Removal Authorization Form or 2" Crushed Concrete Removal Authorization Form with the Contractor's required information to the Engineer a minimum of two (2) working days prior to the date that base will be transported by Contractor. The Engineer will return the form to the Contractor to issue to each truck. Each of the Contractor's trucks entering the POLB Rubble Site to obtain base must present to the City's Load Checker, a copy of an approved CMB Removal Authorization Form or approved 2" Crushed Concrete Removal Authorization Form.

The Contractor shall handle base material in such a manner that it is kept clean and free from segregation. Stockpiling and other handling operations shall be managed by the Contractor to minimize segregation.

Contractor shall moisten CMB to obtain specific relative density.

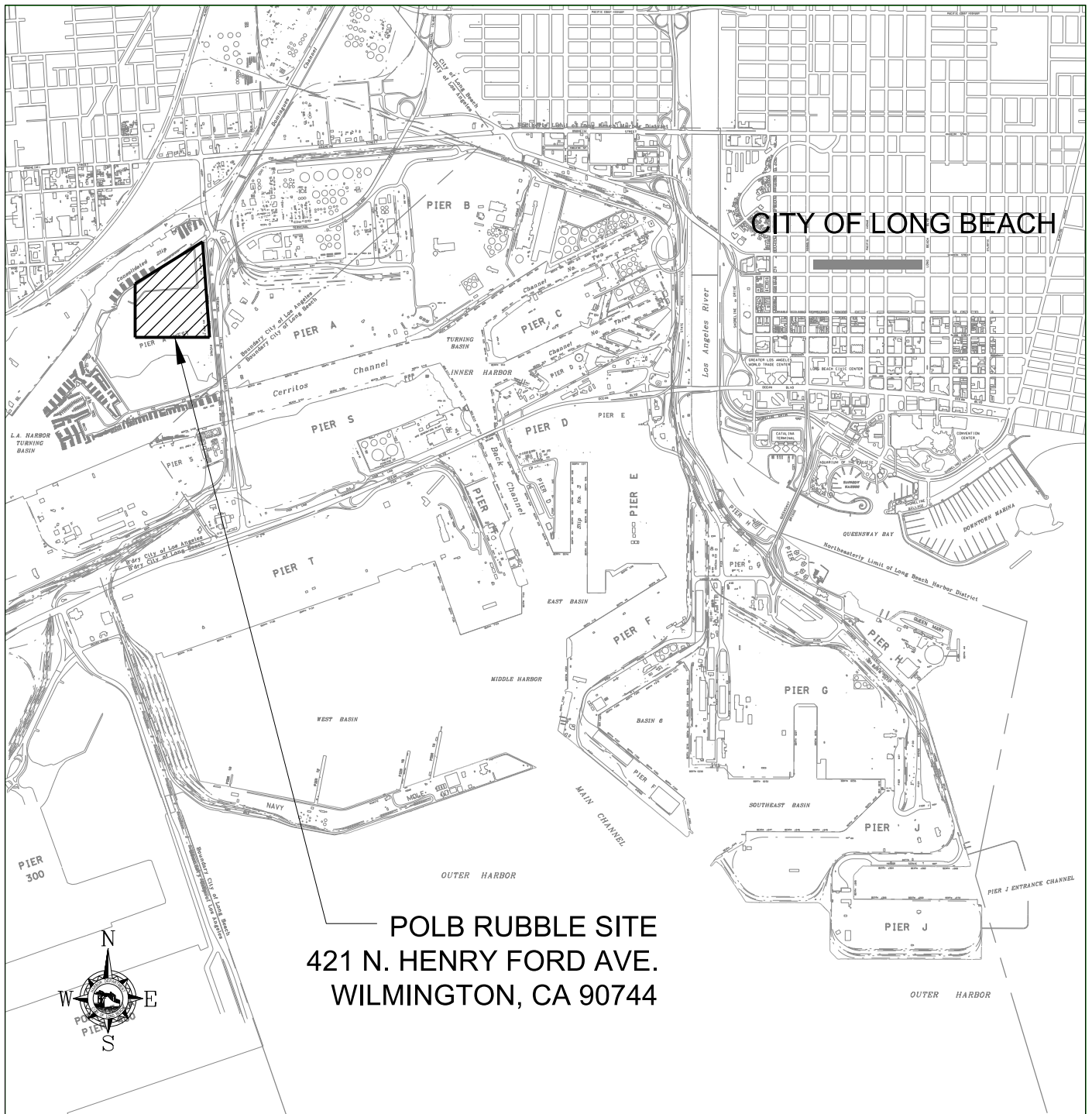
Rubble Site Monitoring and Tracking

The City's Load Checker tracks and tabulates approved materials brought to or removed from the POLB Rubble Site daily. Only authorized City Contractors are allowed to use the POLB Rubble Site for the sole purposes of depositing compliant rubble or removing CMB and/or 2-inch crushed concrete products from the site.

Prior written authorization is required for any truck entering or leaving the POLB Rubble Site. Any truck arriving at the site without a completed and approved authorization form will not be allowed to unload or have material loaded onto the truck.

The City's Load Checker shall continuously monitor all rubble material brought to the Rubble Site for compliance. If non-compliant material is identified, the City shall conduct a second inspection of the incoming material. If the rubble material is confirmed to be non-compliant in accordance with the specified requirements, the City shall reject the load and inform the Engineer. The Engineer is responsible for notifying the Contractor and halting the transport of any additional unacceptable rubble material.

POLB RUBBLE SITE LOCATION MAP



Rubble Disposal Authorization

Prior authorization is required for any rubble proposed for placement at the Port's rubble/crusher pile. Any trucks that arrive at the site without a completed and approved authorization form will not be allowed to dump. Any trucks that dump without authorization will be immediately be reported to the Harbor Patrol as illegal dumpers.

Rubble delivered must be asphalt, concrete, rock, or other pre-approved material and must be no larger than 2 foot in any dimension and rebar must be cut flush with the face of the rubble. Old CMB, AC grindings, geosynthetics, soil, trash or debris brought to the site will not be accepted and the truck turned away. Any material that does not comply with these requirements, but is dumped anyway, will be sampled, tested, loaded and transported for off-site disposal at an approved facility at the expense of the responsible Contractor.

Contractor Required Information:

Company Name: _____

Contact Name: _____

Contact Telephone Number: (____)_____

Project Source of Rubble: _____

Anticipated Date(s) and Time(s) for Delivery: _____

Approximate Number of Trucks and Loads per Truck per day: _____

Size/type of Dump Trucks _____

Description of Rubble: _____

POLB Required Information:

Project Specification No: _____

Project Assigned Port Inspector: _____

RACS Number: _____

Rubble Site: _____

Approved:

Port Construction Manager

Date

Director of Construction Management (1)

Date

(1) Approval is required by the Director of Construction Management for rubble that is not specified in the POLB contract to be disposed of at the POLB rubble site.

CMB Removal Authorization

Prior authorization is required for proposed CMB removal from the Port's CMB pile. Any trucks that arrive at the site without a completed and approved authorization form will not be loaded. Any trucks that enter the site without authorization will be immediately reported to the Harbor Patrol.

If rubble is delivered on the same trip as to pick up CMB, the rubble must be asphalt, concrete, rock, or other pre-approved material and must be no larger than 2 foot in any dimension and rebar must be cut flush with the face of the rubble. Old CMB, AC grindings, geosynthetics, soil, trash or debris brought to the site will not be accepted and the truck turned away. Any material that does not comply with these requirements, but is dumped anyway, will be sampled, tested, loaded and transported for off-site disposal at an approved facility at the expense of the responsible Party.

Contractor Required Information:

Company Name: _____
Contact Name: _____
Contact Telephone Number: (____) _____
Project needing CMB: _____
Anticipated Date(s) for Removal: _____
Approximate Number of Tons Required: _____
Approximate Number of Trucks Involved: _____
Size/type of Dump Trucks: _____

POLB Required Information:

Project Specification No: _____
Assigned Port Inspector: _____
RACS Number: _____
Location of CMB Source: _____

Approved:

Project Construction Manager

Date

Director of Construction Management (1)

Date

(1) Approval is required by the Director of Construction Management for rubble that is not specified in the POLB contract to be disposed of at the POLB rubble site.



2" Crushed Concrete Removal Authorization

Prior authorization is required for proposed 2-inch crushed concrete removal from the Port's stockpile. Any trucks that arrive at the site without a completed and approved authorization form will not be loaded. Any trucks that enter the site without authorization will be immediately reported to the Harbor Patrol.

If rubble is delivered on the same trip as to pick up 2-inch crushed concrete, the rubble must be asphalt, concrete, rock, or other pre-approved material and must be no larger than 2 foot in any dimension and rebar must be cut flush with the face of the rubble. Old CMB, AC grindings, geosynthetics, soil, trash or debris brought to the site will not be accepted and the truck turned away. Any material that does not comply with these requirements, but is dumped anyway, will be sampled, tested, loaded and transported for off-site disposal at an approved facility at the expense of the responsible Party.

Contractor Required Information:

Company Name: _____
Contact Name: _____
Contact Telephone Number: (____) _____
Project needing 2-inch crushed concrete: _____
Anticipated Date(s) for Removal: _____
Approximate Number of Tons Required: _____
Approximate Number of Trucks Involved: _____
Size/type of Dump Trucks: _____

POLB Required Information:

Project Specification No: _____
Assigned Port Inspector: _____
RACS Number: _____
Location of 2-inch crushed concrete Source: _____
Approved: _____

Project Construction Manager

Date

Director of Construction Management (1)

Date

(1) Approval is required by the Director of Construction Management for rubble that is not specified in the POLB contract to be disposed of at the POLB rubble site.

APPENDIX Q

CONSTRUCTION AND DEMOLITION WASTE

RECYCLING PROGRAM

OFFICE OF THE CITY ATTORNEY
ROBERT E. SHANNON, City Attorney
333 West Ocean Boulevard, 11th Floor
Long Beach, CA 90802-4664

ORDINANCE NO. ORD-07-0025

AN ORDINANCE OF THE CITY COUNCIL OF THE
CITY OF LONG BEACH AMENDING THE LONG BEACH
MUNICIPAL CODE BY ADDING CHAPTER 18.97
ESTABLISHING A CONSTRUCTION AND DEMOLITION
RECYCLING PROGRAM

WHEREAS, the State of California through its California Integrated Waste
Management Act of 1989, Assembly Bill 939 (AB 939), requires that each local
jurisdiction in the state divert fifty percent (50%) of discarded materials (base year 1990)
from landfills by December 31, 2000; and

WHEREAS, every city and county in California, including the City, could
face fines up to ten thousand dollars (\$10,000.00) a day for not meeting the above
mandated goal; and

WHEREAS, approximately twenty-two percent (22%) of the City's solid
waste sent to landfills is from construction and demolition activities and the diversion of
these materials would have a significant potential for waste reduction and recycling; and

WHEREAS, reusing and recycling construction and demolition materials
("C&D Debris") is essential to further the City's efforts to reduce waste and continue to
comply with AB 939; and

WHEREAS, C&D Debris waste reduction and recycling have been proven
to reduce the amount of such material which is landfilled, increase worker safety, and be
cost effective; and

WHEREAS, to ensure compliance with this Chapter and to ensure that
those contractors that comply with this Chapter are not placed at a competitive
disadvantage, it is necessary to impose a Performance Security requirement;

NOW, THEREFORE, the City Council of the City of Long Beach ordains as

1 follows:

2 Section 1. Chapter 18.97 is hereby added to the Long Beach Municipal
3 Code to read as follows:

4 Chapter 18.97

5 CONSTRUCTION AND DEMOLITION RECYCLING PROGRAM

6 18.97.010 Definitions.

7 For the purposes of this Chapter, the following definitions shall
8 apply:

9 A. "Applicant" means any individual, firm, limited liability
10 company, association, partnership, political subdivision, government
11 agency, municipality, industry, public or private corporation, or any other
12 entity whatsoever who applies to the City for the applicable permits to
13 undertake any construction, demolition, or renovation project within the City.

14 B. "Class III Landfill" means a landfill that accepts non-
15 hazardous resources such as household, commercial, and industrial waste,
16 resulting from construction, remodeling, repair, and demolition operations.
17 A Class III landfill must have a solid waste facilities permit from the
18 California Integrated Waste Management Board (CIWMB) and is regulated
19 by an Enforcement Agency (as defined in Public Resources Code Section
20 40130).

21 C. "Construction" means the building of any facility or structure or
22 any portion thereof including any tenant improvements to an existing facility
23 or structure.

24 D. "Construction and Demolition Debris" (C&D Debris) means
25 building materials and solid waste resulting from construction, remodeling,
26 repair, cleanup, or demolition operations that are not hazardous as defined
27 in California Code of Regulations, Title 22, Sections 66261.3, et seq. This
28 term includes, but is not limited to, asphalt, concrete, Portland cement

1 concrete, brick, lumber, gypsum wallboard, cardboard, and other
2 associated packaging, roofing material, ceramic tile, carpeting, plastic pipe
3 and steel. The material may be commingled with rock, soil, tree stumps,
4 and other vegetative matter resulting from land clearing and landscaping for
5 construction or land development projects.

6 E. "C&D Recycling Center" means a facility that receives only
7 C&D material that has been separated for reuse prior to receipt, in which
8 the residual (disposed) amount of waste in the material is less than ten
9 percent (10%) of the average weight of material separated for reuse
10 received by the facility over a one month period.

11 F. "City-sponsored project" means a project constructed by the
12 City or a project receiving fifty percent (50%) or more of its financing from
13 the City.

14 G. "Covered Project" shall have the meaning set forth in Section
15 18.97.020.

16 H. "Deconstruction" means the careful dismantling of buildings
17 and structures in order to salvage as much material as possible.

18 I. "Demolition" means the decimating, razing, ruining, tearing
19 down or wrecking of any facility, structure, pavement or building, whether in
20 whole or in part, whether interior or exterior.

21 J. "Disposal" means the final deposition of construction and
22 demolition or inert material, to a Class III Landfill.

23 K. "Divert" means to use material for any purpose other than
24 disposal in a landfill or transformation facility.

25 L. "Diversion Requirement" means the diversion of a percentage
26 of the total Construction and Demolition Debris generated by a project via
27 reuse or recycling, unless the Applicant has been granted an exemption
28 pursuant to Section 18.97.070 in which case the Diversion Requirement

1 shall be the maximum feasible diversion rate established by the Waste
2 Management Plan Compliance Official in relation to the project.

3 M. "Enforcement Agency (EA)" means an enforcement agency
4 as defined in Public Resources Code Section 40130.

5 N. "Inert Solids/Inert Waste" means non-liquid solid resources
6 including, but not limited to, soil and concrete, that do not contain
7 hazardous waste or soluble pollutants at concentrations in excess of water
8 quality objectives established by a regional Water Board pursuant to
9 Division 7 (Sections 13000, et seq.) of the California Water Code and does
10 not contain significant quantities of decomposable solid resources.

11 O. "Project" means any activity which requires an application for
12 a building or demolition permit or any similar permit from the City.

13 P. "Recycling" means the process of collecting, sorting,
14 cleansing, treating, and reconstituting materials for the purpose of using the
15 altered form in the manufacture of a new product. Recycling does not
16 include burning, incinerating, or thermally destroying solid waste.

17 Q. "Renovation" means any change, addition or modification in
18 an existing structure.

19 R. "Reuse" means the use, in the same or similar form as it was
20 produced, of a material which might otherwise be discarded.

21 S. "Solid Waste" means all putrescible and non-putrescible solid,
22 semisolid, and liquid wastes, including garbage, trash, refuse, paper,
23 rubbish, ashes, industrial wastes, demolition and construction wastes,
24 abandoned vehicles and parts thereof, discarded home and industrial
25 appliances, dewatered, treated, or chemically fixed sewage sludge which is
26 not hazardous waste, manure, vegetable or animal solid and semisolid
27 wastes, and other discarded solid and semisolid wastes. "Solid Waste"
28 does not include any of the following wastes:

1. Hazardous waste, as defined in Public Resources Code Section 40141.

2. Radioactive waste regulated pursuant to the Radiation Control Law [Chapter 8 (commencing with Section 114960) of Part 9 of Division 104 of the Health and Safety Code].

3. Medical waste regulated pursuant to the Medical Waste Management Act [Part 14 (commencing with Section 117600) of Division 104 of the Health and Safety Code].

T. "Waste Management Plan" (WMP) means a completed Waste Management Plan form, approved by the City for the purpose of compliance with this Article, submitted by the Applicant for any Covered or Non-covered Project.

U. "Waste Management Plan Attachments" means a list of permitted haulers, reuse facilitators, disposal and recycling facilities, conversions for mass to weight, and green building material suggestions.

V. "Waste Management Plan Compliance Official" means the Director of Planning and Buildings or his or her designee.

18.97.020 Threshold for covered projects.

A. Private Projects.

1. The following threshold will apply to projects for which a demolition or building permit is issued after October 1, 2007, but before January 1, 2008: All construction projects the total valuation of which are, or are projected to be, seventy-five thousand dollars (\$75,000.00) or greater and all demolition projects of any valuation, ("Covered Projects") shall be required to divert at least sixty percent (60%) of all project-related construction and demolition material in compliance with this Chapter.

2. The following threshold will apply to projects for which

1 a demolition or building permit is issued after January 1, 2008: All
2 construction projects the total valuation of which are, or are projected to be,
3 fifty thousand dollars (\$50,000.00) or greater and all demolition projects of
4 any valuation, ("Covered Projects") shall be required to divert at least sixty
5 (60) percent of all project-related construction and demolition material in
6 compliance with this Chapter.

7 B. All City-sponsored construction, demolition and renovation
8 projects shall be subject to this Chapter, and consequently, shall be
9 considered Covered Projects.

10 C. Compliance with this Chapter shall be included as a condition
11 of approval on any construction or demolition permit issued for a Covered
12 Project.

13
14 18.97.030 Submission of a waste management plan.

15 A. Applicants for construction or demolition permits involving a
16 Covered Project shall complete and submit a WMP, on a WMP form
17 approved by the City for this purpose, as part of the application packet for
18 the construction or demolition permit. The completed WMP shall indicate all
19 of the following:

- 20 1. The estimated volume or weight of the project C&D
21 Debris, by material type, to be generated;
- 22 2. The maximum volume or weight of such materials that
23 can feasibly be diverted via reuse or recycling. No more than twenty
24 percent (20%) of the sixty percent (60%) diversion rate can be achieved
25 through the recycling or reuse of inert materials unless applicant can
26 demonstrate to the satisfaction of the WMP Compliance Official that
27 sufficient structural materials do not exist for recycling or that forty percent
28 (40%) diversion of total waste through non-inert materials is not feasible.

3. The vendor or facility where the Applicant proposes to use to collect or receive that material; and

4. The estimated volume or weight of C&D Debris that will be landfilled in Class III Landfills.

B. Calculating Volume and Weight of Material: In estimating the volume or weight of materials identified in the WMP, the Applicant shall use the Conversion Rates approved by the City for this purpose.

C. Deconstruction: In preparing the WMP, applicants for demolition permits involving the removal of all or part of an existing structure shall consider Deconstruction to the maximum extent feasible, and shall make the materials generated thereby available for salvage prior to landfilling. Deconstruction can be used to meet the sixty percent (60%) diversion requirement provided it is accounted for in the WMP.

18.97.040 Waste diversion deposit.

The project applicant shall submit a waste diversion deposit with the WMP. The amount of the performance security shall be calculated as three percent (3%) of total project valuation, provided, however, that the minimum fee shall not be less than one thousand five hundred dollars (\$1,500.00) and the maximum fee shall not exceed fifty thousand dollars (\$50,000.00).

18.97.050 Administrative fee.

The project applicant shall submit an administrative fee with the WMP. The amount of the administrative fee shall be set by a resolution of the City Council.

18.97.060 Review of WMP.

A. Notwithstanding any other provisions of this Code, no building

1 or demolition permit shall be issued for any Covered Project unless and
2 until the WMP Compliance Official has reviewed the WMP. Approval shall
3 not be required, however, where an emergency demolition is required to
4 protect public health or safety. The WMP Compliance Official shall only
5 approve a WMP if he or she first determines that all of the following
6 conditions have been met:

7 1. The WMP provides all of the information set forth in
8 Section 18.97.030.

9 2. The WMP indicates that at least sixty percent (60%) of
10 all C&D material generated by the Project will be diverted or an exemption
11 has been approved pursuant to Section 18.97.080.

12 3. The Applicant has submitted an appropriate waste
13 diversion deposit in compliance with Section 18.97.040

14 If the WMP Compliance Official determines that these conditions
15 have been met, he or she shall mark the WMP "Approved," return a copy
16 of the WMP to the Applicant, and notify the Building Bureau that the WMP
17 has been approved.

18 B. If the WMP Compliance Official determines that the WMP fails
19 to meet the conditions specified in subsection A of this Section, he or she
20 shall either:

21 1. Return the WMP to the Applicant marked "Denied,"
22 including a statement of reasons, and so notify the Building Bureau, to
23 ensure that the construction or demolition permit does not issue.

24 2. Return the WMP to the applicant marked "Further
25 Explanation Required."

26 If the Applicant determines during the course of the project that the
27 estimated tonnage of material to be generated and or recovered from the
28 project is substantially different from the WMP, applicant shall submit an

1 addendum to the original WMP.

2
3 18.97.070 Compliance with WMP.

4 A. Within thirty (30) days after the completion of any Covered
5 Project, the Applicant shall submit to the WMP Compliance Official
6 documentation that it has met the Diversion Requirement for the project.
7 Applicant shall provide a summary of efforts used to meet the Diversion
8 Requirement and also provide the following documentation:

9 1. Receipts from the vendor or facility which collected or
10 received each material showing the actual weight or volume of that
11 material.

12 2. Weight slips/count of material salvaged or reused in
13 current project.

14 3. A copy of the previously approved WMP for the project
15 adding the actual volume or weight of each material diverted and landfilled.

16 4. Any additional information the Applicant believes is
17 relevant to determining its efforts to comply in good faith with this Chapter.

18 B. Weighing of Wastes: Applicants shall make reasonable efforts
19 to ensure that all C&D Debris diverted or landfilled are measured and
20 recorded using the most accurate method of measurement available. To
21 the extent practical, all C&D Debris shall be weighted by measurement on
22 scales. Such scales shall be in compliance with all State and County
23 regulatory requirements for accuracy and maintenance. For C&D Debris for
24 which weighing is not practical due to small size or other considerations, a
25 volumetric measurement shall be used. For conversion of volumetric
26 measurements by weight, the Applicant shall use the standardized
27 conversion rates approved by the City for this purpose.

28 C. The WMP Compliance Official shall review the information

1 submitted under subsection A of this Section to determine whether the
2 Applicant has complied with the Diversion Requirement as follows:

3 1. If the WMP Compliance Official determines that the
4 Applicant has fully complied with the Diversion Requirement applicable to
5 the project, he or she shall cause the full waste diversion deposit to be
6 released to the Applicant.

7 2. If the WMP Compliance Official determines that the
8 Diversion Requirement has not been met, he or she shall return only that
9 portion of the performance security equivalent to the portion of C&D Debris
10 actually diverted compared to the portion that should have been diverted
11 according to the WMP. Any portion of the waste diversion deposit not
12 released to the Applicant shall be forfeited to the City, and shall be used to
13 further develop environmental sustainability efforts within the Department of
14 Planning & Building. If the WMP Compliance Official determines that the
15 Applicant has fully failed to comply with the Diversion Requirement or if the
16 Applicant fails to submit the documentation required by subsection A of this
17 Section within the required time period, then the entire waste diversion
18 deposit shall be forfeited to the City. All forfeited waste diversion deposits
19 shall be used to further develop environmental sustainability efforts within
20 the Department of Planning & Building.

21
22 18.97.080 Exemption.

23 A. Application: If an Applicant believes it is infeasible to comply
24 with the diversion requirements of this chapter due to the circumstances
25 delineated in this Section, the Applicant may apply for an exemption at the
26 time that he or she submits the required WMP. Exemptions may be
27 granted based the following considerations:

28 1. An emergency situation exists.

2. Contamination by hazardous substances.

3. Low recyclability of specific materials.

The Applicant shall indicate on the WMP the maximum rate of diversion he or she believes is feasible for each material and the specific circumstances that he or she believes make it infeasible to comply with the Diversion Requirement.

B. Meeting with WMP Compliance Official: The WMP Compliance Official shall review the information supplied by the Applicant and may meet with the Applicant to discuss possible ways of meeting the Division Requirement. The WMP Compliance Official may request that staff from the Environmental Services Bureau attend this meeting or may require the Applicant to request a separate meeting with Environmental Services Bureau staff. Based on the information supplied by the Applicant and, if applicable, Environmental Services Bureau staff, the Compliance Official shall determine whether it is possible for the Applicant to meet the Division Requirement.

C. Granting of Exemption: If the WMP Compliance Official determines that it is infeasible for the Applicant to meet the Diversion Requirement due to unique circumstances, he or she shall determine the maximum feasible diversion rate for each material and shall indicate this rate on the WMP submitted by the Applicant. The WMP Compliance Official shall return a copy of the WMP to the Applicant marked "Approved Exemption" and shall notify the Building Bureau that the WMP has been approved.

D. Denial of Exemption: If the WMP Compliance Official determines that it is possible for the Applicant to meet the Diversion Requirement, he or she shall inform the Applicant in writing. The Applicant shall have thirty (30) days to resubmit a WMP form in full compliance with

1 Section 18.97.030. If the Applicant fails to resubmit the WMP, or if the
2 resubmitted WMP does not comply with Section 18.97.030, the WMP
3 Compliance Official shall deny the WMP.
4

5 18.97.090 Appeal.

6 The applicant or any interested person may appeal to a hearing
7 officer from any ruling of the WMP Compliance Official made pursuant to
8 this Chapter in accordance with Section 18.97.070 Notice of any appeal
9 from the ruling of the WMP Compliance Official must be filed within ten
10 (10) days of the date that such ruling is made. The decision of the
11 Hearing Examiner upon such appeal, relative to any matter within the
12 jurisdiction of the WMP Compliance Official, shall be final and shall not be
13 appealable to the City Council or to any other City body or official.
14

15 Section 2. The City Clerk shall certify to the passage of this ordinance by
16 the City Council and cause it to be posted in three (3) conspicuous places in the City of
17 Long Beach, and it shall take effect on October 1, 2007.

18 ///

19 ///

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OFFICE OF THE CITY ATTORNEY
ROBERT E. SHANNON, City Attorney
333 West Ocean Boulevard, 11th Floor
Long Beach, CA 90802-4664

I hereby certify that the foregoing ordinance was adopted by the City
Council of the City of Long Beach at its meeting of May 15, 2007, by the
following vote:

Ayes: Councilmembers: B. Lowenthal, S. Lowenthal,
DeLong, Schipske, Gabelich,
Lerch.

Noes: Councilmembers: None.

Absent: Councilmembers: O'Donnell, Reyes Uranga.

Approved: 5/18/07
(Date)

[Signature] City Clerk
[Signature] Mayor

HAM:fl
5/3/2007
#07-01923



Construction & Demolition Management Plan

The Construction and Demolition (C&D) Recycling Program encourages the use of green building techniques and promotes the reuse, salvage and/or deconstruction of all recyclable materials in construction, deconstruction, and/or demolition projects. As part of the City's commitment to sustainable development, your project is required to divert at least 65% of recyclable construction waste.

Project Address:**Project No.:****Date:****PROJECT DESCRIPTION:****Project Valuation:**

\$

Deposit (3% of Valuation \$1,605 min., \$53,425 max)

\$

Administrative Fee (Residential \$210, Commercial \$415)

\$

Project Type	RESIDENTIAL			NON-RESIDENTIAL		
	Remodel/ Additions	New Construction	Demolition/ Removal	Remodel/ Additions	New Construction	Demolition/ Removal
Project Size (SF)						
Lbs/sf per project type	3.31	4.38	115.00	2.85	3.89	155.00
Calculated Weight(s) in Tons	0.00	0	0	0	0	0.00

ESTIMATED PROJECT TOTAL:

Estimated Generated Amount (in tons)

65% Diversion Required to Meet:

At least 65% of all generated materials must be diverted.

tons

lbs

20% of Inert Debris (i.e., concrete, asphalt, dirt, etc.):

Maximum 20% of inert materials

tons

lbs

Comments

I. I acknowledge that within thirty (30) days after final inspection for the above project, the completed Final Compliance Report (see back) shall be submitted. I further acknowledge that the amount of C&D Deposit returned will be prorated based on the rate of compliance and that the Return of Deposit should be made payable to:

Name:

Address:

City/ST/Zip:

Phone No:

()

Email:

II. I further acknowledge that a copy of this C&D Management Plan will be sent to the property / business owner listed below:

☐ Same as above

Name:

Address:

City/ST/Zip:

Phone No:

()

Email:

FINAL COMPLIANCE REPORT

Address: _____

Project No.: _____

Final Date: _____

Within thirty (30) days after final inspection for this project, please provide the names of all certified recyclers, salvage companies, or recycling, mixed use or repurpose facilities, by material type, that were used for disposal of C&D debris and the total weights of each material. Please submit the Final Compliance Report and all supporting documentation to the Long Beach Development Permit Center or by email at Construct-Demo@LongBeach.gov.

NAME OF PERMITTED HAULER _____

The program requires applicants to either self-haul material(s) or to use a waste hauler that is permitted to haul within the City of Long Beach. [A list of permitted haulers.](#)

	Disposal Facility Name longbeach.gov/lbds/building/cd/	Weights (Ton/lbs)
MIXED DEBRIS		
Facility #1		
Facility #2		
Facility #3		
Total Tons Diverted - Mixed Debris		
ITEMIZED DEBRIS - INERT		
Concrete/Block/Brick		
Asphalt/Aggregates/Dirt		
Other		
Total Tons Diverted - Inert Max Allowed: _____ tons _____ lbs		
ITEMIZED DEBRIS - NON-INERT		
Drywall		
Metal/scrap iron		
Plastic		
Roofing		
Wood		
Other		
Total Tons Diverted - Non-Inert		
TOTAL TONS GENERATED Target Wt: _____ tons _____ lbs		

To the best of my knowledge, the above information is an accurate representation of the disposition of the construction and demolition materials generated on-site at the construction job. I understand that the City of Long Beach may audit disposal and recycling documentation.

Name of Owner/Agent	Signature	Date
---------------------	-----------	------

I am aware that I may file an appeal to a Hearing Officer regarding any compliance ruling made pursuant to Long Beach Municipal Code §18.67.070 within ten (10) days of the date that a ruling is made. The decision of the Hearing Officer conducting the appeal is final and is not appealable to the City Council or to any other City body or official in accordance with of Long Beach Municipal Code §18.67.090.

OFFICE USE ONLY

Diversion Requirement Met: <input type="checkbox"/> Yes <input type="checkbox"/> No	
% of Diversion Met: _____ %	
Amount of Deposit: \$ _____	Amount to be Returned: \$ _____
Final Report Approved By: _____	
Comments: _____	

To request this information in an alternative format or to request a reasonable accommodation, please contact the Development Services Department at longbeach.gov/lbds and 562.570.3807. A minimum of three business days is requested to ensure availability; attempts will be made to accommodate requests with shorter notice.

APPENDIX R

SCAQMD RULE 403 FUGITIVE DUST

(Adopted May 7, 1976) (Amended November 6, 1992)
(Amended July 9, 1993) (Amended February 14, 1997)
(Amended December 11, 1998)(Amended April 2, 2004)
(Amended June 3, 2005)

RULE 403. FUGITIVE DUST

(a) Purpose

The purpose of this Rule is to reduce the amount of particulate matter entrained in the ambient air as a result of anthropogenic (man-made) fugitive dust sources by requiring actions to prevent, reduce or mitigate fugitive dust emissions.

(b) Applicability

The provisions of this Rule shall apply to any activity or man-made condition capable of generating fugitive dust.

(c) Definitions

- (1) ACTIVE OPERATIONS** means any source capable of generating fugitive dust, including, but not limited to, earth-moving activities, construction/demolition activities, disturbed surface area, or heavy- and light-duty vehicular movement.
- (2) AGGREGATE-RELATED PLANTS** are defined as facilities that produce and / or mix sand and gravel and crushed stone.
- (3) AGRICULTURAL HANDBOOK** means the region-specific guidance document that has been approved by the Governing Board or hereafter approved by the Executive Officer and the U.S. EPA. For the South Coast Air Basin, the Board-approved region-specific guidance document is the Rule 403 Agricultural Handbook dated December 1998. For the Coachella Valley, the Board-approved region-specific guidance document is the Rule 403 Coachella Valley Agricultural Handbook dated April 2, 2004.
- (4) ANEMOMETERS** are devices used to measure wind speed and direction in accordance with the performance standards, and maintenance and calibration criteria as contained in the most recent Rule 403 Implementation Handbook.
- (5) BEST AVAILABLE CONTROL MEASURES** means fugitive dust control actions that are set forth in Table 1 of this Rule.

- (6) BULK MATERIAL is sand, gravel, soil, aggregate material less than two inches in length or diameter, and other organic or inorganic particulate matter.
- (7) CEMENT MANUFACTURING FACILITY is any facility that has a cement kiln at the facility.
- (8) CHEMICAL STABILIZERS are any non-toxic chemical dust suppressant which must not be used if prohibited for use by the Regional Water Quality Control Boards, the California Air Resources Board, the U.S. Environmental Protection Agency (U.S. EPA), or any applicable law, rule or regulation. The chemical stabilizers shall meet any specifications, criteria, or tests required by any federal, state, or local water agency. Unless otherwise indicated, the use of a non-toxic chemical stabilizer shall be of sufficient concentration and application frequency to maintain a stabilized surface.
- (9) COMMERCIAL POULTRY RANCH means any building, structure, enclosure, or premises where more than 100 fowl are kept or maintained for the primary purpose of producing eggs or meat for sale or other distribution.
- (10) CONFINED ANIMAL FACILITY means a source or group of sources of air pollution at an agricultural source for the raising of 3,360 or more fowl or 50 or more animals, including but not limited to, any structure, building, installation, farm, corral, coop, feed storage area, milking parlor, or system for the collection, storage, or distribution of solid and liquid manure; if domesticated animals, including horses, sheep, goats, swine, beef cattle, rabbits, chickens, turkeys, or ducks are corralled, penned, or otherwise caused to remain in restricted areas for commercial agricultural purposes and feeding is by means other than grazing.
- (11) CONSTRUCTION/DEMOLITION ACTIVITIES means any on-site mechanical activities conducted in preparation of, or related to, the building, alteration, rehabilitation, demolition or improvement of property, including, but not limited to the following activities: grading, excavation, loading, crushing, cutting, planing, shaping or ground breaking.
- (12) CONTRACTOR means any person who has a contractual arrangement to conduct an active operation for another person.
- (13) DAIRY FARM is an operation on a property, or set of properties that are contiguous or separated only by a public right-of-way, that raises cows or

produces milk from cows for the purpose of making a profit or for a livelihood. Heifer and calf farms are dairy farms.

- (14) **DISTURBED SURFACE AREA** means a portion of the earth's surface which has been physically moved, uncovered, destabilized, or otherwise modified from its undisturbed natural soil condition, thereby increasing the potential for emission of fugitive dust. This definition excludes those areas which have:
 - (A) been restored to a natural state, such that the vegetative ground cover and soil characteristics are similar to adjacent or nearby natural conditions;
 - (B) been paved or otherwise covered by a permanent structure; or
 - (C) sustained a vegetative ground cover of at least 70 percent of the native cover for a particular area for at least 30 days.
- (15) **DUST SUPPRESSANTS** are water, hygroscopic materials, or non-toxic chemical stabilizers used as a treatment material to reduce fugitive dust emissions.
- (16) **EARTH-MOVING ACTIVITIES** means the use of any equipment for any activity where soil is being moved or uncovered, and shall include, but not be limited to the following: grading, earth cutting and filling operations, loading or unloading of dirt or bulk materials, adding to or removing from open storage piles of bulk materials, landfill operations, weed abatement through disking, and soil mulching.
- (17) **DUST CONTROL SUPERVISOR** means a person with the authority to expeditiously employ sufficient dust mitigation measures to ensure compliance with all Rule 403 requirements at an active operation.
- (18) **FUGITIVE DUST** means any solid particulate matter that becomes airborne, other than that emitted from an exhaust stack, directly or indirectly as a result of the activities of any person.
- (19) **HIGH WIND CONDITIONS** means that instantaneous wind speeds exceed 25 miles per hour.
- (20) **INACTIVE DISTURBED SURFACE AREA** means any disturbed surface area upon which active operations have not occurred or are not expected to occur for a period of 20 consecutive days.
- (21) **LARGE OPERATIONS** means any active operations on property which contains 50 or more acres of disturbed surface area; or any earth-moving operation with a daily earth-moving or throughput volume of 3,850 cubic

meters (5,000 cubic yards) or more three times during the most recent 365-day period.

- (22) OPEN STORAGE PILE is any accumulation of bulk material, which is not fully enclosed, covered or chemically stabilized, and which attains a height of three feet or more and a total surface area of 150 or more square feet.
- (23) PARTICULATE MATTER means any material, except uncombined water, which exists in a finely divided form as a liquid or solid at standard conditions.
- (24) PAVED ROAD means a public or private improved street, highway, alley, public way, or easement that is covered by typical roadway materials, but excluding access roadways that connect a facility with a public paved roadway and are not open to through traffic. Public paved roads are those open to public access and that are owned by any federal, state, county, municipal or any other governmental or quasi-governmental agencies. Private paved roads are any paved roads not defined as public.
- (25) PM₁₀ means particulate matter with an aerodynamic diameter smaller than or equal to 10 microns as measured by the applicable State and Federal reference test methods.
- (26) PROPERTY LINE means the boundaries of an area in which either a person causing the emission or a person allowing the emission has the legal use or possession of the property. Where such property is divided into one or more sub-tenancies, the property line(s) shall refer to the boundaries dividing the areas of all sub-tenancies.
- (27) RULE 403 IMPLEMENTATION HANDBOOK means a guidance document that has been approved by the Governing Board on April 2, 2004 or hereafter approved by the Executive Officer and the U.S. EPA.
- (28) SERVICE ROADS are paved or unpaved roads that are used by one or more public agencies for inspection or maintenance of infrastructure and which are not typically used for construction-related activity.
- (29) SIMULTANEOUS SAMPLING means the operation of two PM₁₀ samplers in such a manner that one sampler is started within five minutes of the other, and each sampler is operated for a consecutive period which must be not less than 290 minutes and not more than 310 minutes.
- (30) SOUTH COAST AIR BASIN means the non-desert portions of Los Angeles, Riverside, and San Bernardino counties and all of Orange

County as defined in California Code of Regulations, Title 17, Section 60104. The area is bounded on the west by the Pacific Ocean, on the north and east by the San Gabriel, San Bernardino, and San Jacinto Mountains, and on the south by the San Diego county line.

- (31) **STABILIZED SURFACE** means any previously disturbed surface area or open storage pile which, through the application of dust suppressants, shows visual or other evidence of surface crusting and is resistant to wind-driven fugitive dust and is demonstrated to be stabilized. Stabilization can be demonstrated by one or more of the applicable test methods contained in the Rule 403 Implementation Handbook.
- (32) **TRACK-OUT** means any bulk material that adheres to and agglomerates on the exterior surface of motor vehicles, haul trucks, and equipment (including tires) that have been released onto a paved road and can be removed by a vacuum sweeper or a broom sweeper under normal operating conditions.
- (33) **TYPICAL ROADWAY MATERIALS** means concrete, asphaltic concrete, recycled asphalt, asphalt, or any other material of equivalent performance as determined by the Executive Officer, and the U.S. EPA.
- (34) **UNPAVED ROADS** means any unsealed or unpaved roads, equipment paths, or travel ways that are not covered by typical roadway materials. Public unpaved roads are any unpaved roadway owned by federal, state, county, municipal or other governmental or quasi-governmental agencies. Private unpaved roads are all other unpaved roadways not defined as public.
- (35) **VISIBLE ROADWAY DUST** means any sand, soil, dirt, or other solid particulate matter which is visible upon paved road surfaces and which can be removed by a vacuum sweeper or a broom sweeper under normal operating conditions.
- (36) **WIND-DRIVEN FUGITIVE DUST** means visible emissions from any disturbed surface area which is generated by wind action alone.
- (37) **WIND GUST** is the maximum instantaneous wind speed as measured by an anemometer.
- (d) **Requirements**
 - (1) No person shall cause or allow the emissions of fugitive dust from any active operation, open storage pile, or disturbed surface area such that:

- (A) the dust remains visible in the atmosphere beyond the property line of the emission source; or
 - (B) the dust emission exceeds 20 percent opacity (as determined by the appropriate test method included in the Rule 403 Implementation Handbook), if the dust emission is the result of movement of a motorized vehicle.
- (2) No person shall conduct active operations without utilizing the applicable best available control measures included in Table 1 of this Rule to minimize fugitive dust emissions from each fugitive dust source type within the active operation.
- (3) No person shall cause or allow PM₁₀ levels to exceed 50 micrograms per cubic meter when determined, by simultaneous sampling, as the difference between upwind and downwind samples collected on high-volume particulate matter samplers or other U.S. EPA-approved equivalent method for PM₁₀ monitoring. If sampling is conducted, samplers shall be:
 - (A) Operated, maintained, and calibrated in accordance with 40 Code of Federal Regulations (CFR), Part 50, Appendix J, or appropriate U.S. EPA-published documents for U.S. EPA-approved equivalent method(s) for PM₁₀.
 - (B) Reasonably placed upwind and downwind of key activity areas and as close to the property line as feasible, such that other sources of fugitive dust between the sampler and the property line are minimized.
- (4) No person shall allow track-out to extend 25 feet or more in cumulative length from the point of origin from an active operation. Notwithstanding the preceding, all track-out from an active operation shall be removed at the conclusion of each workday or evening shift.
- (5) No person shall conduct an active operation with a disturbed surface area of five or more acres, or with a daily import or export of 100 cubic yards or more of bulk material without utilizing at least one of the measures listed in subparagraphs (d)(5)(A) through (d)(5)(E) at each vehicle egress from the site to a paved public road.
 - (A) Install a pad consisting of washed gravel (minimum-size: one inch) maintained in a clean condition to a depth of at least six inches and extending at least 30 feet wide and at least 50 feet long.

- (B) Pave the surface extending at least 100 feet and at least 20 feet wide.
 - (C) Utilize a wheel shaker/wheel spreading device consisting of raised dividers (rails, pipe, or grates) at least 24 feet long and 10 feet wide to remove bulk material from tires and vehicle undercarriages before vehicles exit the site.
 - (D) Install and utilize a wheel washing system to remove bulk material from tires and vehicle undercarriages before vehicles exit the site.
 - (E) Any other control measures approved by the Executive Officer and the U.S. EPA as equivalent to the actions specified in subparagraphs (d)(5)(A) through (d)(5)(D).
 - (6) Beginning January 1, 2006, any person who operates or authorizes the operation of a confined animal facility subject to this Rule shall implement the applicable conservation management practices specified in Table 4 of this Rule.
- (e) Additional Requirements for Large Operations
- (1) Any person who conducts or authorizes the conducting of a large operation subject to this Rule shall implement the applicable actions specified in Table 2 of this Rule at all times and shall implement the applicable actions specified in Table 3 of this Rule when the applicable performance standards can not be met through use of Table 2 actions; and shall:
 - (A) submit a fully executed Large Operation Notification (Form 403 N) to the Executive Officer within 7 days of qualifying as a large operation;
 - (B) include, as part of the notification, the name(s), address(es), and phone number(s) of the person(s) responsible for the submittal, and a description of the operation(s), including a map depicting the location of the site;
 - (C) maintain daily records to document the specific dust control actions taken, maintain such records for a period of not less than three years; and make such records available to the Executive Officer upon request;

- (D) install and maintain project signage with project contact signage that meets the minimum standards of the Rule 403 Implementation Handbook, prior to initiating any earthmoving activities;
 - (E) identify a dust control supervisor that:
 - (i) is employed by or contracted with the property owner or developer;
 - (ii) is on the site or available on-site within 30 minutes during working hours;
 - (iii) has the authority to expeditiously employ sufficient dust mitigation measures to ensure compliance with all Rule requirements;
 - (iv) has completed the AQMD Fugitive Dust Control Class and has been issued a valid Certificate of Completion for the class; and
 - (F) notify the Executive Officer in writing within 30 days after the site no longer qualifies as a large operation as defined by paragraph (c)(18).
- (2) Any Large Operation Notification submitted to the Executive Officer or AQMD-approved dust control plan shall be valid for a period of one year from the date of written acceptance by the Executive Officer. Any Large Operation Notification accepted pursuant to paragraph (e)(1), excluding those submitted by aggregate-related plants and cement manufacturing facilities must be resubmitted annually by the person who conducts or authorizes the conducting of a large operation, at least 30 days prior to the expiration date, or the submittal shall no longer be valid as of the expiration date. If all fugitive dust sources and corresponding control measures or special circumstances remain identical to those identified in the previously accepted submittal or in an AQMD-approved dust control plan, the resubmittal may be a simple statement of no-change (Form 403NC).
- (f) **Compliance Schedule**
The newly amended provisions of this Rule shall become effective upon adoption. Pursuant to subdivision (e), any existing site that qualifies as a large operation will have 60 days from the date of Rule adoption to comply with the notification and recordkeeping requirements for large operations. Any Large Operation

Notification or AQMD-approved dust control plan which has been accepted prior to the date of adoption of these amendments shall remain in effect and the Large Operation Notification or AQMD-approved dust control plan annual resubmittal date shall be one year from adoption of this Rule amendment.

(g) Exemptions

- (1) The provisions of this Rule shall not apply to:
 - (A) Dairy farms.
 - (B) Confined animal facilities provided that the combined disturbed surface area within one continuous property line is one acre or less.
 - (C) Agricultural vegetative crop operations provided that the combined disturbed surface area within one continuous property line and not separated by a paved public road is 10 acres or less.
 - (D) Agricultural vegetative crop operations within the South Coast Air Basin, whose combined disturbed surface area includes more than 10 acres provided that the person responsible for such operations:
 - (i) voluntarily implements the conservation management practices contained in the Rule 403 Agricultural Handbook;
 - (ii) completes and maintains the self-monitoring form documenting sufficient conservation management practices, as described in the Rule 403 Agricultural Handbook; and
 - (iii) makes the completed self-monitoring form available to the Executive Officer upon request.
 - (E) Agricultural vegetative crop operations outside the South Coast Air Basin whose combined disturbed surface area includes more than 10 acres provided that the person responsible for such operations:
 - (i) voluntarily implements the conservation management practices contained in the Rule 403 Coachella Valley Agricultural Handbook; and
 - (ii) completes and maintains the self-monitoring form documenting sufficient conservation management practices, as described in the Rule 403 Coachella Valley Agricultural Handbook; and
 - (iii) makes the completed self-monitoring form available to the Executive Officer upon request.

- (F) Active operations conducted during emergency life-threatening situations, or in conjunction with any officially declared disaster or state of emergency.
 - (G) Active operations conducted by essential service utilities to provide electricity, natural gas, telephone, water and sewer during periods of service outages and emergency disruptions.
 - (H) Any contractor subsequent to the time the contract ends, provided that such contractor implemented the required control measures during the contractual period.
 - (I) Any grading contractor, for a phase of active operations, subsequent to the contractual completion of that phase of earth-moving activities, provided that the required control measures have been implemented during the entire phase of earth-moving activities, through and including five days after the final grading inspection.
 - (J) Weed abatement operations ordered by a county agricultural commissioner or any state, county, or municipal fire department, provided that:
 - (i) mowing, cutting or other similar process is used which maintains weed stubble at least three inches above the soil; and
 - (ii) any discing or similar operation which cuts into and disturbs the soil, where watering is used prior to initiation of these activities, and a determination is made by the agency issuing the weed abatement order that, due to fire hazard conditions, rocks, or other physical obstructions, it is not practical to meet the conditions specified in clause (g)(1)(H)(i). The provisions this clause shall not exempt the owner of any property from stabilizing, in accordance with paragraph (d)(2), disturbed surface areas which have been created as a result of the weed abatement actions.
 - (K) sandblasting operations.
- (2) The provisions of paragraphs (d)(1) and (d)(3) shall not apply:
- (A) When wind gusts exceed 25 miles per hour, provided that:

- (i) The required Table 3 contingency measures in this Rule are implemented for each applicable fugitive dust source type, and;
 - (ii) records are maintained in accordance with subparagraph (e)(1)(C).
 - (B) To unpaved roads, provided such roads:
 - (i) are used solely for the maintenance of wind-generating equipment; or
 - (ii) are unpaved public alleys as defined in Rule 1186; or
 - (iii) are service roads that meet all of the following criteria:
 - (a) are less than 50 feet in width at all points along the road;
 - (b) are within 25 feet of the property line; and
 - (c) have a traffic volume less than 20 vehicle-trips per day.
 - (C) To any active operation, open storage pile, or disturbed surface area for which necessary fugitive dust preventive or mitigative actions are in conflict with the federal Endangered Species Act, as determined in writing by the State or federal agency responsible for making such determinations.
- (3) The provisions of (d)(2) shall not apply to any aggregate-related plant or cement manufacturing facility that implements the applicable actions specified in Table 2 of this Rule at all times and shall implement the applicable actions specified in Table 3 of this Rule when the applicable performance standards of paragraphs (d)(1) and (d)(3) can not be met through use of Table 2 actions.
 - (4) The provisions of paragraphs (d)(1), (d)(2), and (d)(3) shall not apply to:
 - (A) Blasting operations which have been permitted by the California Division of Industrial Safety; and
 - (B) Motion picture, television, and video production activities when dust emissions are required for visual effects. In order to obtain this exemption, the Executive Officer must receive notification in writing at least 72 hours in advance of any such activity and no nuisance results from such activity.
 - (5) The provisions of paragraph (d)(3) shall not apply if the dust control actions, as specified in Table 2, are implemented on a routine basis for

each applicable fugitive dust source type. To qualify for this exemption, a person must maintain records in accordance with subparagraph (e)(1)(C).

- (6) The provisions of paragraph (d)(4) shall not apply to earth coverings of public paved roadways where such coverings are approved by a local government agency for the protection of the roadway, and where such coverings are used as roadway crossings for haul vehicles provided that such roadway is closed to through traffic and visible roadway dust is removed within one day following the cessation of activities.
- (7) The provisions of subdivision (e) shall not apply to:
 - (A) officially-designated public parks and recreational areas, including national parks, national monuments, national forests, state parks, state recreational areas, and county regional parks.
 - (B) any large operation which is required to submit a dust control plan to any city or county government which has adopted a District-approved dust control ordinance.
 - (C) any large operation subject to Rule 1158, which has an approved dust control plan pursuant to Rule 1158, provided that all sources of fugitive dust are included in the Rule 1158 plan.
- (8) The provisions of subparagraph (e)(1)(A) through (e)(1)(C) shall not apply to any large operation with an AQMD-approved fugitive dust control plan provided that there is no change to the sources and controls as identified in the AQMD-approved fugitive dust control plan.

(h) Fees

Any person conducting active operations for which the Executive Officer conducts upwind/downwind monitoring for PM₁₀ pursuant to paragraph (d)(3) shall be assessed applicable Ambient Air Analysis Fees pursuant to Rule 304.1. Applicable fees shall be waived for any facility which is exempted from paragraph (d)(3) or meets the requirements of paragraph (d)(3).

TABLE 1
BEST AVAILABLE CONTROL MEASURES
 (Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Backfilling	01-1 Stabilize backfill material when not actively handling; and	✓ Mix backfill soil with water prior to moving
	01-2 Stabilize backfill material during handling; and	✓ Dedicate water truck or high capacity hose to backfilling equipment
	01-3 Stabilize soil at completion of activity.	✓ Empty loader bucket slowly so that no dust plumes are generated ✓ Minimize drop height from loader bucket
Clearing and grubbing	02-1 Maintain stability of soil through pre-watering of site prior to clearing and grubbing; and	✓ Maintain live perennial vegetation where possible
	02-2 Stabilize soil during clearing and grubbing activities; and	✓ Apply water in sufficient quantity to prevent generation of dust plumes
	02-3 Stabilize soil immediately after clearing and grubbing activities.	
Clearing forms	03-1 Use water spray to clear forms; or	✓ Use of high pressure air to clear forms may cause exceedance of Rule requirements
	03-2 Use sweeping and water spray to clear forms; or	
	03-3 Use vacuum system to clear forms.	
Crushing	04-1 Stabilize surface soils prior to operation of support equipment; and	✓ Follow permit conditions for crushing equipment
	04-2 Stabilize material after crushing.	✓ Pre-water material prior to loading into crusher ✓ Monitor crusher emissions opacity ✓ Apply water to crushed material to prevent dust plumes

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Cut and fill	05-1 Pre-water soils prior to cut and fill activities; and	✓ For large sites, pre-water with sprinklers or water trucks and allow time for penetration
	05-2 Stabilize soil during and after cut and fill activities.	✓ Use water trucks/pulls to water soils to depth of cut prior to subsequent cuts
Demolition – mechanical/manual	06-1 Stabilize wind erodible surfaces to reduce dust; and	✓ Apply water in sufficient quantities to prevent the generation of visible dust plumes
	06-2 Stabilize surface soil where support equipment and vehicles will operate; and	
	06-3 Stabilize loose soil and demolition debris; and	
	06-4 Comply with AQMD Rule 1403.	
Disturbed soil	07-1 Stabilize disturbed soil throughout the construction site; and	✓ Limit vehicular traffic and disturbances on soils where possible
	07-2 Stabilize disturbed soil between structures	✓ If interior block walls are planned, install as early as possible ✓ Apply water or a stabilizing agent in sufficient quantities to prevent the generation of visible dust plumes
Earth-moving activities	08-1 Pre-apply water to depth of proposed cuts; and	✓ Grade each project phase separately, timed to coincide with construction phase
	08-2 Re-apply water as necessary to maintain soils in a damp condition and to ensure that visible emissions do not exceed 100 feet in any direction; and	✓ Upwind fencing can prevent material movement on site
	08-3 Stabilize soils once earth-moving activities are complete.	✓ Apply water or a stabilizing agent in sufficient quantities to prevent the generation of visible dust plumes

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Importing/exporting of bulk materials	09-1	Stabilize material while loading to reduce fugitive dust emissions; and
	09-2	Maintain at least six inches of freeboard on haul vehicles; and
	09-3	Stabilize material while transporting to reduce fugitive dust emissions; and
	09-4	Stabilize material while unloading to reduce fugitive dust emissions; and
	09-5	Comply with Vehicle Code Section 23114.
Landscaping	10-1	Stabilize soils, materials, slopes
Road shoulder maintenance	11-1	Apply water to unpaved shoulders prior to clearing; and
	11-2	Apply chemical dust suppressants and/or washed gravel to maintain a stabilized surface after completing road shoulder maintenance.

- ✓ Use tarps or other suitable enclosures on haul trucks
 - ✓ Check belly-dump truck seals regularly and remove any trapped rocks to prevent spillage
 - ✓ Comply with track-out prevention/mitigation requirements
 - ✓ Provide water while loading and unloading to reduce visible dust plumes
-
- ✓ Apply water to materials to stabilize
 - ✓ Maintain materials in a crusted condition
 - ✓ Maintain effective cover over materials
 - ✓ Stabilize sloping surfaces using soil binders until vegetation or ground cover can effectively stabilize the slopes
 - ✓ Hydroseed prior to rain season
-
- ✓ Installation of curbing and/or paving of road shoulders can reduce recurring maintenance costs
 - ✓ Use of chemical dust suppressants can inhibit vegetation growth and reduce future road shoulder maintenance costs

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Screening	12-1 Pre-water material prior to screening; and 12-2 Limit fugitive dust emissions to opacity and plume length standards; and 12-3 Stabilize material immediately after screening.	<ul style="list-style-type: none"> ✓ Dedicate water truck or high capacity hose to screening operation ✓ Drop material through the screen slowly and minimize drop height ✓ Install wind barrier with a porosity of no more than 50% upwind of screen to the height of the drop point
Staging areas	13-1 Stabilize staging areas during use; and 13-2 Stabilize staging area soils at project completion.	<ul style="list-style-type: none"> ✓ Limit size of staging area ✓ Limit vehicle speeds to 15 miles per hour ✓ Limit number and size of staging area entrances/exists
Stockpiles/ Bulk Material Handling	14-1 Stabilize stockpiled materials. 14-2 Stockpiles within 100 yards of off-site occupied buildings must not be greater than eight feet in height; or must have a road bladed to the top to allow water truck access or must have an operational water irrigation system that is capable of complete stockpile coverage.	<ul style="list-style-type: none"> ✓ Add or remove material from the downwind portion of the storage pile ✓ Maintain storage piles to avoid steep sides or faces

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Traffic areas for construction activities	15-1 Stabilize all off-road traffic and parking areas; and	<ul style="list-style-type: none"> ✓ Apply gravel/paving to all haul routes as soon as possible to all future roadway areas ✓ Barriers can be used to ensure vehicles are only used on established parking areas/haul routes
	15-2 Stabilize all haul routes; and	
	15-3 Direct construction traffic over established haul routes.	
Trenching	16-1 Stabilize surface soils where trencher or excavator and support equipment will operate; and	<ul style="list-style-type: none"> ✓ Pre-watering of soils prior to trenching is an effective preventive measure. For deep trenching activities, pre-trench to 18 inches soak soils via the pre-trench and resuming trenching ✓ Washing mud and soils from equipment at the conclusion of trenching activities can prevent crusting and drying of soil on equipment
	16-2 Stabilize soils at the completion of trenching activities.	
Truck loading	17-1 Pre-water material prior to loading; and	<ul style="list-style-type: none"> ✓ Empty loader bucket such that no visible dust plumes are created ✓ Ensure that the loader bucket is close to the truck to minimize drop height while loading
	17-2 Ensure that freeboard exceeds six inches (CVC 23114)	
Turf Overseeding	18-1 Apply sufficient water immediately prior to conducting turf vacuuming activities to meet opacity and plume length standards; and	<ul style="list-style-type: none"> ✓ Haul waste material immediately off-site
	18-2 Cover haul vehicles prior to exiting the site.	

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Unpaved roads/parking lots	19-1 Stabilize soils to meet the applicable performance standards; and	✓ Restricting vehicular access to established unpaved travel paths and parking lots can reduce stabilization requirements
	19-2 Limit vehicular travel to established unpaved roads (haul routes) and unpaved parking lots.	
Vacant land	20-1 In instances where vacant lots are 0.10 acre or larger and have a cumulative area of 500 square feet or more that are driven over and/or used by motor vehicles and/or off-road vehicles, prevent motor vehicle and/or off-road vehicle trespassing, parking and/or access by installing barriers, curbs, fences, gates, posts, signs, shrubs, trees or other effective control measures.	

Table 2
DUST CONTROL MEASURES FOR LARGE OPERATIONS

FUGITIVE DUST SOURCE CATEGORY	CONTROL ACTIONS
Earth-moving (except construction cutting and filling areas, and mining operations)	<p>(1a) Maintain soil moisture content at a minimum of 12 percent, as determined by ASTM method D-2216, or other equivalent method approved by the Executive Officer, the California Air Resources Board, and the U.S. EPA. Two soil moisture evaluations must be conducted during the first three hours of active operations during a calendar day, and two such evaluations each subsequent four-hour period of active operations; OR</p> <p>(1a-1) For any earth-moving which is more than 100 feet from all property lines, conduct watering as necessary to prevent visible dust emissions from exceeding 100 feet in length in any direction.</p>
Earth-moving: Construction fill areas:	<p>(1b) Maintain soil moisture content at a minimum of 12 percent, as determined by ASTM method D-2216, or other equivalent method approved by the Executive Officer, the California Air Resources Board, and the U.S. EPA. For areas which have an optimum moisture content for compaction of less than 12 percent, as determined by ASTM Method 1557 or other equivalent method approved by the Executive Officer and the California Air Resources Board and the U.S. EPA, complete the compaction process as expeditiously as possible after achieving at least 70 percent of the optimum soil moisture content. Two soil moisture evaluations must be conducted during the first three hours of active operations during a calendar day, and two such evaluations during each subsequent four-hour period of active operations.</p>

Table 2 (Continued)

FUGITIVE DUST SOURCE CATEGORY	CONTROL ACTIONS
Earth-moving: Construction cut areas and mining operations:	(1c) Conduct watering as necessary to prevent visible emissions from extending more than 100 feet beyond the active cut or mining area unless the area is inaccessible to watering vehicles due to slope conditions or other safety factors.
Disturbed surface areas (except completed grading areas)	(2a/b) Apply dust suppression in sufficient quantity and frequency to maintain a stabilized surface. Any areas which cannot be stabilized, as evidenced by wind driven fugitive dust must have an application of water at least twice per day to at least 80 percent of the unstabilized area.
Disturbed surface areas: Completed grading areas	(2c) Apply chemical stabilizers within five working days of grading completion; OR (2d) Take actions (3a) or (3c) specified for inactive disturbed surface areas.
Inactive disturbed surface areas	(3a) Apply water to at least 80 percent of all inactive disturbed surface areas on a daily basis when there is evidence of wind driven fugitive dust, excluding any areas which are inaccessible to watering vehicles due to excessive slope or other safety conditions; OR (3b) Apply dust suppressants in sufficient quantity and frequency to maintain a stabilized surface; OR (3c) Establish a vegetative ground cover within 21 days after active operations have ceased. Ground cover must be of sufficient density to expose less than 30 percent of unstabilized ground within 90 days of planting, and at all times thereafter; OR (3d) Utilize any combination of control actions (3a), (3b), and (3c) such that, in total, these actions apply to all inactive disturbed surface areas.

Table 2 (Continued)

FUGITIVE DUST SOURCE CATEGORY	CONTROL ACTIONS
Unpaved Roads	<p>(4a) Water all roads used for any vehicular traffic at least once per every two hours of active operations [3 times per normal 8 hour work day]; OR</p> <p>(4b) Water all roads used for any vehicular traffic once daily and restrict vehicle speeds to 15 miles per hour; OR</p> <p>(4c) Apply a chemical stabilizer to all unpaved road surfaces in sufficient quantity and frequency to maintain a stabilized surface.</p>
Open storage piles	<p>(5a) Apply chemical stabilizers; OR</p> <p>(5b) Apply water to at least 80 percent of the surface area of all open storage piles on a daily basis when there is evidence of wind driven fugitive dust; OR</p> <p>(5c) Install temporary coverings; OR</p> <p>(5d) Install a three-sided enclosure with walls with no more than 50 percent porosity which extend, at a minimum, to the top of the pile. This option may only be used at aggregate-related plants or at cement manufacturing facilities.</p>
All Categories	<p>(6a) Any other control measures approved by the Executive Officer and the U.S. EPA as equivalent to the methods specified in Table 2 may be used.</p>

TABLE 3
CONTINGENCY CONTROL MEASURES FOR LARGE OPERATIONS

FUGITIVE DUST SOURCE CATEGORY	CONTROL MEASURES
Earth-moving	(1A) Cease all active operations; OR (2A) Apply water to soil not more than 15 minutes prior to moving such soil.
Disturbed surface areas	(0B) On the last day of active operations prior to a weekend, holiday, or any other period when active operations will not occur for not more than four consecutive days: apply water with a mixture of chemical stabilizer diluted to not less than 1/20 of the concentration required to maintain a stabilized surface for a period of six months; OR (1B) Apply chemical stabilizers prior to wind event; OR (2B) Apply water to all unstabilized disturbed areas 3 times per day. If there is any evidence of wind driven fugitive dust, watering frequency is increased to a minimum of four times per day; OR (3B) Take the actions specified in Table 2, Item (3c); OR (4B) Utilize any combination of control actions (1B), (2B), and (3B) such that, in total, these actions apply to all disturbed surface areas.
Unpaved roads	(1C) Apply chemical stabilizers prior to wind event; OR (2C) Apply water twice per hour during active operation; OR (3C) Stop all vehicular traffic.
Open storage piles	(1D) Apply water twice per hour; OR (2D) Install temporary coverings.
Paved road track-out	(1E) Cover all haul vehicles; OR (2E) Comply with the vehicle freeboard requirements of Section 23114 of the California Vehicle Code for both public and private roads.
All Categories	(1F) Any other control measures approved by the Executive Officer and the U.S. EPA as equivalent to the methods specified in Table 3 may be used.

Table 4
(Conservation Management Practices for Confined Animal Facilities)

SOURCE CATEGORY	CONSERVATION MANAGEMENT PRACTICES
Manure Handling (Only applicable to Commercial Poultry Ranches)	(1a) Cover manure prior to removing material off-site; AND (1b) Spread the manure before 11:00 AM and when wind conditions are less than 25 miles per hour; AND (1c) Utilize coning and drying manure management by removing manure at laying hen houses at least twice per year and maintain a base of no less than 6 inches of dry manure after clean out; or in lieu of complying with conservation management practice (1c), comply with conservation management practice (1d). (1d) Utilize frequent manure removal by removing the manure from laying hen houses at least every seven days and immediately thin bed dry the material.
Feedstock Handling	(2a) Utilize a sock or boot on the feed truck auger when filling feed storage bins.
Disturbed Surfaces	(3a) Maintain at least 70 percent vegetative cover on vacant portions of the facility; OR (3b) Utilize conservation tillage practices to manage the amount, orientation and distribution of crop and other plant residues on the soil surface year-round, while growing crops (if applicable) in narrow slots or tilled strips; OR (3c) Apply dust suppressants in sufficient concentrations and frequencies to maintain a stabilized surface.
Unpaved Roads	(4a) Restrict access to private unpaved roads either through signage or physical access restrictions and control vehicular speeds to no more than 15 miles per hour through worker notifications, signage, or any other necessary means; OR (4b) Cover frequently traveled unpaved roads with low silt content material (i.e., asphalt, concrete, recycled road base, or gravel to a minimum depth of four inches); OR (4c) Treat unpaved roads with water, mulch, chemical dust suppressants or other cover to maintain a stabilized surface.
Equipment Parking Areas	(5a) Apply dust suppressants in sufficient quantity and frequency to maintain a stabilized surface; OR (5b) Apply material with low silt content (i.e., asphalt, concrete, recycled road base, or gravel to a depth of four inches).

APPENDIX S

LABOR CODE COMPLIANCE FORM

APPENDIX S

LABOR CODE COMPLIANCE FORM

To comply with Labor Code Sec. 2810, Contractor shall complete and submit this Information Sheet within thirty (30) days after Conditional Award of the Contract:

- 1) Workers' Compensation Insurance:
 - A. Policy Number:
 - B. Name of Insurer (NOT Broker):
 - C. Address of Insurer:
 - D. Telephone Number of Insurer:
- 2) For Vehicles owned by Contractor and used in performing work under this contract:
 - A. VIN (Vehicle Identification Number):
 - B. Automobile Liability Insurance Policy Number:
 - C. Name of Insurer (NOT Broker):
 - D. Address of Insurer:
 - E. Telephone Number of Insurer:
- 3) Address of Property used to house workers on this Contract, if any:
- 4) Estimated total number of workers to be employed on this Contract:
- 5) Estimated total wages to be paid those workers:
- 6) Dates (or schedule) when those wages will be paid:
- 7) Estimated total number of independent contractors to be used on this Contract:
- 8) Taxpayer's Identification Number:

WORKERS' COMPENSATION CERTIFICATION

In accordance with California Labor Code Sections 1860 and 3700, I certify that I am aware of the provisions of Section 3700 which requires every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with said provisions before commencing the performance of the Work of this Contract.

Contractors Name:

Signature of Contractor, or corporate officer of Contractor, as a general partner of Contractor

Title:

Date:

APPENDIX T

FORM CR4 (CONTRACTOR PERFORMANCE EVALUATION)

FORM CR4
CONTRACTOR PERFORMANCE EVALUATION FORM

Date:

☐ **INTERIM REPORT:** at % of a ☐ working day ☐ calendar day contract.

☐ **FINAL REPORT:** Submitted at completion of a ☐ working day
☐ calendar day contract.

TITLE OF CONTRACT/CONTRACT NUMBER:

CONTRACTOR NAME:

CONTRACTOR ADDRESS:

CONTRACT AMOUNT (ORIGINAL/FINAL): /

TOTAL VALUE OF CHANGE ORDERS (OWNER INITIATED/NON-OWNER INITIATED):
 /

LIQUIDATED DAMAGES ASSESSED:

NUMBER OF UNAUTHORIZED SUBCONTRACTOR SUBSTITUTIONS:

WAGE VIOLATION PENALTIES FILED AND SUSTAINED:

TOTAL AMOUNT OF CLAIMS FILED AND SUSTAINED (NUMBER/VALUE):
 /

TOTAL AMOUNT OF STOP NOTICES (NUMBER/VALUE):
 /

DAYS OVER CONTRACT TERM:

TOTAL AMOUNT OF OSHA VIOLATIONS:

TOTAL NUMBER OF DAYS WITHOUT ACCEPTABLE INSURANCE DOCUMENTATION:

CONTRACTOR REPRESENTATIVE'S NAME:

CONTRACTOR SUPERINTENDENT'S NAME:

CONTRACTOR FOREMAN'S NAME:

PORT PROGRAM MANAGER:

PORT CONSTRUCTION MANAGER:

PORT CONSTRUCTION INSPECTOR:

This evaluation represents the conclusions of the Port of Long Beach, prepared by Port staff in the course of their official duties. The Contractor may agree with or dispute the contents and conclusions of this evaluation.

INSTRUCTIONS: To demonstrate responsibility for future projects with the Port, a Contractor must receive a total evaluation score of 75% or greater out of the total possible points, and receive a minimum of 37 out of a total possible score of 50 on Section G at the final project completion timeline. Written justifications for scores of "0-2" and "5" are required and the documentation shall be attached to the evaluation. If "N/A" Not Applicable is scored then the final possible score will be reduced. Note: The Contractor will be allowed five (5) working days from the receipt of this evaluation to provide a response in writing to this evaluation; otherwise the evaluation will be deemed accepted by the Contractor.

DEFINITIONS:

Change Requests: Any changes or requests for changes in the contract scope, whether there was cost or not, that were due to actions by the Contractor, Architect/Engineer, or Owner. This includes every individual change requested and/or approved on a project. For example, if you had a Change Order that went for approval, but it included five different individual change requests, the number of change requests would be five, not one.

Claims: Claim means a written demand or assertion by the Contractor against the City seeking payment of money, extension of time, or other relief arising out of, or related to, the Contract Documents or performance of the work. Claims are items that were not able to be resolved between the Contractor and the City per Article 7 of the General Conditions and were filed in a court of law and/or resolved in arbitration, mediation, or litigation. The items include, but are not limited to, compensable delays, conflicts on scope of work, conflicts on exclusions in the Contract Documents, unforeseen conditions, liquidated damages, warranty and maintenance issues, latent defects, and product failures.

Acceptable Insurance Documentation: Insurance documents that are as specified and described by the project contract and approved as to sufficiency and to form by the Port’s Risk Management and City Attorney’s Office.

NOTE: All references to Contractor shall mean Prime Contractor unless otherwise specified.

A. CONTRACTOR’S WORKFORCE

1. Experience/ Knowledge of Contractor’s Project Manager (0-5):	0
2. Experience/ Knowledge of Contractor’s Superintendent (0-5):	0
3. Experience/ Knowledge of Contractor’s Foreman (0-5):	0
4. Experience/ Knowledge of Contractor’s Office Engineer/DCC staff (0-5):	0
5. Was the Contractor’s staffing level adequate for the proper execution of the work? (0-5):	0

B. CONTRACT DOCUMENTS

6. Contractor’s familiarity with the Contract Documents (0-5):	0
7. Did the Contractor timely notify the Construction Manager of any potential problems, including conflicts or deficiencies in the plans and specification, prior to starting any element of work such that there was no impact to the project? (0-5):	0

C. MANAGEMENT OF SUBCONTRACTORS

8. General Contractor’s management of sub-contractors' schedules and activities (0-5):	0
9. General Contractor’s willingness to resolve deficiencies in sub-contractors' performance (0-5):	0

D. EXECUTION, PROGRESS AND ACCEPTANCE OF THE WORK

10. Did the Contractor furnish all equipment and facilities required for the proper inspection of the work and maintain them in good condition? (0-5):	0
11. Was a complete, comprehensive baseline schedule submitted in accordance with the Contract Documents? (0-5):	0
12. Were schedule revisions submitted in accordance with the Contract Documents? (0-5):	0
13. Were monthly schedule updates submitted in accordance with the Contract Documents? (0-5):	0
14. Did the Contractor adhere to the activities' durations per the Baseline Schedule? (0-10):	
If yes, score 10 on this row and leave the following three items 0. If no, score 0 on this row and provide scores for the following three items:	0
i. Were the variances (unforeseen conditions, delayed RFI responses etc.) beyond Contractor’s control? (If yes, score 3, if no, score 0)	0
ii. Was the Contractor’s failure to adhere due to lack of coordination, resources or poor planning? (If yes, score 0, if no, score 1- 3)	0
iii. Did the Contractor take any corrective actions to mitigate the schedule impacts? (If yes, score 4, if no, score 0)	0
15. Did the Contractor start the work as agreed upon? (0-5):	0
16. Were the submittals and/or Shop Drawings completed and submitted in accordance with the Contract Documents to avoid impact the critical path? (0-5):	0
17. Were the redlines and as-built drawings maintained, updated, and submitted in accordance with the Contract Documents? (0-5):	0
18. Were RFIs clear, relevant, and submitted early enough to avoid impacting the critical path? (0-5):	0
19. Did the Contractor promptly address the deficiencies brought up by the inspection team? (0-5):	0
20. Was the Contractor reasonable in dealing with the tenant/general public/third party and minimizing impacts on day-to-day operations during construction? (0-5):	0
21. Were there any avoidable incidents of damage to existing improvements by the Contractor or subcontractors? (0-5): (if no avoidable accidents score 5)	0
22. Was the Construction Manager promptly notified of each incident of damage to existing improvements? (0-5):	0
23. Did the Contractor promptly repair or replace existing improvements damaged in the course of work? (0-5):	0

E. CONTRACT COMPLIANCE

24. Quality of materials, parts and equipment furnished in compliance with the contract (0-5):

0
25. Quality and workmanship in accordance with generally accepted standards (0-5):

0
26. Were the materials incorporated into the work with approved submittals? (0-5):

0
27. Did the Contractor take adequate measures to protect the work and materials? (0-5):

0
28. Were any Notices of Non-Compliance issued for corrections, deficiencies or violations?
(0 or 5): (if no notice issued score 5)

0
29. Did the Contractor attempt to add and/or remove any subcontractor or supplier without Port
approval? (0 or 5):

0
30. Did the Contractor obtain and review required permits, including deferred permits, in a timely
manner and in accordance with the Contract Documents? (0-5):

0
31. Did the Contractor comply with applicable permits, and coordinate/cooperate with other
agencies issuing permits? (0-5):

0
32. Did the Contractor comply with environmental regulations and mitigation documents per the
Contract Documents and applicable laws? (0-5):

0

F. LABOR COMPLIANCE AND PROJECT LABOR AGREEMENTS

33. Did the contractor submit required labor compliance and PLA documentation as required or
requested by the Port? (0-5):

2.5 points for Labor Compliance documentation (0 if not submitted, 1 if submitted after 2 or more notifications
from the Port, 2.5 if submitted without request or follow up by the Port)

2.5 points for PLA documentation (0 if not submitted, 1 if submitted after 2 or more notifications from the Port,
2.5 if submitted without request or follow up by the Port)

0
34. Did the Contractor pay applicable prevailing wages? (0-5):

2.5 points for payment of prevailing wage (0 if the contractor did not pay prevailing wage, 1 if the
contractor made prompt and voluntary restitution upon notification, 2.5 if the contractor paid the
correct prevailing wage rates for all classifications)

2.5 points for the correct payment of fringe benefit monthly contributions to the union trust funds
(0 if the contractor did not make monthly contributions to the union trust funds, 1 if the contractor makes
monthly contributions after notification from the Port, 2.5 if the contractor makes monthly contributions)

0
35. Were complete and accurate Certified Payroll Reports submitted as required or as requested by the
Port? (0-5): (0 if the CPRs were not submitted, 2.5 if the CPRs were submitted with incorrect information,
5 if CPRs were submitted and accurate)

0
36. Did the contractor make any good faith efforts to meet the PLA’s worker utilization goals? (0-5)
(0 if no efforts were made and goals were not met, 1-4 if efforts were made and goals were not met,
5 if goals were met)

0

G. SAFETY (TO BE SCORED BY RISK MANAGEMENT STAFF)

37. Did the contractor obtain and maintain current required safety-related permits on-site? (0 or 5):

0
38. Did the contractor or any subcontractors receive any OSHA citations during the conduct of work
activities? (0-5):

0
39. Did the contractor or any subcontractors have any injuries or incidents during the course of
their project work? (0-5):

0
40. Did the contractor and all subcontractors provide complete safety plans in compliance with
regulatory requirements and the project specifications, and receive approvals for those plans prior to
starting work? (0-5):

0
41. Did the contractor’s safety representative perform the duties outlined in the project specification?

- (0-5):
42. Are safety submittal(s) being updated as necessary to reflect changes on the project (i.e. activity specific submittals, scope of work changes, additional subcontractors, worksite changes, etc.) and is the contractor/subcontractor abiding by their submitted plans? (0-5):

0
43. Did the contractor have safety issues that the Port Safety Representative identified as repeat or reoccurring during routine safety audits? (0-5):

0
44. Was equipment on the jobsite used safely and for its intended purpose as observed by the Port Safety Representative? (0-5):

0
45. Was equipment on the jobsite properly and safely maintained as observed by the Port Safety Representative? (0-5):

0
46. Was the Contractor's traffic control, and access in and out of the project area, maintained in a safe manner that minimized public inconvenience? (0-5):

0

H. COMMUNICATION

47. Did the Contractor provide clear, timely notice of required inspections? (0-5):

0
48. Did the Contractor respond to requests from the Construction Manager in a complete and timely manner? (0-5):

0
49. Did the Contractor's office staff communicate effectively with its field staff, subcontractors, and vendors to avoid critical path impacts? (0-5):

0
50. Did the Contractor ensure that subcontractors were present in weekly progress meetings? (0-5):

0

I. CHANGES IN WORK

51. Out of the total change orders submitted, did the Contractor submit change requests that were unfounded, or without merit (0-5)?: (if less than 10% score 5, from 10-25% score 4, from 25-35% score 3, from 35-50% score 2, more than 50% score 0)

0
52. Did the Contractor submit the proposals and change orders by the due date? (0-5):

0
53. Were the change orders signed on time? (0-5):

0
54. Was extra work negotiated in a fair and equitable manner? (0-5):

0
55. Were changed conditions addressed quickly to avoid or minimize delays to the contract? (0-5):

0
56. Did the Contractor submit accurate daily extra work reports for time and material change orders? (0-5):

0
57. Was there any Government Code Claim per GC-4.4.1 filed on the project? (0 or 5):
(if no Government Code Claim was filed, score 5)

0
58. Did the Contractor respond diligently to address disputed work to avoid or minimize delays to the project? (0 or 5): (if yes, score 5, if no, score 0)

0
59. Was the Contractor assessed liquidated damages? (0-5): (if no liquidated damages, score 5)

0

J. INSURANCE (TO BE SCORED BY RISK MANAGEMENT)

60. Did the Contractor have acceptable insurance documentation as required by the project contract in place at all times during the project (0 or 5)?:

0

K. SBE or DBE (TO BE SCORED BY SBE or DBE PROGRAM STAFF)

61. The contractor reported SBE/VSBE or DBE utilization in accordance with the contract documents (0 or 5):

0
62. The contractor followed SBE or DBE change requirements (e.g. SBE or DBE additions, amendments and/or substitutions) in accordance with the contract documents (0 or 5):

0
63. The contractor's SBE/VSBE or DBE utilization met or exceeded their contracted SBE/VSBE or DBE commitments (0 or 5): (if met or exceeded score 5, if not achieved without approved exceptions score 0)

0

FULL EVALUATION: SAFETY (SECTION G):	Total Points Available	Total Points Earned	
	320	-	0.0%
	50	-	0.0%

1. Contractor Project Manager

By: _____
(signature/date)

(printed name)

2. Port Construction Manager

By: _____
(signature/date)

(printed name)

3. Port Program Manager

By: _____
(signature/ date)

(printed name)

4. SBE Program Administrator

By: _____
(signature/date)

(printed name)

5. Port Safety Manager

By: _____
(signature/ date)

(printed name)

6. Director of Risk Management

(signature/date)

(printed name)

7. Director of Program Management

(signature/date)

(printed name)

8. Director of Construction Management

(signature/ date)

(printed name)

9. Approval of Chief Harbor Engineer

(signature/date)

(printed name)

Narrative for CPE Questions: (Project Spec. Number & Contractor Name)

___% Contractor Performance Evaluation

[illegible]

APPENDIX U

POLB SURVEY DIVISION MANUALS



Port of
LONG BEACH
THE PORT OF CHOICE

Construction Surveys

Staking Procedures Manual



Acknowledgement

I sincerely thank the following Survey staff who contributed to the development of this manual:

Ed Capalaran, PLS
Gary Newkirk, PLS
Juan Buleje, PLS
Rex Orenzo, LSIT
Scott McDermid, LSIT
Armando Boyd, LSIT
Aulden Thomas, EIT

Without their dedication and hard work, this effort may not have been successful.

Robert Seidel, PLS
Survey Division Director

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1.0 CONSTRUCTION SURVEYS

Construction surveys, performed under the supervision of a licensed land surveyor, generally are used to establish lines, grades and to produce as-built data for project construction. In order to maintain and produce consistent and reproducible surveys, the Port of Long Beach (The Port) requires project control monuments and construction benchmarks to be based on a project datum selected by the Port Survey Division. Said monuments and benchmarks are to be set prior to start of construction. From this established control the contractor may set supplemental “working stakes.”

Construction staking at the Port requires that all contractors follow a set of rules and guidelines that have been established over time and are specified in the policy that follows. This policy addresses procedures and general information regarding typical construction staking methodology and includes types of stakes and materials to be used, staking intervals, placement and offsets, and markings.

1.1 PROFESSIONAL CONDUCT

As individuals in the Port Survey Division, it is important to conduct ourselves in a professional manner. Professionalism includes respectful and courteous behaviors, dedication to the Port’s mission, and an awareness of the needs of our customers – contractors, Port construction management, Port engineering design, Port consultants, and the Public. Professional conduct includes:

- Conduct which is ethical, honest and incorporates integrity in all situations.
- Acting and communicating professionally, respectfully, and courteously at all times.
- A continuous effort to identify and satisfy customer needs.
- Following all Port policies, rules, and guidelines.
- Meeting or exceeding expectations whenever possible.
- Delivering on commitments.
- Communicating clearly, concisely, thoroughly, and accurately.
- Striving to stay up-to-date with the latest surveying procedures, equipment, and best practices.

1.2 POLICY

The Survey Division’s policy regarding Port-furnished construction layout, as defined by this manual, is to provide the necessary staking to establish the lines and grades required for project construction.

The policy regarding Contractor furnished stakes is to allow the contractor to set any stakes they deem necessary to aid in the performance of their work. Contractor stakes should be based on Port-furnished control stakes.

Means and methods used to establish working stakes are the Contractor's option. Methods used by the contractor are not prescribed herein but working stakes should maintain necessary accuracies and precision shown in Plan Specifications or as required by the Engineer. With the exception of contractual restrictions, the Contractor's means and methods for guiding the actual construction is the Contractor's choice.

Generally, the density of required staking, as defined by this document, will not be increased. However, site conditions could necessitate additional staking or reduce the typical staking requirements. Examples are:

- ♦ If roadway construction involves minor grade changes, then a single set of slope stakes or final grade stakes may be the only staking requirement.
- ♦ Final grade stakes might be used for curb control as well as final grade.
- ♦ Minor roadways curb stakes might also be used to control final street grading.
- ♦ Existing pavement might be used to control contiguous paving work, as opposed to setting an additional set of final grade stakes.

Private consultants performing surveying on behalf of the Survey Division are responsible for providing all services and meeting all standards that are required by this policy.

Nothing contained in this Policy or the consultant contracts with the Port is to be construed to limit consultants or Port surveyors from their basic responsibilities for land surveying work as defined by the Land Surveyor's Act.

1.3 RESPONSIBILITIES

The responsibilities described in this section pertain to construction surveys.

Port Surveyor

Construction staking is the responsibility of The Port Survey Division and shall be performed in cooperation with Port Engineers. The following are the responsibilities of the Surveyor:

- ◆ Review site conditions for survey crew's safety.
- ◆ Attend regular construction progress meetings.
- ◆ Ensure construction staking adheres to Port Standards.
- ◆ Provide pre-contract-award Port-furnished construction staking, as determined necessary by the Engineer.
- ◆ Provide all Port-furnished construction staking for project completion.
- ◆ Determine which methods and procedures are most appropriate in order to accomplish the Port-furnished construction staking.
- ◆ Check data furnished by the Design Engineer for completeness, discrepancies and constructability.
- ◆ Verify that planned lines and grades match existing conditions of and are consistent with design plans (i.e... Pavement design joins existing pavement, inlets and outlets of drainage facilities, etc.); advises the Engineer.
- ◆ Advise the Engineer of design conflicts regarding lines and grades, and records relevant information in Surveyor's logbook/daily report.
- ◆ Keep Engineer informed of pertinent construction issues.
- ◆ Commit to a field survey only from Engineer's written requests and reject all verbal requests.
- ◆ Keep adequate records of Port-furnished construction staking efforts (work accomplished, dates, time and resources required, survey data and re-staking).

Engineer

The Engineer is responsible for administration and completion of the project, including the coordination of construction surveys in cooperation with The Port Surveyor. The following are the responsibilities of the Engineer:

Conduct a pre-construction meeting and convene interim meetings as needed between engineers, construction managers, surveyors and contractors.

- ◆ Ensure that the contractor understands:
 - Port-furnished construction staking procedures as detailed in this policy.
 - How to request Port-furnished construction staking, including contract requirements and the process.
 - Contract requirements regarding preservation of Port-furnished stakes.
- ◆ Coordination of survey requests.
- ◆ Verification that Contractor requests for Port-furnished construction staking is appropriate and acceptable. This includes:
 - That the requested staking areas are ready for stakes.
 - That stakes will be used in reasonable time period.

- The stakes have been requested 2 working days in advance of when they are required.
 - The request is specific as to what is required.
 - Whether the request is applicable to an outstanding RFI (Request for Information), DDC (Design Directed Change), shop drawings or other written requests.
- ◆ Determination of the cause for restaking, the responsible party and notification of the Port Surveyor. Note: The Port surveyor will use this information for proper time sheet entry.
- ◆ Resolution of all design conflicts.
- ◆ Approval of Field adjustments made by Surveyors.
- ◆ Settle disputes regarding staking priorities and schedules.

Contractor

The following are the responsibilities of the Contractor:

- ◆ Submit suitable requests for construction staking, ensuring that the requested staking areas are ready for stakes and that the stakes will be used in a reasonable time.
- ◆ Ensuring requests for construction staking are submitted at least 2 working days before survey services will be required in accordance with contract requirements.
- ◆ When multiple requests are submitted at the same time, establishes priorities for requested Port-furnished construction staking and clearly documents these priorities on the staking request.
- ◆ Submits all construction-staking requests to the Engineer for approval.
- ◆ Attaches applicable RFI's, DDC, shop drawings, etc. to go with the construction staking request.
- ◆ Preserves Port-furnished construction staking and survey control points in accordance with the contract requirements.

Design Engineer

The design engineer shall provide CADD file deliverables to the Survey Division per POLB CADD Standards Manual. The following information is a partial list of typical Survey File formats and deliverables:

- ◆ MicroStation Plan Sheets and Models, DGN file (s).
- ◆ InRoads Design Surface Model (s), DTM file (s).
- ◆ InRoads Design Geometry Project (s), ALG file (s).
- ◆ Final hardcopy contract plans.
- ◆ Control diagram and coordinate list for the control used to design the project, if the survey control work was not performed by Survey Division.
- ◆ Coordinate tables, Drainage cross-sections, alignments with station/offset and coordinates for angle points, end points, curve data, and structure locations with station/offset and coordinates to the centerline point at the flow line.
- ◆ Taper, transition curve, super-elevation diagrams, and flare locations, including sufficient data to precisely define beginning and ending locations and elevations, radius points, offsets, and parabolic curve base line distances.

- ◆ Data for structures including abutment and wing wall lay-out lines, abutment fills, and pier alignments.

Note: All design data to be delivered to the Survey Division in both digital and hardcopy format.

1.4 KICK-OFF MEETING

Engineer/Surveyor


Survey Division shall have a pre-construction meeting with the Engineer. All Surveyors permanently assigned to a project should attend this meeting. The purpose of this meeting is to establish a working relationship between the Engineer and Survey personnel and to review the anticipated survey work, including tentative staking schedules.

Engineer/Contractor

A pre-construction meeting between the engineer and contractor will be scheduled by the engineer. A Survey Division representative should attend this meeting. The Contractor will be given a copy of the POLB Construction Staking Manual at this meeting. The Port Surveyor should be ready to describe the types, placement and marking of stakes, and explain the survey request process. At this meeting a special emphasis will be given to the need for preserving stakes and contractor obligations regarding the re-staking process.

1.5 REQUEST FOR CONSTRUCTION STAKING

The Port Standard Specifications require the Contractor to provide a written request for Port-furnished construction staking. To facilitate the Contractor's written request and to ensure that all necessary information is included in the request, the Engineer will furnish the Contractor a supply of pink "Request for Construction Survey" sheets (RCS) for their use, see figure 1 below. Requests for staking shall only be accepted by the Port Surveyor after approval by the Engineer.

 Port of LONG BEACH THE PORT OF CHOICE				REQUEST FOR CONSTRUCTION SURVEY			
<small>TO BE FILLED IN BY INSPECTOR:</small> <div style="border: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="display: flex; justify-content: space-between;"> Project Title per CWO Charge Point Spec. No. Req. No. </div>							
<small>TO BE FILLED IN BY CONTRACTOR:</small> REQUESTED BY: <div style="border: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="display: flex; justify-content: space-between;"> CONTRACTOR'S REP. DATE </div>				<small>TO BE FILLED IN BY INSPECTOR:</small> RECEIVED BY: <div style="border: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="display: flex; justify-content: space-between;"> INSPECTOR DATE & TIME </div>			
TYPE OF SURVEY: <input type="checkbox"/> Mark Utility Interferences <input type="checkbox"/> Mark Removals* <input type="checkbox"/> Stake Utility* <input type="checkbox"/> Stake for Grading* <input type="checkbox"/> Layout Striping <input type="checkbox"/> Layout Fence Line <input type="checkbox"/> As-Built* <input type="checkbox"/> Other* <small>*Specify:</small> <div style="border: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; height: 20px; margin-bottom: 5px;"></div>		INSTRUCTIONS: (Station to Station, Coordinates, Grid, etc.) <div style="border: 1px solid black; height: 100px; margin-top: 5px;"></div>			DATES: <div style="border: 1px solid black; height: 40px; margin-top: 5px;"></div> <div style="border: 1px solid black; height: 40px; margin-top: 5px;"></div>		
<div style="border: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; height: 20px; margin-bottom: 5px;"></div> <div style="border: 1px solid black; height: 20px; margin-bottom: 5px;"></div>		Change Order No. <div style="border: 1px solid black; width: 100px; height: 15px;"></div> RFI No. <div style="border: 1px solid black; width: 100px; height: 15px;"></div> Drawing No. <div style="border: 1px solid black; width: 100px; height: 15px;"></div> Sheets: <div style="border: 1px solid black; width: 100px; height: 15px;"></div> <small>** TWO WORKING DAYS NOTICE REQUIRED PRIOR TO COMMENCING SURVEY</small>			<small>** Stakes will be used on:</small> <div style="border: 1px solid black; height: 40px; margin-top: 5px;"></div>		
Stakes to be set: <input type="checkbox"/> On Line, or <input type="checkbox"/> Offset: <div style="border: 1px solid black; width: 100px; height: 15px;"></div> & <div style="border: 1px solid black; width: 100px; height: 15px;"></div> <input type="checkbox"/> Restake							
<small>FOR INSPECTOR'S & SURVEYOR'S USE ONLY</small> Comments: <div style="border: 1px solid black; height: 40px; margin-top: 5px;"></div>				DELIVERABLES: <input type="checkbox"/> Grade Sheet <input type="checkbox"/> <input type="checkbox"/> XYZ File <input type="checkbox"/> <input type="checkbox"/> ASCII File <input type="checkbox"/>			
<small>TO BE FILLED IN BY SURVEYOR:</small> Date Began: <div style="border: 1px solid black; width: 100px; height: 15px;"></div> Date Completed: <div style="border: 1px solid black; width: 100px; height: 15px;"></div> Reference: <div style="border: 1px solid black; width: 100px; height: 15px;"></div>							
Received by: <div style="border: 1px solid black; width: 100px; height: 15px;"></div> Supervisor <div style="border: 1px solid black; width: 100px; height: 15px;"></div> Date <div style="border: 1px solid black; width: 100px; height: 15px;"></div>		Crew hours: <div style="border: 1px solid black; width: 100px; height: 15px;"></div> Estimated <div style="border: 1px solid black; width: 100px; height: 15px;"></div> Used <div style="border: 1px solid black; width: 100px; height: 15px;"></div>		Assigned to: <div style="border: 1px solid black; width: 100px; height: 15px;"></div> Surveyor <div style="border: 1px solid black; width: 100px; height: 15px;"></div>			

N:\Survey Group\Forms & Information\Request for Const Survey Rev. 06/24/11

Figure 1: Request for Construction Survey Form

When the Contractor requires construction staking, the Contractor shall notify the Engineer of his requirements, in writing, on the supplied forms, a minimum of 2 working days before survey services will commence. In no event shall a notice of less than 2 working days be considered a sufficient length of time to commence surveying. The Contractor shall allow sufficient time in their schedule for the Survey crew to complete the requested survey work. " For example, if the surveyor estimates a requested staking effort requires eight working days to complete, a reasonable notice would be ten working days".

If the area is not prepared satisfactorily for staking, as determined by the Engineer, the request for such staking may be voided by the Engineer, in which case, the Contractor shall submit a new request for staking when the area has been properly prepared. If a survey crew has been dispatched to an area that is not ready for staking and is unable to complete the staking, the Engineer shall charge the Contractor for the survey crew's time at current re-staking rates.

After receiving a survey request from the Engineer, the Port Surveyor will schedule the work. To expedite scheduling, the request should include calendar dates to indicate when the area will be ready, when the stakes are needed and any other details regarding the area or types of stakes to be set. If multiple survey requests are submitted at the same time and no priority number is listed on the staking request, staking will proceed in the order received. If a request includes more staking than the advance notice permits, it may be returned to the Engineer for an additional Engineering review.

When staking has been completed, the Surveyor will record on the request form the date completed, any comments, and if the request was for re-staking. The surveyor will also notify the Engineer that the request has been completed and if it was for re-staking.

1.6 RE-STAKING

Marks or stakes are to be used within a reasonable amount of time to prevent exposure to deterioration or destruction. The Port Surveyor will furnish one set of line and grade stakes as required for the completion of the Work. The Contractor shall take proper precautions to prevent disturbance or damage to marks or stakes. In case such marks or stakes are damaged or destroyed they will be replaced at the Engineer's discretion and convenience. Remarking, re-staking, or rechecking of survey will be charged to the Contractor at the current rate for a three-person city survey crew and will be deducted from final payment.

1.7 ALTERNATIVES TO NORMAL STAKING

If determined by the Engineer, in cooperation with the Port Surveyor, that additional Port-furnished construction stakes are needed, the Port Surveyor will provide the appropriate staking needed to complete the work. As an example, construction stakes may be timed in several stages to accommodate construction.

In cooperation with the Engineer and the Contractor, alternate Port-furnished construction staking procedures (staking interval, placement, and markings) will be considered to facilitate the Contractor's construction method, providing that such alternate procedures do not require more Port surveying resources than the method outlined in this document.

1.8 STAKING TOLERANCES

Staking tolerances refer to the acceptable deviation of the position of each stake from its computed position relative to the line and grade of the facility being staked. Section 2 of this document references typical types of staking used at the Port. Tolerances are described for each of these stakes. When a stake is positioned within its tolerance it is deemed "acceptable". Staked positions should be verified at the time of staking and the staked position should be recorded electronically as part of the QA/QC process.

1.9 VERIFICATION & FIELD CHECKS

Sufficient independent field checks must be made throughout the field staking process to assure the integrity of the staking. It should never be assumed that values for a specific control point are correct or that the occupied control point hasn't moved or been disturbed. Additionally, it shouldn't be assumed that survey equipment is operating properly. Checks should be made to validate that equipment is working properly and that instrument setting are correct. Instrument measurements, such as pegging levels and taking baseline measurements, should be conducted regularly to verify proper instrument operation. Control values, including coordinate and elevation values should be checked and verified with each new setup.

Staking locations that have been pre-calculated in the office should be reviewed by the Surveyor to verify that staking positions reflects correct offset distances and references to the appropriate facilities. After staking, the as-staked location should be recorded electronically and random checks should be made and compared to design plans. A field check of field notes and markers

should be incorporated in the staking process to verify that correct information has been written on the marking lathe/stakes and written correctly in the survey notes.

1.10 FIELD NOTES

The surveyor shall copy and furnish one set of construction staking notes to the Engineer or Inspector. The notes may be in the form of an electronic file or a hard copy. Notes may include stakeout reports, grade sheets or stakeout listings (actual staked positions to be noted). Notes will be distributed to the contractor by the Engineer or Inspector.

2.0 TYPICAL PORT- FURNISHED STAKES

This section outlines the typical types, density, and placement of Port-furnished construction stakes.

Alternate locations for Port-furnished construction stakes may be used to accommodate site conditions. That determination will be made by The Port Surveyor.

Working stakes shall be based on Port Furnished project control and shall be marked in a consistent manner throughout the Port. It should also be noted that field notes shall supersede stake markings should there be a discrepancy between the two.

2.1 STAKE MARKINGS

Construction stakes contain two components: a reference point and information about that point. Examples of reference points are:

- A wooden hub
- A 60d nail
- A c-nail or paint mark on pavement

Offset distances are measured horizontally from the reference point to the design point. Information about the reference is typically written on wooden lath behind the reference point or painted on the ground next to the point. The stake marking format includes:

- Station – front of lath
- Offset distance to station line or feature – front of lath
- Feature description – front of lath (FL, Water, PB, etc.)
- Cut/Fill – front of lath
- Elevation – back of lath
- Measured point number – back of lath

Cuts or fills are measured vertically from the top of the reference point to the design point (Invert, top, FS, etc.) The elevation marking is for the top of the reference point.

If a discrepancy is discovered between stake markings and grade sheet values or the approved plans, the Engineer shall be immediately advised. (*Note:* some discrepancies might occur because of required field adjustments).

2.2 STAKE COLOR CODE

Stakes are color coded to conform to the following table.

Type of Stake	Description	Color
Horizontal Control	Coordinated control points, control line reference points, centerline, alignment, etc.	White/Red
Vertical Control	Benchmark	White/Blue
Rough Grade/Slope Stakes	Slope, abutment fill, rough grade, contour grading, final grade, etc.	Florescent Pink
Precise Grade	Blue Top	Blue
Walls – Retaining & Screen	For Grading & Landscape	White
Sewer	Pipelines, Manholes, Junction Structures	Green
Storm Drain	Drainage Facilities – Pipelines, Manholes, Inlets, Catch Basins, Concrete Structures, Culverts	Green
Water	Water line, Valve, Fire Hydrant...etc.	Blue
Electrical	Electrical Duct bank, MH, Vaults...Etc.	Red
Communication	Telephone, Fiber Optic	Florescent Orange
Curb & Gutter, Sidewalks	Includes cross-gutters, curb only & AC Berms	Florescent Pink
Fencing		Florescent Pink
Structures	Buildings, Bridges, retaining wall, etc.	White
Miscellaneous	Railroad, Signs, railings, barriers, lighting, etc.	Florescent Pink

2.3 MARKING ABBREVIATIONS

Commonly used stake marking abbreviations are listed below. This is not a complete list of all marking abbreviations. See plans for additional abbreviations.

Abbreviation	Definition		Abbreviation	Definition
AHD	Ahead		FNC	Fence
BC	Begin Curve		FG	Finish Grade
BEN	Bench		FL	Flow Line
BCR	Begin Curb Return		FS	Finished Surface
BEG	Begin or Beginning		FWALL	Face of Wall
BK	Back		GB	Grade Break
C	Cut		GRT	Grate
CL	Centerline		INV	Invert
CNTRL	Control Stakes		LIP	Lip of a Feature
CP	Catch Point		L/O	Line Only
D/L	Daylight		LOL	Lay-out Line
DB	Duct Bank		O/S	Offset
DI	Drainage Inlet		PB	Pull Box
EC	End Curve		R/W	Right of Way
ECR	End of Curb Return		S/C	Saw Cut Line
EL	Elevation		SG	Sub Grade
ELEV	Elevation		TC	Top of Curb
END	End or Ending		TOE	Toe of Fill
EP	Edge Pavement		TOP	Top of Fill
EW	End Wall		TOP XXX	Top of Feature
F	Fill			
FDN	Foundation			

2.4 ROUGH GRADE & SLOPE STAKES

Slope Stakes are set to control the construction of earthwork slopes. Typically they are set to mark a designed top or toe of slope. Existing topography may be used to pre-calculate staking locations. If actual field conditions show the "catch point" of the slope to deviate more than 0.3 ft. vertically, then the catch point must be staked in its true horizontal location. If less than 0.3 ft., the stake marker may be set at the standard offset distance and the marker stake shall show the vertical cut or fill to the catch point.

Contour Grading

Survey personnel, in cooperation with the Engineer, shall determine the spacing and pattern of Port-furnished stakes to be provided. Generally, staking on 40 ft. grid patterns will be provided. A grid pattern of stakes will typically be used for pad areas of relatively shallow fills or cuts. Stakes should be marked to identify the line, station and offset, if any, on which they are set, and give the cut/fill to finished grade for the point stake references.

Slope stakes may be used to control the location of additional grading features and facilities. That determination shall be made by The Port Surveyor.

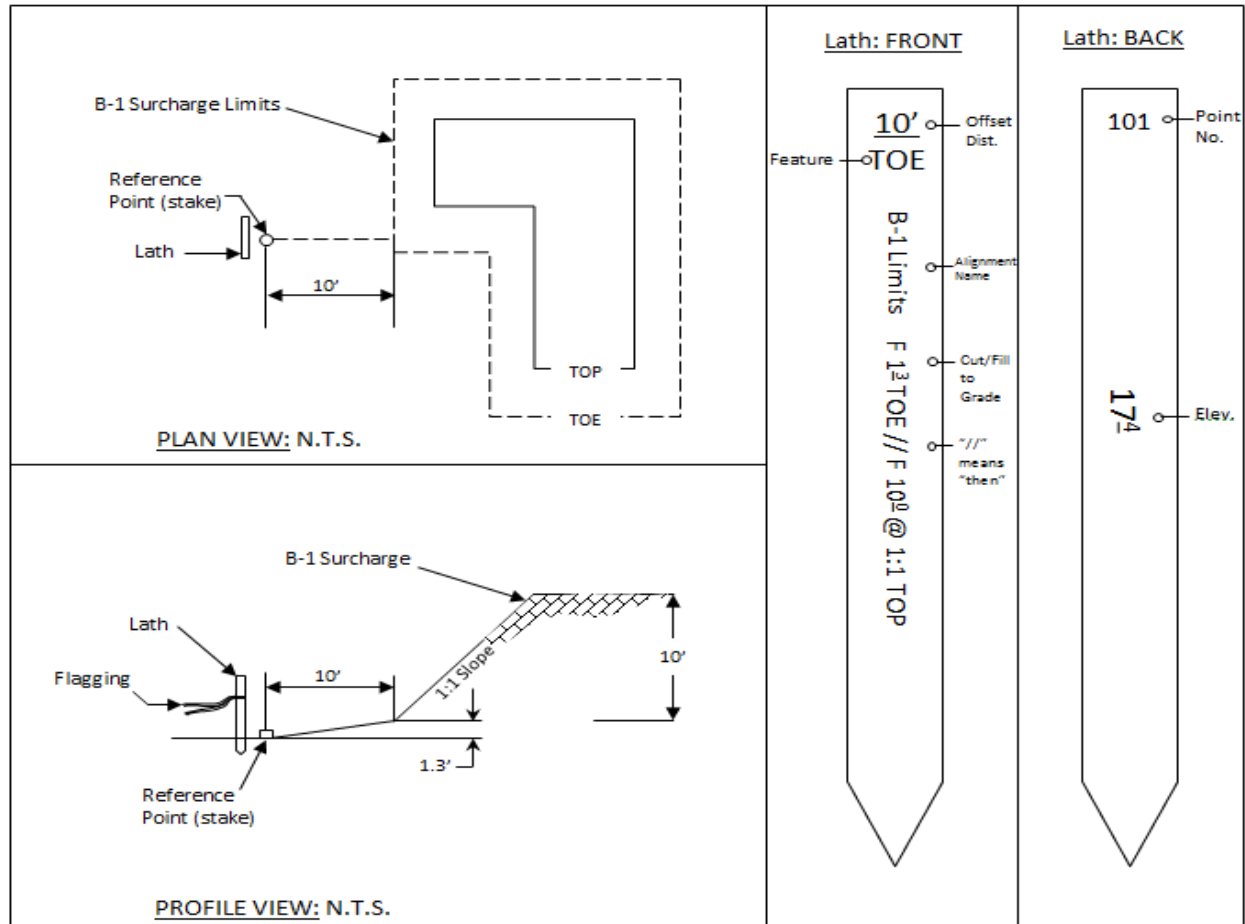


Figure 2.1

Stakes to be set: Reference point with marker stake typically set at 10ft. from the design point. Line-Only stakes are to be added in areas where visual lines are not normal or radial to the station line. Offset distance should be determined in cooperation with the Engineer and the Contractor.

Color Code: Florescent Pink

Staking Interval: Typical interval will be 50 ft., BC's, EC's, Angle Points and other points of control. Staking shall maintain inter-visibility at all times and additional stakes may be added depending on site conditions. Staking for short radius curves shall be divided by equal portions of the degree of curvature (quarter or half delta).

Markings: See Figure 2.1

Any required cut/fill information shall be provided on a separate grade sheet/ survey report.

Note: Field Notes shall supersede stake markings should there be discrepancy between the two.

Front:

- ◆ Offset
- ◆ Feature
- ◆ Station
- ◆ Cut/Fill Information

Back:

- ◆ Point Number
- ◆ Elevation

Staking Tolerance: Slope stakes should be set within 0.1 feet horizontally and 0.1 feet vertically.

Field Checks: Check staking visually and review the electronic stakeout report, Grade sheet and survey notes for accuracy.

2.5 PRECISE GRADE STAKES

Precise grade stakes are set when rough grading has been completed. Port-furnished precise grade stakes are set only one time. One set of final grade stakes shall be set and will control each structural section (grading plane, sub-base, base, and pavement).

Stakes to be set: Reference point and marker stake, at a horizontal offset to the edge of the grading or on a grid pattern. Offsets and grid pattern intervals should be determined in cooperation with the Engineer and the Contractor.

Blue tops: Set hub at plan elevation, spray top of hub blue, set feather on top. Optional reference stake may be set with marked elevation.

Color Code: Blue

Staking Interval: Typical interval will be every 50 ft. along tangents and curves except for curves with radius of less than 800 feet in which case spacing should be 25 ft. Generally, staking on 40 ft. grid patterns will be provided. However, additional stakes may be added depending on site conditions.

Markings: See figure 2.1

Any required cut/fill information shall be provided on a separate grade sheet/ survey report.

Note: Field Notes shall supersede stake markings should there be discrepancy between the two.

Front:

- ◆ Offset
- ◆ Station
- ◆ Cut/Fill Information

Back:

- ◆ Point Number
- ◆ Elevation

Staking Tolerance: Precise Grade Stakes should be set within 0.03 feet horizontally and 0.02 feet vertically.

Field Checks: Check staking visually and review the electronic stakeout report, Grade sheet and survey notes for accuracy.

2.6 WALL STAKES

Wall stakes are set to reference wall layout line (LOL). Only one line is to be referenced for each wall.

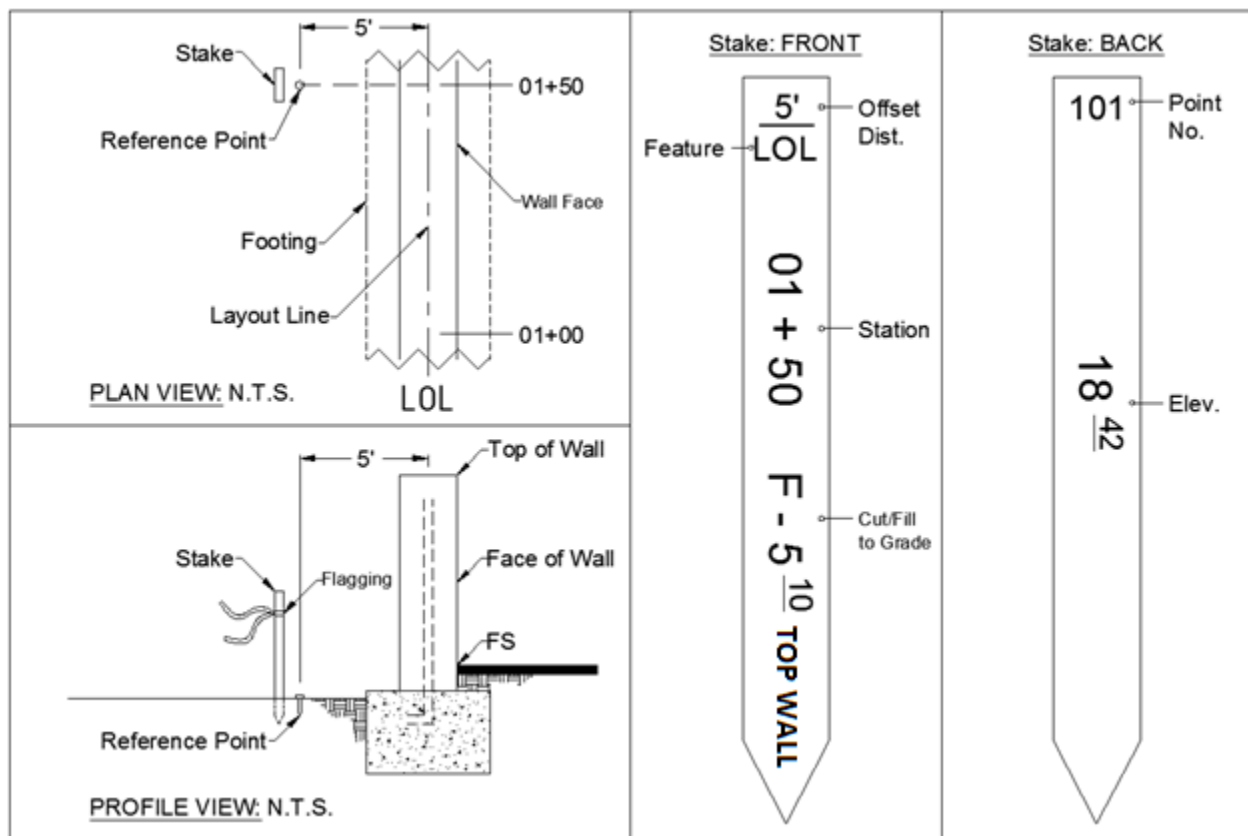


Figure 2.2

Stakes to be set: Reference point and marker stake, at a horizontal offset to the Layout Line (LOL). Additional stakes should be set at the beginning and end of wall and any change in alignment or profile. Offset should be determined in cooperation with the Engineer and the Contractor.

Color Code: White

Staking Interval: Stakes are set at the beginning and end of each wall, beginning and ends of curves, LOL angle points (including back and ahead stakes), changes in footing (dimension, grade), and change in wall height. Staking interval is determined by Surveys personnel, in consultation with the Engineer and the Structures Representative, but shall not be greater than 50 ft.

Markings: See Figure 2.2

When the plans show grade (e.g. top of footing or top of wall grades), reference stakes shall show elevations. Any required cut/fill information shall be provided on a separate grade sheet/survey report.

Note: Field Notes shall supersede stake markings should there be discrepancy between the two.

Front:

- ◆ Offset
- ◆ Station

- ♦ Cut/Fill – Note: Field Notes shall supersede stake markings should there be discrepancy between the two.

Back:

- ♦ Point Number
- ♦ Elevation

Staking Tolerance: Wall stakes should be set within 0.02 feet horizontally and 0.02 feet vertically.

Field Checks: Check staking visually and review the electronic stakeout report, Grade sheet and survey notes for accuracy.

2.7 SEWER & STORM DRAIN STAKES

Storm Drain or Sewer stakes are set to reference storm drain or sewer lines or features.

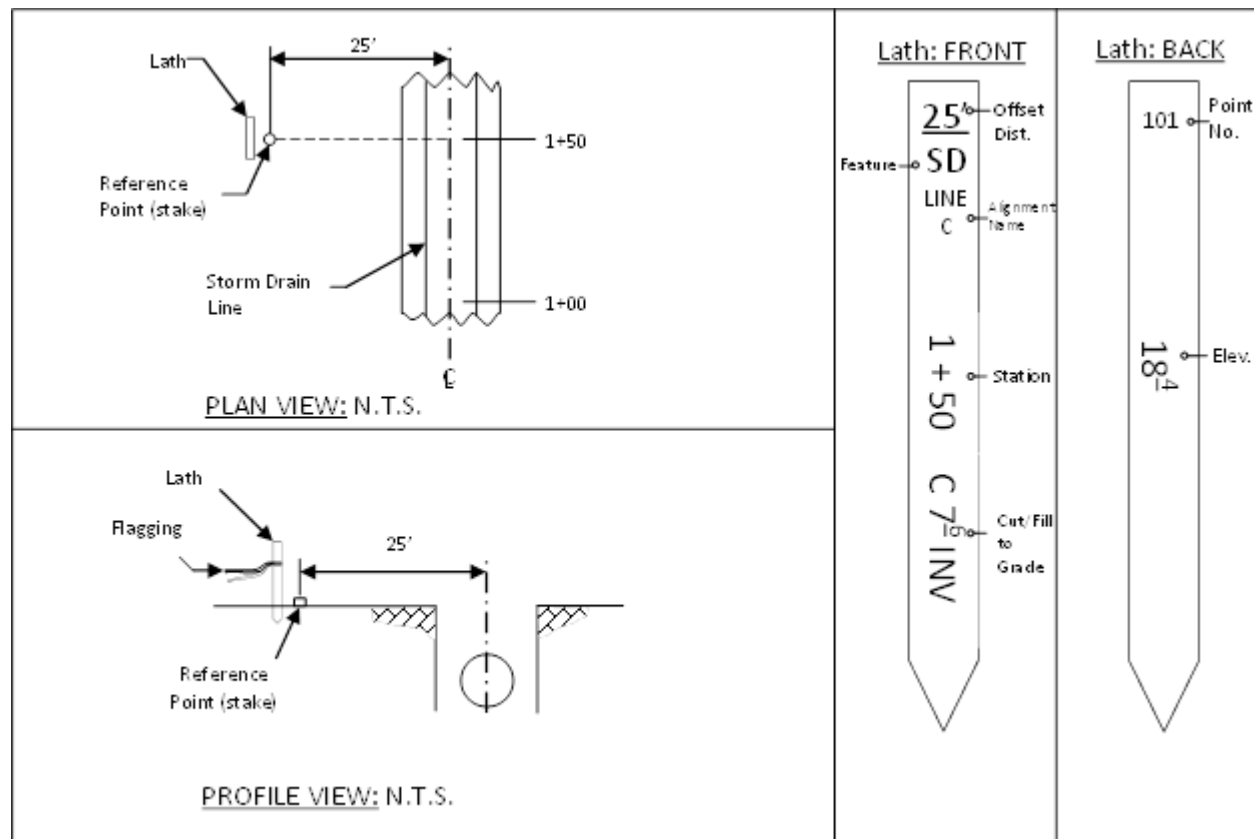


Figure 2.3A – Typical staking for lines

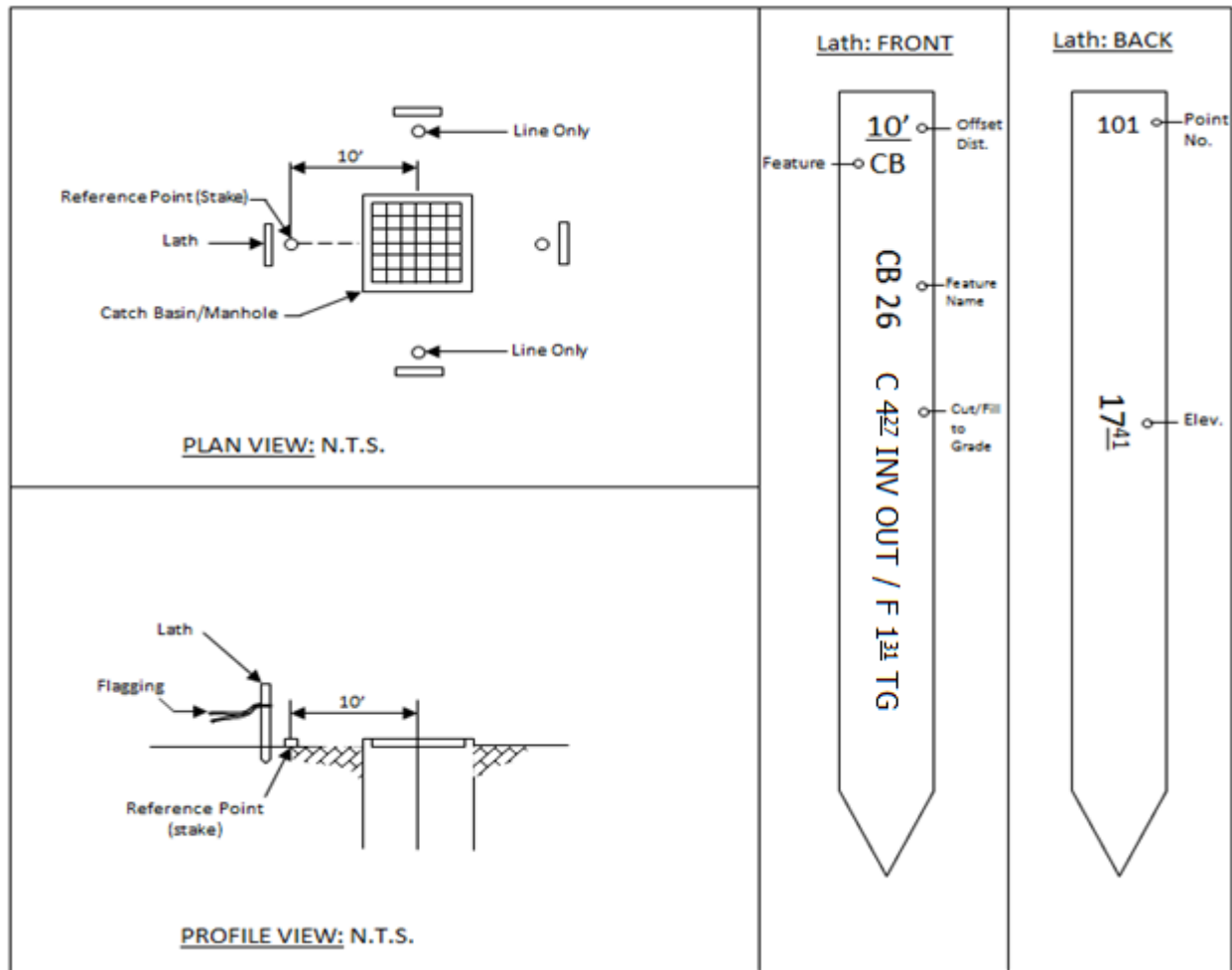


Figure 2.3B – Typical staking for catch basins, manholes etc.

Stakes to be set: Reference point and marker stake, at a horizontal offset to the centerline of the pipe or facility. Offset distances should be determined in cooperation with the Engineer and the Contractor.

- ◆ Ends of pipe.
- ◆ Junction structure – In, Out & Center of Structure.
- ◆ Inlets and Outlet.
- ◆ Manholes – In, Out & Rim
- ◆ Risers and similar facilities (Note: The plumbing of risers and other similar facilities is the contractor's responsibility; no reference stakes are set for plumbing).
- ◆ Skewed cut-off lines, when necessary as determined by the Engineer in cooperation with Surveys.
- ◆ Other appurtenances

Color Code:

Storm Drain: Green

Sewer: Green

Staking Interval: Typical interval will be 25 ft., BC's, EC's, Angle Points and other points of control. Staking shall maintain inter-visibility at all times and additional stakes may be added depending on site conditions.

Markings: See Figures 2.3A and 2.3B

Any required cut/fill information shall be provided on a separate grade sheet/ survey report.

Note: Field Notes shall supersede stake markings should there be discrepancy between the two.

Front:

- ◆ Offset
- ◆ Specific utility being staked
- ◆ Station
- ◆ Cut/Fill Information

Back:

- ◆ Point Number
- ◆ Elevation

Staking Tolerance: Storm Drain and Sewer stakes should be set within 0.03 feet horizontally and 0.02 feet vertically.

Field Checks: Check staking visually and review the electronic stakeout report, Grade sheet and survey notes for accuracy.

2.8 WATER LINE STAKES

Stakes for water lines are set to reference the alignment and grade of in-ground water lines (e.g. domestic, reclaimed, recycled & fire water).

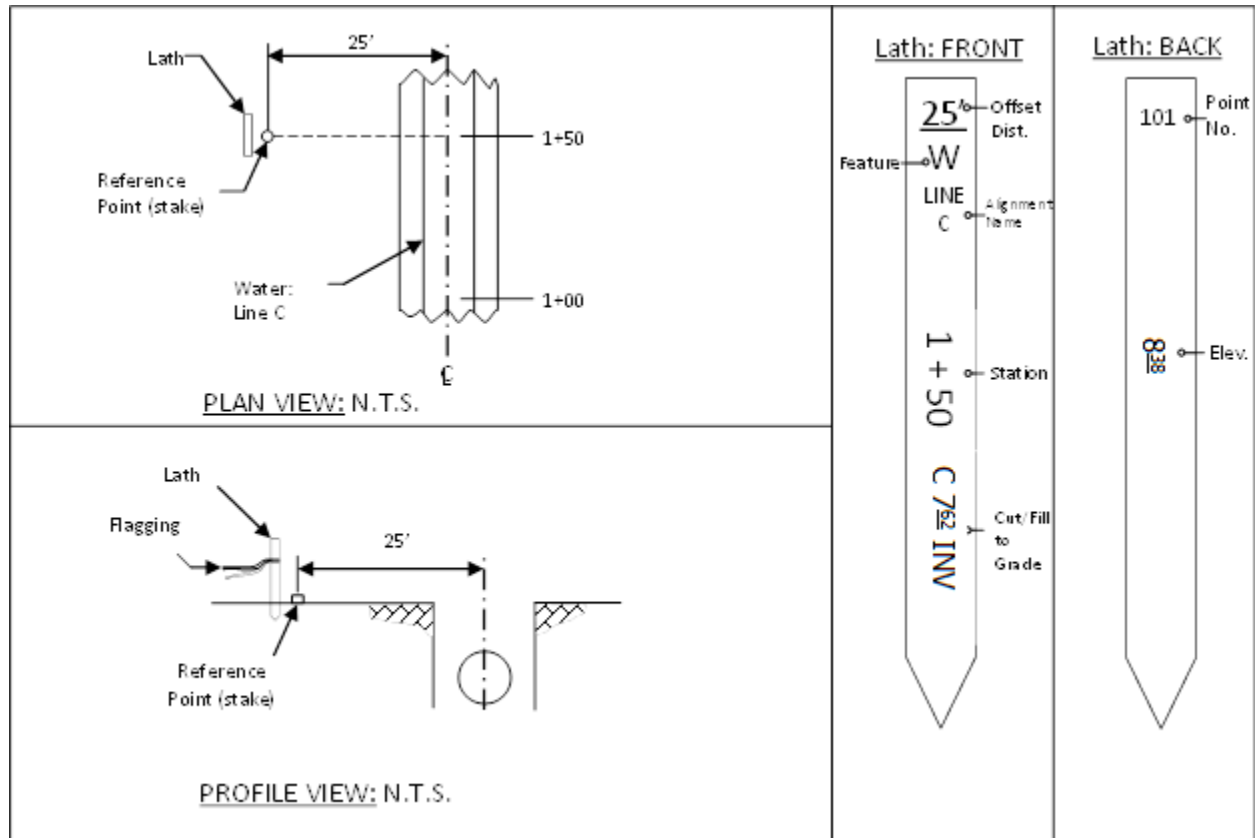


Figure 2.4A – Typical staking for water lines

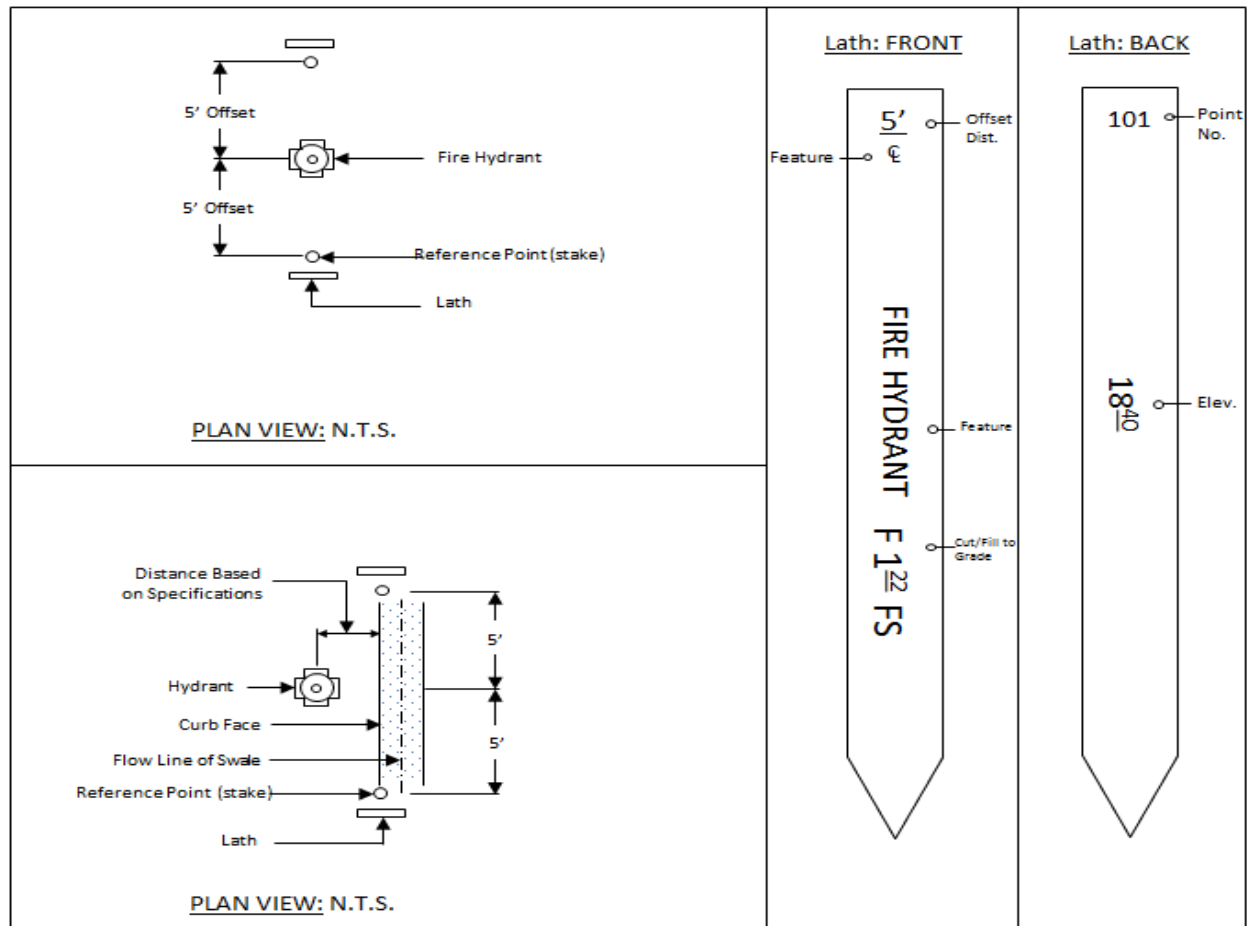


Figure 2.4B – Typical staking for water hydrants and other appurtenances

Stakes to be set: Reference point and marker stake, at a horizontal offset to the centerline of the facility. Offset should be determined in cooperation with the Engineer and the Contractor.

Color Code: Blue

Staking Interval: Typical interval will be 50 ft., BC's, EC's, angle Points and other points of control. Staking shall maintain inter-visibility at all times and additional stakes may be added depending on site conditions. Additional line stakes may be needed for appurtenances (e.g. fire hydrant, blow off valve, air release, water services, etc.).

Markings: See Figures 2.4A and 2.4B

Any required cut/fill information shall be provided on a separate grade sheet/ survey report.

Note: Field Notes shall supersede stake markings should there be discrepancy between the two.

Front:

- ◆ Offset
- ◆ Station
- ◆ Cut/Fill Information

Back:

- ◆ Point Number
- ◆ Elevation

Staking Tolerance: Water Line stakes should be set within 0.03 feet horizontally and 0.02 feet vertically.

Field Checks: Check staking visually and review the electronic stakeout report, Grade sheet and survey notes for accuracy.

2.9 ELECTRICAL CONDUIT, COMMUNICATION, VAULTS, & MH STAKES

Stakes for electrical lines, Communication Lines, vaults & manholes are set to reference the alignment and grade of the ground (e.g. duct bank, vaults). Offsets to be agreed upon between the Surveyor, Engineer and contractor.

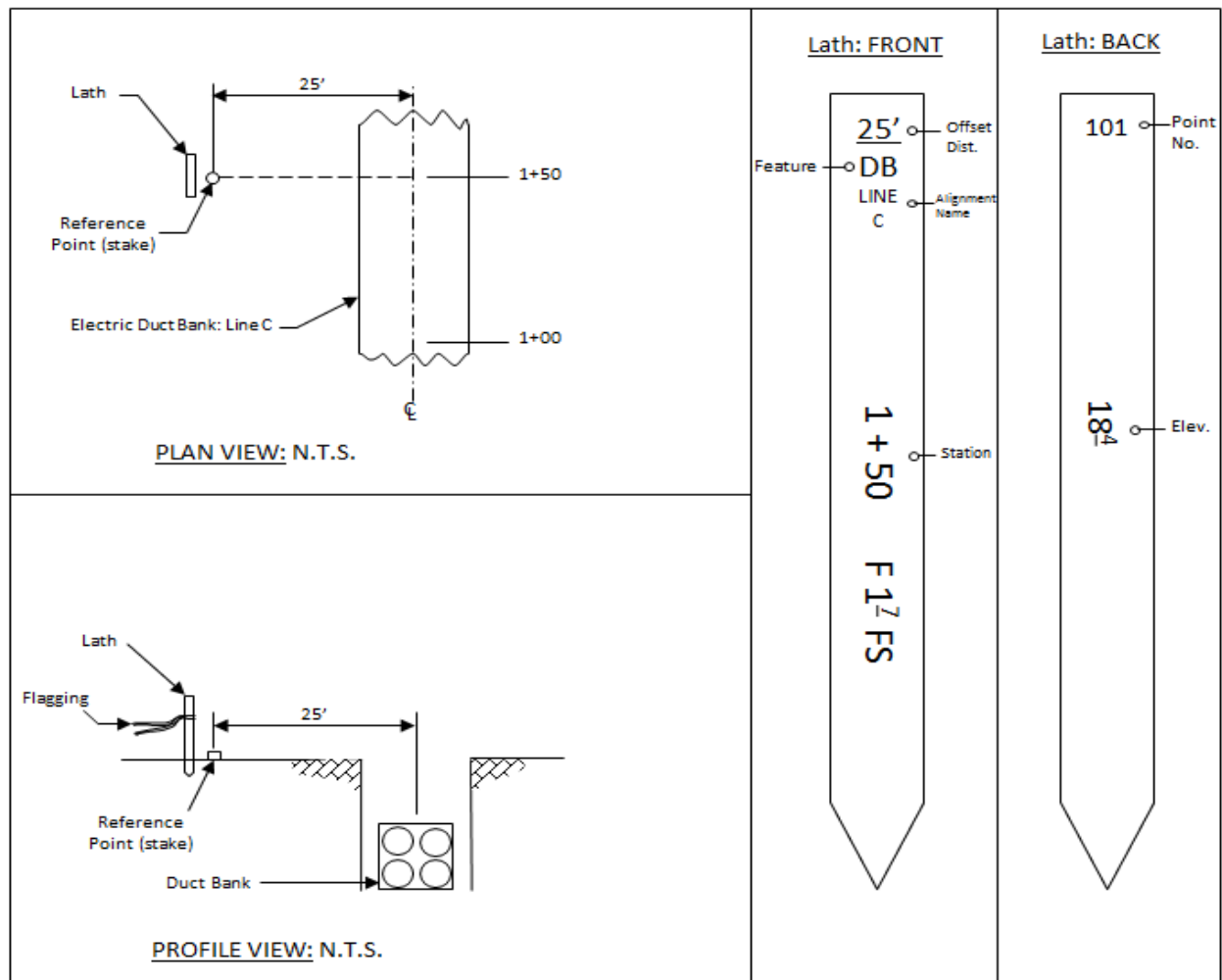


Figure 2.5A – Typical staking for electrical and communication ducts

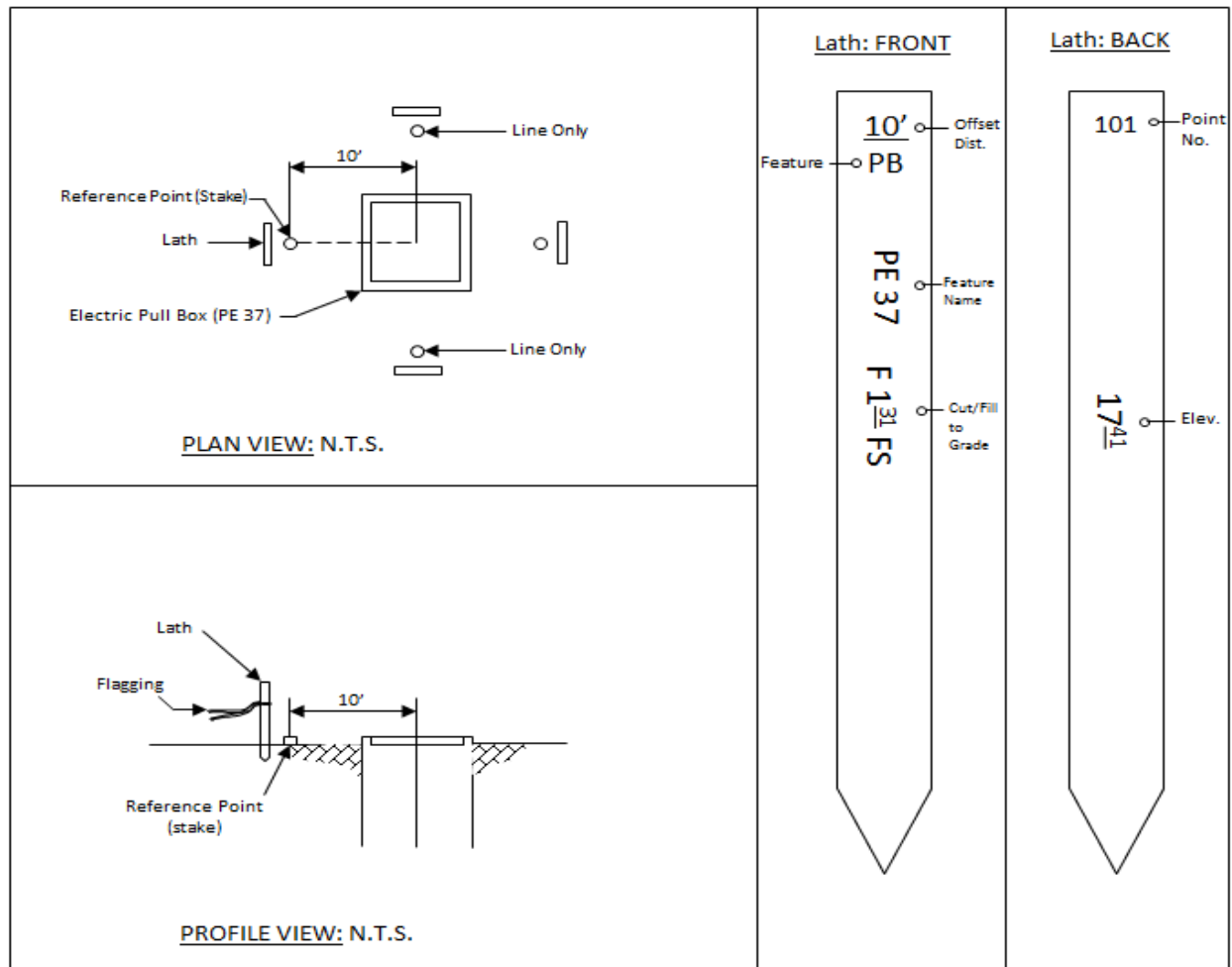


Figure 2.5B – Typical staking for electrical or communication pull boxes

Stakes to be set: Reference point and marker stake, at a horizontal offset to the centerline of the facility. Offset should be determined in cooperation with the Engineer and the Contractor.

Color Code:

Electrical: Red

Communication: Florescent Orange

Staking Interval: Typical interval will be 50 ft., BC's, EC's, Angle Points and other points of control. Staking shall maintain inter-visibility at all times and additional stakes may be added depending on site conditions. Additional line stakes may be needed for appurtenances.

Markings: See Figures 2.5A and 2.5B

When plans show grades (e.g. invert or top of pipe grades), reference stakes shall show elevations. Cut/Fill information shall be provided on a separate grade sheet/ survey report.

Front:

- ◆ Offset
- ◆ Station

- ◆ Cut/Fill Information – When marking cut or fill information, the precision for finish grades should be written in tenths and finished surfaces and facilities should be written in hundredths. Note: Field Notes shall supersede stake markings should there be discrepancy between the two.

Back:

- ◆ Point Number
- ◆ Elevation

Staking Tolerance:

- Lines, Pipe & Conduit (i.e... Utility, Fiber Optic, Telephone Lines) should be set within 0.1 feet horizontally and 0.1 feet vertically.
- Appurtenances & Facilities should be set (i.e... Manholes, vaults, pull boxes) within 0.03 feet horizontally and 0.02 feet vertically.

Field Checks: Check staking visually and review the electronic stakeout report, Grade sheet and survey notes for accuracy.

2.10 CURB AND GUTTER STAKES

Curb and Gutter stakes are set to reference the alignment and grade of curb lines and/or gutter flow lines.

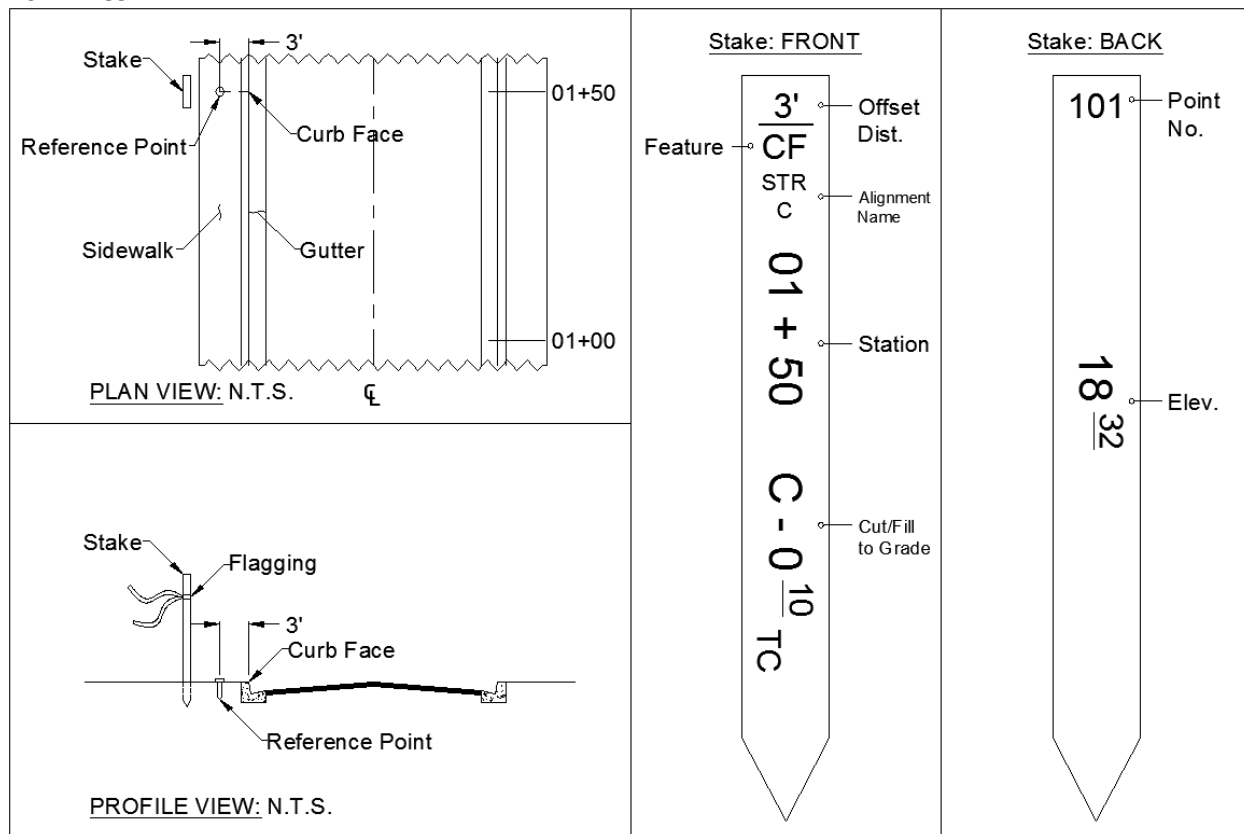


Figure 2.6

Stakes to be set: Reference point and marker stake, at a horizontal offset to the centerline of the facility. Offset should be determined in cooperation with the Engineer and the Contractor.

Color Code: Pink

Spacing: Space longitudinally every 25 feet and at breaks in grade or alignment. A shorter interval may be used for flares, tapers or curb returns when necessary, as determined by the Surveyor.

Markings: See Figure 2.6

When plans show grades (e.g. flow line or top of curb grades), reference stakes will show elevations. Any required cut/fill information shall be provided on a separate grade sheet/survey report.

Front:

- ◆ Offset
- ◆ Station
- ◆ Cut/Fill Information – Note: Field Notes shall supersede stake markings should there be discrepancy between the two.

Back:

- ◆ Point Number
- ◆ Elevation

Staking Tolerance: Curb and Gutter Stakes should be set within 0.03 feet horizontally and 0.02 feet vertically.

Field Checks: Check staking visually and review the electronic stakeout report, Grade sheet and survey notes for accuracy.

2.11 FENCE STAKES

Fence stakes are typically set for horizontal location only.

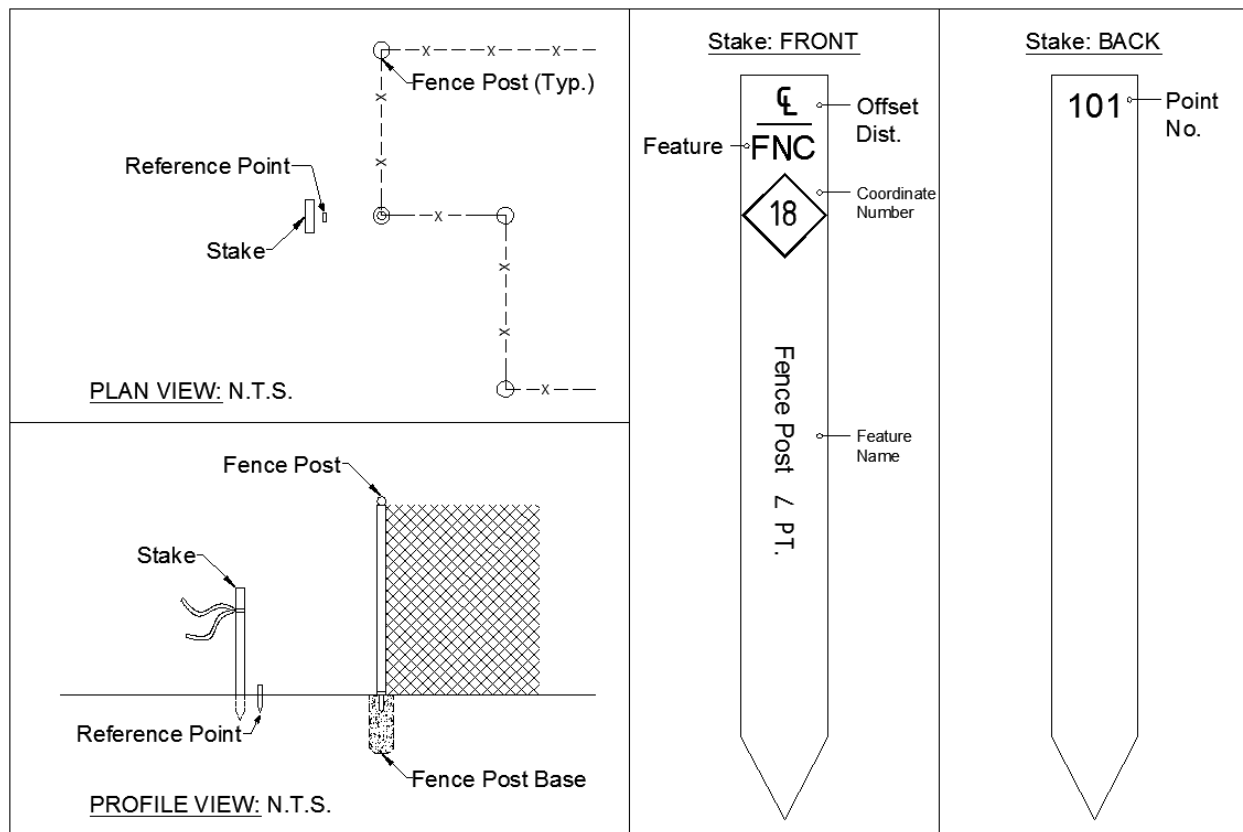


Figure 2.7

Stakes to be set: Reference point and marker stake, at a horizontal offset to the centerline of the fence. Offset should be determined in cooperation with the Engineer and the Contractor.

Color Code: Florescent Pink

Staking Interval: Typical interval will be 100 ft. on tangents and 50 ft. on curves with a radius of more than 100 ft. and will include BC's, EC's, Angle Points and other points of control. Staking shall be set on 25 ft. intervals for curves with radius distances less than 100 ft. Stakes shall maintain inter-visibility at all times and additional stakes may be added depending on site conditions.

Markings: See Figure 2.7

Any required cut/fill information shall be provided on a separate grade sheet/ survey report.

Note: Field Notes shall supersede stake markings should there be discrepancy between the two.

Front:

- ◆ Offset
- ◆ Coordinate Number
- ◆ Feature Name:

Note: Field Notes shall supersede stake markings should there be discrepancy between the two.

Back:

- ◆ Point Number

Staking Tolerance: Fence Stakes should be set within 0.1 foot horizontally.

Field Checks: Check staking visually and review the electronic stakeout report, Grade sheet and survey notes for accuracy.

2.12 BUILDING STAKES

Building stakes are set to reference building corners or building grid lines. The surveyor shall furnish two (2) reference points at each building corner, each with a marker stake that provides elevation and distance to the controlling reference building corner... One (1) reference point shall be set to delineate grid lines. Grid lines to be set shall be agreed upon between the engineer and contractor. Generally, grid line spaced closer than 25' will not be staked. A reference stake, for "line only" is set when required by the construction site conditions, as determined by the Surveyor in cooperation with the Engineer.

The Contractor shall be responsible for the location of anchor bolts, bearing plates, and other embedment's for compliance with the requirements.

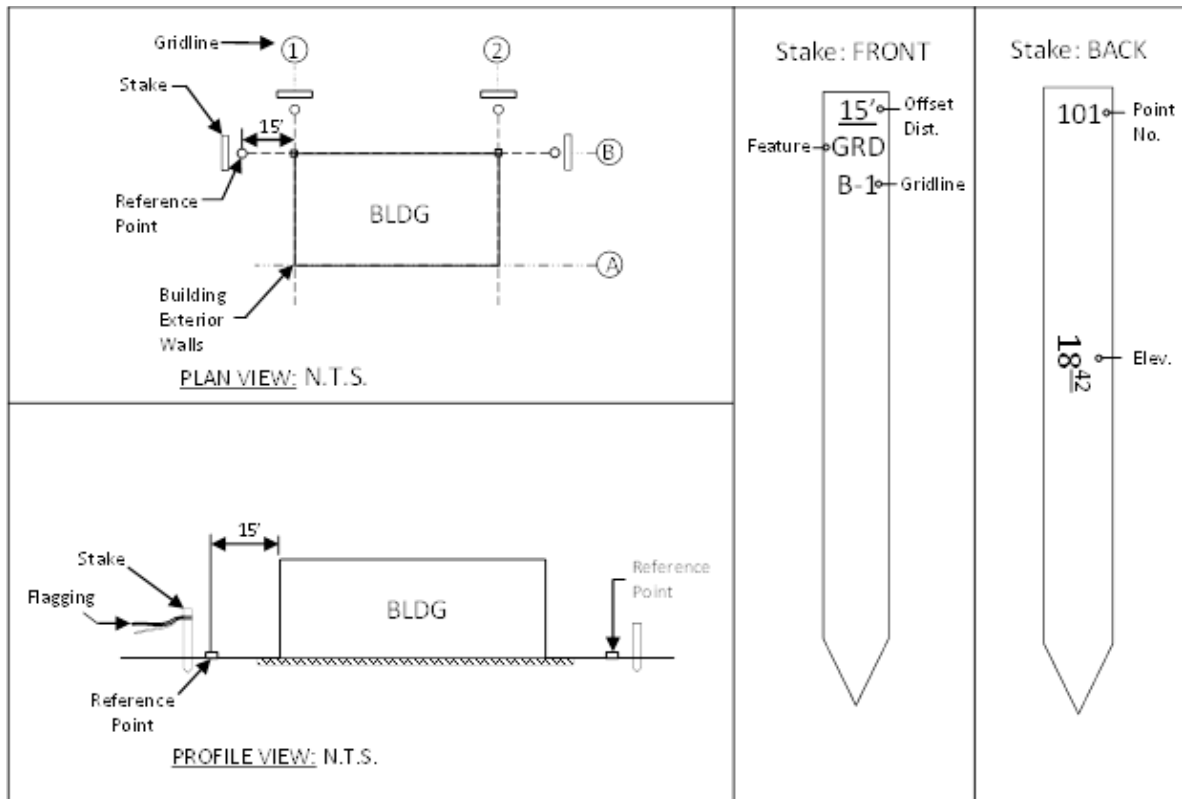


Figure 2.8

Stakes to be set: Reference point and marker stake, at a horizontal offset to the building corner or grid line. Offset should be determined in cooperation with the Engineer and the Contractor.

Color Code: White

Spacing: Perimeter controlling grid line intersections are staked on both grid lines produced. Additional grid lines to be staked should be determined in cooperation with the Engineer and the Contractor.

Markings: See Figure 2.8

When the plans show grade (e.g. finished floor, top of foundation grade), reference stakes shall show elevations. Any required cut/fill information shall be provided on a separate grade sheet/survey report.

Front:

- ◆ Minimum: Offset, Corner or Grid Reference, Cut/Fill
- ◆ Corner or Grid Line
- ◆ Cut/Fill – Note: Field Notes shall supersede stake markings should there be discrepancy between the two.
- ◆

Back:

- ◆ Point Number
- ◆ Elevation

Staking Tolerance: Building stakes should be set within 0.02 feet horizontally and 0.02 feet vertically.

Field Checks: Check staking visually and review the electronic stakeout report, Grade sheet and survey notes for accuracy. As an additional check, the distance between stakes set on the ground should be measured and compared against plan dimensions.

2.13 RAILROAD STAKES

Railroad stakes are set to reference the alignment and grade of railroad tracks.

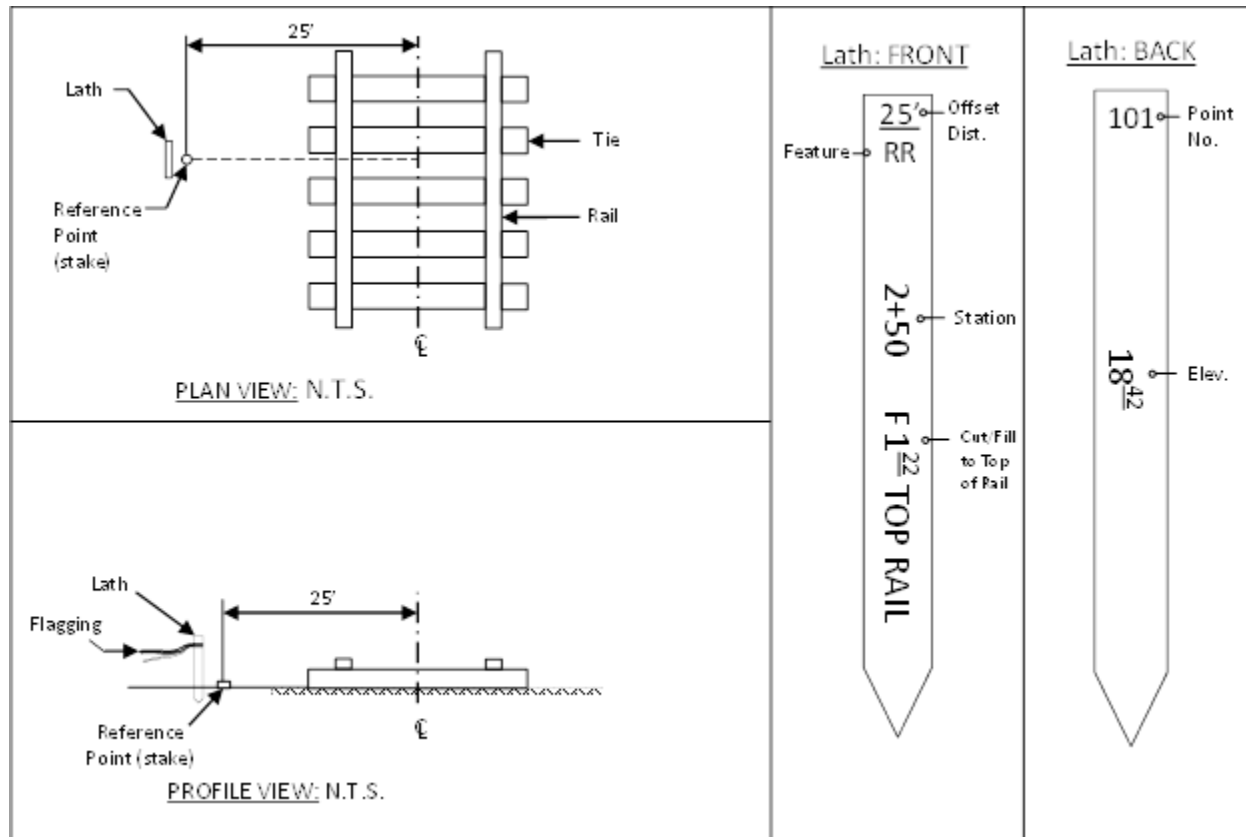


Figure 2.9

Stakes to be set: Reference point and marker stake, at a horizontal offset to the centerline of the facility. Offset should be determined in cooperation with the Engineer and the Contractor.

Color Code: Pink

Spacing: Space longitudinally every 50 feet and at a break in alignment or a break in grade as well as points of control (e.g. point of switch, point of frog, derail, last common tie, etc.).

Markings: See Figure 2.9

When the plans show grades (e.g. top of rail grades), reference stakes will show elevations. Any required cut/fill information shall be provided on a separate grade sheet/ survey report.

Front

- ◆ Offset
- ◆ Station
- ◆ Cut/Fill – Note: Field Notes shall supersede stake markings should there be discrepancy between the two.
- ◆

Back

- ◆ Point Number
- ◆ Elevation

Staking Tolerance: Railroad stakes should be set within 0.03 feet horizontally and 0.02 feet vertically.

Field Checks: Check staking visually and review the electronic stakeout report, Grade sheet and survey notes for accuracy.

2.14 MAJOR STRUCTURE STAKES

Bridges, buildings, wharfs and crane rails are examples of major structures. The extent of Port-furnished construction staking for major structures will vary depending on the type and complexity of the structure and its construction. Port-furnished staking of footings (foundation, bents, abutments, wing walls, etc.) is normally provided by the Surveyor. Line and grade points on the superstructure are usually the responsibility of the Structures Representative. The Surveyor, in cooperation with the Engineer and contractor, shall determine the actual staking to be provided.

No stakes are set by Surveys personnel for the following:

- ◆ The location of individual piles
- ◆ Individual pile cutoff elevations
- ◆ False work

Stakes to be set for Footings (Bents, Abutments & Wing walls): Two reference points and marker stakes, at a horizontal offset to the centerline of the facility. Offset should be determined in cooperation with the Engineer and the Contractor. Line Only stakes may be required depending on site conditions.

Generally, a set of reference stakes is established on each side of the structure and it's recommended that bents be staked with two (2) reference points on each side of the bent, in order to maintain the alignment of the sides.

Stakes to be set for Superstructures: When feasible, elevation points are provided on footings at the bottom of columns. References for the deck top are provided at sufficient locations on soffit forms to enable the use of string lines (or similar method) to grade the deck. Line points are provided for barrier railings as determined by the Structure Representative.

Staking Interval: Staking interval shall be 10 ft. to 25 ft. along deck and barrier railing lines as determined by the Structures Representative. For barrier railing line on curved bridges, use the deck edge or reference points at a suitable spacing as determined by the Structures Representative.

Markings: Reference stakes for major structures provide references for the controlling lines of the structure and reference elevations. Markings should include the following information:

- ◆ The identification of the major structures being staked (abutment, wing wall, pier, etc.)
- ◆ The reference point elevation
- ◆ The distance from the reference point to the line being referenced and the identification of the line being referenced. The distance is measured horizontally along the line identified by the stake markings. Cuts or fills not provided for major structures.
- ◆ Note: Field Notes shall supersede stake markings should there be discrepancy between the two.

Staking Tolerance: Major Structure stakes should be set within 0.02 feet horizontally and 0.02 feet vertically.

Field Checks: Check staking visually and review the electronic stakeout report, Grade sheet and survey notes for accuracy. As additional check, the distance between stakes set on the ground should be measured and compared against plan dimensions.

2.15 MISCELLANEOUS STAKES

Miscellaneous staking is generally the responsibility of the Engineer. The Port Surveyor shall review and coordinate with the Engineer regarding requests for Surveys to perform miscellaneous staking.

Utility work generally is controlled by adjacent construction staking or adjacent facilities, and no Port-furnished stakes are set. If staking is determined to be necessary by the Engineer and Port Surveyor then Port-furnished utility stakes shall be provided.

Channel, Dikes, and Ditches

Major channels and dikes are controlled by Port-furnished slope stake references. The Port may provide staking for line and grade of ditches on a case-by-case basis, as determined by the engineer and Port Surveyor.

Signs

When necessary, as determined by the Engineer, Port-furnished stakes shall be provided to locate signs.

Sub-surface Drains

Port-furnished stakes are set only as determined necessary by the Engineer. Set stakes for subsurface drains in the same manner as for drainage pipes (see section 2.7 "Storm Drain/Sewer Stakes"). Sub drain systems may not be staked, but shall be surveyed in their as-built condition. The contractor should not backfill the system until the surveyor or engineer approves pipe location and grades.

Railings and Barriers

Where railings and barriers are controlled by adjacent construction staking or adjacent facilities, no Port-furnished stakes are provided, except to establish the beginning and end of each railing or barrier.

Where Port-furnished construction staking is necessary, as determined by the Engineer, stakes are provided for alignment and grade at an interval of 50 ft. along the facility. Twenty-five foot spacing shall be used when the radius of curvature is less than 100 ft. The staking interval will be adjusted when staking flares, as determined by Survey personnel.

AC Dikes

Port-furnished stakes are provided only at the beginning and end of asphalt concrete dikes.

Pavement Markers & Striping Stakes

Port-furnished references are provided in accordance with the contractual requirements. If the contract does not specify any requirements, one row of references will be provided per traveled way. References will be set every 150 ft. on tangents, every 100 ft. on curves with a radius of over 1000 ft. and every 50 ft. on curves with radius of under 1000 ft



Port of
LONG BEACH
THE PORT OF CHOICE

Survey Division

Coding Handbook

And

Field Collection Guide

1.5 Workspace

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Codes - Category Listing

PCode	Alpha	Description	Pt Type	DTM	Draw
BRIDGE					
1001	BRCL	Bridge CL	Breakline	Y	Line
1002	BRSIGN	Bridge Sign	Random	Excl	Point
COMMUNICATIONS					
800	TLX	Communication Line Xing	Breakline	Excl	Line
801	TMD	Communication Main	Breakline	Excl	Line
802	TMDA	Communication Main Duct Abnd	Breakline	Excl	Line
803	TMDC	Communication Main Duct Casing	Breakline	Excl	Line
804	TLD	Communication Lateral Duct	Breakline	Excl	Line
805	TLDA	Communication Lateral Duct Abnd	Breakline	Excl	Line
806	TLDC	Communication Lateral Duct Casing	Breakline	Excl	Line
807	EFOD	Fiber Optic Duct	Breakline	Excl	Line
808	EFOA	Fiber Optic Abnd	Breakline	Excl	Line
809	EFOC	Fiber Optic Casing	Breakline	Excl	Line
810	TLXP	Communication Line Xing Point	Random	Excl	Point
812	CLO	Communication Line Overhead	Breakline	Excl	Line
832	TMHI	Communication Manhole Invert	Random	Excl	Point
834	TPAB	Communication Panel Box	Random	Excl	Point
835	TPBX	Communication Pullbox	Random	Excl	Point
837	TRIS	Communication/Telephone Riser	Random	Excl	Point
838	TSTB	Communication Stub Out	Random	Excl	Point
840	TMH	Communication Manhole	Random	Y	Point
841	TVB	Communication Vertical Bend	Random	Excl	Point
842	TMHVC	Communication Manhole Vault Cnrs	Interior	Y	Line
843	TDMN	Communication Deadman	Random	Excl	Point
844	TPOL	Communication Pole	Random	Excl	Point
846	TCPD	Communication Pedestal	Random	Excl	Point
850	FAD	Fire Alarm Duct	Breakline	Excl	Line
851	FADA	Fire Alarm Duct Abnd	Breakline	Excl	Line
860	PAD	Public Address Duct	Breakline	Excl	Line
861	PADA	Public Address Duct Abnd	Breakline	Excl	Line
870	TVD	Television Duct	Breakline	Excl	Line
871	TVDA	Television Duct Abnd	Breakline	Excl	Line
872	CMH	Communication Manhole	Random	Excl	Point
873	CMD	Communication Main Duct	Breakline	Excl	Line
874	CVLTP	Communication Vault	Random	Excl	Point

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PCode	Alpha	Description	Pt Type	DTM	Draw
COMMUNICATIONS					
875	CRIS	Communication Riser	Random	Excl	Point
876	CDUCT	Communication Duct	Breakline	Excl	Line
877	CVLTL	Communication Vault 4 Cnrs	Interior	Y	Line
COMPRESSED AIR					
400	CALX	Compressed Air Line Xing	Breakline	Excl	Line
401	CAL	Compressed Air Line	Breakline	Excl	Line
402	CALA	Compressed Air Line Abnd	Breakline	Excl	Line
403	CALCSN	Compressed Air Line Casing	Breakline	Excl	Line
410	CALXP	Compressed Air Line Xing Point	Random	Excl	Point
411	CAA	Compressed Air Anchor	Random	Excl	Point
412	CACB	Compressed Air Connection Box	Random	Excl	Point
413	CAPRS	Compressed Air PRS	Random	Excl	Point
414	CAVB	Compressed Air Vertical Bend	Random	Excl	Point
415	CARI	Compressed Air Riser	Random	Excl	Point
ELECTRICAL					
300	ELXL	Electric Line Xing	Breakline	Excl	Line
301	EED	Electric Service Duct Center	Breakline	Excl	Line
302	EEDA	Electric Service Duct Edge	Breakline	Excl	Line
303	EEDC	Electric Edison Duct Casing	Breakline	Excl	Line
304	ESDT	Electric Service Duct	Breakline	Excl	Line
305	ESDA	Electric Service Duct Abnd	Breakline	Excl	Line
306	ESDC	Electric Service Duct Casing	Breakline	Excl	Line
310	ELXP	Electric Line Xing Point	Random	Excl	Point
311	ETSLR	Top of Slurry	Breakline	Excl	Line
312	ELO	Electric Line Overhead	Breakline	Excl	Line
320	ECAAN	Cathodic Protection Anode	Random	Excl	Point
321	ECAD	Cathodic Protection Duct	Breakline	Excl	Line
322	ECADA	Cathodic Protection Duct Abnd	Breakline	Excl	Line
323	ECAJ	Cathodic Protection Junction Box	Random	Excl	Point
324	ECAPT	Cathodic Protection Test	Random	Excl	Point
332	EMHI	Electric Manhole Invert	Random	Excl	Point
333	EMETER	Electric Meter	Random	Excl	Point
334	EPAB	Electric Panel Box	Random	Excl	Point
335	EPB	Electric Pullbox	Random	Excl	Point
337	ERIS	Electric Riser	Random	Excl	Point
338	ESTO	Electric Stub Out	Random	Excl	Point

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PCode	Alpha	Description	Pt Type	DTM	Draw
ELECTRICAL					
340	EMH	Electric Manhole	Random	Y	Point
341	EVB	Electric Vertical Bend	Random	Excl	Point
342	EVLTL	Electric Manhole Vault Cnrs	Interior	Y	Line
343	EDMN	Electric Deadman (use code 756)	Random	Excl	Point
344	EMPL	Electric Meter Panel	Breakline	Excl	Line
345	EPP	Electric Power Pole	Random	Excl	Point
346	ERR	Electric Refrig Reefer	Random	Excl	Point
347	ETS	Electric Traffic Signal	Random	Excl	Point
348	EVENT	Electric Vent	Random	Excl	Point
349	EVPHL	Electric Vent Pipe Horizontal	Breakline	Excl	Line
350	EPBL	Electric Panel Box Cnrs	Interior	Y	Line
352	EBSS	Electric Box Ship Service	Random	Excl	Point
353	ELTR	Electric Line Trench	Breakline	Excl	Line
360	EPAD	Electric Pad	Interior	Y	Line
361	ESUB	Electric Substation	Breakline	Excl	Line
362	ETTFP	Transmission Tower Footing Point	Random	Excl	Point
363	ETBL	Electric Traffic Control Box Cnrs	Breakline	Excl	Line
364	ETTFL	Transmission Tower Footing Line	Breakline	Excl	Line
370	ELP	Light Pole	Random	Excl	Point
371	ELBB	Light Below Bridge	Random	Excl	Point
372	ELG	Light Ground	Random	Excl	Point
373	ELN	Light Navigation	Random	Excl	Point
374	ELNG	Light Navigation Green	Random	Excl	Point
375	ELNR	Light Navigation Red	Random	Excl	Point
376	ELOVB	Light Overhead Building	Random	Excl	Point
377	ECAM	Camera Box	Breakline	Excl	Line
378	ECAP	Camera Pedestal	Breakline	Excl	Line
GAS					
500	GLX	Gas Line Xing	Breakline	Excl	Line
501	GLM	Gas Main Line	Breakline	Excl	Line
502	GLMA	Gas Main Line Abnd	Breakline	Excl	Line
503	GLMC	Gas Main Line Casing	Breakline	Excl	Line
504	GLL	Gas Lateral Line	Breakline	Excl	Line
505	GLLA	Gas Lateral Line Abnd	Breakline	Excl	Line
506	GLLC	Gas Lateral Line Casing	Breakline	Excl	Line
510	GLXP	Gas Line Xing Point	Random	Excl	Point

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PCode	Alpha	Description	Pt Type	DTM	Draw
GAS					
530	GCAP	Gas Cap	Random	Excl	Point
533	GMETER	Gas Meter	Random	Excl	Point
536	GRED	Gas Reducer	Random	Excl	Point
537	GRISER	Gas Riser	Random	Excl	Point
538	GSTB	Gas Tee Stub Out	Random	Excl	Point
539	GVALVE	Gas Valve	Random	Excl	Point
541	GVBEND	Gas Vertical Bend	Random	Excl	Point
542	GVENT	Gas Vent	Random	Excl	Point
INSTRUMENT					
99	IS	Survey Instrument Station	Random	Excl	Point
100	IBS	Survey Backsight Station	Random	Excl	Point
101	IFS	Survey Foresight Station	Random	Excl	Point
102	ICA	Survey Closing Azimuth	Random	Excl	Point
103	IRIS	Survey Radial Instrument Station	Random	Excl	Point
104	IEC	Survey Elevation Control	Random	Excl	Point
105	IBML	Survey Benchmark 1	Random	Excl	Point
106	IVC	Vertical Alignment	Breakline	Y	Line
107	IHC	Horizontal Alignment	Breakline	Y	Line
108	IVCST	Survey Vertical Control Station	Random	Excl	Point
109	IQSC	Survey Quarter Section Corner	Random	Excl	Point
110	IRP	Survey Remote Point	Random	Excl	Point
111	IBM	Survey Benchmark 2	Random	Excl	Point
114	ITPS	Survey Turning Point Set	Random	Excl	Point
124	ITPR	Survey Turning Point Read	Random	Excl	Point
134	ICKEL	Survey Check Elevation Control	Random	Excl	Point
150	IBMX	Survey Benchmark	Random	Excl	Point
151	IBLC	Baseline Construction	Random (BL)	Excl	Line
152	IBLS	Baseline Station Construction	Random	Excl	Point
153	ICNTL	Survey Control Point	Random	Excl	Point
154	IMON	Survey Monument	Random	Excl	Point
155	IBMON	Baseline Monument	Random	Excl	Point
156	IBSM	Baseline Station Monument	Random	Excl	Point
157	IBLO	Baseline Offset	Random	Excl	Point
158	IBLSO	Baseline Station Offset	Random	Excl	Point
159	SMT	Survey Monument Ties	Random	Excl	Point
170	IBLSN	Baseline Sounding	Random (BL)	Excl	Line

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PCode	Alpha	Description	Pt Type	DTM	Draw
INSTRUMENT					
171	WHFM	Wharf Footage Mark	Random	Excl	Point
NATURAL					
248	NDEDG	Edge of Dirt Non Road	Breakline	Y	Line
249	NROCK	Rocks Boulders and Cobbles	Random	Y	Point
250	NDIRT	Ground Shot Dirt	Random	Y	Point
251	NBSH	Natural Brushline	Breakline	Excl	Line
252	NWATR	Natural Water Edge Pond/Lake	Breakline	Y	Line
253	NRTOP	Dike Top	Breakline	Y	Line
254	NTOPS	Top of Slope	Breakline	Y	Line
255	NTOES	Toe of Slope	Breakline	Y	Line
256	NTREE	Natural Tree Line	Breakline	Excl	Line
257	NWATH	Natural Water Edge Harbor	Breakline	Y	Line
258	NRBTP	Top of Rock Ballast	Random	Y	Point
259	NRBED	Edge of Rock Ballast	Breakline	Y	Line
260	GSSG	Ground Shot Subgrade	Random	Y	Point
261	CMB	Ground Shot Crushed Misc Base	Random	Y	Point
262	CTB	Ground Shot Concrete Treated Base	Random	Y	Point
263	LCB	Ground Shot Lean Concrete Base	Random	Y	Point
264	BTS	Blue Top Stake	Random	Y	Point
265	BATH	Hydrographic Survey Point	Random	Y	Point
270	NTREE	Natural Vegetation ID	Random	Excl	Point
OIL					
600	OLX	Oil Line Xing	Breakline	Excl	Line
601	OL	Oil Line	Breakline	Excl	Line
602	OLA	Oil Line Abnd	Breakline	Excl	Line
603	OLC	Oil Line Casing	Breakline	Excl	Line
604	OCHL	Chemical Line	Breakline	Excl	Line
605	OCHLA	Chemical Line Abnd	Breakline	Excl	Line
606	OCHLC	Chemical Line Casing	Breakline	Excl	Line
607	ODGL	Dry Gas Line	Breakline	Excl	Line
608	ODGLA	Dry Gas Line Abnd	Breakline	Excl	Line
609	ODGLC	Dry Gas Line Casing	Breakline	Excl	Line
610	OLXP	Oil Line Xing Point	Random	Excl	Point
611	OWL	Oil Water Line	Breakline	Excl	Line
612	OWLA	Oil Water Line Abnd	Breakline	Excl	Line
613	OWLC	Oil Water Line Casing	Breakline	Excl	Line

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PCode	Alpha	Description	Pt Type	DTM	Draw
OIL					
614	OWIL	Oil Water Injection Line	Breakline	Excl	Line
615	OWILA	Oil Water Injection Line Abnd	Breakline	Excl	Line
616	OWILC	Oil Water Injection Line Casing	Breakline	Excl	Line
617	OWGL	Wet Gas Line	Breakline	Excl	Line
618	OWGLA	Wet Gas Line Abnd	Breakline	Excl	Line
619	OWGLC	Wet Gas Line Casing	Breakline	Excl	Line
620	OML	Oil Miscellaneous Line	Breakline	Excl	Line
621	OMLA	Oil Miscellaneous Line Abnd	Breakline	Excl	Line
622	OMLC	Oil Miscellaneous Line Casing	Breakline	Excl	Line
629	OLT	Oil Line Trench	Breakline	Excl	Line
630	OCAP	Oil Cap	Random	Excl	Point
632	OMHI	Oil Manhole Invert	Random	Excl	Point
636	ORED	Oil Reducer	Random	Excl	Point
637	ORIS	Oil Riser	Random	Excl	Point
638	OSO	Oil Tee Stub Out	Random	Excl	Point
639	OVAL	Oil Valve	Random	Excl	Point
640	OMH	Oil Manhole	Random	Y	Point
641	OVEB	Oil Vertical Bend	Random	Excl	Point
642	OVBC	Oil Valve Box Cnrs	Interior	Y	Line
643	OPAG	Oil Pipeline Above Ground	Breakline	Excl	Line
644	OPC	Oil Pipeline Corridor	Breakline	Excl	Line
645	OWAB	Oil Well Anchor Block	Random	Excl	Point
646	OVNT	Oil Vent	Random	Excl	Point
647	OFBS	Oil Fuel Box Ship Service	Random	Excl	Point
648	OVC	Oil Vault 4 Cnrs	Interior	Y	Line
670	OWC	Oil Well Curb	Breakline	Excl	Line
671	OWRW	Oil Well Retaining Berm	Breakline	Excl	Line
672	OWST	Oil Well Stem	Random	Excl	Point
673	OWMT	Oil Well Mat	Breakline	Excl	Line
RAILROAD					
420	RRCL	Railroad Centerline	Breakline	Excl	Line
421	RRBP	Railroad Bumper	Random	Excl	Point
422	RRFP	Railroad Frog Point	Random	Excl	Point
423	RRSW	Railroad Switch	Random	Excl	Point
424	RRSP	Railroad Switch Point	Random	Excl	Point
425	RRTR	Railroad Track Top of Rail	Breakline	Excl	Line

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PCode	Alpha	Description	Pt Type	DTM	Draw
RAILROAD					
426	RRSG	Railroad Signal	Random	Excl	Point
427	RRXC	Railroad Crossover CL	Breakline	Excl	Line
428	RRTC	Railroad Turnout CL	Breakline	Excl	Line
429	RRDC	Railroad Diamond Xing Point	Random	Excl	Point
430	RRXA	Railroad Crossing Arm Base	Random	Excl	Point
431	RRLCT	Railroad Last Common Tie	Breakline	Excl	Line
ROADWAYS					
448	RDFC	Face of Curb	Breakline	Y	Line
449	RDBEG	Berm Edge	Breakline	Y	Line
450	RDBCL	Berm Centerline	Breakline	Y	Line
451	RDFL	Flowline	Breakline	Y	Line
452	RDBC	Back of Curb	Breakline	Y	Line
453	RDFCA	Curb Face Type A (Vertical curb)	Breakline	Y	Line
454	RDTCB	Top of Curb Type E (Rolled curb)	Breakline	Y	Line
455	RDGUT	Gutter Lip	Breakline	Y	Line
456	RDFLCA	Gutter Flow Line Type A (Vertical curb)	Breakline	Y	Line
457	RDFLCE	Gutter Flow Line Type E (Rolled curb)	Breakline	Y	Line
458	RDACX	Ground Shot AC Pavement	Random	Y	Point
459	RDPCCX	Ground Shot PCC Pavement	Random	Y	Point
460	RDACE	Edge of AC	Breakline	Y	Line
461	RDACR	Edge of AC Road	Breakline	Y	Line
462	RDPCCRD	Edge of PCC Road	Breakline	Y	Line
463	RDPCCCE	Edge of PCC	Breakline	Y	Line
464	RDDW	Curb Driveway	Breakline	Y	Line
465	RDRAMP	Curb Wheelchair Ramp	Breakline	Y	Line
466	RDMEDB	Median Barrier	Breakline	Excl	Line
467	ACB	Asphalt Breakline / Ridgeline	Breakline	Y	Line No Plot
470	RDSSM	Striping - Solid Miscellaneous	Random (BL)	Y	Line
471	RDSSP	Striping - Solid Parking	Random (BL)	Y	Line
472	RDSST	Striping - Solid Travelway	Random (BL)	Y	Line
473	RDSSTR	Striping - Solid Terminal	Random (BL)	Y	Line
474	RDSSL	Striping - Solid Lane	Random (BL)	Y	Line
475	RDSSCL	Striping - Solid Centerline	Random (BL)	Y	Line
476	RSDSM	Striping - Dashed Miscellaneous	Random (BL)	Y	Line
477	RSDST	Striping - Dashed Terminal	Random (BL)	Y	Line
478	RSDSL	Striping - Dashed Lane	Random (BL)	Y	Line

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PCode	Alpha	Description	Pt Type	DTM	Draw
ROADWAYS					
479	RDSDCL	Striping - Dashed Centerline	Random (BL)	Y	Line
480	RDASL	Bridge Approach Slab	Breakline	Y	Line
481	RDDECK	Bridge Deck	Breakline	Y	Line
482	BRRR	Bridge for Railroad	Breakline	Excl	Line
490	RDBW	Sidewalk Back	Breakline	Y	Line
491	RDFW	Sidewalk Front	Breakline	Y	Line
499	RDDTRD	Unimproved Dirt Road	Breakline	Y	Line
SEWER					
700	SLX	Sanitary Sewer Line Xing	Breakline	Excl	Line
701	SL	Sanitary Sewer Line	Breakline	Excl	Line
702	SLA	Sanitary Sewer Line Abnd	Breakline	Excl	Line
703	SLC	Sanitary Sewer Line Casing	Breakline	Excl	Line
710	SLXP	Sanitary Sewer Line Xing Point	Random	Excl	Point
730	SCAP	Sanitary Sewer Cap	Random	Excl	Point
731	SCO	Sanitary Sewer Cleanout	Random	Excl	Point
732	SMHI	Sanitary Sewer Manhole Invert	Random	Excl	Point
738	STSB	Sanitary Sewer Tee Stub Out	Random	Excl	Point
740	SMH	Sanitary Sewer Manhole	Random	Y	Point
741	SVB	Sanitary Sewer Vertical Bend	Random	Excl	Point
742	SLST	Sanitary Sewer Lift Station	Random	Excl	Point
743	SPST	Sanitary Sewer Pump Station	Breakline	Excl	Line
744	STNK	Sanitary Sewer Septic Tank	Breakline	Excl	Line
745	SWYE	Sanitary Sewer Wye Stub Out	Random	Excl	Point
746	SCHM	Sanitary Sewer Chimney	Random	Excl	Point
STORM DRAIN					
200	SDLX	Storm Drain Line Xing	Breakline	Excl	Line
201	SDLN	Storm Drain Line	Breakline	Excl	Line
202	SDLA	Storm Drain Line Abnd	Breakline	Excl	Line
203	SDLC	Storm Drain Line Casing	Breakline	Excl	Line
204	SDOUTL	Storm Drain Outfall Line	Breakline	Excl	Line
205	SDOUTA	Storm Drain Outfall Line Abnd	Breakline	Excl	Line
206	SDOUTC	Storm Drain Outfall Line Casing	Breakline	Excl	Line
210	SDXP	Storm Drain Line Xing Point	Random	Excl	Point
215	SDADRN	Area Drain	Random	Y	Point
216	SDTDRN	Trench Drain	Breakline	Y	Line
220	SDCBG	Storm Drain Inlet Grate	Random	Y	Point

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PCode	Alpha	Description	Pt Type	DTM	Draw
STORM DRAIN					
221	SDCBD	Storm Drain Drop inlet	Random	Y	Point
222	SDCBI	Storm Drain Inlet Invert	Random	Excl	Point
223	SDCBCR	Storm Drain Inlet Cnrs	Breakline	Y	Line
230	SDPL	Storm Drain Plug	Random	Excl	Point
231	SDCO	Storm Drain Cleanout	Random	Excl	Point
232	SDMHI	Storm Drain Manhole Invert	Random	Excl	Point
236	SDRED	Storm Drain Reducer	Random	Excl	Point
240	SDMH	Storm Drain Manhole	Random	Y	Point
241	SDVB	Storm Drain Vertical Bend	Random	Excl	Point
242	SDPS	Storm Drain Pump Station	Random	Excl	Point
243	SDOUTP	Storm Drain Outfall Point	Random	Excl	Point
244	SDCLA	Storm Drain Clarifier	Random	Excl	Point
STRUCTURES					
20	STBBA	Building Balcony	Breakline	Excl	Line
21	STBCN	Building Canopy	Breakline	Excl	Line
22	STBDK	Building Foundation Open Edge	Breakline	Excl	Line
23	STBNT	Building Entrance	Breakline	Y	Line
24	STBFA	Building Outline - Face of Building	Breakline	Y	Line
25	STBFN	Building Foundation Closed Shape	Interior	Y	Line
26	STBOV	Building Overhang	Breakline	Excl	Line
27	STBRM	Building Ramp	Breakline	Y	Line
28	STBCD	Building Concrete Loading Dock	Breakline	Y	Line
29	STSHED	Building Shed Shack	Interior	Y	Line
30	STBLW	Building Elevated Walk	Breakline	Excl	Line
38	STTRLR	Trailer	Breakline	Excl	Line
39	STUST	Unknown Utility Structure	Breakline	Excl	Line
40	STTF	Tank Face	Breakline	Excl	Line
41	STTAG	Tank Above Ground	Breakline	Excl	Line
42	STTUG	Tank Underground	Breakline	Excl	Line
43	STTMB	Top of Timber	Breakline	Y	Line
50	BWA	Fence Block Wall	Breakline	Excl	Line
51	STFNC	Fence Chain Link	Breakline	Excl	Line
52	STGATE	Fence Gate	Breakline	Excl	Line
53	STGAPST	Fence Gate Post	Random	Excl	Point
54	STFENO	Fence Other	Breakline	Excl	Line
55	STFENT	Fence Turnstile	Random	Excl	Point

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PCode	Alpha	Description	Pt Type	DTM	Draw
STRUCTURES					
56	KRAL	K Rail	Breakline	Excl	Line
57	KRALF	K Rail with Fence	Breakline	Excl	Line
60	STHWAL	High Wall	Breakline	Y	Line
61	STHWS	High Wall Support	Breakline	Y	Line
62	STRWAL	Retaining Wall Face	Breakline	Y	Line
63	STSEAW	Seawall	Breakline	Y	Line
64	STCONW	Containment Wall Centerline	Breakline	Y	Line
65	STSHTP	Sheet Pile	Breakline	Y	Line
66	STSPT	Structural Pile - Timber	Breakline	Excl	Circle
67	STSPS	Structural Pile - Steel	Breakline	Excl	Circle
68	STSPW	Structural Pile - Wharf	Breakline	Excl	Circle
70	BRABU	Bridge Abutment	Breakline	Y	Line
71	BRCLMN	Bridge Column	Breakline	Excl	Line
72	BRBRC	Bridge Rail Concrete	Breakline	Excl	Line
73	BRP	Bridge Pedestrian	Breakline	Y	Line
74	BRCNTR	Bridge Column Center	Random	Excl	Point
75	BRBBO	Bridge Bottom	Breakline	Excl	Line
79	STCDFL	Storm Drain Concrete Flowline	Breakline	Y	Line
80	STCDE	Storm Drain Concrete Edge	Breakline	Y	Line
81	STCFT	Concrete Footing	Breakline	Y	Line
82	STCPAD	Concrete Pad	Interior	Y	Line
83	STCONL	Utility Conduit Large	Breakline	Excl	Line
84	STCONV	Conveyor	Breakline	Excl	Line
85	STCULV	Storm Drain Culvert	Breakline	Excl	Line
86	STCATW	Catwalk	Breakline	Excl	Line
87	STSTPV	Stairs Paved	Breakline	Excl	Line
88	STSTNP	Stairs Non Paved	Breakline	Excl	Line
89	STSUMP	Storm Drain Sump	Breakline	Y	Line
90	STTUN	Tunnel	Breakline	Excl	Line
91	STCOPA	Concrete Pad Raised	Interior	Y	Line
92	STCONH	Hole Concrete	Random	Excl	Point
93	STCVU	Conveyor Underground	Breakline	Excl	Line
94	STTSCA	Truck Scale	Breakline	Y	Line
95	STGDRL	Guardrail	Breakline	Excl	Line
96	STRSCA	Railcar Scale	Breakline	Y	Line

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PCode	Alpha	Description	Pt Type	DTM	Draw
TOPO					
752	FPOL	Flag Pole	Random	Excl	Point
753	GPOST	Guard Post	Random	Excl	Point
754	GPOL	Guy Pole	Random	Excl	Point
756	GDAN	Guy Deadman Anchor (Guy wire)	Random	Excl	Point
757	MB	Mailbox	Random	Excl	Point
758	MWELL	Monitoring Well	Random	Excl	Point
759	POLMIS	Pole Miscellaneous	Random	Excl	Point
760	POST	Post General	Random	Excl	Point
761	SIGN	Sign - Small	Random	Excl	Point
762	SIB	Sign - Large Sign Post (over 4' wide)	Breakline	Excl	Line
763	SIBP	Sign - Large Double Post - Sign Face	Random	Excl	Line
774	RRCTIE	Concrete Tie	Breakline	Excl	Line
775	RRWTIE	Wood Tie	Breakline	Excl	Line
776	STWEHO	Weep Hole	Random	Excl	Point
780	STPR	Utility Pipe Rack Support	Breakline	Excl	Line
781	RRWHST	Curb Stop	Random	Excl	Point
782	RRWHSTL	Wheel Stop Line	Breakline	Excl	Line
UNKNOWN					
1	UUX	Unknown Utility Xing	Breakline	Excl	Line
2	UMHI	Unknown Utility Manhole Invert	Random	Excl	Point
3	UMH	Unknown Utility Manhole	Random	Excl	Point
4	UPBC	Unknown Utility Panel Box Cnrs	Breakline	Excl	Line
5	UPB	Unknown Utility Pullbox	Random	Excl	Point
6	UV	Unknown Utility Vault Point	Random	Y	Point
7	UR	Unknown Utility Riser	Random	Excl	Point
8	UVC	Unknown Utility Vault 4 Cnrs	Interior	Y	Line
9	UVAL	Unknown Utility Valve	Random	Excl	Point
10	UUXP	Unknown Utility Xing Point	Random	Excl	Point
11	UPAG	Utility Pipe Above Ground Horizontal	Breakline	Excl	Line
12	UC	Utility Corridor	Breakline	Excl	Line
13	BOR	Borehole Location	Random	Excl	Point
14	UTRCH	Unknown Utility Trench	Random	Y	Line
15	UPMRK	Unknown Utility Paint Mark	Breakline	Excl	Line No Plot
998	NOP	No PCode Point	Random	Excl	Point
999	NOL	No PCode Line	Breakline	Excl	Line

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PCode	Alpha	Description	Pt Type	DTM	Draw
WATER					
900	WLX	Water Line Xing	Breakline	Excl	Line
901	WML	Water Main Line	Breakline	Excl	Line
902	WMLA	Water Main Line Abnd	Breakline	Excl	Line
903	WMLC	Water Main Line Casing	Breakline	Excl	Line
904	WLL	Water Lateral Line	Breakline	Excl	Line
905	WLLA	Water Lateral Line Abnd	Breakline	Excl	Line
906	WLLC	Water Lateral Line Casing	Breakline	Excl	Line
907	WSPL	Sprinkler Line	Breakline	Excl	Line
908	WSPLA	Sprinkler Line Abnd	Breakline	Excl	Line
909	WSPLC	Sprinkler Line Casing	Breakline	Excl	Line
910	WLXP	Water Line Xing Point	Random	Excl	Point
911	WSCC	Sprinkler Control Cabinet - 4 Cnrs	Breakline	Excl	Line
920	WTBL	Water Thrust Block	Random	Excl	Point
930	WCAP	Water Cap	Random	Excl	Point
932	WMHI	Water Manhole Invert	Random	Excl	Point
933	WM	Water Meter	Random	Excl	Point
936	WRED	Water Reducer	Random	Excl	Point
937	WRIS	Water Riser	Random	Excl	Point
938	WTEE	Water Tee Stub Out	Random	Excl	Point
939	WV	Water Valve	Random	Excl	Point
940	WMH	Water Manhole	Random	Y	Point
941	WVB	Water Vertical Bend	Random	Excl	Point
942	WFH	Fire Hydrant	Random	Excl	Point
943	WVC	Water Vault Cnrs	Interior	Y	Line
944	WSIV	Water Siamese Valve	Random	Excl	Point
945	WSPIT	Sprinkler Pit	Random	Excl	Point
946	WCV	Water Check Valve	Random	Excl	Point
947	WBSS	Water Box Ship Service	Random	Excl	Point
948	SPRH	Sprinkler Head	Random	Excl	Point
949	WBUP	Water Backflow Point	Random	Excl	Point
950	WBUL	Water Backflow Line	Breakline	Excl	Line
951	WSRPB	Sprinkler Pullbox	Random	Excl	Point
WHARF					
97	WHTRUN	Transtainer Runway	Breakline	Y	Line
550	WHBOL	Bollard	Random	Excl	Point
551	WHCLT	Cleat	Random	Excl	Point

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PCode	Alpha	Description	Pt Type	DTM	Draw
WHARF					
552	WHCRRL	Crane Rail - Top of Rail	Breakline	Excl	Line
553	WHCSTP	Crane Stop	Random	Excl	Point
554	WHDKFL	Dock Floating	Breakline	Excl	Line
555	WHDKST	Dock Stairs	Breakline	Excl	Line
556	WHDLFN	Dolphin	Breakline	Y	Line
557	WHDCAT	Dolphin Catwalk	Breakline	Y	Line
558	WHGANG	Gangway	Breakline	Y	Line
559	WHMOOR	Mooring	Random	Excl	Point
560	WHPF	Pier Face	Breakline	Y	Line
561	WHPB	Pier Bumper	Breakline	Y	Line
562	WHPFW	Pier Fender Wood	Breakline	Y	Line
563	WHDS	Wharf Deckland Side	Breakline	Y	Line
564	WHDPIL	Dock Piling	Random	Excl	Point
570	WHTIC	Tieback Cable	Breakline	Excl	Line
571	WHTID	Tieback Deadman	Random	Excl	Point
572	WHTIDC	Tieback Deadman Concrete	Random	Excl	Point
573	WHPINS	Pin Socket	Random	Excl	Point
CONTROL CODES – see page 29					
CC	BL	Begin Line			
CC	CF	Close Figure			
CC	CR	Close Rectangle			
CC	DNC	Exclude from DTM			
CC	JPT	Join to Point			
CC	NT	Nontangent Curve			
CC	PC	Point of Curvature			
CC	PT	Point of Tangency			
CC	RND	Add as Random DTM Point			
CC	R	Rectangle (2 shots +Distance)			
CC	TMPL	Template			
CC	XS	Cross Section Collection Work			
CC	OC	Single Point Arc			
CC	XA	Extend Arc to Create Circle			

Codes - Alpha Description Listing

PCode	Alpha	Description	Pt Type	DTM	Draw
215	SDADRN	Area Drain	Random	Y	Point
467	ACB	Asphalt Breakline / Ridgeline	Breakline	Y	Line No Plot
452	RDBC	Back of Curb	Breakline	Y	Line
151	IBLC	Baseline Construction	Random (BL)	Excl	Line
155	IBMON	Baseline Monument	Random	Excl	Point
157	IBLO	Baseline Offset	Random	Excl	Point
170	IBLSN	Baseline Sounding	Random (BL)	Excl	Line
152	IBLS	Baseline Station Construction	Random	Excl	Point
156	IBSM	Baseline Station Monument	Random	Excl	Point
158	IBLSO	Baseline Station Offset	Random	Excl	Point
450	RDBCL	Berm Centerline	Breakline	Y	Line
449	RDBEG	Berm Edge	Breakline	Y	Line
264	BTS	Blue Top Stake	Random	Y	Point
550	WHBOL	Bollard	Random	Excl	Point
13	BOR	Borehole Location	Random	Excl	Point
70	BRABU	Bridge Abutment	Breakline	Y	Line
480	RDASL	Bridge Approach Slab	Breakline	Y	Line
75	BRBBO	Bridge Bottom	Breakline	Excl	Line
1001	BRCL	Bridge CL	Breakline	Y	Line
71	BRCLMN	Bridge Column	Breakline	Excl	Line
74	BRCNTR	Bridge Column Center	Random	Excl	Point
481	RDDECK	Bridge Deck	Breakline	Y	Line
482	BRRR	Bridge for Railroad	Breakline	Excl	Line
73	BRP	Bridge Pedestrian	Breakline	Y	Line
72	BRBRC	Bridge Rail Concrete	Breakline	Excl	Line
1002	BRSIGN	Bridge Sign	Random	Excl	Point
20	STBBA	Building Balcony	Breakline	Excl	Line
21	STBCN	Building Canopy	Breakline	Excl	Line
28	STBCD	Building Concrete Loading Dock	Breakline	Y	Line
30	STBLW	Building Elevated Walk	Breakline	Excl	Line
23	STBNT	Building Entrance	Breakline	Y	Line
25	STBFN	Building Foundation Closed Shape	Interior	Y	Line
22	STBDK	Building Foundation Open Edge	Breakline	Excl	Line
24	STBFA	Building Outline - Face of Building	Breakline	Y	Line
26	STBOV	Building Overhang	Breakline	Excl	Line
27	STBRM	Building Ramp	Breakline	Y	Line
29	STSHED	Building Shed Shack	Interior	Y	Line
377	ECAM	Camera Box	Breakline	Excl	Line

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PCode	Alpha	Description	Pt Type	DTM	Draw
378	ECAP	Camera Pedestal	Breakline	Excl	Line
320	ECAAN	Cathodic Protection Anode	Random	Excl	Point
321	ECAD	Cathodic Protection Duct	Breakline	Excl	Line
322	ECADA	Cathodic Protection Duct Abnd	Breakline	Excl	Line
323	ECAJ	Cathodic Protection Junction Box	Random	Excl	Point
324	ECAPT	Cathodic Protection Test	Random	Excl	Point
86	STCATW	Catwalk	Breakline	Excl	Line
604	OCHL	Chemical Line	Breakline	Excl	Line
605	OCHLA	Chemical Line Abnd	Breakline	Excl	Line
606	OCHLC	Chemical Line Casing	Breakline	Excl	Line
551	WHCLT	Cleat	Random	Excl	Point
843	TDMN	Communication Deadman	Random	Excl	Point
876	CDUCT	Communication Duct	Breakline	Excl	Line
804	TLD	Communication Lateral Duct	Breakline	Excl	Line
805	TLDA	Communication Lateral Duct Abnd	Breakline	Excl	Line
806	TLDC	Communication Lateral Duct Casing	Breakline	Excl	Line
812	CLO	Communication Line Overhead	Breakline	Excl	Line
800	TLX	Communication Line Xing	Breakline	Excl	Line
810	TLXP	Communication Line Xing Point	Random	Excl	Point
801	TMD	Communication Main	Breakline	Excl	Line
873	CMD	Communication Main Duct	Breakline	Excl	Line
802	TMDA	Communication Main Duct Abnd	Breakline	Excl	Line
803	TMDC	Communication Main Duct Casing	Breakline	Excl	Line
840	TMH	Communication Manhole	Random	Y	Point
872	CMH	Communication Manhole	Random	Excl	Point
832	TMHI	Communication Manhole Invert	Random	Excl	Point
842	TMHVC	Communication Manhole Vault Cnrs	Interior	Y	Line
834	TPAB	Communication Panel Box	Random	Excl	Point
846	TCPD	Communication Pedestal	Random	Excl	Point
844	TPOL	Communication Pole	Random	Excl	Point
835	TPBX	Communication Pullbox	Random	Excl	Point
875	CRIS	Communication Riser	Random	Excl	Point
838	TSTB	Communication Stub Out	Random	Excl	Point
874	CVLTP	Communication Vault	Random	Excl	Point
877	CVLTL	Communication Vault 4 Cnrs	Interior	Y	Line
841	TVB	Communication Vertical Bend	Random	Excl	Point
837	TRIS	Communication/Telephone Riser	Random	Excl	Point
411	CAA	Compressed Air Anchor	Random	Excl	Point
412	CACB	Compressed Air Connection Box	Random	Excl	Point
401	CAL	Compressed Air Line	Breakline	Excl	Line
402	CALA	Compressed Air Line Abnd	Breakline	Excl	Line

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<u>PCode</u>	<u>Alpha</u>	<u>Description</u>	<u>Pt Type</u>	<u>DTM</u>	<u>Draw</u>
403	CALCSN	Compressed Air Line Casing	Breakline	Excl	Line
400	CALX	Compressed Air Line Xing	Breakline	Excl	Line
410	CALXP	Compressed Air Line Xing Point	Random	Excl	Point
413	CAPRS	Compressed Air PRS	Random	Excl	Point
415	CARI	Compressed Air Riser	Random	Excl	Point
414	CAVB	Compressed Air Vertical Bend	Random	Excl	Point
81	STCFT	Concrete Footing	Breakline	Y	Line
82	STCPAD	Concrete Pad	Interior	Y	Line
91	STCOPA	Concrete Pad Raised	Interior	Y	Line
774	RRTIE	Concrete Tie	Breakline	Excl	Line
64	STCONW	Containment Wall Centerline	Breakline	Y	Line
84	STCONV	Conveyor	Breakline	Excl	Line
93	STCVU	Conveyor Underground	Breakline	Excl	Line
552	WHCRRL	Crane Rail - Top of Rail	Breakline	Excl	Line
553	WHCSTP	Crane Stop	Random	Excl	Point
464	RDDW	Curb Driveway	Breakline	Y	Line
453	RDFCA	Curb Face Type A (Vertical curb)	Breakline	Y	Line
781	RRWHST	Curb Stop	Random	Excl	Point
465	RDRAMP	Curb Wheelchair Ramp	Breakline	Y	Line
253	NRTOP	Dike Top	Breakline	Y	Line
554	WHDKFL	Dock Floating	Breakline	Excl	Line
564	WHDPIIL	Dock Piling	Random	Excl	Point
555	WHDKST	Dock Stairs	Breakline	Excl	Line
556	WHDLFN	Dolphin	Breakline	Y	Line
557	WHDCAT	Dolphin Catwalk	Breakline	Y	Line
607	ODGL	Dry Gas Line	Breakline	Excl	Line
608	ODGLA	Dry Gas Line Abnd	Breakline	Excl	Line
609	ODGLC	Dry Gas Line Casing	Breakline	Excl	Line
460	RDACE	Edge of AC	Breakline	Y	Line
461	RDACR	Edge of AC Road	Breakline	Y	Line
248	NDEDEG	Edge of Dirt Non Road	Breakline	Y	Line
463	RDPCCCE	Edge of PCC	Breakline	Y	Line
462	RDPCCRD	Edge of PCC Road	Breakline	Y	Line
259	NRBED	Edge of Rock Ballast	Breakline	Y	Line
352	EBSS	Electric Box Ship Service	Random	Excl	Point
343	EDMN	Electric Deadman (Use 756)	Random	Excl	Point
303	EEDC	Electric Edison Duct Casing	Breakline	Excl	Line
312	ELO	Electric Line Overhead	Breakline	Excl	Line
353	ELTR	Electric Line Trench	Breakline	Excl	Line
300	ELXL	Electric Line Xing	Breakline	Excl	Line
310	ELXP	Electric Line Xing Point	Random	Excl	Point

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PCode	Alpha	Description	Pt Type	DTM	Draw
340	EMH	Electric Manhole	Random	Y	Point
332	EMHI	Electric Manhole Invert	Random	Excl	Point
342	EVLT	Electric Manhole Vault Cnrs	Interior	Y	Line
333	EMETER	Electric Meter	Random	Excl	Point
344	EMPL	Electric Meter Panel	Breakline	Excl	Line
360	EPAD	Electric Pad	Interior	Y	Line
334	EPAB	Electric Panel Box	Random	Excl	Point
350	EPBL	Electric Panel Box Cnrs	Interior	Y	Line
345	EPP	Electric Power Pole	Random	Excl	Point
335	EPB	Electric Pullbox	Random	Excl	Point
346	ERR	Electric Refrig Reefer	Random	Excl	Point
337	ERIS	Electric Riser	Random	Excl	Point
304	ESDT	Electric Service Duct	Breakline	Excl	Line
305	ESDA	Electric Service Duct Abnd	Breakline	Excl	Line
306	ESDC	Electric Service Duct Casing	Breakline	Excl	Line
301	EED	Electric Service Duct Center	Breakline	Excl	Line
302	EEDA	Electric Service Duct Edge	Breakline	Excl	Line
338	ESTO	Electric Stub Out	Random	Excl	Point
361	ESUB	Electric Substation	Breakline	Excl	Line
363	ETBL	Electric Traffic Control Box Cnrs	Breakline	Excl	Line
347	ETS	Electric Traffic Signal	Random	Excl	Point
348	EVENT	Electric Vent	Random	Excl	Point
349	EVPHL	Electric Vent Pipe Horizontal	Breakline	Excl	Line
341	EVB	Electric Vertical Bend	Random	Excl	Point
448	RDFC	Face of Curb	Breakline	Y	Line
50	BWA	Fence Block Wall	Breakline	Excl	Line
51	STFNC	Fence Chain Link	Breakline	Excl	Line
52	STGATE	Fence Gate	Breakline	Excl	Line
53	STGAPST	Fence Gate Post	Random	Excl	Point
54	STFENO	Fence Other	Breakline	Excl	Line
55	STFENT	Fence Turnstile	Random	Excl	Point
808	EFOA	Fiber Optic Abnd	Breakline	Excl	Line
809	EFOC	Fiber Optic Casing	Breakline	Excl	Line
807	EFOD	Fiber Optic Duct	Breakline	Excl	Line
850	FAD	Fire Alarm Duct	Breakline	Excl	Line
851	FADA	Fire Alarm Duct Abnd	Breakline	Excl	Line
942	WFH	Fire Hydrant	Random	Excl	Point
752	FPOL	Flag Pole	Random	Excl	Point
451	RDFL	Flowline	Breakline	Y	Line
558	WHGANG	Gangway	Breakline	Y	Line
530	GCAP	Gas Cap	Random	Excl	Point

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PCode	Alpha	Description	Pt Type	DTM	Draw
504	GLL	Gas Lateral Line	Breakline	Excl	Line
505	GLLA	Gas Lateral Line Abnd	Breakline	Excl	Line
506	GLLC	Gas Lateral Line Casing	Breakline	Excl	Line
500	GLX	Gas Line Xing	Breakline	Excl	Line
510	GLXP	Gas Line Xing Point	Random	Excl	Point
501	GLM	Gas Main Line	Breakline	Excl	Line
502	GLMA	Gas Main Line Abnd	Breakline	Excl	Line
503	GLMC	Gas Main Line Casing	Breakline	Excl	Line
533	GMETER	Gas Meter	Random	Excl	Point
536	GRED	Gas Reducer	Random	Excl	Point
537	GRISER	Gas Riser	Random	Excl	Point
538	GSTB	Gas Tee Stub Out	Random	Excl	Point
539	GVALVE	Gas Valve	Random	Excl	Point
542	GVENT	Gas Vent	Random	Excl	Point
541	GBEND	Gas Vertical Bend	Random	Excl	Point
458	RDACX	Ground Shot AC Pavement	Random	Y	Point
262	CTB	Ground Shot Concrete Treated Base	Random	Y	Point
261	CMB	Ground Shot Crushed Misc Base	Random	Y	Point
250	NDIRT	Ground Shot Dirt	Random	Y	Point
263	LCB	Ground Shot Lean Concrete Base	Random	Y	Point
459	RDPCX	Ground Shot PCC Pavement	Random	Y	Point
260	GSSG	Ground Shot Subgrade	Random	Y	Point
753	GPOST	Guard Post	Random	Excl	Point
95	STGDRL	Guardrail	Breakline	Excl	Line
456	RDFLCA	Gutter Flow Line Type A (Vertical curb)	Breakline	Y	Line
457	RDFLCE	Gutter Flow Line Type E (Rolled curb)	Breakline	Y	Line
455	RDGUT	Gutter Lip	Breakline	Y	Line
756	GDAN	Guy Deadman Anchor (Guy wire)	Random	Excl	Point
754	GPOL	Guy Pole	Random	Excl	Point
60	STHWAL	High Wall	Breakline	Y	Line
61	STHWS	High Wall Support	Breakline	Y	Line
92	STCONH	Hole Concrete	Random	Excl	Point
107	IHC	Horizontal Alignment	Breakline	Y	Line
265	BATH	Hydrographic Survey Point	Random	Y	Point
56	KRAL	K Rail	Breakline	Excl	Line
57	KRALF	K Rail with Fence	Breakline	Excl	Line
371	ELBB	Light Below Bridge	Random	Excl	Point
372	ELG	Light Ground	Random	Excl	Point
373	ELN	Light Navigation	Random	Excl	Point
374	ELNG	Light Navigation Green	Random	Excl	Point
375	ELNR	Light Navigation Red	Random	Excl	Point

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<u>PCode</u>	<u>Alpha</u>	<u>Description</u>	<u>Pt Type</u>	<u>DTM</u>	<u>Draw</u>
376	ELOVB	Light Overhead Building	Random	Excl	Point
370	ELP	Light Pole	Random	Excl	Point
757	MB	Mailbox	Random	Excl	Point
466	RDMEDB	Median Barrier	Breakline	Excl	Line
758	MWELL	Monitoring Well	Random	Excl	Point
559	WHMOOR	Mooring	Random	Excl	Point
251	NBSH	Natural Brushline	Breakline	Excl	Line
256	NTREL	Natural Tree Line	Breakline	Excl	Line
270	NTREE	Natural Vegetation ID	Random	Excl	Point
257	NWATH	Natural Water Edge Harbor	Breakline	Y	Line
252	NWATR	Natural Water Edge Pond/Lake	Breakline	Y	Line
999	NOL	No PCode Line	Breakline	Excl	Line
998	NOP	No PCode Point	Random	Excl	Point
630	OCAP	Oil Cap	Random	Excl	Point
647	OFBS	Oil Fuel Box Ship Service	Random	Excl	Point
601	OL	Oil Line	Breakline	Excl	Line
602	OLA	Oil Line Abnd	Breakline	Excl	Line
603	OLC	Oil Line Casing	Breakline	Excl	Line
629	OLT	Oil Line Trench	Breakline	Excl	Line
600	OLX	Oil Line Xing	Breakline	Excl	Line
610	OLXP	Oil Line Xing Point	Random	Excl	Point
640	OMH	Oil Manhole	Random	Y	Point
632	OMHI	Oil Manhole Invert	Random	Excl	Point
620	OML	Oil Miscellaneous Line	Breakline	Excl	Line
621	OMLA	Oil Miscellaneous Line Abnd	Breakline	Excl	Line
622	OMLC	Oil Miscellaneous Line Casing	Breakline	Excl	Line
643	OPAG	Oil Pipeline Above Ground	Breakline	Excl	Line
644	OPC	Oil Pipeline Corridor	Breakline	Excl	Line
636	ORED	Oil Reducer	Random	Excl	Point
637	ORIS	Oil Riser	Random	Excl	Point
638	OSO	Oil Tee Stub Out	Random	Excl	Point
639	OVAL	Oil Valve	Random	Excl	Point
642	OVBC	Oil Valve Box Cnrs	Interior	Y	Line
648	OVC	Oil Vault 4 Cnrs	Interior	Y	Line
646	OVNT	Oil Vent	Random	Excl	Point
641	OVEB	Oil Vertical Bend	Random	Excl	Point
614	OWIL	Oil Water Injection Line	Breakline	Excl	Line
615	OWILA	Oil Water Injection Line Abnd	Breakline	Excl	Line
616	OWILC	Oil Water Injection Line Casing	Breakline	Excl	Line
611	OWL	Oil Water Line	Breakline	Excl	Line
612	OWLA	Oil Water Line Abnd	Breakline	Excl	Line

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<u>PCode</u>	<u>Alpha</u>	<u>Description</u>	<u>Pt Type</u>	<u>DTM</u>	<u>Draw</u>
613	OWLC	Oil Water Line Casing	Breakline	Excl	Line
645	OWAB	Oil Well Anchor Block	Random	Excl	Point
670	OWC	Oil Well Curb	Breakline	Excl	Line
673	OWMT	Oil Well Mat	Breakline	Excl	Line
671	OWRW	Oil Well Retaining Berm	Breakline	Excl	Line
672	OWST	Oil Well Stem	Random	Excl	Point
561	WHPB	Pier Bumper	Breakline	Y	Line
560	WHPF	Pier Face	Breakline	Y	Line
562	WHPFW	Pier Fender Wood	Breakline	Y	Line
573	WHPINS	Pin Socket	Random	Excl	Point
759	POLMIS	Pole Miscellaneous	Random	Excl	Point
760	POST	Post General	Random	Excl	Point
860	PAD	Public Address Duct	Breakline	Excl	Line
861	PADA	Public Address Duct Abnd	Breakline	Excl	Line
96	STRSCA	Railcar Scale	Breakline	Y	Line
421	RRBP	Railroad Bumper	Random	Excl	Point
420	RRCL	Railroad Centerline	Breakline	Excl	Line
430	RRXA	Railroad Crossing Arm Base	Random	Excl	Point
427	RRXC	Railroad Crossover CL	Breakline	Excl	Line
429	RRDC	Railroad Diamond Xing Point	Random	Excl	Point
422	RRFP	Railroad Frog Point	Random	Excl	Point
431	RRLCT	Railroad Last Common Tie	Breakline	Excl	Line
426	RRSG	Railroad Signal	Random	Excl	Point
423	RRSW	Railroad Switch	Random	Excl	Point
424	RRSP	Railroad Switch Point	Random	Excl	Point
425	RRTR	Railroad Track Top of Rail	Breakline	Excl	Line
428	RRTC	Railroad Turnout CL	Breakline	Excl	Line
62	STRWAL	Retaining Wall - Face	Breakline	Y	Line
249	NROCK	Rocks Boulders and Cobbles	Random	Y	Point
730	SCAP	Sanitary Sewer Cap	Random	Excl	Point
746	SCHM	Sanitary Sewer Chimney	Random	Excl	Point
731	SCO	Sanitary Sewer Cleanout	Random	Excl	Point
742	SLST	Sanitary Sewer Lift Station	Random	Excl	Point
701	SL	Sanitary Sewer Line	Breakline	Excl	Line
702	SLA	Sanitary Sewer Line Abnd	Breakline	Excl	Line
703	SLC	Sanitary Sewer Line Casing	Breakline	Excl	Line
700	SLX	Sanitary Sewer Line Xing	Breakline	Excl	Line
710	SLXP	Sanitary Sewer Line Xing Point	Random	Excl	Point
740	SMH	Sanitary Sewer Manhole	Random	Y	Point
732	SMHI	Sanitary Sewer Manhole Invert	Random	Excl	Point
743	SPST	Sanitary Sewer Pump Station	Breakline	Excl	Line

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PCode	Alpha	Description	Pt Type	DTM	Draw
744	STNK	Sanitary Sewer Septic Tank	Breakline	Excl	Line
738	STSB	Sanitary Sewer Tee Stub Out	Random	Excl	Point
741	SVB	Sanitary Sewer Vertical Bend	Random	Excl	Point
745	SWYE	Sanitary Sewer Wye Stub Out	Random	Excl	Point
63	STSEAW	Seawall	Breakline	Y	Line
65	STSHTP	Sheet Pile	Breakline	Y	Line
490	RDBW	Sidewalk Back	Breakline	Y	Line
491	RDFW	Sidewalk Front	Breakline	Y	Line
763	SIBP	Sign - Large Double Post - Sign Face	Random	Excl	Point
762	SIB	Sign - Large Sign Post (over 4' wide)	Breakline	Excl	Line
761	SIGN	Sign - Small	Random	Excl	Point
911	WSCC	Sprinkler Control Cabinet - 4 Cnrs	Breakline	Excl	Line
948	SPRH	Sprinkler Head	Random	Excl	Point
907	WSPL	Sprinkler Line	Breakline	Excl	Line
908	WSPLA	Sprinkler Line Abnd	Breakline	Excl	Line
909	WSPLC	Sprinkler Line Casing	Breakline	Excl	Line
945	WSPIT	Sprinkler Pit	Random	Excl	Point
951	WSRPB	Sprinkler Pullbox	Random	Excl	Point
88	STSTNP	Stairs Non Paved	Breakline	Excl	Line
87	STSTPV	Stairs Paved	Breakline	Excl	Line
244	SDCLA	Storm Drain Clarifier	Random	Excl	Point
231	SDCO	Storm Drain Cleanout	Random	Excl	Point
80	STCDE	Storm Drain Concrete Edge	Breakline	Y	Line
79	STCDFL	Storm Drain Concrete Flowline	Breakline	Y	Line
85	STCULV	Storm Drain Culvert	Breakline	Excl	Line
221	SDCBD	Storm Drain Drop inlet	Random	Y	Point
223	SDCBCR	Storm Drain Inlet Cnrs	Breakline	Y	Line
220	SDCBG	Storm Drain Inlet Grate	Random	Y	Point
222	SDCBI	Storm Drain Inlet Invert	Random	Excl	Point
201	SDLN	Storm Drain Line	Breakline	Excl	Line
202	SDLA	Storm Drain Line Abnd	Breakline	Excl	Line
203	SDLC	Storm Drain Line Casing	Breakline	Excl	Line
200	SDLX	Storm Drain Line Xing	Breakline	Excl	Line
210	SDXP	Storm Drain Line Xing Point	Random	Excl	Point
240	SDMH	Storm Drain Manhole	Random	Y	Point
232	SDMHI	Storm Drain Manhole Invert	Random	Excl	Point
204	SDOUTL	Storm Drain Outfall Line	Breakline	Excl	Line
205	SDOUTA	Storm Drain Outfall Line Abnd	Breakline	Excl	Line
206	SDOUTC	Storm Drain Outfall Line Casing	Breakline	Excl	Line
243	SDOUTP	Storm Drain Outfall Point	Random	Excl	Point
230	SDPL	Storm Drain Plug	Random	Excl	Point

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PCode	Alpha	Description	Pt Type	DTM	Draw
242	SDPS	Storm Drain Pump Station	Random	Excl	Point
236	SDRED	Storm Drain Reducer	Random	Excl	Point
89	STSUMP	Storm Drain Sump	Breakline	Y	Line
241	SDVB	Storm Drain Vertical Bend	Random	Excl	Point
479	RSDSCL	Striping - Dashed Centerline	Random (BL)	Y	Line
478	RSDSL	Striping - Dashed Lane	Random (BL)	Y	Line
476	RSDSM	Striping - Dashed Miscellaneous	Random (BL)	Y	Line
477	RSDST	Striping - Dashed Terminal	Random (BL)	Y	Line
475	RDSSCL	Striping - Solid Centerline	Random (BL)	Y	Line
474	RDSSL	Striping - Solid Lane	Random (BL)	Y	Line
470	RDSSM	Striping - Solid Miscellaneous	Random (BL)	Y	Line
471	RDSSP	Striping - Solid Parking	Random (BL)	Y	Line
473	RDSSTR	Striping - Solid Terminal	Random (BL)	Y	Line
472	RDSST	Striping - Solid Travelway	Random (BL)	Y	Line
67	STSPS	Structural Pile - Steel	Breakline	Excl	Circle
66	STSPT	Structural Pile - Timber	Breakline	Excl	Circle
68	STSPW	Structural Pile - Wharf	Breakline	Excl	Circle
100	IBS	Survey Backsight Station	Random	Excl	Point
150	IBMX	Survey Benchmark	Random	Excl	Point
105	IBML	Survey Benchmark 1	Random	Excl	Point
111	IBM	Survey Benchmark 2	Random	Excl	Point
134	ICKEL	Survey Check Elevation Control	Random	Excl	Point
102	ICA	Survey Closing Azimuth	Random	Excl	Point
153	ICNTL	Survey Control Point	Random	Excl	Point
104	IEC	Survey Elevation Control	Random	Excl	Point
101	IFS	Survey Foresight Station	Random	Excl	Point
99	IS	Survey Instrument Station	Random	Excl	Point
154	IMON	Survey Monument	Random	Excl	Point
159	SMT	Survey Monument Ties	Random	Excl	Point
109	IQSC	Survey Quarter Section Corner	Random	Excl	Point
103	IRIS	Survey Radial Instrument Station	Random	Excl	Point
110	IRP	Survey Remote Point	Random	Excl	Point
124	ITPR	Survey Turning Point Read	Random	Excl	Point
114	ITPS	Survey Turning Point Set	Random	Excl	Point
108	IVCST	Survey Vertical Control Station	Random	Excl	Point
41	STTAG	Tank Above Ground	Breakline	Excl	Line
40	STTF	Tank Face	Breakline	Excl	Line
42	STTUG	Tank Underground	Breakline	Excl	Line

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<u>PCode</u>	<u>Alpha</u>	<u>Description</u>	<u>Pt Type</u>	<u>DTM</u>	<u>Draw</u>
870	TVD	Television Duct	Breakline	Excl	Line
871	TVDA	Television Duct Abnd	Breakline	Excl	Line
570	WHTIC	Tieback Cable	Breakline	Excl	Line
571	WHTID	Tieback Deadman	Random	Excl	Point
572	WHTIDC	Tieback Deadman Concrete	Random	Excl	Point
255	NTOES	Toe of Slope	Breakline	Y	Line
454	RDTCB	Top of Curb Type E (Rolled curb)	Breakline	Y	Line
258	NRBTP	Top of Rock Ballast	Random	Y	Point
254	NTOPS	Top of Slope	Breakline	Y	Line
311	ETSLR	Top of Slurry	Breakline	Excl	Line
43	STTMB	Top of Timber	Breakline	Y	Line
38	STTRLR	Trailer	Breakline	Excl	Line
364	ETTFL	Transmission Tower Footing Line	Breakline	Excl	Line
362	ETTFP	Transmission Tower Footing Point	Random	Excl	Point
97	WHTRUN	Transtainer Runway	Breakline	Y	Line
216	SDTDRN	Trench Drain	Breakline	Y	Line
94	STSCA	Truck Scale	Breakline	Y	Line
90	STTUN	Tunnel	Breakline	Excl	Line
499	RDDTRD	Unimproved Dirt Road	Breakline	Y	Line
3	UMH	Unknown Utility Manhole	Random	Excl	Point
2	UMHI	Unknown Utility Manhole Invert	Random	Excl	Point
15	UPMRK	Unknown Utility Paint Mark	Breakline	Excl	Line No Plot
4	UPBC	Unknown Utility Panel Box Cnrs	Breakline	Excl	Line
5	UPB	Unknown Utility Pullbox	Random	Excl	Point
7	UR	Unknown Utility Riser	Random	Excl	Point
39	STUST	Unknown Utility Structure	Breakline	Excl	Line
14	UTRCH	Unknown Utility Trench	Random	Y	Line
9	UVAL	Unknown Utility Valve	Random	Excl	Point
8	UVC	Unknown Utility Vault 4 Cnrs	Interior	Y	Line
6	UV	Unknown Utility Vault Point	Random	Y	Point
1	UUX	Unknown Utility Xing	Breakline	Excl	Line
10	UUXP	Unknown Utility Xing Point	Random	Excl	Point
83	STCONL	Utility Conduit Large	Breakline	Excl	Line
12	UC	Utility Corridor	Breakline	Excl	Line
11	UPAG	Utility Pipe Above Ground Horizontal	Breakline	Excl	Line
780	STPR	Utility Pipe Rack Support	Breakline	Excl	Line
106	IVC	Vertical Alignment	Breakline	Y	Line
950	WBUL	Water Backflow Line	Breakline	Excl	Line
949	WBUP	Water Backflow Point	Random	Excl	Point
947	WBSS	Water Box Ship Service	Random	Excl	Point
930	WCAP	Water Cap	Random	Excl	Point

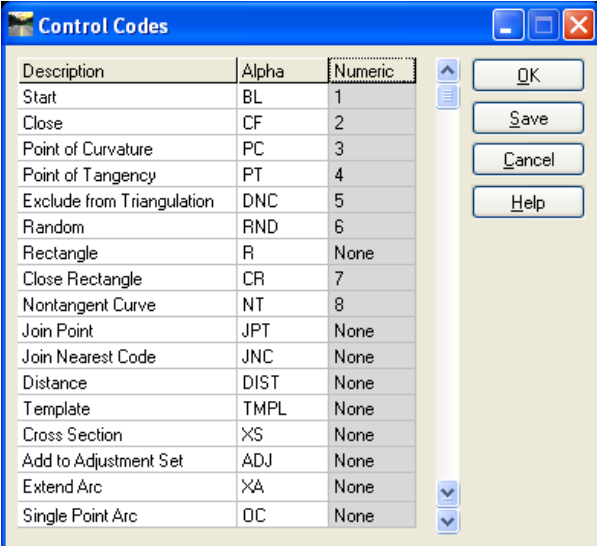
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PCode	Alpha	Description	Pt Type	DTM	Draw
946	WCV	Water Check Valve	Random	Excl	Point
904	WLL	Water Lateral Line	Breakline	Excl	Line
905	WLLA	Water Lateral Line Abnd	Breakline	Excl	Line
906	WLLC	Water Lateral Line Casing	Breakline	Excl	Line
900	WLX	Water Line Xing	Breakline	Excl	Line
910	WLXP	Water Line Xing Point	Random	Excl	Point
901	WML	Water Main Line	Breakline	Excl	Line
902	WMLA	Water Main Line Abnd	Breakline	Excl	Line
903	WMLC	Water Main Line Casing	Breakline	Excl	Line
940	WMH	Water Manhole	Random	Y	Point
932	WMHI	Water Manhole Invert	Random	Excl	Point
933	WM	Water Meter	Random	Excl	Point
936	WRED	Water Reducer	Random	Excl	Point
937	WRIS	Water Riser	Random	Excl	Point
944	WSIV	Water Siamese Valve	Random	Excl	Point
938	WTEE	Water Tee Stub Out	Random	Excl	Point
920	WTBL	Water Thrust Block	Random	Excl	Point
939	WV	Water Valve	Random	Excl	Point
943	WVC	Water Vault Cnrs	Interior	Y	Line
941	WVB	Water Vertical Bend	Random	Excl	Point
776	STWEHO	Weep Hole	Random	Excl	Point
617	OWGL	Wet Gas Line	Breakline	Excl	Line
618	OWGLA	Wet Gas Line Abnd	Breakline	Excl	Line
619	OWGLC	Wet Gas Line Casing	Breakline	Excl	Line
563	WHDS	Wharf Deckland Side	Breakline	Y	Line
171	WHFM	Wharf Footage Mark	Random	Excl	Point
782	RRWHSTL	Wheel Stop Line	Breakline	Excl	Line
775	RRWTIE	Wood Tie	Breakline	Excl	Line

Control Coding – InRoads Survey

Each survey shot will have a **Feature Code** that identifies the 'item'. A **Control Code** is added as needed to further describe the shot or series of shots being taken. Ex: **454 BL** (Refer to the *PoLB Survey Code Book* for the Feature Codes.)

There are only a handful of InRoads Survey Control Codes that can be used during data collection.



Description	Alpha	Numeric
Start	BL	1
Close	CF	2
Point of Curvature	PC	3
Point of Tangency	PT	4
Exclude from Triangulation	DNC	5
Random	RND	6
Rectangle	R	None
Close Rectangle	CR	7
Nontangent Curve	NT	8
Join Point	JPT	None
Join Nearest Code	JNC	None
Distance	DIST	None
Template	TMPL	None
Cross Section	XS	None
Add to Adjustment Set	ADJ	None
Extend Arc	XA	None
Single Point Arc	OC	None

See explanation below

The typical **Control Codes** that will be used are:

- **BL** to start a line, used with a series of shots no end line code is needed; the line continues with the code until another BL
- **CF** to force closure of a figure onto the 1st shot
- **CR** is used on the 3rd corner of a rectangular feature to create a rectangle when the 4th corner is not visible.
- **R** is used on the 2nd corner of a rectangle when the other 2 corners are not visible. It is followed by a rectangle width, a negative values denotes the rectangle is to the left of the line.
- **PC** identifies the beginning of a curve
- **PT** identifies the end of a curve
- **NT** is used when a non-tangent curve is collected
- **JPT** is used to force a connection to a specific Point #
- **DNC** is used when a code that is normally part of a dtm should be excluded.

Coding Issues:

The BL Control Code -

When a Feature Code, or series of shots, is intended to create a Breakline a **BL** code is used on the first shot to begin the linear connection of those shots.

If a single usage of that Feature Code is entered (without a **BL** Control Code), even though it is identified as a breakline within the processing software (InRoads Survey), it will be added to the DTM as a Random point and drawn in the CAD file from the Fieldbook as a point.

Taking this one step further, if a 'breakline / linear' Feature Code is collected multiple times, (for example a flowline code is used in various locations to collect isolated pipe inverts) it will be added into the surface model as a Random Point but these single shots will be collected into a one feature in the DTM called "flowline". This collection of single shots will be drawn as a line when displayed from the DTM. The line will be drawn from one shot to the next to the next.

This means that Feature Coding identified as a breakline (line), when collected only as a single shot, will display in the fieldbook as a point and will turn into a Random point in the DTM. But when more than one 'single shots' are taken the 'single shots' will be correctly viewed from the Fieldbook but the result is a 'line' when the data is viewed from the DTM. This is because the Surface (DTM) and Fieldbook (FWD) are different databases using different display mechanisms.

Interior Point Type -

Each **Feature Code** is assigned a surface **Point Type** to identify how it contributes to the surface model. The basic **Point Types** used in the survey software are:

- **Random** – Single shot
- **Breakline** – Series of connected shots
- **Interior Boundary** – Closed shapes that create ‘holes’ in the surface model.

The *PoLB Survey Code Book* shows the **Point Type** that is assigned to the **Feature Code**.

Several Feature Codes are assigned the **Interior** Point Type.

PCode	Description	Pt Type	DTM
25	Building_Foundation	Interior	Y
91	Concrete_Pad_Raised	Interior	Y
350	Elec_Panel_Box_4_corners	Interior	Y
360	Elec_Pad	Interior	Y
642	Oil_Valve_Box_4Corners	Interior	Y
648	Oil_Vault_4Corners	Interior	Y
842	Tele_MH_Vault_corners	Interior	Y
877	Communication_Vault_4Corners	Interior	Y
943	Water_Vault_4Corners	Interior	Y

Interiors are always closed shapes, and in fact must be closed shapes ...or else. Or else InRoads Survey will force them to become closed shapes. This is very undesirable if you collect a Building Foundation (**25**) and do not collect the whole way around. As an Interior surface type InRoads Survey will take the last shot and automatically connect it with the first shot.

Multi-Line Coding Notes:

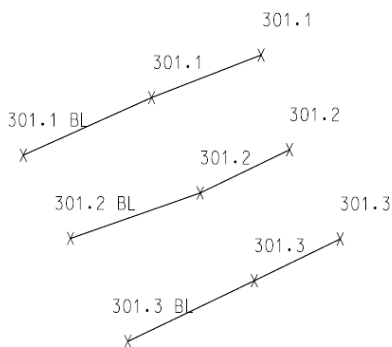
This is an example of collecting simultaneous similar linear items such as railroad tracks or curbs. When multiple lines are collected at the same time an 'index' number has to be added to the Feature Code:

301.1 BL

301.2 BL

301.3 BL

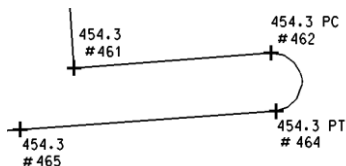
When the data collection is complex you should create a sketch so that you don't lose track of the line numbers.



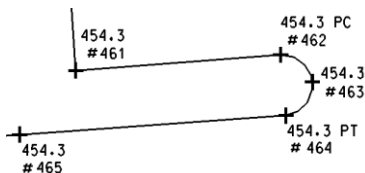
Collecting Curves and Circular Objects:

There are four ways to collect curves.

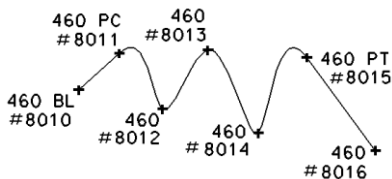
- 1) A single **PC** and **PT** without any POCs (Tangent unless NT code)



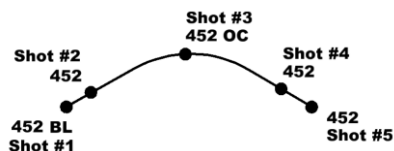
- 2) A **PC** and a **PT** with a shot on the curve. (Non-Tangent)



- 3) A **PC** and a **PT** identifying the start and end of the curvature and multiple shots on the curve creates a 'spline' or best fit series of curves that pass thru all of the shots between the **PC** and **PT**. (Tangent unless NT code)

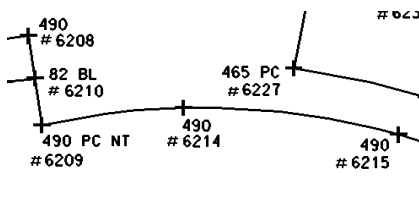


- 4) **OC** – Single Point Curve creates a tangential arc from a single shot on the curve, by developing the PC and PT based on the two shots collected before and after the OC shot.



Non-Tangent Curves

The **NT** code is used on either the first or last shot of the curve along with the **PC** or **PT** code whenever you know that there is curve non-tangency.



The **NT** Code is not necessary when collecting 3 point curves (**PC** – **POC** – **PT**) because when InRoads Survey sees 3 curve points collected like this it will 'force' a curve to be created that passes through those 3 points.

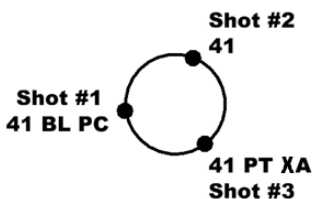
3-Point curves are always non-tangent.

2-Point curves and multi-point curve collection must use the **NT** Control Code if they are non-tangent.

Extend Arc Control Coding

InRoads Survey a recently added a new code for collecting circular objects.

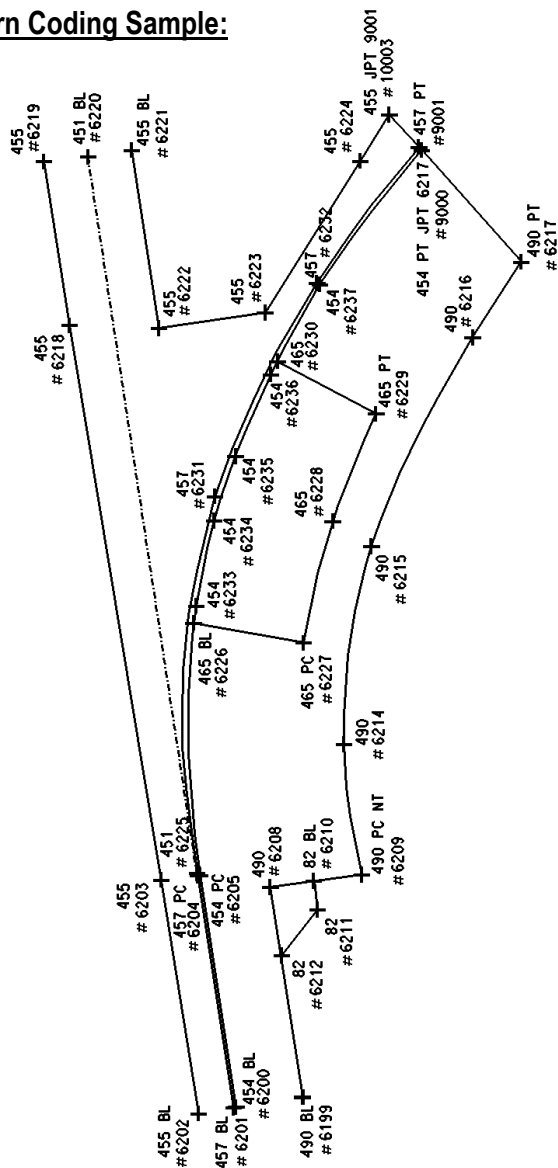
XA – Extend Arc, closes an arc with another arc based on three field points, creating a circle.



Notes on Curves:

These collection techniques must consider correct collection of the elevational grade, not just the horizontal layout. For example, a low spot might force the collection of one or more POC shots on a curve.

*Note: As a general rule, if you are collecting enough shots on a curve, you can get away with always adding the **NT** Control Code on the first shot without ever adversely affecting the resulting linework.*

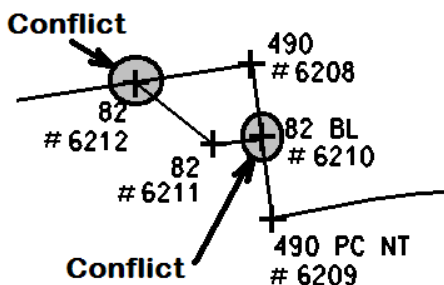
Return Coding Sample:

Double Coding to avoid conflicts:

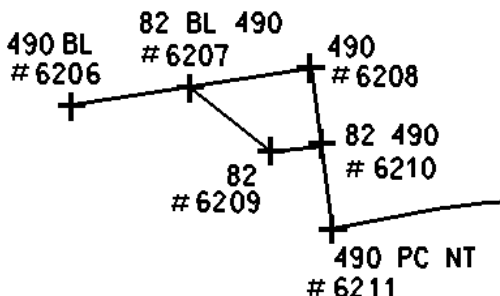
This is a sample that illustrates the type of coding that can be used for return / ramp / roadway collection. Do not look at this coding as the only way to collect this.

There are a couple notable coding items to point out here:

- 1) Coding that begins or ends a new line on top of another line can (and most likely will) produce an elevational conflict during surface creation. (The **82 BL** line that is beginning on the **490** line.)

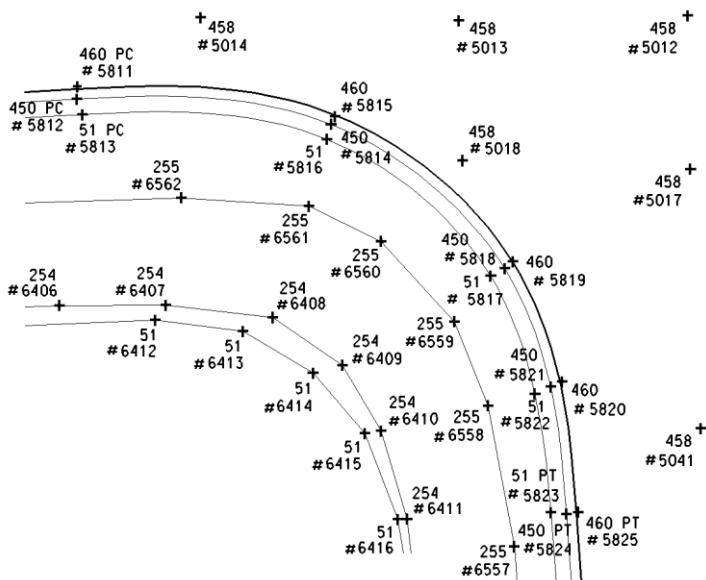


Double Feature coding can be used such as this:



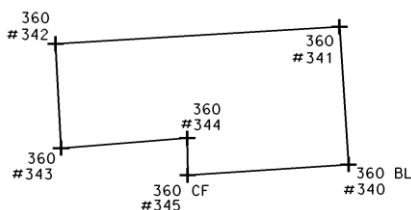
Edge Coding Sample:

This illustration shows an example of correct edge coding.

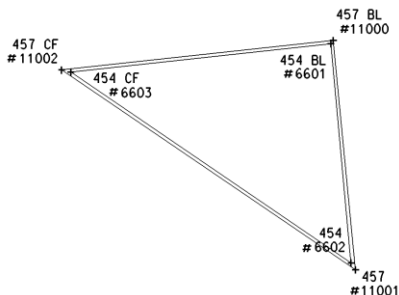


Any edges, whether they are asphalt parking lots or dirt shoulders, or at the top of a slope or the bottom of the slope should be collected using a linear Feature Code. In the example above the **460** (*Edge of AC*) code is used to define the edge.

The purpose behind this revised coding practice is because the resulting surface model (DTM) will not be accurately formed by the collection illustrated above.

Pad Coding Sample:

Any pads are collected by starting on one of the corners with a **BL** Control Code and then progressing around the pad. The best way to close off the pad is to add a **CF** code on the last shot just prior to the first shot. This type of collection can be used when the pad is flush with the surrounding grades. If this pad is raised then you should be collecting it as described in the *Island Coding*.

Island Coding Sample:

When collecting raised islands it was sometimes noticed that the top of curbing was collected as a breakline but only ground shots were taken at the toe of curb or asphalt at the bottom of the curb. If these shots are not collected as breaklines the resulting surface model (DTM) will not form properly.

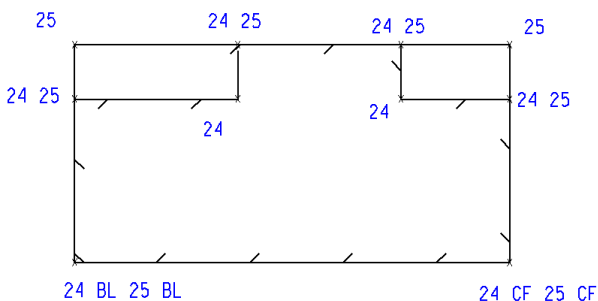
Raised islands and medians have to be collected with linear codes on the top and bottom around it. The code used to shoot these must be linear codes. You may collect 'point' ground shots or pavement shots near the raised islands or medians but there has to be a 'linear' series of shots around the tops and toes.

Building Collection

Code 22, V_STRC_BLDG_FNDN_EDGE, *Building Foundation Edge, Breakline, Included* - Used for open building pads that do not close.

Code 24, V_STRC_BLDG_OTLN_FACE, *Building Outline - Face of Building, – Breakline Excluded*

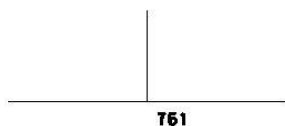
Code 25, V_STRC_BLDG_FNDN_CLSD, *Building Foundation Closed Shape – Interior, Included*



Either an asphalt breakline (467), or spot shots (458) should be collected along the building face for grade adjacent to the building

Signage Collection:

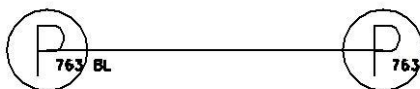
761 – Sign Post: Single post, small sign



762 – Billboard Post: Single post, billboard (over 4ft. wide).



763 – Billboard Sign: Double posted, billboard.



Note: 760 is used for a generic post with no signage.

Survey Control Monumentation

Monumentation for the Port of Long Beach Vertical network will consist of a minimum of a 1 inch brass disc.

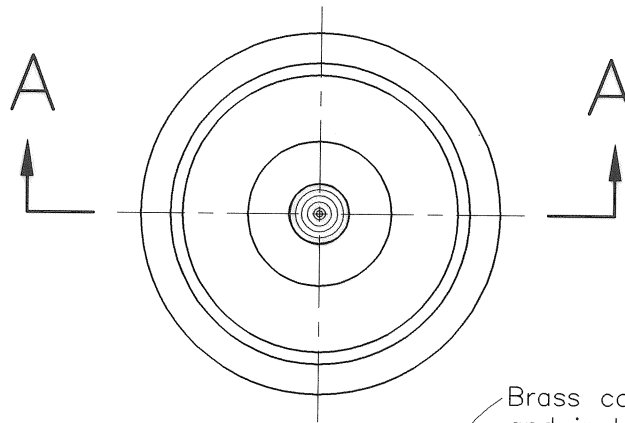
Monumentation for Horizontal and Vertical control will be of sufficient character and durability to be identified and used in later phases of projects, such as:

PK or MAG nail with stamped washer (minimum)

Lead, Tack and Tag

Brass disk with stamp

Iron pipe with tag etc.



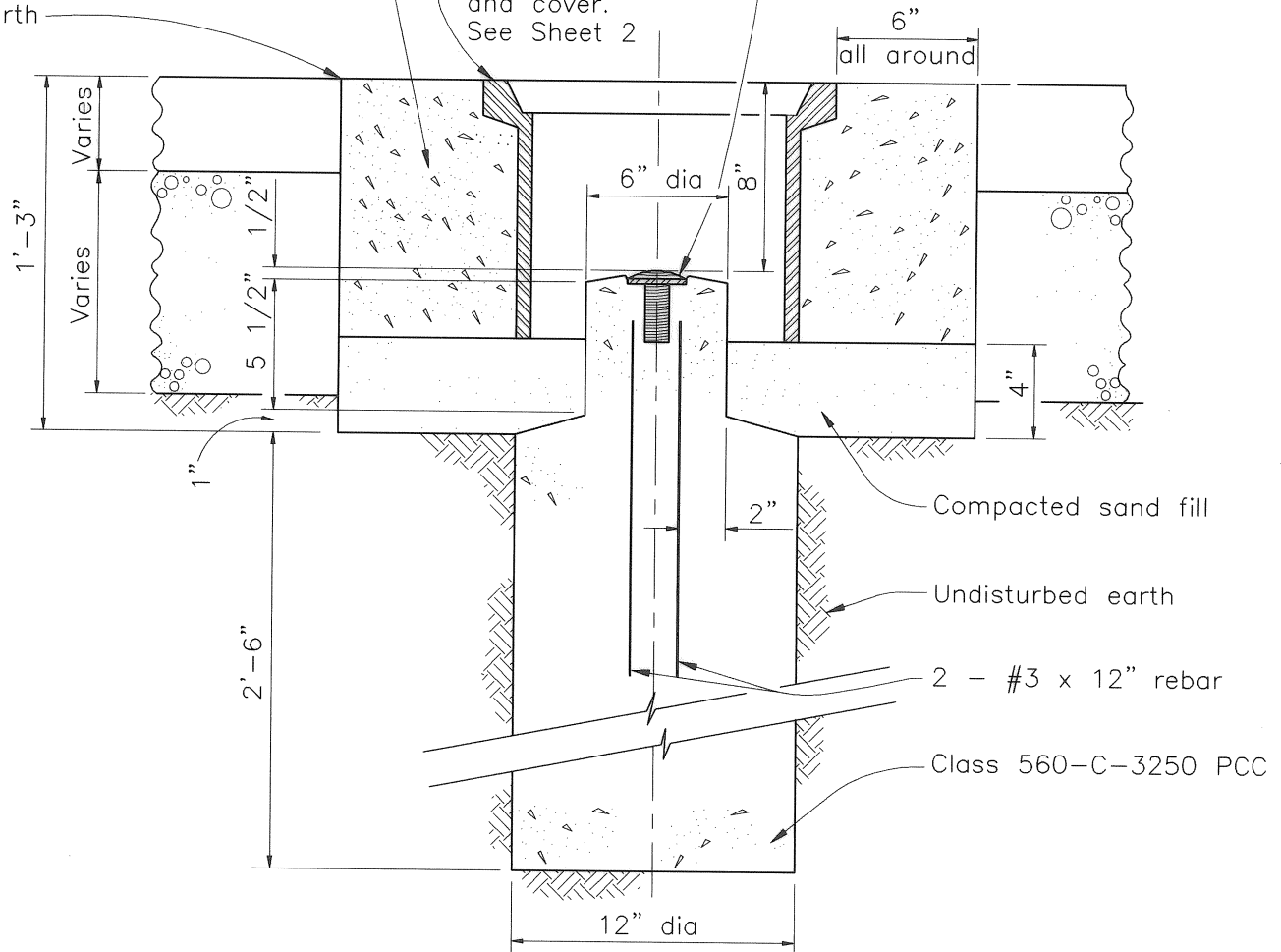
PLAN

Class 560-C-3250 PCC

Pavement shall be cut to neat lines and concrete placed against undisturbed CMB or earth

11" cast iron frame and cover. See Sheet 2

Brass cap shall be furnished and installed by the Contractor. Domed brass cap shall be 2 1/2" dia with 3/4" x 2 1/2" shank or approved equal. Center within 1/4".

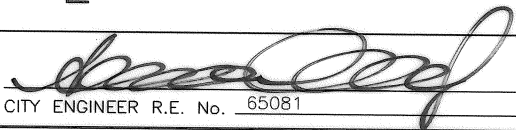


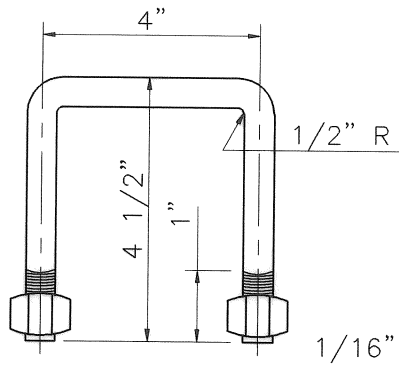
SECTION A-A

NOTE:

1. Brass Cap shall be submitted to the Survey Section for stamping prior to setting.

SAVED PATH: R:\Standard Plans\CLBSTD_2017\CLB--STD PLAN--2017 MULTI-LAYOUT

4		CITY OF LONG BEACH, DEPARTMENT OF PUBLIC WORKS 2017 STANDARD PLANS		STANDARD PLAN NO. 202
3				
2				
1				
NO.	DATE	TYPE C & INTERSECTION MONUMENT		SHEET
REVISIONS				1 OF 3
		APPROVED BY:  DATE: 11/13/17		
		CITY ENGINEER R.E. No. 65081		

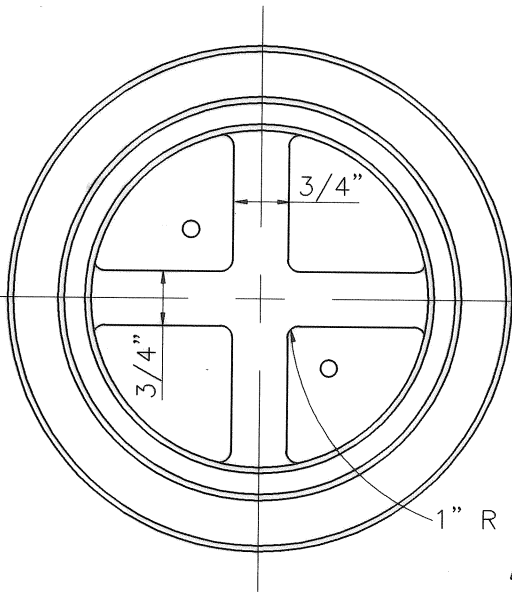


HANDLE DETAIL

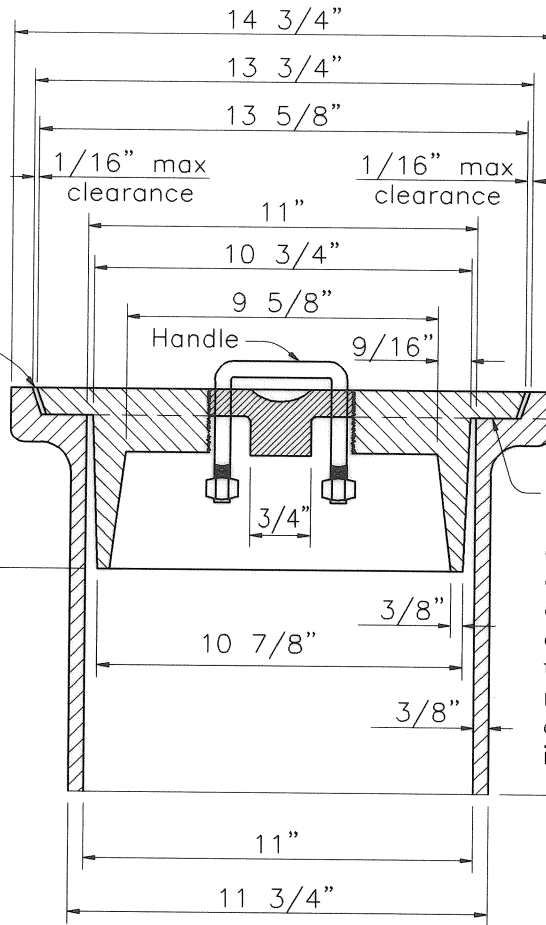
1/16" draft

7/16" dia

6"



UNDERSIDE OF COVER

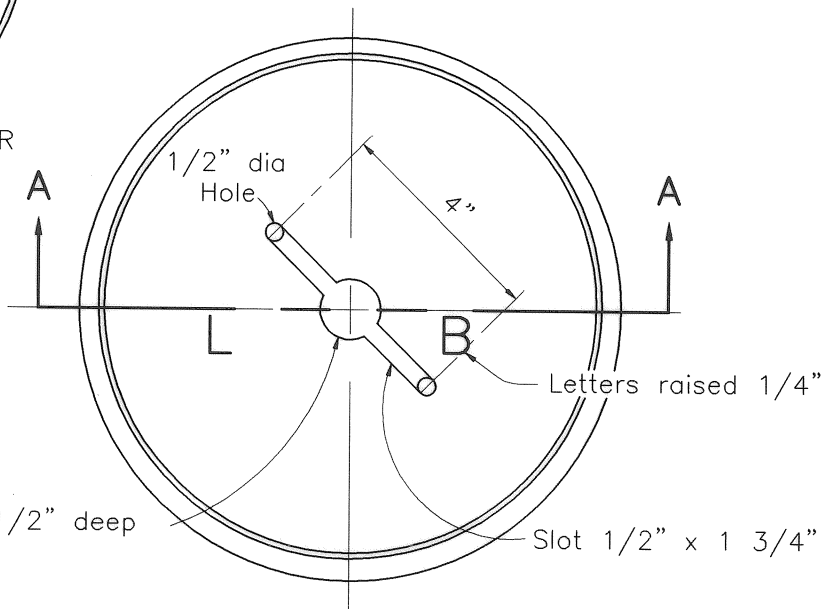


SECTION A-A

Cover thickness approx. 3/4". Cover shall not project above casting rim nor be recessed more than 1/16" below casting rim.

Machine fit bottom of cover flange and seat of casting all around to prevent rocking of cover when in place

10 1/4"
11"




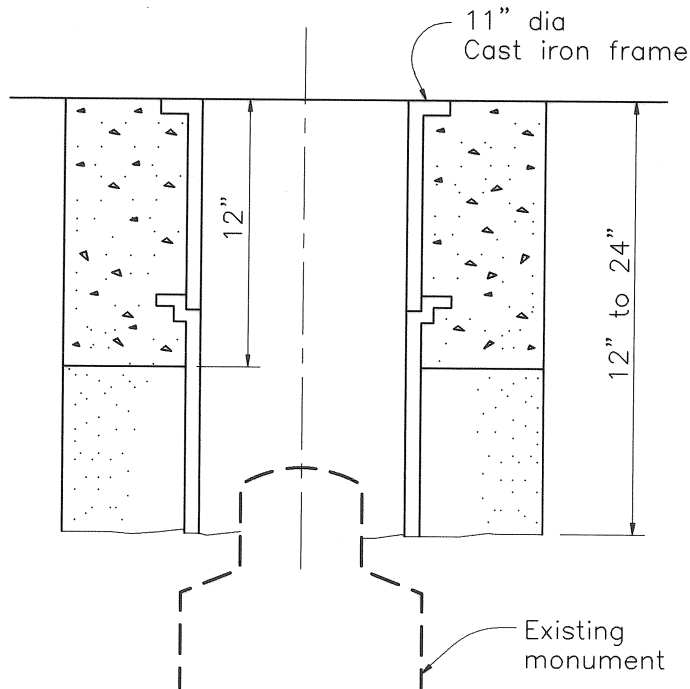
PLAN

Finger Hole
1 3/4" dia x 1/2" deep

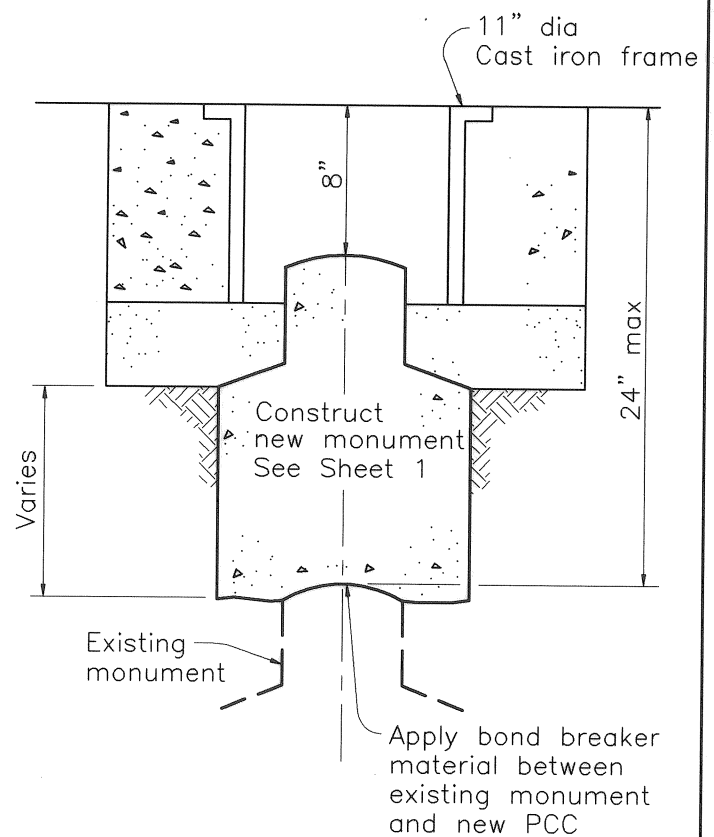
CAST IRON FRAME DETAILS

SAVED PATH: R:\Standard Plans\CLBSTD_2017\CLB-STD PLAN-2017 MULTI-LAYOUT

4		CITY OF LONG BEACH, DEPARTMENT OF PUBLIC WORKS 2017 STANDARD PLANS		STANDARD PLAN NO. 202
3		TYPE C & INTERSECTION MONUMENT		
2				
1				
NO.	DATE	APPROVED BY: 		SHEET 2 OF 3
REVISIONS		CITY ENGINEER R.E. No. 65081		
		DATE: 11/13/17		



CASE 1

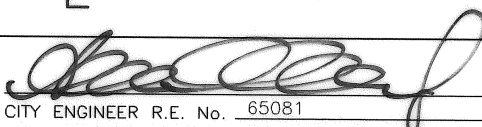


CASE 2

ADJUSTMENT OF EXISTING TYPE C Q INTERSECTION MONUMENT

NOTES:

1. See Sheet 1 for additional Notes and Details.
2. Bond breaker material shall be approved by City Engineer.

<div>4</div> <div>3</div> <div>2</div> <div>1</div>	<div>CITY OF LONG BEACH, DEPARTMENT OF PUBLIC WORKS 2017 STANDARD PLANS</div> <div>TYPE C Q INTERSECTION MONUMENT</div>	<div>STANDARD PLAN NO.</div> <div>202</div>
<div>NO. DATE</div> <div>REVISIONS</div>	<div>APPROVED BY:  DATE: 11/13/17</div> <div>CITY ENGINEER R.E. No. 65081</div>	<div>SHEET</div> <div>3 OF 3</div>

APPENDIX V

NO TRESPASSING SIGN



SIGN DESCRIPTION:

COLOR: BLACK ON WHITE
 SIZE: 36" X 24"
 MATERIAL: ALUMINUM (0.063")
 SHEETING: DIAMOND GRADE
 FONT: FHWA 2000 SERIES E

CONSTRUCTION NOTES:

1. INSTALL ONE SIGN AT EACH CORNER OF THE FENCE AND NO FEWER THAN THREE (3) SIGNS TO ONE MILE LENGTH ALONG EXTERIOR BOUNDARIES IN EACH DIRECTION AND AT ALL ENTRANCES TO THE CONSTRUCTION SITE AND/OR LAYDOWN AREA SITE.
2. FENCE MOUNTING HARDWARE SHALL CONSIST OF A STURDY RUST-RESISTANT CAST METAL MOUNTING PIECE THAT FITS INTO A STANDARD 2-INCH CHAIN LINK FENCE WITH A ONE-WAY SCREW AND NUT.



Port of
LONG BEACH
 The Green Port

NO TRESPASSING SIGN

STANDARD PLAN

T-9

APPROVED BY:

JOHN Y. CHUN DIRECTOR, ENG. DESIGN

P.E. NO.: C-58867

DATE: 04-03-19

1 OF 1