ADDENDUM #2

CONTRA COSTA COMMUNITY COLLEGE DISTRICT

C-4016, INC. 3, DEMO AND ABATEMENT OF PHYSICAL SCIENCE AND BIOLOGICAL SCIENCE BUILDINGS AND OTHER STRUCTURES

Contra Costa College
2600 Mission Bell Drive, San Pablo, CA 94806

Date: December 13, 2021

NOTICE TO ALL CONTRACTORS

You are hereby notified of the following changes, clarifications and/or modifications to the original Contract Documents, Project Manual, Drawings, Specifications and/or previous Addenda. This Addendum shall supersede the original Contract Documents and previous Addenda wherein it contradicts the same, and shall take precedence over anything to the contrary therein. All other conditions remain unchanged.

This Addendum forms a part of the Contract Documents and modifies the original Contract Documents dated ***November 6, 2021, and Addendum #1, dated November 24, 2021.*** Acknowledge receipt of this Addendum in space provided on the Bid Proposal Form. Failure to acknowledge may subject Bidder to disqualification.

A. DELETIONS, ADDITIONS, CHANGES, REVISIONS

Item: SPECIFICATIONS

1. **Revise:** SECTION 00010 TABLE OF CONTENTS
   Add SECTION 01572.1 Storm Water Pollution Prevention Plan, November 11, 2021 (attached)

2. **Replace:** SECTION 00300 BID PROPOSAL FORM (attached)
   Replace existing SECTION 00300 BID PROPOSAL FORM, in its entirety, with the attached, SECTION 00300 BID PROPOSAL FORM, in its entirety.

3. **Revise**: SECTION 01010 - SUMMARY OF WORK, **1.5 WORK SEQUENCE**
   - **Add:** 1.5D *Prior to removal or demolition of chillers, air conditioning or any refrigerant containing equipment, all refrigerants shall be recovered and properly disposed of in accordance to EPA regulations.*

- **Add:** 1.5E *Existing furnishings, fixtures and equipment remaining within the buildings and structures shall be removed and properly recycled and/or removed from the project site.*
- **Add:** 1.5F *Contractor shall contract directly with Siemens to disconnect and remove the fire alarm system in all buildings and structures to be demolished. Campus will notify Contractor of any panels and devices to be salvaged for campus use. Siemens shall provide all required programming work on the campus fire monitoring system to reflect the changes from the removal of the fire alarm system from these buildings and structures.*

4. **Revise**: SECTION 01010 - SUMMARY OF WORK, **1.13 HAZARDOUS MATERIALS**
   Add: B. Removal of all refrigerants shall comply with EPA regulations (40 CFR Part 82, Subparts A and F) Section 608 of the Clean Air Act (CAA)

5. **Replace:** SECTION 01030 ALTERNATES (attached)
   Replace existing SECTION 01030 ALTERNATES, in its entirety, with the attached, SECTION 01030 ALTERNATES, in its entirety.

6. **Replace:** SECTION 01140 WORK RESTRICTIONS (attached)
   Replace existing SECTION 01140 WORK RESTRICTIONS, in its entirety, with the attached, SECTION 01140 WORK RESTRICTIONS, in its entirety.

7. **Add:** SECTION 01572.1 STORM WATER POLLUTION PREVENTION PLAN
   Add new SECTION 01572.1 STORM WATER POLLUTION PREVENTION PLAN, in its entirety.

8. **Replace:** SECTION 02 82 00 ASBESTOS-CONTAINING MATERIALS ABATEMENT – **PRE-DEMOLITION SURVEY REPORT** (prepared by FACS)
   Replace existing SECTION 02 82 00 ASBESTOS-CONTAINING MATERIALS ABATEMENT – **PRE-DEMOLITION SURVEY REPORT** dated July 30, 2021, in its entirety, with the attached, PRE-DEMOLITION SURVEY REPORT dated November 24, 2021. (All references to the July 30, 2021 PRE-DEMOLITION SURVEY REPORT are superseded by the November 24, 2021 report of the same name.)
   - **a.** Note: The November 24, 2021 report includes additional survey information related to the Chiller Units and Pads, and the above ground piping between the Physical Science Building and Boiler Building.
9. **Revise**: SECTION 02 83 00 LEAD-RELATED CONSTRUCTION
   All references to the **PRE-DEMOLITION SURVEY REPORT** dated July 30, 2021 are superseded by the November 24, 2021 report of the same name.

10. **Delete**: **SECTION 02 41 16 STRUCTURE DEMOLITION, paragraphs 1.7D and 1.7E**
    - Delete paragraph 1.7D in its entirety.
    - Delete paragraph 1.7E in its entirety.

ADDENDUM #2

Item: DRAWINGS

1. **Revise/Add, as noted:**

   Sheet AD1.3 – SITE DEMOLITION SHEET

   - **a.** **Revised**: Biological Sciences Chiller has been revised as Bid Add Alternate 2, as indicated in drawings.
   - **b.** **Revised**: Boiler Room Building and related scopes have been revised as indicated in drawings, to be included as base bid scope.
   - **c.** **Revised**: Chiller units and pads demolition scopes have been revised to be included as base scope.
   - **d.** **Revised**: Existing light poles revised to be protected and remain in place as indicated in drawings.
   - **e.** **Added**: Added existing map stand to remain at the north end of the walkway of Biological Sciences Building as indicated in drawings.
   - **f.** **Added**: Added existing walkways near the north side of the Biological Sciences Building as indicated in drawings.
   - **g.** **Added**: Added note to include removal of MEP items attached and/or associated with canopy structure as indicated in drawings.

2. **Revise/Add, as noted:**
   - **a.** **Add:** AC path to be removed Northwest corner of the biological science building. EC plans adjusted accordingly.
   - **b.** **Revise:** Boiler House to remain and patched where utilities removed.
   - **c.** **Revise:** Removal of biological science chiller changed to Add Alt 2.
   - **d.** **Add:** Demolition/trimming of existing trees added to plan.
   - **e.** **Add:** Two (2) Additional Light poles to be protected, 2 to be removed.
   - **f.** **Add:** Two (2) Additional Storm Structures to be protected.
   - **g.** **Revise:** Canopy foundation to remain, posted to be cut clean and grouted.
   - **h.** **Add:** ALL rainwater leader connections to be removed and capped at point of connection.
   - **i.** **Add:** Removal of Natural Gas emergency generator and associated utility lines.
   - **j.** **Add:** All rebar from pile/pier removal to be cut flush.
   - **k.** **Add:** Additional Notes regarding the removal of foundations and piles.
   - **l.** **Revise:** Grading has been adjusted for the northern portion of the physical science building.

B. If you have any questions regarding this Addendum, please contact:

Mr. Ben Cayabyab, Contracts Manager
Contra Costa Community College District
500 Court St., Martinez, CA 94553
Email: **bcayabyab@4cd.edu**
Facsimile: 925-370-7512;

All other terms and conditions of BID are to remain the same.

ADDENDUM #2

ATTACHMENTS

1. SECTION 00300 BID PROPOSAL FORM, Addendum 2
2. SECTION 01030 ALTERNATES, Addendum 2
3. SECTION 01140 WORK RESTRICTIONS, Addendum 2
4. PRE-DEMOLITION SURVEY REPORT, dated November 24, 2021
5. SECTION 01572.1 Storm Water Pollution Prevention Plan, November 11, 2021
6. AD1.3 SITE DEMOLITION SHEET
7. CIVIL DRAWING SHEETS — C1.0 - C7.0 (8 sheets) – C-4016 INC 3, ADD2

SECTION 00300
BID PROPOSAL FORM (Adden. 2)

PROJECT NUMBER / NAME: C-4016, Inc. 3, Demo and Abatement of Physical Science and Biological Science Buildings and other Structures

CAMPUS / LOCATION: Contra Costa College, 2600 Mission Bell Drive, San Pablo, CA. 94806

DISTRICT: CONTRA COSTA COMMUNITY COLLEGE DISTRICT
500 Court St, Martinez, CA 94553

Herein Referred to as "District"

1. INTRODUCTION

A. The Bidder proposes to perform the Work for the Contract Sum and within the proposed Contract Time, based upon an examination of the site and the Bid and Contract Documents.

B. The Bidder certifies this Bid is submitted in good faith.

C. The Bidder agrees that the Contract Sum and other proposed terms will be considered in evaluating Bids and may be negotiated and adjusted before awarding of Contract.

D. The signed copy of the Certification of the Visit to the Site shall be attached to the Bid Form Submittal.

E. A fully executed Statement of Bidder's Qualifications signed by an authorized officer of the Bidder submitting the Bid shall be attached to the Bid Form.

F. A fully executed Non-Collusion Affidavit signed by an authorized officer of the Bidder submitting Bid shall be attached to the Bid Form.

G. **The District shall award the contract to the lowest responsive and responsible Bidder. The evaluation of the low bid shall be based on the total of Item 2.A Base Bid; all unit prices included in Item 2.B Unit Prices; and all listed 2.C Add Alternates C.1 and C.2.**

H. The District reserves the right to delete any or all Add Alternates, if any, through change orders within **45 calendar days** after the Award of Contract. If deleted by the District, the deleted dollar amount shall be the amount listed for the specific Add Alternate. The Contract Time will remain the same regardless if any Add Alternate is deleted.

2. CONTRACT SUM

A. BASE BID

For labor, materials, bonds, fixtures, equipment, tools, transportation, services, sales taxes, overhead and profit, and other costs necessary to complete the general construction in accordance with the Contract Documents, for a stipulated Contract Sum in the amount of:

____ Dollars ($________________________)

B. UNIT PRICES

Contractor's Base Bid shall be calculated based upon quantities and other information **as shown in the FACS *Pre-Demolition Survey Report*, dated November 24, 2021**. If Base Bid quantities are exceeded the Contractor will be compensated using the unit prices listed below, which are based on the additional arbitrary quantities listed below. A deductive change order will be issued for any remaining quantities listed below that are not used. Unit prices listed below will also apply should these arbitrary quantities be exceeded.

Unit prices include labor, materials, bonds, fixtures, equipment, tools, transportation, services, sales taxes, overhead and profit, and other costs necessary to complete the general construction in accordance with the Contract Documents, for a stipulated Contract Sum in the amount of:

1. **Unit Price #1: Vinyl Flooring & Mastic**

Qty 4,000 SQ FT X Unit Price $___________________ SUBTOTAL $_____________

2. **Unit Price #2: Wallboard / Joint Compound / Texture**

Qty 9,000 SQ FT X Unit Price $___________________ SUBTOTAL $_____________

3. **Unit Price #3: Pipe And Fitting Insulation**

Qty 200 LF X Unit Price $___________________ SUBTOTAL $_____________

4. **Unit Price #4: HVAC Mastic**

Qty 100 LF X Unit Price $___________________ SUBTOTAL $_____________

5. **Unit Price #5: Exterior Wall Sealant / Expansion Joint**

Qty 100 LF X Unit Price $___________________ SUBTOTAL $_____________

6. **Unit Price #6: Window Caulking**

Qty 300 LF X Unit Price $___________________ SUBTOTAL $_____________

7. **Unit Price #7: Exterior Caulking**

Qty 600 LF X Unit Price $___________________ SUBTOTAL $_____________

8. **Unit Price #8: ACM Vapor Barrier**

Qty 50 YD________X Unit Price $___________________ SUBTOTAL $____________

C. **ADD ALTERNATES**

1. **HAZARDOUS CHEMICAL STORAGE**

____Dollars ($_______________________)

2. **BIOLOGICAL SCIENCES CHILLER**

____Dollars ($_______________________)

3. COMPLETION TIME

A. For establishing the Date of Final Completion, the contract time for the Base Bid shall be as indicated in Section 00600, Construction Agreement. This time may be subject to modification to facilitate the work, as mutually agreed upon at a later date.

B. The Bidder certifies that the Bid is based on the Contract Time for completion as stated in Section 00600, Construction Agreement. Bidder further certifies that the Base Bid amount is sufficient to cover all labor, materials, central office and construction site overhead, profit, and all other costs related to the completion of the Project for the entire Project construction time for both the General Contractor and all Subcontractors, as stated above in paragraphs 2 and 3.

4. ADDENDA

A. The Bidder acknowledges receipt of the following Addenda, and certifies the Bid has provided for all modifications and considerations required therein.

None [ ]

Addendum No.: _________ dated _________________

Addendum No.: _________ dated _________________

Addendum No.: _________ dated _________________

Addendum No.: _________ dated _________________

B. List of Additional Addenda Attached: Yes [ ] No. [ ].

5. DESIGNATION OF SUBCONTRACTORS

A. The Bidder has set forth a complete list indicating the type of work, name, and business address of each Subcontractor who will perform work in excess of one-half of one percent of the Contract Sum.

B. Any portion of the work in excess of the specified amount having no designated Subcontractor shall be performed by the Bidder.

C. Substitution of listed Subcontractors will not be permitted unless approved in advance by the District.

D. Prior to signing the Contract, the District reserves the right to reject any listed Subcontractor.

	Type of Work	Subcontractor's Name	Business Address/Phone	CSLB License # and DIR Registration #
1				
2				
3				

E. Complete list of Subcontractors is attached: Yes [ ] No [ ]

F. Continuation list of Subcontractors is attached: Yes [ ] No [ ]

6. ACCEPTANCE AND AWARD

A. The District reserves the right to reject this Bid and to negotiate changes before or after execution of the Contract. This Bid shall remain open and shall not be withdrawn for a period of 90 days after Bid Opening date.

B. If written notice of acceptance of this Bid is mailed or delivered to the Bidder within 90 days after the date set for the receipt of this Bid, or other time before it is withdrawn, the Bidder will execute and deliver to the District a Contract prepared by District with the required Surety Bonds and Certificates of Insurance, within 10 days after personal delivery or deposit in the mail of the notification of acceptance.

C. Notice of acceptance or request for additional information may be addressed to the Bidder at the address provided.

7. BID SECURITY

A. The required 10 percent (10%) Bid Security for this Bid is attached in the form of:

( ) Bid Bond Issued By: ____________________________________

( ) Certified or Cashier's Check No.__________________________________

Issued by: ____

8. BIDDER'S BUSINESS INFORMATION

A. Individual [ ]:____

Personal Name: ____

Business Name: ____

Address: ____

_____________________Zip Code:_____________

Telephone: ____

Fax Number: ____

B. Partnership [ ]:____

Co-partners' Names:____

Business Name: ____

Address: ____

_____________________Zip Code:_____________

Telephone: ____

Fax Number: ____

C. Corporation [ ]: ____

Firm Name: ____

Address: ____

_____________________________Zip Code:_____________

Telephone: ____

Fax Number: ____

State of Incorporation: ____________________________________

President:____

Secretary:____

Treasurer: ____

Manager: ____

D. **Power of Attorney:** Name:________________________________

Title:________________________________

E. **Contractor License No.** ______________ State of __________________________

F. Bidder is submitting this proposal on behalf of a Joint Venture. Names, license numbers, and relevant information are given on a separate attachment:
Yes [ ] No [ ].

G. Upon request, furnish appropriate documentation to substantiate and/or support the data given.

9. The undersigned hereby certifies under penalty of perjury under the laws of the State of California that all the information submitted by the Bidder in connection with this Bid and all the representations herein made are true and correct.

Executed this day of ____

____
CSLB License No. Expiration Date DIR Registration No.

____
Firm Name

____
Signature

____
By (Print or Type Name)

____
Title

End of Section 00300

SECTION 01030

ALTERNATES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. All Contract Documents shall be reviewed for applicable provisions related to the provisions in this document, and provisions in the General Conditions and other Division 1 Specification Sections shall apply to this Section without limitation.

1.2 RELATED REQUIREMENTS SPECIFIED IN OTHER SECTIONS

A. SECTION 00200 – INSTRUCTIONS TO BIDDERS

B. SECTION 00300 – BID PROPOSAL FORM

C. SECTION 00700 – GENERAL CONDITIONS

D. SECTION 01010 – SUMMARY OF WORK

E. SECTION 01311 – PROJECT MANAGEMENT AND COORDINATION

F. If listed below in Part 2, also see the Contract Drawings for additional information and requirements regarding the Alternates, as applicable.

1.3 SUMMARY

A. This Section includes administrative and procedural requirements governing Alternates. Each Alternate is identified by number and describes the basic changes to be made in the Work. A list of Alternates is included in Part 2 of this Section.

1.4 DEFINITIONS

A. Alternate, as used herein, is a dollar amount proposed by Bidders and stated on the Bid Proposal form for Work defined in the Contract Documents that the District may elect to add to or deduct from the Base Bid, as the case may be, if an Alternate or Alternates, are accepted by the District.

1.5 REQUIREMENTS

A. Alternate pricing quoted on the Bid Proposal Form will be reviewed by the District, and accepted or rejected at District’s sole option. Any accepted Alternate(s) will be identified in the Construction Agreement, or shall be executed by Change Order.

B. See Section 00300, Bid Proposal Form, Paragraph 1.G for the bid award process.

C. All Alternates are either “additive” or “deductive” or “no change” to the Lump Sum Base Bid. The Contractor shall quote the amount for each Alternate in the space provided on the Bid Proposal Form.

D. Failure to either quote an Alternate amount or the insertion of the words “no bid,” “none” or words of similar import, may be considered as not completing the Bid Proposal Form and may constitute disqualification of the entire bid at District’s sole discretion. Bidders may insert a zero-dollar amount ($0.00) in the Alternate price line of the Bid Proposal Form if the Bidder proposes to perform the Work of the Alternate with no additional change to the Contract Sum.

E. The Base Bid and the Alternates are exclusive in their scope of Work. There is no overlap between or among the Base Bid and the Alternates.

F. The cost of any item of work shall be included only once, in the Base Bid or in the Alternates.

G. Each Alternate is intended to cover all of the Work required for a complete, finished job.

  1. Alternate Work includes all miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of the Alternate, but necessary to complete the Alternate Work according to the Contract Documents.

1.6 PROCEDURES

A. Modify or adjust affected adjacent Work as necessary to completely integrate Work of each accepted Alternate into the Project.

B. Notification: Immediately following Notice to Proceed, Contractor shall notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. The District reserves the right to delete **Add Alternates** at any time within **45** calendar days after the Notice of Award with the corresponding decrease in Contract Price. Contract Time shall remain the same regardless of any add alternate deletions.

D. Execute accepted Alternate(s) under the same conditions as other Work of this Contract.

PART 2 - PRODUCTS

2.1 DESCRIPTION OF ADDITIVE ALTERNATES

SEE SCOPE OF WORK ON SHEET INC-3 AD1.3 (ADDENDUM 2).

PART 3 - EXECUTION

3.1 GENERAL

A. Execute accepted alternates under the same conditions as other Work of this Contract.

B. Coordination: Modify or adjust affected Work as required to completely and fully integrate that Work into the Project.

END OF SECTION 01030

SECTION 01140

WORK RESTRICTIONS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. All Contract Documents shall be reviewed for applicable provisions related to the provisions in this document, and provisions in the General Conditions and other Division 1 Specification Sections shall apply to this Section without limitation**.**

1.2 SUMMARY OF WORK RESTRICTION REQUIREMENTS

A. Prior to the start of Work, Contractor shall familiarize itself with the Work Restrictions as they relate to all Work required by the Contract Documents.

B. Temporary Work Activity Plan shall include:

1. Full size drawing (36"x42") of site plan showing the proposed locations and dimensions of temporary facilities and activities, including but not limited to, all proposed trailers, equipment and material storage areas on the Project Site; safe and ADA complaint access (ingress/egress) for pedestrians and vehicles around the construction areas; proposed haul routes; all temporary construction, and way-finding signage; temporary fenced area(s), noise and safety barriers, and dust partitions; and temporary measures to maintain continuous and uninterrupted code compliant use of ~~all occupied and~~ surrounding areas impacted by construction activities. Identify any areas that require temporary paving for stabilization or prevention of tracking of mud, and for ADA complaint ingress and egress. Indicate if the use of supplemental or other staging areas for District approval might be required at Contractor's cost. **Also see *Section 01500 Temporary Facilities and Control* for additional requirements.**

2. Contractor shall submit two (2) hard copies at the pre-construction meeting, and email Adobe PDF Format of the initial submittal of the Temporary Work Activity Plan for review by the District, Architect, and by personnel from the Campus (e.g., Buildings & Grounds, Police Department, and other representatives).

C. Contractor shall construct dust partitions and other barriers as required by the Contract Documents prior to the start of abatement or demolition activities, whichever may occur first, and they must remain in place until the completion of that activity where required.

D. Contractor shall perform and complete all Temporary Work Activities to ensure the following:

~~1. The continuous and uninterrupted use of all occupied areas or areas within buildings that require 24/7 utility services, including but not limited to the applicable power, data, telephone, waterline, fire alarm system, fire sprinkler system mechanical, HVAC, gas, storm, sewage, plumbing, and electrical systems serving these areas.~~

2. Protection of students, staff, faculty and personnel in ~~occupied areas and~~ surrounding and adjacent areas from the hazards and dust associated with construction.

3. The work areas, roads, parking lots, and streets are to be kept clear, clean, and free of loose debris, construction materials and partially installed work which would create a safety hazard or interfere with adjacent use by vehicles and pedestrians. **The Contractor shall sweep adjacent roads and pathways clean at the end of each workday where Contractor**

activities generated mud and other debris tracked onto nearby roads and pedestrian pathways.

4. Prior to starting work, the Contractor shall provide a proposed schedule of temporary interruptions or shutdown of any utility or electrical/mechanical systems to the District Representatives. The Contractor shall provide written request **(10) working days** prior to the desired time for the proposed interruption(s). Work shall be performed at times other than the Campus's normal hours of operation, or as directed by the District's Representative. Temporary interruptions shall be completed prior to the start of the next business day at the Campus to maintain continuous and uninterrupted use of Campus facilities and utility systems.

1.3 SUMMARY OF WORK RESTRICTIONS

A. **General:** All Temporary Work Activities must be completed within the timelines, work shift times, and the scheduled time period as required by the Contract Documents. Comply with the following:

1. The Temporary Work Activity Plan shall be approved by the District prior to any Work starting on the Project Site.

2. **Contractor shall have all temporary fencing, signage, ADA compliant pathways and other temporary measures described in Paragraph 1.2 above installed, operational and accepted by the District prior to starting abatement and building demolition or other Work as applicable, unless otherwise noted in Article 1.3B below.**

B. **Time Related Work Restrictions within the Contract Time**

1. Although the Contract Time is a total of **200 calendar days** between the Notice to Proceed and Substantial Completion, as articulated in Section 00600, Construction Agreement, Work by the Contactor is restricted and limited to specific time periods at specific locations during this contract duration as follows:

1.1 **Commencement of Work on the Project Site: Other than the removal of trees and vegetation shown or required to be removed**, Contractor cannot and shall not start any Work on the project site until **50 calendar days after the Notice to Proceed**, unless the District provides written approval. The time between the Notice to Proceed and commencing Work on the project site shall be used for completing all off-site requirements (e.g., obtain approval of the Temporary Work Activity Plan; transmittal of all required submittals; submittal and approval of the CPM schedule; transmittal and approval of abatement submittals, etc.)**. During this 50 calendar day time period, the District will be allowed safe access to the buildings to removed miscellaneous equipment and other items intended for use at the new Science Building.**

1.2 **Removal of Trees and Vegetation by No Later than February 28, 2022. After the Notice to Proceed is issued, the Contractor shall identify all trees and vegetation on site shown to be removed and meet with the District to confirm before the trees are cut down or trimmed and removed from the project site. Due to the Bird Nesting Season starting on March 1, 2022, all trees and vegetation shown or required to perform the Work to be removed shall be removed from the project site prior to March 1, 2022. Contractor**

shall have all temporary fencing installed prior to commencement of cutting down or removing trees and vegetation.

1.3 **Sunday Work**: Work on Sunday is not allowed, unless otherwise approved by the District.

1.4 **Finals Week:** The Contractor shall not work between **May 16, 2022 and the close of business on May 20, 2022,** unless otherwise approved by the District/College, as this is finals week and noise generation activities will not be permitted.

1.5 **Delayed Notice of Award: In the event the Notice of Award is not issued in January 2022, the District will remove the tree removal and tree trimming from the Contractor's scope of work and will have this work performed by others. Contractor shall provide bid estimate documents to confirm the direct cost for this scope of work. In addition, the 50 calendar day time period noted above in Article B1.1 will be reduced to 30 calendar days.**

2. The Contractor is responsible for its own means and methods to comply with these work restrictions, and to submit its schedule in accordance with Section 00700, Article 3.8.

C. Other Project Requirements and Restrictions

1. The Contractor's staging area for trailers, construction vehicles, construction equipment and materials is restricted to the general area within the temporary construction fencing shown on **Drawing C2.00 Limit of Work Boundary**.
2. **Due to the one lane vehicular road north and east of the project site, the Contractor is cautioned not to attempt to drive the wrong way (i.e., headed east) on this road. Violators will be ticketed by the Campus Police Services.**
3. Truck traffic, material deliveries and equipment deliveries on this one-way road to the project site shall be closely monitored and controlled by the Contractor to avoid any delays to other vehicles using this road by faculty and students. The Contractor shall include delivery milestones in its Project CPM Schedule, and provide written notice at least two (2) workdays to the District and to the Police Services for all deliveries. Any material or equipment deliveries that could potentially delay traffic on this one-way road will have to be delivered after normal business hours, unless otherwise approved by the District. Contractor truck deliveries that stop traffic on this road or other roads on Campus could be subjected to being ticketed by the Campus Police Services.
4. **Truck Hauling Routes.** Obtain City of San Pablo approval for preferred construction traffic routing over public streets and/or other construction truck access and egress from public streets to the Site. Contractor shall avoid routing trucks through residential areas. Prohibit mobilization and demobilization of heavy construction equipment and trucks on residential streets. No construction truck access or egress is permitted on Mills Avenue.

PART 2 - PRODUCTS

2.1 MATERIALS

A. All labor, equipment, materials, and all other requirements shall be provided and will be the sole responsibility of the Contractor for execution of entire work described in this specification section.

PART 3 - EXECUTION

3.1 MEANS AND METHODS OF CONSTRUCTION

A. Contractor to provide and shall be responsible for any and all means and methods that will be constructed, implemented and/or maintained on the site for all work described above.

END OF SECTION 01140

November 24, 2021

Pre-Demolition Survey Report

Asbestos and Lead Survey Report

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
2600 Mission Bell Drive
San Pablo, California 94806

Contract No. B0010039

Prepared for:

Ms. Gaile Suarez
CSI / Contra Costa Community College District
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FACS Project #PJ63338

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Contents

Executive Summary

Forensic Analytical Consulting Services, Inc. (FACS) was retained by Contra Costa Community College District (District) to perform a pre-demolition asbestos, lead, and polychlorinated biphenyls (PCB) survey of six (6) structures located on the Contra Costa Community College campus at 2600 Mission Bell Drive, in San Pablo, California. The six structures include the Chemical Storage Building, Biological Science Building, Boiler Room Building, Physical Science Building North, Physical Science Building South and selected chiller units.

This survey was limited to suspect asbestos-, lead-, and PCB-containing materials that will be disturbed during the demolition of the buildings. The survey was performed between May 24 and November 12, 2021. This report presents the findings of the pre-demolition asbestos and lead survey and includes a summary of the visual inspection for PCB-containing light ballasts. Findings of the PCB bulk sampling survey was presented in a separate report.

A list of all suspect asbestos- and lead-containing materials identified and sampled as part of this survey, along with the corresponding analytical result of each sample, is included in Appendix A of this report.

Asbestos-Containing Materials

The following building materials were identified as asbestos-containing:

Description	Building Material Location
Tan Sheet Flooring and Mastic	Biological Science Building
Gypsum Wallboard / Joint Compound	Biological Science Building
12x12 Blue Speck Floor Tile and Mastic	Biological Science Building
TSI Elbow Pipe Fittings	Biological Science Building
Black Chalkboard	Biological Science Building
Black Countertop	Biological Science Building
Orange Peel Wall Tile on Wallboard with Texture Coat and Joint Compound	Biological Science Building
Tank Insulation	Biological Science Building
White HVAC Vibration Dampener	Biological Science Building
Black Mastic on HVAC Coils Drip Pan	Biological Science Building
White Cloth HVAC Gasket	Biological Science Building
HVAC Seam Mastic / Silver Paint	Biological Science Building
Dark Gray Sealant on Generator Exhaust Duct Fan	Biological Science Building
Exterior Stucco	Biological Science Building

Exterior Concrete	Biological Science Building
Exterior Light Gray Caulk	Biological Science Building
Asbestos Cement Exhaust Flue	Biological Science Building
Exterior Concrete	Boiler Room Building
Exterior Sealant	Boiler Room Building
TSI Pipe Runs and Fittings Insulation	Boiler Room Building
12”x12” Brown with White Specks Floor Tile Over Black Mastic	Physical Sciences Building North
12”x12” Blue with White Streaks Floor Tile Over Black Mastic	Physical Sciences Building North
12”x12” Beige with Gray Streaks Floor Tile Over Black Mastic Over Brown Mastic	Physical Sciences Building North
12”x12” Red Floor Tile Over Black Mastic	Physical Sciences Building North
12”x12” Gray with Black Dots Floor Tile Over Black Mastic	Physical Sciences Building North
Gypsum Wallboard / Joint Compound	Physical Sciences Building North
Wall Texture Large Splotch	Physical Sciences Building North
Wall Texture Orange Peel Splotch	Physical Sciences Building North
White Sink Undercoat	Physical Sciences Building North
Black Lab Table	Physical Sciences Building North
Black Window Caulking	Physical Sciences Building North
9”x9 Tan with Brown Streaks Floor Tile Over Black Mastic	Physical Sciences Building South
12”x12” Beige with Dark Gray and White Floor Tiles over Black Mastic	Physical Sciences Building South
12”x12” Dark gray with White Streaks Floor Tiles over Black Mastic	Physical Sciences Building South
12”x12” Red with Black Streaks Floor Tile over Black and Yellow Mastic	Physical Sciences Building South
12”x12” Light Brown with White Streaks Floor Tile over Yellow Mastic	Physical Sciences Building South
Black Exhaust System Tabletop	Physical Sciences Building South
Gray Exhaust System Panel	Physical Sciences Building South
Black Exhaust System Panel	Physical Sciences Building South

White Insulation Packing	Physical Sciences Building South
Gypsum Wallboard / Joint Compound	Physical Sciences Building South
Off White Transite Pipe Fitting	Physical Sciences Building South
Pipe Penetration Tape and Insulation	Physical Sciences Building South
Exhaust Hood	Physical Sciences Building South
White Transite Pipe	Physical Sciences Building South
Pipe Penetration Tape and Insulation	Physical Sciences Building South
Exterior White Window Caulking	Physical Sciences Building South
Exterior Off-White Expansion Joint	Physical Sciences Building South
Exterior Black Caulking	Physical Sciences Building South
Roof Flashing	Physical Sciences Building South
Exterior Gray Sealant	Physical Sciences Building South
Brown Pipe Wrap Mastic	Chiller Area
Black Pipe Wrap	Chiller Area

Lead-Containing Materials:

The following paints were identified by laboratory analysis to contain detectable amounts of lead:

Description	Lead Content Weight % or PPM	Sample Location
Orange Paint on Gypsum Wallboard	0.33%	Biological Science Building
Beige Paint on Gypsum Wallboard	0.14%	Biological Science Building
Off-White Paint on Plaster	0.38%	Biological Science Building
Black Paint on Metal Beam	0.75%	Biological Science Building
White Paint on Wood Trim	0.035%	Biological Science Building
Blue Paint on Wood	0.037%	Biological Science Building
Off-White Paint on Wood	0.21%	Biological Science Building
Beige Paint on Metal	0.016%	Biological Science Building
Yellow Paint on Metal Support Post	0.037%	Biological Science Building
Red Paint on Metal Pipe Valve	0.022%	Biological Science Building

Description	Lead Content Weight % or PPM	Sample Location
Gray Paint on Metal Exhaust Flue	180,000 ppm	Biological Science Building
White Paint on Stucco	0.0073%	Biological Science Building
White Paint on Metal	0.023%	Biological Science Building
Beige Paint on Metal	2.9%	Biological Science Building
Brown Paint on Metal	0.063%	Biological Science Building
Black Paint on Metal	0.28%	Biological Science Building
White Paint on Wood	0.82%	Biological Science Building
White Paint on Metal	<0.0081%	Biological Science Building
Grey Metal Chiller Component	0.88%	Chiller Unit
Gray Paint on Chiller Units	3.3%	Chiller Unit CH9 & CH10
Light Orange Paint on Plaster	0.96%	Physical Sciences Building South
Off-White Paint on Plaster	0.10%	Physical Sciences Building South
Orange Paint on Plaster	1.9%	Physical Sciences Building South
Dark Blue Paint on Drywall	0.11%	Physical Sciences Building South
Brown Paint on Metal	0.38%	Physical Sciences Building South
Baby Blue Paint on Metal	0.32%	Physical Sciences Building South
Brown Paint on Plaster	0.26%	Physical Sciences Building South
Black Paint on Glass	0.012%	Physical Sciences Building South
Red Paint on Metal	0.029%	Physical Sciences Building South
Off-White Paint on Metal	0.039%	Physical Sciences Building South
Off-White Paint on Drywall	0.32%	Physical Sciences Building South
Green Paint on Metal Window Frame	5.5%	Physical Sciences Building South
Green Paint on Wood Wall	0.090%	Physical Sciences Building South
Baby Blue Paint on Wood Baseboard	0.57%	Physical Sciences Building South
Brown Paint on Wood Baseboard	0.97%	Physical Sciences Building South
Off-White Paint on Wood Baseboard	0.29%	Physical Sciences Building South
Light Brown Paint on Wood Cabinet	0.013%	Physical Sciences Building South
Dark Blue Paint on Metal Door Frame	0.34%	Physical Sciences Building South
Black Paint on Metal Door	0.11%	Physical Sciences Building South
Orange Paint on Metal HVAC Unit	8.5%	Physical Sciences Building South
Light Orange Paint on Transite Exhaust Hood	0.47%	Physical Sciences Building South

Description	Lead Content Weight % or PPM	Sample Location
Dark Blue Paint on Transite Exhaust Hood	0.020%	Physical Sciences Building South
Dark Brown Paint on Metal Post	3.2%	Physical Sciences Building South
White Paint on Stucco Wall	0.19%	Physical Sciences Building South
Brown Paint on Metal Door	2.5%	Physical Sciences Building South
Blue Paint on Metal Post	0.008%	Physical Sciences Building South
Pink Paint on Concrete Wall	0.11%	Boiler Room Building
Brick Red Paint on Metal Door	1.4%	Boiler Room Building
Brick Red Paint on Metal Pipe	1.2%	Boiler Room Building
Ferrari Red Paint on Metal Pipe Flange	0.078%	Boiler Room Building
Yellow Paint on Metal Pipe	0.019%	Boiler Room Building
Blue Paint on Thermal System Insulation	0.18%	Boiler Room Building
Blue Paint on Metal Door Frame	1.4%	Boiler Room Building
Gray Paint on Pipe	0.007%	Boiler Room Building
Gray Paint on Pedestal	0.19%	Boiler Room Building
Gray Paint on Metal Handrail	0.089%	Physical Sciences Building North
Red Paint on Metal Duct	0.032%	Physical Sciences Building North
Black Paint on Metal Door Frame	0.32%	Physical Sciences Building North
White Paint on Metal Door Frame	0.032%	Physical Sciences Building North
Yellow Paint on Metal Fixture	1.9%	Physical Sciences Building North
Brown Paint on Metal Door Frame	0.20%	Physical Sciences Building North
Red Ceramic Wall Tile	0.008%	Physical Sciences Building North
Yellow Paint on Drywall	0.034%	Physical Sciences Building North
Red Paint on Metal Beam	0.028%	Physical Sciences Building North
Brown Paint on Metal Rail	0.12%	Physical Sciences Building North
Black Paint on Metal Door	0.018%	Physical Sciences Building North

7

PCB-Containing Light Ballasts and Fluorescent Light Tubes:

Three hundred sixty-five (365) suspect PCB-containing ballasts and seven hundred twenty-five (725) fluorescent light tubes were identified within the buildings.

FACS recommends that the results of this report be incorporated into the demolition plans for the building. In addition, the removal of any of the above-referenced materials should be conducted by an appropriately California licensed and registered contractor. A more complete discussion of findings, conclusions, and recommendations is provided below.

Introduction

Contra Costa Community College District retained FACS to perform a pre-demolition survey for asbestos-, lead-, and PCB-containing materials for the commercial building located at the above-referenced address. Sampling was performed between May 24, and November 12, 2021. This report presents the findings of the pre-demolition asbestos and lead survey and includes a summary of the visual inspection for PCB-containing light ballasts.

Site Characterization

The Survey includes six (6) structures located on Contra Costa College Campus, 2600 Mission Bell Drive, San Pablo, California. The six structures include the Chemical Storage Building, Biological Science Building, Boiler Room Building, Physical Science Building North, Physical Science Building South, and selected chiller units. The structures are in the northeast section of the campus. Demolition is planned for all six (6) structures.

The Physical Science Building North and Physical Science Building South are attached and known collectively as the Physical Science Building. Both building have different entrances and the Physical Science Building North has a later construction date. For the purpose of this survey, we have defined the Physical Science Building as two separate buildings. Both buildings and the Biological Science Building are currently in use as classroom buildings.

The Boiler Room Building, Chemical Storage Building, and three client-identified chiller units (counted as a structure in this project) are currently in use as support services to the Physical Science Building and Biological Science Building. These structures are not accessible to students and the general public.

Scope of Work

Asbestos

The asbestos survey was conducted by personnel accredited as asbestos inspectors under the federal Environmental Protection Agency (EPA) Asbestos Hazard Emergency Response Act (AHERA) and certified by the California Division of Industrial Relations, Department of Occupational Safety and Health (Cal/OSHA) as an Asbestos Consultant (CAC) and a Site Surveillance Technician (SST). FACS representatives Martin Alvarez, Peter Radzinski, Certified Asbestos Consultants (CAC# 98-2382 and 15-5571), Anthony Aguilar, and Jim Sevilla, Site Surveillance Technicians (SST# 19-6525 and 19-6720), conducted the asbestos survey. FACS employee certifications are included in Appendix D.

The scope of the survey and the services provided by FACS included:

- Performing a visual inspection of the buildings to identify accessible suspect asbestos-containing building materials (ACBMs);
- Collecting and analyzing bulk samples of suspect building materials for asbestos content;
- Ensuring the technical quality of all work by using Asbestos Hazard Emergency Response Act (AHERA) accredited Inspectors and Management Planners and Cal/OSHA certified asbestos personnel;
- Consolidating data and findings into a report format.

Materials to be disturbed by the project and suspected of containing asbestos were sampled in accordance with the federal EPA AHERA protocols. Suspect materials were grouped and classified as homogeneous materials based on their color, texture, and time of construction (i.e., similar appearing materials in different construction phases of a building are classified as separate materials). For any suspect materials determined to be impacted by the project, samples representative of the materials were collected. Materials determined by the inspector to be non-suspect, such as wood, metal, glass, and fiberglass insulation, were not sampled.

Samples were collected in such a manner as to minimize release of the material into the surroundings. Material type, sample number, sample location, and other pertinent information were recorded at the time of sampling. Each sample was placed in an airtight container labeled with a unique sample number and submitted to SGS Forensic Laboratories (SGS), in Hayward California and Micro Analytical Laboratories, Inc. (MAL) in Emeryville, California for analysis. Samples were analyzed in accordance with EPA Method 600/R-93-116, using polarized light microscopy (PLM) with dispersion staining and using visual area estimation to determine percent asbestos content. This method allows for the identification of the primary types of asbestos used in building materials. The lower limit of detection for this method is one percent. Samples containing less than one-percent asbestos by this PLM method are reported as Trace.

Lead

The lead survey was conducted by personnel certified for lead-related construction consulting work by the California Department of Public Health (CDPH). FACS representatives Martin Alvarez, a CDPH Certified Inspector Assessor (LRC-00001062), Peter Radzinski, Anthony Aguilar, and Miguel Coyotl, CDPH Certified Sampling Technicians (LRC-00002184, LRC-00001334 and LRC-00002983), conducted the lead survey.

The lead survey was limited to prevalent and predominant paints within the interior and exterior of the buildings. The purpose of the lead testing was to provide information to assist the contractor in compliance with various regulatory requirements during the demolition. Since this paint chip survey sampled only representative components and not every individual component, the lead results are assumed to be the same on like components in the same general area of the representative component that was sampled.

All of the suspect lead paint samples were analyzed by MAL and SGS using atomic absorption spectrometry (Flame AAS) in accordance with EPA SW-846 Method 7420 and 3050B/7000B. The detection limit is determined by factors including the size and matrix of each individual sample.

Paint containing lead greater than 0.5% lead by weight (or 5,000 ppm) is considered lead-based paint by CDPH and the EPA, which regulate the disturbance of lead-based paint. Paint with any detectable level of lead is considered lead-containing paint by Cal/OSHA and is regulated under Title 8 California Code of Regulations (CCR) Section 1532.1, Lead in Construction Standard.

PCB-Containing Light Ballasts

California DTSC and the U.S. EPA regulate the use, handling, and disposal of polychlorinated biphenyls (PCBs). PCBs were used in the manufacture of a variety of electrical equipment and components. Until the late 1970s, fluorescent light fixture ballasts often contained regulated concentrations of PCBs.

In the 1970s federal legislation was enacted that prohibited the manufacture and use of PCBs in general; however, almost all fluorescent light fixture ballasts manufactured through 1979 are assumed to have contained PCBs. Ballasts manufactured after 1979 that did not contain PCBs were required to be labeled “No PCBs” or “PCB-free.” Any ballast not containing a label indicating “No PCBs” or “PCB-free” should be assumed to contain regulated quantities of PCBs and handled in accordance with applicable laws and regulations. Disposal of such ballasts must be managed as a hazardous waste.

Beginning in 1979, lighting ballast manufacturers prohibited from using PCBs began substituting the substance Di(2-ethylhexyl)phthalate or DEHP. DEHP-containing fluorescent lighting ballasts were produced until approximately 1991, when dry-type ballasts became the industry standard. Although DEHP is recognized as a hazardous substance, neither the U. S. EPA nor DTSC currently regulates DEHP-containing lighting ballasts as hazardous waste. Free-liquid DEHP, as might result from a leaking or drained ballast, is regulated as a hazardous waste.

During this survey, FACS noted the presence of fluorescent light fixtures throughout the buildings. FACS did not visually inspect the ballasts, but rather documented the presence of such fixtures. Based on the age of construction, the ballasts should be assumed to be PCB-containing. However, any lighting fixture ballasts displaying a label indicating they contain “No PCBs” or are “PCB Free” should be assumed to contain DEHP and be recycled according to applicable state and federal regulations.

Asbestos Survey Methodology

Performing an asbestos survey prior to commencement of any demolition and renovation is regulated by the local air quality district. In the San Francisco Bay Area, an asbestos survey is required regardless of the building’s construction date. This asbestos survey was performed in accordance with the Bay Area Air Quality Management District (BAAQMD) Regulation 11, Rule 2.

BAAQMD and Cal/OSHA recognize material with more than one-percent (1%) asbestos to be asbestos-containing material (ACM). However, Cal/OSHA also requires notification and registration of the contractor when working with materials containing more than one-tenth of one percent (0.1%) asbestos, and requires worker protection and specified work practices whenever materials containing any detectable levels of asbestos are to be disturbed.

Our investigation consisted of the following:

- Visual inspection;
- Collection of samples of suspect ACM using the AHERA Survey protocol;
- Submitting samples to MAL and SGS for analysis by Polarized Light Microscopy (PLM). MAL and SGE are accredited by the American Industrial Hygiene Association (AIHA) and by the NIST National Volunteer Laboratory Accreditation Program (NVLAP) for asbestos sample analysis; and
- Presenting analytical results, conclusions, and recommendations in a report that can be submitted to the BAAQMD.

The suspect ACMs were sampled using a knife or other similar coring device suitable to the type of material sampled to cut through its entire thickness and to ensure that a cross-section of the material was obtained. The sample was then placed in an appropriately labeled container, which was sealed and submitted to the laboratory following appropriate chain-of-custody procedures.

The types, number, and locations of samples were determined based on available information about the subject project provided to FACS, visual observations, regulatory requirements, and other project management considerations.

Lead Survey Methodology

This survey was conducted by paint chip sampling. The paint chip samples were collected using a sharp scraper to remove all layers of paint down to the substrate material, taking care not to include the substrate in the sample. The sample was then placed in an appropriately labeled container, which was sealed and submitted to the laboratory following appropriate chain-of-custody procedures. The detection limit is determined by factors including the size and matrix of each individual sample.

The lead survey was intended to assist the District for compliance with Cal/OSHA worker protection requirements. *The lead survey was not a comprehensive lead-based paint survey as detailed in the "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing" by The National Center for Lead-Safe Housing for HUD.*

Our investigation consisted of the following:

- Visual inspection;
- Collection of samples of suspect lead-containing paint;
- Submitting samples to MAL and SGS for analysis by atomic absorption spectrometry (Flame AAS) in accordance with EPA SW-846 Method 7420 and 3050B/7000B. MAL and SGS are accredited by the AIHA Environmental Lead Laboratory Accreditation Program (ELLAP) and by the CDPH for lead analysis; and
- Presenting analytical results, conclusions, and recommendations in a report.

The types, number, and locations of samples were determined based on available information about the subject project provided to FACS, visual observations, regulatory requirements, and other project management considerations.

PCB Ballasts Survey Methodology

During this survey, FACS inspected the subject building for the presence of fluorescent light ballasts. The approximate number of ballasts, as well as fluorescent light tubes, are documented and presented in this report.

Asbestos Sampling and Analysis

FACS collected a total of four hundred and one (401) suspect asbestos bulk samples of one hundred ninety-three (193) suspect homogeneous materials from the project area. The detailed laboratory report and completed bulk sample request form (chain of custody) are contained in Appendix A. A floor plan identifying the sample locations can be found in Appendix B.

Lead Paint Sampling and Analysis

FACS collected ninety-two (92) paint chip samples and four (4) ceramic tile samples from the project area. The samples were submitted to MAL and SGS for analysis by Flame AAS in accordance with EPA SW-846 Method 7420 and 0350B/7000B. The detailed laboratory report and completed paint sample request form (chain of custody) are contained in Appendix A. A floor plan identifying the sample locations can be found in Appendix B.

Findings and Recommendations

Asbestos Survey Results

The table below presents a summary of the findings for each of the asbestos-containing materials identified in this survey.

Table 1. Asbestos Survey Results
C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
2600 Mission Bell Drive
San Pablo, California 94806

Material	Location	Asbestos Content	Estimated Quantity	Regulatory Classification
Tan Sheet Flooring and Mastic	Biological Science Building	Sheet Flooring: ND Mastic: 25% Chrysotile Asbestos	18,380 sf	CAT 1 Non-Friable
Gypsum Wallboard / Joint Compound	Biological Science Building	Drywall: ND Joint Compound: 2% Chrysotile Tape/Paint: ND	41,000 sf	RACM
12x12 White / Blue Speck Floor Tile and Mastic	Biological Science Building	Floor Tile: ND Mastic: 2% Chrysotile Asbestos Debris/Dust: ND	3,100 sf	CAT 1 Non-Friable
TSI Elbow Pipe Fittings	Biological Science Building	5% Chrysotile Asbestos	1,100 ea	RACM
Black Chalkboard	Biological Science Building	20% Amosite Asbestos 5% Chrysotile Asbestos	85 ea	CAT 2 Non-Friable
Black Countertop	Biological Science Building	35% Chrysotile Asbestos	120 ea	CAT 2 Non-Friable
Orange Peel Wall Tile on Wallboard with Texture Coat and Joint Compound	Biological Science Building	Drywall: ND Joint Compound: 3% Chrysotile Asbestos Tape: ND Paint: ND	8,000 sf	RACM
Tank Insulation	Biological Science Building	20% Amosite Asbestos 5% Chrysotile Asbestos	150 sf	RACM
White HVAC Vibration Dampener	Biological Science Building	40% Chrysotile Asbestos	16 ea	RACM
Black Mastic on HVAC Coils Drip Pan	Biological Science Building	15% Chrysotile Asbestos	80 sf	CAT 1 Non-Friable
White Cloth HVAC Gasket	Biological Science Building	80% Chrysotile Asbestos	16 ea	RACM
HVAC Seam Mastic / Silver Paint	Biological Science Building	Mastic: ND Paint (Silver): 8% Chrysotile Asbestos Mesh: ND	70 lf	CAT 1 Non-Friable
Dark Gray Sealant on Generator Exhaust Duct Fan	Biological Science Building	2% Chrysotile Asbestos	5 lf	CAT 1 Non-Friable
Exterior Stucco	Biological Science Building	Stucco: ND Skim Coat: <1% Chrysotile	130 sf	CAT 2 Non-Friable
Exterior Concrete	Biological Science Building	2% Chrysotile Asbestos	20 sf	CAT 2 Non-Friable
Exterior Light Gray Caulk	Biological Science Building	2% Chrysotile Asbestos	5,200 lf	CAT 1 Non-Friable
Asbestos Cement Exhaust Flue	Biological Science Building	Assumed Asbestos Material	20 sf	CAT 2 Non-Friable

Table 1. Asbestos Survey Results
C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
2600 Mission Bell Drive
San Pablo, California 94806

Material	Location	Asbestos Content	Estimated Quantity	Regulatory Classification
Exterior Concrete	Boiler Room Building	Trace Chrysotile	200 sf	CAT 2 Non-Friable
Exterior Sealant	Boiler Room Building	Trace Chrysotile	20 sf	CAT 1 Non-Friable
TSI Pipe Runs and Fittings Insulation	Boiler Room Building	3% Chrysotile 10-15% Amosite	900 lf	RACM
12"x12" Brown with White Specks Floor Tile Over Black Mastic	Physical Sciences Building North	Tile: ND Mastic: 5% Chrysotile Asbestos	900 sf	CAT 1 Non-Friable
12"x12" Blue with White Streaks Floor Tile Over Black Mastic	Physical Sciences Building North	Tile: ND Mastic: 5% Chrysotile Asbestos	20 sf	CAT 1 Non-Friable
12"x12" Beige with Gray Streaks Floor Tile Over Black Mastic Over Brown Mastic	Physical Sciences Building North	Tile: ND Mastic: 5% Chrysotile Asbestos	20 sf	CAT 1 Non-Friable
12"x12" Red Floor Tile Over Black Mastic	Physical Sciences Building North	Tile: ND Mastic: 5% Chrysotile Asbestos	20 sf	CAT 1 Non-Friable
12"x12" Gray with Black Dots Floor Tile Over Black Mastic	Physical Sciences Building North	Tile: ND Mastic: 5% Chrysotile Asbestos	20 sf	CAT 1 Non-Friable
Gypsum Wallboard / Joint Compound	Physical Sciences Building North	Wallboard: ND Joint Compound: 2% Chrysotile Asbestos Tape: ND Paint: ND	18,000 sf	RACM
Wall Texture Large Splotch	Physical Sciences Building North	Texture: 2% Chrysotile Asbestos Paint: ND	5,000 sf	RACM
Wall Texture Orange Peel Splotch	Physical Sciences Building North	Texture: 2% Chrysotile Asbestos Paint: ND	100 sf	RACM
White Sink Undercoat	Physical Sciences Building North	Coating: 2% Chrysotile Asbestos	15 sf	CAT 1 Non-Friable
Black Lab Table	Physical Sciences Building North	10% Chrysotile Asbestos	150 sf	CAT 2 Non-Friable
Black Window Caulking	Physical Sciences Building North	2% Chrysotile	150 lf18	CAT 2 Non-Friable
9"x9 Tan with Brown Streaks Floor Tile Over Black Mastic	Physical Sciences Building South	Tile: 5% Chrysotile Mastic: 5% Chrysotile	600 sf	CAT 1 Non-Friable
12"x12" Beige with Dark Gray and White Floor Tiles over Black Mastic	Physical Sciences Building South	Tile: ND Mastic: 5% Chrysotile	150 sf	CAT 1 Non-Friable

Table 1. Asbestos Survey Results
C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
2600 Mission Bell Drive
San Pablo, California 94806

Material	Location	Asbestos Content	Estimated Quantity	Regulatory Classification
12”x12” Dark Gray with White Streaks Floor Tiles over Black Mastic	Physical Sciences Building South	Tile: 3% Chrysotile Mastic: 5% Chrysotile	1,760 sf	CAT 1 Non-Friable
12”x12” Red with Black Streaks Floor Tile over Black and Yellow Mastic	Physical Sciences Building South	Tile: ND Mastic: 5% Chrysotile	20sf	CAT 1 Non-Friable
12”x12” Light Brown with White Streaks Floor Tile over Yellow Mastic	Physical Sciences Building South	Tile: 2% Chrysotile Mastic: ND	20 sf	CAT 1 Non-Friable
Black Exhaust System Tabletop	Physical Sciences Building South	10% Chrysotile Asbestos	200 sf	CAT 2 Non-Friable
Gray Exhaust System Panel	Physical Sciences Building South	10% Chrysotile Asbestos	200 sf	CAT 2 Non-Friable
Black Exhaust System Panel	Physical Sciences Building South	10% Chrysotile Asbestos	200 sf	CAT 2 Non-Friable
White Insulation Packing	Physical Sciences Building South	10% Amosite Asbestos 5% Chrysotile Asbestos	50 sf	RACM
Gypsum Wallboard / Joint Compound	Physical Sciences Building South	Drywall: ND Joint Compound: 2% Chrysotile	1,250 sf	RACM
Off White Transite Pipe Fitting	Physical Sciences Building South	10% Chrysotile Asbestos 5% Crocidolite	10 sf	RACM
Pipe Penetration Tape and Insulation	Physical Sciences Building South	10% Amosite 2% Chrysotile	5 lf	RACM
Exhaust Hood	Physical Sciences Building South	10% Chrysotile	600 sf	CAT 2 Non-Friable
White Transite Pipe	Physical Sciences Building South	10% Chrysotile 2% Crocidolite	40 sf	RACM
Pipe Penetration Tape and Insulation	Physical Sciences Building South	10% Chrysotile 2% Crocidolite	20 lf	RACM
Exterior White Window Caulking	Physical Sciences Building South	Trace Chrysotile	100 lf	CAT 2 Non-Friable
Exterior Off-White Expansion Joint	Physical Sciences Building South	5% Chrysotile	150 lf	CAT 1 Non-Friable
Exterior Black Caulking	Physical Sciences Building South	5% Chrysotile	1,600 lf	CAT 1 Non-Friable
Roof Flashing	Physical Sciences Building South	40% Chrysotile Asbestos	500 sf	CAT 1 Non-Friable
Exterior Gray Sealant	Physical Sciences Building South	10% Chrysotile	500 lf	CAT 1 Non-Friable
Brown Pipe Wrap Mastic	Chiller Area	8% Chrysotile	50 lf	CAT 1 Non-Friable

Table 1. Asbestos Survey Results C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project 2600 Mission Bell Drive San Pablo, California 94806				
Material	**Location**	**Asbestos Content**	**Estimated Quantity**	**Regulatory Classification**
Black Pipe Wrap	**Chiller Area**	**Trace Chrysotile**	**15 lf**	**CAT 2 Non-Friable**

Abbreviations/Acronyms
ND – No Asbestos Detected
NA – Not Applicable
RACM – Regulated Asbestos-Containing Material
CAT 1 Nonfriable – Category 1 Nonfriable Asbestos-Containing Material
CAT 2 Nonfriable – Category 2 Nonfriable Asbestos-Containing Material

Asbestos was detected in the above listed materials in this survey:

These results apply to all locations where the materials listed above are present in the project area, not just to the sample locations.

A table summarizing the laboratory analytical results for each of the bulk samples collected and submitted for asbestos analysis can be found in Appendix A of this report. Samples containing less than 10% asbestos (including Trace) must be further analyzed using the point count method to determine asbestos content more accurately or else must be considered >1% asbestos (ACM).

FACS recommends:

1. Develop a specification for removal of ACM prior to disturbance by demolition activities.
2. If other suspect asbestos-containing materials not previously tested are identified/uncovered during demolition activities, those materials must be assumed to contain asbestos or must be sampled accordingly prior to their disturbance.

Lead Survey Results

The table below presents a summary of the lead findings for each of the paints and solder sampled in this survey.

Table 2. Lead Survey Results C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project 2600 Mission Bell Drive San Pablo, California 94806		
Material	**Lead Content**	**Location**
Biological Science Building		
Orange Paint on Gypsum Wallboard	**0.33%**	**Room 18, Southeast Corner Wall**
1”x1” Ceramic Tile Gray with Black Specks	<7.7 ppm	Room 24, Southwest Corner from Countertop
Beige Paint on Gypsum Wallboard	**0.14%**	**Room 26, Southeast Counter**
4”x4” Off-White Ceramic Tile	210 ppm	Room 43, Wall
Off-White Paint on Gypsum Wallboard	<0.0078%	Room 12, Southeast Wall
Off-White Paint on Plaster	**0.38%**	**Room 43, Northeast Corner Wall**
Black Paint on Metal Beam	**0.75%**	**Room 33, Center I-Beam**

Table 2. Lead Survey Results
C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
2600 Mission Bell Drive
San Pablo, California 94806

Material	Lead Content	Location
White Paint on Wood Trim	**0.035%**	**Room 37, Corridor Door**
Light Blue Paint on Gypsum Wallboard	<0.0081%	Corridor, South End, West Wall
Blue Paint on Wood	**0.037%**	**Corridor, South End, Door 7**
Off-White Paint on Wood	**0.21%**	**Room 1, Southwest Adjacent Room to Electrical Beam**
Beige Paint on Metal	**0.016%**	**Room 1, Southeast Wall**
Blue Paint on Metal	<0.0081	Room 3 Boiler Room, North Side Generator
Yellow Paint on Metal Support Post	**0.037%**	**Room 3 Boiler Room**
Red Paint on Metal Pipe Valve	**0.022%**	**Room 3 Boiler Room, South Side**
Gray Paint on Concrete	<0.0081%	Room 3 Boiler Room, Floor
Blue Paint on Wood	<0.0081%	Room 3 Boiler Room, South Wall Panel
1”x1” Gray Ceramic Tile	<8.9 ppm	Men’s Restroom, Floor
Gray Paint on Metal	**180,000 ppm**	**Roof Exhaust Flue**
White Paint on Stucco	**0.0073%**	**Exterior, South Side Soffit**
Red Paint on Metal Duct	<0.0079%	Exterior, Southwest Corner, Duct Chase
White Paint on Metal Shade	**0.023%**	**Exterior, West Side, Shade Lower**
Beige Paint on Metal Trim	**2.9%**	**Exterior, West Side Wall, Lower Header Trim**
Brown Paint on Metal	**0.063%**	**Exterior, Roof, Southwest Corner Parapet Cap**
Black Paint on Metal	**0.28%**	**Exterior, West Side I-Beam Column**
White Paint on Wood	**0.82%**	**Exterior, West Side Eave Joist**
Red Paint on Wood	<0.0081%	Exterior, South Box
White Paint on Metal	<0.0081%	Room 29, Exhaust Hood
Chemical Storage Building		
Grey Paint on Metal Door	<0.007%	Ante-Chamber, Flammables Door
Beige Paint on Wallboard	<0.007%	Ante-Chamber, Wall Between Hazardous and Flammable Storage Doors
Chiller Units		
Grey Metal Chiller Component	**0.88%**	**Near Entry, Chiller Component**
Grey Metal Chiller Component	**3.3%**	**Chiller CH9 & CH10**
Physical Sciences Building South		
Baby Blue Paint on Plaster	<0.006%	Physical Sciences Building South, Corridor, South Wall

Table 2. Lead Survey Results
C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
2600 Mission Bell Drive
San Pablo, California 94806

Material	Lead Content	Location
Light Orange Paint on Plaster	**0.96%**	**Physical Sciences Building South, Room PS-8, West Wall**
Off-White Paint on Plaster	**0.10%**	**Physical Sciences Building South, Room PS-17, West Wall**
Orange Paint on Plaster	**1.9%**	**Physical Sciences Building South, Room PS-12, South Wall**
Dark Blue Paint on Drywall	**0.11%**	**Physical Sciences Building South, Room PS-19, North Wall**
Brown Paint on Metal	**0.38%**	**Physical Sciences Building South, Room PS-5, North Wall**
Baby Blue Paint on Metal	**0.32%**	**Physical Sciences Building South, Room PS-5, North Wall**
Brown Paint on Plaster	**0.26%**	**Physical Sciences Building South, Room PS-2, North Wall**
Black Paint on Glass	**0.012%**	**Physical Sciences Building South, Room PS-19, Northwest Wall**
Red Paint on Metal	**0.029%**	**Physical Sciences Building South, Room PS-5, Southwest Wall**
Off-White Paint on Metal	**0.039%**	**Physical Sciences Building South, Room PS-2, East Wall**
Off-White Paint on Drywall	**0.32%**	**Physical Sciences Building South, Room PS-1, South Wall**
Green Paint on Metal Window Frame	**5.5%**	**Physical Sciences Building South, Room PS-5, North Wall**
Green Paint on Wood Wall	**0.090%**	**Physical Sciences Building South, Room PS-5, North Wall**
Baby Blue Paint on Wood Baseboard	**0.57%**	**Physical Sciences Building South, Room PS-6, North Wall**
Brown Paint on Wood Baseboard	**0.97%**	**Physical Sciences Building South, Room PS-8, North Wall**
Off-White Paint on Wood Baseboard	**0.29%**	**Physical Sciences Building South, Room PS-10, South Wall**
Light Brown Paint on Wood Cabinet	**0.013%**	**Physical Sciences Building South, Room PS-6, Cabinet**
Dark Blue Paint on Metal Door Frame	**0.34%**	**Physical Sciences Building South, Room PS-19, Room-108**
Black Paint on Metal Door	**0.11%**	**Physical Sciences Building South, Room PS-19, Room 108**
Orange Paint on Metal HVAC Unit	**8.5%**	**Physical Sciences Building South, Room PS-5, North on Hood**
Light Orange Paint on Transite Exhaust Hood	**0.47%**	**Physical Sciences Building South, Room PS-6, South Side**

Table 2. Lead Survey Results
C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
2600 Mission Bell Drive
San Pablo, California 94806

Material	Lead Content	Location
Dark Blue Paint on Transite Exhaust Hood	**0.020%**	**Physical Sciences Building South, Room PS-14, South Wall**
Dark Brown Paint on Metal Post	**3.2%**	**Physical Sciences Building South, Room PS-6, South Wall**
White Paint on Stucco Wall	**0.19%**	**Exterior, Physical Sciences Building South, Southeast Area**
Brown Paint on Metal Door	**2.5%**	**Exterior, Physical Sciences Building South, North Center Area**
Blue Paint on Metal Post	**0.008%**	**Exterior, Physical Sciences Building South, East Center Area**
Boiler Room Building		
Pink Paint on Concrete Wall	**0.11%**	**Interior, West Wall, Center**
Blue Paint on Metal Transformer	<0.006%	Interior, Transformer Stand, Southwest Corner
Brick Red Paint on Metal Door	**1.4%**	**Interior, Boiler Room, Entry Door, Southwest Area**
Brick Red Paint on Metal Pipe	**1.2%**	**Exterior, Boiler Room, Southwest Corner, Pipe**
Fire Red Paint on Metal Control Panel	<0.007%	Interior, Boiler Room, South Wall, Control Panel
Ferrari Red Paint on Metal Pipe Flange	**0.078%**	**Interior, Boiler Room, Northwest Corner, Pipe Flange**
Yellow Paint on Metal Pipe	**0.019%**	**Interior, Boiler Room, West Wall, Pipe Adjacent to Entry**
Blue Paint on Thermal System Insulation	**0.18%**	**Interior, Boiler Room, Southeast Area, Thermal System Insulation on Pipe**
Blue Paint on Metal Door Frame	**1.4%**	**Interior, Boiler Room, Northeast Entry, Door Frame**
Gray Paint on Pipe	<0.007%	Interior, Boiler Room, Southwest Area Adjacent to Entry
Gray Paint on Pipe	**0.007%**	**Exterior, Boiler Room, Northeast Area, Gas Meter**
Gray Paint on Pedestal	**0.19%**	**Interior, Boiler Room, Northeast Area, Pedestal**
Physical Sciences Building North		
White Paint on Drywall	<0.007%	Physical Sciences Building North, Room PS-109, West Wall
Gray Paint on Metal Door Frame	<0.006%	Physical Sciences Building North, Room PS-109, Entrance
Beige Paint on Wood Trim	<0.006%	Physical Sciences Building North, Corridor 1, Above Entrance

Table 2. Lead Survey Results C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project 2600 Mission Bell Drive San Pablo, California 94806		
Material	**Lead Content**	**Location**
Gray Paint on Metal Handrail	**0.089%**	**Physical Sciences Building North, Corridor 1, Center**
Red Paint on Metal Duct	**0.032%**	**Physical Sciences Building North, Room PS-113, South**
Baby Blue Paint on Drywall	<0.007%	Physical Sciences Building North, Room PS-113, North Wall
Black Paint on Metal Door Frame	**0.32%**	**Physical Sciences Building North, Room PS-123, Door Frame**
White Paint on Metal Door Frame	**0.032%**	**Physical Sciences Building North, Room PS-118, Door Frame**
Gray Paint on Wood Wall	<0.006%	Physical Sciences Building North, Room PS-118, Wall
White Paint on Wood Trim	<0.006%	Physical Sciences Building North, Room PS-118, Near Ceiling
Yellow Paint on Metal Fixture	**1.9%**	**Physical Sciences Building North, Room PS-113, On Light Fixture**
Baby Blue Paint on Wood Trim	<0.006%	Physical Sciences Building North, Room PS-106, North Wall
Brown Paint on Metal Door Frame	**0.20%**	**Physical Sciences Building North, Room PS-106, Door Frame**
Black Paint on Drywall	<0.007%	Physical Sciences Building North, Room PS-132 Lecture Hall, Above Ceiling
Brown Ceramic Floor Tile	<0.006%	Physical Sciences Building North, Women’s Restroom, South Wall
Red Ceramic Wall Tile	**0.008%**	**Physical Sciences Building North, Women’s Restroom, South Wall**
Yellow Paint on Drywall	**0.034%**	**Physical Sciences Building North, Room 130, Northwest Corner**
Black Paint on Wood Wall	<0.006%	Physical Sciences Building North, Room Exploratorium, 132 Entrance
Red Paint on Metal Beam	**0.028%**	**Physical Sciences Building North, Corridor, Above Ceiling Beam**
Brown Paint on Metal Gutter	<0.007%	Physical Sciences Building North, Roof F, West Area
Red Paint on Metal Dome Joint	<0.007%	Physical Sciences Building North, Roof G, Southwest Area
Red Paint on Wood Dome Siding	<0.006%	Physical Sciences Building North, Roof G, Southwest Area
Black Paint on Wood Cabinet Door	<0.007%	Physical Sciences Building North, Roof J, South Area
Brown Paint on Metal Rail	**0.12%**	**Physical Sciences Building North, Roof J, South Area**

Table 2. Lead Survey Results C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project 2600 Mission Bell Drive San Pablo, California 94806		
Material	**Lead Content**	**Location**
Black Paint on Metal Door	**0.018%**	**Physical Sciences Building North, North Area, North Door**
Orange Paint on Gypsum Wallboard	**0.33%**	**Room 18, Southeast Corner Wall**
1"x1" Ceramic Tile Gray with Black Specks	<7.7 ppm	Room 24, Southwest Corner from Countertop
Beige Paint on Gypsum Wallboard	**0.14%**	**Room 26, Southeast Counter**
4"x4" Off-White Ceramic Tile	**210 ppm**	**Room 43, Wall**
Off-White Paint on Gypsum Wallboard	<0.0078%	Room 12, Southeast Wall
Abbreviations/Acronyms mg/kg – milligrams per kilogram ppm – parts per million wt% – percent by weight mg/cm2 – milligrams per square centimeter		

A detectable concentration of lead was reported in the samples identified in bold text in the table above. All similar paints should be considered to be lead-containing based on these results. All lead-based paint in the project area is considered to contain lead at greater than 0.5% lead by weight.

As required by the California Department of Public Health, Title 17, Article 16 Regulations, dated April 20, 2008, FACS will forward Form 8552 to CDPH notifying them of the presence of LBP in the areas tested at the subject property. A copy of the Form 8552 is contained in Appendix C.

FACS recommends:

1. Current Cal/OSHA regulations (e.g. 8CCR 1532.1 "Lead in Construction" Standard) apply to all construction work where an employee may be occupationally exposed to lead. Therefore, any work performed on a surface containing any amount of lead must comply with this regulation.
2. A lead hazard control plan should be developed for the project.
3. Any paint not represented by a result that is below the analytical limit of detection should be considered to contain lead and be treated as such until proven otherwise.
4. If other suspect lead-containing materials and/or paint not previously tested are encountered during demolition activities, those materials and/or paint must be assumed to contain lead or must be sampled accordingly prior to their disturbance.
5. Building records should indicate that a complete lead hazard evaluation of the buildings was not performed. The lead paint sampling was limited to assisting with Cal/OSHA compliance.

PCB-Containing Light Ballasts and Fluorescent Light Tubes

Three hundred sixty-five (365) suspect PCB-containing ballasts and seven hundred twenty-five (725) fluorescent light tubes were identified within the buildings.

FACS recommends:

1. Based on the age of construction, the light ballasts should be assumed to be PCB-containing.

2. Any lighting fixture ballasts displaying a label indicating they contain “No PCBs” or are “PCB Free” should be assumed to contain DEHP and be recycled according to applicable state and federal regulations.
3. Fluorescent light tubes and thermostat switches typically contain mercury and other metals and their disposal is regulated under the California EPA’s Universal Waste Rules. Fluorescent light tubes should be removed prior to building demolition, should be handled so as to prevent breakage, and, if discarded, should be sent to an appropriately permitted recycler.

Asbestos Regulations

The following is a summary of some current regulations that contain requirements related to building surveys for asbestos, worker protection from asbestos exposure, and asbestos as a hazardous waste. These summaries are not intended to be all-inclusive and do not contain every aspect of the regulations discussed. For detailed regulatory requirements in specific situations, FACS may be consulted, and the applicable regulations should be examined.

Building Survey

US EPA National Emission Standard for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61 and Bay Area Air Quality Management District (BAAQMD) Regulation 11 Rule 2

Under NESHAP’s regulation, no visible emissions are allowed during building demolition or renovation activities that involve regulated asbestos-containing materials (RACM). For this reason, all buildings must be surveyed for ACM prior to demolition or renovation. BAAQMD, which implements NESHAP, must be notified prior to any building demolition even if no ACM are present. BAAQMD must be notified of most renovation projects that disturb RACM. All RACM must be removed from a building prior to demolition. Any disturbance (removal) of RACM during renovation or demolition must be performed according to BAAQMD regulations.

RACM is (a) friable ACM; (b) Category I non-friable ACM that has or will become friable; (c) Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading; or (d) Category II non-friable ACM that may become or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of demolition or renovation.

Category I non-friable ACM are asbestos-containing packings, gaskets, resilient floor coverings, mastics, and asphalt roofing products. Category II non-friable ACM is any non-friable material not designated as Category I. Per BAAQMD, these products include transite board, pipe, and asbestos-cement products, plaster, stucco, and paint.

Asbestos Hazard Emergency Response Act (AHERA), 40 CFR Part 763, Subpart E

AHERA requires asbestos surveys and the development of Asbestos Management Plans for all of the nation's primary and secondary schools. The asbestos survey procedures of AHERA are considered the industry standard and are applied to all surveys performed by FACS unless otherwise specified.

Samples are analyzed in accordance with EPA Method 600/R-93-116, using PLM with dispersion staining and visual area estimation to determine percent asbestos content. This method allows for identifying the primary types of asbestos used in building materials. All layers in a sample must be analyzed and reported separately. Samples (and layers of samples) containing <1 percent asbestos by PLM are reported as Trace. Samples containing <10 percent asbestos (including Trace) must be further analyzed using the point-count method to determine asbestos content more accurately, or be considered >1 percent asbestos (ACM).

Composite sampling, which may potentially reduce the total asbestos content of a material, is only permitted by EPA when sampling joint compound, tape, and gypsum wallboard according to Asbestos

NESHAP Clarification Regarding Analysis of Multi-Layered Systems (40 CFR Part 61 FRL-4821-7). OSHA does not recognize composite sampling.

Worker Protection

California Assembly Bill AB3713, Health and Safety Code Division 20, Chapter 10.4, Section 25915-25924

Building owners, employers, lessees, etc., must notify tenants, employees, and contractors of the presence of asbestos in both friable and non-friable forms. Preventive maintenance activities must be developed and communicated to these parties. Notification is required 15 days after the identification of ACM and asbestos-containing construction materials (ACCM, >0.1 percent asbestos) in the building, and annually thereafter.

Occupational Safety and Health Administration (OSHA) 29 CFR 1926.1101 and Cal/OSHA 8 CCR 1529 – Asbestos in Construction

OSHA and Cal/OSHA require employers to implement specific work practices to protect workers from airborne asbestos exposure. Materials that contain any detectable amount of asbestos are regulated by OSHA and Cal/OSHA.

Even building materials that contain low levels of asbestos (<1 percent) can potentially generate significant concentrations of airborne asbestos fibers when disturbed; therefore, control measures should be instituted that adequately address worker health and safety during planned renovation or demolition activities involving these materials.

OSHA requires ACM to be categorized into Thermal System Insulation (TSI), Surfacing Materials, and ‘Other’ Materials for the purpose of determining job classification for abatement. TSI is ACM applied to pipes, fittings, boilers, breeching, tanks, ducts, or other structural components to prevent heat loss or gain. Surfacing Material is material that is sprayed, troweled, or otherwise applied to surfaces (such as acoustical plaster on ceilings; fireproofing materials on structural members; or other materials applied to surfaces for acoustical, fireproofing, and other purposes). ′Other′ materials are all ACM not categorized as TSI or Surfacing Material.

Hazardous Asbestos Waste

US EPA National Emission Standard for Hazardous Air Pollutants (NESHAP), 40 CFR Part 61 and Bay Area Air Quality Management District (BAAQMD) Regulation 11 Rule 2

Hazardous waste in California is regulated by Cal/EPA, Division of Toxic Substances Control (DTSC). In California, friable ACM (>1 percent asbestos) waste is hazardous waste. EPA defines friable ACM waste as asbestos-containing waste but does not consider it to be “hazardous waste”. A waste site must be notified of the asbestos content of waste, including non-hazardous asbestos waste, prior to disposal.

Lead Regulations and Guidelines

The following is a summary of some current regulations that contain requirements related to worker protection from lead exposure and some regulations and guidelines related lead waste segregation, characterization, and disposal. These summaries are not intended to be all-inclusive and do not contain every aspect of the regulations discussed. For detailed regulatory requirements in specific situations, FACS may be consulted, and the applicable regulations should be examined.

Worker Protection

Cal/OSHA Lead in Construction Safety Standard (8 CCR 1532.1)

The current Cal/OSHA Lead in Construction Safety Standard (8 CCR 1532.1) regulation applies to all construction work where an employee may be occupationally exposed to lead; therefore, work (including manual demolition, scraping, welding, etc.) performed on surfaces containing any detectable concentration of lead must comply with the standard, including exposure assessment monitoring (personal air sampling) to determine if the airborne lead exposure levels are within acceptable limits.

For work involving a Cal/OSHA “trigger tasks” (such as sanding, cutting, torch cutting, etc.), workers must be protected during the initial exposure assessment, per the Cal/OSHA Lead Standard requirements, as if they were exposed above the Permissible Exposure Limit (PEL) until actual exposures are determined. With torch cutting, for example, this includes providing supplied air respiratory protection during the initial exposure assessment.

Lead Waste Segregation, Characterization, and Disposal

Loose and flaking paints should be scraped down to intact paint (and the resulting paint chips captured for disposal) prior to demolition. Only components with intact, well-adhered paint will then remain during demolition. Ceramic tile with high lead content should also be removed prior to demolition. The owner or removal/demolition contractor should conduct appropriate segregation of waste created during the removal or dismantling/demolition process and dispose of the different waste streams in accordance regulatory requirements based on appropriate testing results.

Lead waste is considered a hazardous waste if the result of the Toxicity Characterization Leaching Procedure (TCLP) test exceeds 5 milligrams per liter (mg/l) (5ppm), under the Resource Conservation and Recovery Act (RCRA), 40 CFR 261, Appendix II. In California, a waste is also considered hazardous if the result of soluble lead content by a Waste Extraction Test (WET) is greater than 5 mg/l, or if the total lead content exceeds 1,000 milligrams per kilogram (mg/kg) in accordance with Title 22 of the CCR. When TTLC results are below 50 mg/kg, STLC/TCLP limits cannot be exceeded, so the waste is classified as general construction debris.

For detailed regulatory requirements in specific situations, FACS may be consulted, and the applicable regulations should be examined.

As required by the California Department of Public Health, Title 17, Article 16 Regulations, dated January 8, 1999, FACS will forward Form 8552 to CDPH notifying them of the absence of lead-based paint in the areas tested at the subject property. The Form 8552 is contained in Appendix C.

1. Any sample not represented by a less than the limit of detection sample result should be considered to contain lead and be treated as such unless proven otherwise.

2. Building records should indicate that a complete lead hazard evaluation of the buildings was not performed. The lead paint sampling was limited to assisting with Cal/OSHA compliance.

Limitations

The results of this survey do not apply beyond the planned demolition described above. Suspect asbestos- and lead-containing materials in areas not included in the scope of this survey should be assumed to be ACM and lead-containing, respectively, unless testing is conducted which determines otherwise. The lead paint sampling was limited only to Cal/OSHA compliance and is not considered to be a complete lead hazard evaluation.

If revisions to the demolition project are made that impact additional materials or areas, FACS should be contacted to review the changes and/or to conduct additional survey work to address potential impact to untested materials.

This investigation is limited to the conditions and practices observed and information made available to FACS. The methods, conclusions and recommendations provided are based on FACS' judgment, expertise and the standard of practice for professional service. They are subject to the limitations and variability inherent in the methodology employed. As with all environmental investigations, this investigation is limited to the defined scope and does not purport to set forth all hazards, nor indicate that other hazards do not exist.

Please do not hesitate to contact our offices at 510-266-4600 with any questions or concerns. Thank you for the opportunity to assist the Contra Costa Community College District in promoting a more healthful environment.

Respectfully,

FORENSIC ANALYTICAL

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Appendix A

Results Summary Tables and Laboratory Analytical Reports

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
2600 Mission Bell Drive
San Pablo, California 94806

Sample Number	Material Description	Asbestos Content	Sample Location
Chemical Storage Building			
CSB-01	White Drywall	White Drywall: ND White Joint Compound: ND White Tape: ND	Flammables Room, Northeast Corner
CSB-02	White Drywall	White Drywall: ND White Joint Compound: ND White Tape: ND	Acid Room, Northeast Corner
CSB-03	Sealant	Black Sealant: ND	Acid Room, Northeast Corner Exhaust Air Duct
CSB-04	Sealant	Black Sealant: ND	Acid Room, Northeast Corner, Exhaust Air Duct
CSB-05	Sealant	White Sealant: ND	Exterior North Side Louvre, West
CSB-06	Sealant	White Sealant: ND	Exterior North Side Louvre, East
CSB-07	Sealant	Brown Sealant: ND	Ante-Chamber, North Entry Jamb to Hazardous Room
CSB-08	Sealant	Brown Sealant: ND	Flammables Room, North Entry Jamb
CSB-09	Mortar	Grey Mortar: ND	Exterior, East of Entry, at Deck
CSB-10	Mortar	Grey Mortar: ND	Exterior, West of Entry
CSB-11	Concrete	ND	Exterior, East of entry
CSB-12	Concrete	ND	Interior, Ante-Chamber, Center at Drainage Grill
CSB-13	Tar and Gravel Roof	Black Tar: ND Black Felt: ND	Roof Field, Northwest Quadrant
CSB-14	Tar and Gravel Roof	Black Tar: ND Black Felt: ND	Roof Field, Southeast Quadrant
CSB-15	Rolled Roofing	Stones: ND Black Tar: ND Black Felt: ND	Parapet and Flashing, Southwest Quadrant
CSB-16	Rolled Roofing	Stones: ND Black Tar: ND Black Felt: ND	Parapet and Flashing, Northeast Quadrant
CSB-17	Grey Sealant	ND	Roof Parapet, Southwest Corner
CSB-18	Grey Sealant	ND	Roof Parapet, Northeast Corner
Chiller Units			
CE-01	TSI, Straight Run	ND	Northeast Quadrant, North Chiller Line, East End of East-West Run
CE-02	TSI, Straight Run	ND	Northeast Quadrant, North Chiller Line, North End of North-South Run

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
2600 Mission Bell Drive
San Pablo, California 94806

Sample Number	Material Description	Asbestos Content	Sample Location
CE-03	TSI, Straight Run	ND	Northwest Quadrant, North Chiller Line, East of Valve
CE-04	TSI, Valve Jacket	ND	Northwest Quadrant, North Chiller Line, Valve Jacket
CE-05	TSI	ND	West Side, Pump Manifold
CE-06	Packing	ND	Corrugated Roof Panel and Joist
CE-07	Packing	ND	Corrugated Roof Panel and Joist
CE-08	TSI	ND	Pipe Elbow Above West Pump
CE-09	Concrete	ND	Exterior, Southwest Corner, Pad
CE-10	Concrete	ND	Exterior, Northwest Corner, Pad
111221-CHA-A01	**Gray pipe insulation wrap**	**TSI & jacket: ND** **Brown mastic: 8% Chrysotile**	**Chiller 10, pipe**
111221-CHA-A02	**Gray pipe insulation wrap**	**TSI & jacket: ND** **Brown mastic: 8% Chrysotile**	**Pipe between Chiller 9 and 10**
111221-CHA-A03	Concrete	ND	Chiller 9, footing
111221-CHA-A04	Concrete	ND	Chiller 10, footing
111221-CHA-A05	Black pipe insulation wrap	ND	Chiller 9, pipe under unit
111221-CHA-A06	Black pipe insulation wrap	ND	Chiller 9, pipe under unit
111221-CHA-A07	**Black pipe insulation wrap**	**TSI: ND** **Wrap & mastic: Trace Chrysotile**	**Chiller 9, pipe under unit**
111221-CHA-A08	**Gray pipe insulation wrap**	**TSI & jacket: ND** **Brown mastic: 8% Chrysotile**	**Chiller 9, pipe**
111221-CHA-A09	White/yellow pipe insulation	ND	Pipe on exterior of Chem Storage
111221-CHA-A10	White/yellow pipe insulation	ND	Pipe on exterior of Chem Storage
111221-CHA-A11	White/yellow pipe insulation	ND	Pipe on exterior of Chem Storage
Biological Science Building			
BIO-A001	**Tan Sheet Flooring**	**Sheet Flooring: ND** **Mastic: 25% Chrysotile Asbestos**	**Room 18, Southeast Corner**
BIO-A002	Tan Sheet Flooring	Not Analyzed (Prior Positive)	Room 18, Northwest Corner
BIO-A003	Beige Sheet Flooring	Sheet Flooring: ND Mastic: ND	Room 18, West Side Pothole on Floor
BIO-A004	Beige Sheet Flooring	Sheet Flooring: ND Mastic: ND Concrete: ND	Room 2, East Side

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
2600 Mission Bell Drive
San Pablo, California 94806

Sample Number	Material Description	Asbestos Content	Sample Location
BIO-A005	White Adhesive	ND	Room 16, Metal HVAC Pins
BIO-A006	White Adhesive	ND	Room 16, Metal HVAC Pins
BIO-A007	Gray Seam Mastic	ND	Room 16, HVAC
BIO-A008	Gray Seam Mastic	ND	Room 17, HVAC
BIO-A009	2”x4” White Acoustical Ceiling Tile with Fissure Pattern	Ceiling Tile: ND Paint: ND	Room 18
BIO-A010	2”x4” White Acoustical Ceiling Tile with Fissure Pattern	Ceiling Tile: ND Paint: ND	Corridor East Wall on South End
BIO-A011	Black Floor Mats with Gray Streaks	ND	Room 16
BIO-A012	Black Floor Mats with Gray Streaks	ND	Room 16
BIO-A013	**Joint Compound/Drywall**	**Drywall: ND** **Joint Compound: 2% Chrysotile Asbestos** **Tape/Paint: ND**	**Room 18, Southeast Corner Wall**
BIO-A014	**Joint Compound/Drywall**	**Drywall: ND** **Joint Compound: 2% Chrysotile Asbestos** **Tape/Paint: ND**	**Room 26, Southeast Corner**
BIO-A015	**Joint Compound/Drywall**	**Drywall: ND** **Joint Compound: 2% Chrysotile Asbestos** **Tape/Paint**	**Room 3 Boiler Room**
BIO-A016	**Joint Compound/Drywall**	**Drywall: ND** **Joint Compound: 2% Chrysotile Asbestos** **Tape/Paint**	**Janitor Closet Next to Room 7**
BIO-A017	Brown Baseboard Mastic	ND	Room 18, East Wall
BIO-A018	Brown Baseboard	Mastic: ND	Room 35
BIO-A019	1”x1” Gray Ceramic Tile with Black Specks/Off-White Grout/Off-White Mortar	Ceramic Tile: ND Grout: ND Mortar: ND	Room 24, Counter Top
BIO-A020	1”x1” Gray Ceramic Tile with Black Specks/Off-White Grout/Off-White Mortar	Ceramic Tile: ND Grout: ND Mortar: ND	Room 18
BIO-A021	TSI on 4” Pipe Run	TSI: ND Wrap: ND	Room 22 Northeast Corner

Table 3. Summary of Asbestos Analytical Results			
C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project 2600 Mission Bell Drive San Pablo, California 94806			
Sample Number	**Material Description**	**Asbestos Content**	**Sample Location**
BIO-A022	TSI on 4" Pipe Run	TSI: ND Wrap: ND	Room 22
BIO-A023	TSI on 4" Pipe Run	TSI: ND Wrap: ND	Room 22
BIO-A024	2"x4" White Acoustical Ceiling Tile with Pin Hole Pattern	Ceiling Tile: ND Paint: ND	Room 24
BIO-A025	2"x4" White Acoustical Ceiling Tile with Pin Hole Pattern	Ceiling Tile: ND Paint: ND	Room 39
BIO-A026	12"x12" Floor Tile with Gray Streaks/Yellow Mastic	Floor Tile: ND Mastic: ND	Room 128A
BIO-A027	12"x12" Floor Tile with Gray Streaks/Yellow Mastic	Floor Tile: ND Mastic: ND	Room 128A
BIO-A028	Red Brick and Gray Mortar	Brick: ND Mortar: ND	Room 26, North Wall
BIO-A029	Red Brick and Gray Mortar	Brick: ND Mortar: ND	Exterior, South Entrance
BIO-A030	12"x12" Floor Tile with Blue Specks/Yellow Mastic	Floor Tile: ND Mastic: ND	Corridor, South Side
BIO-A031	Red Brick and Gray Mortar	Brick: ND Mortar: ND	Exterior, South Entrance
BIO-A032	12"x12" Floor Tile with Blue Specks/Yellow Mastic	Floor Tile: ND Mastic: ND	Corridor, South Side
BIO-A033	**12"x12" Floor Tile with Blue Specks/Yellow Mastic**	**Floor Tile: ND** **Mastic: 2% Chrysotile Asbestos** **Debris/Dust: ND**	**Men's Restroom Vestibule, Northwest Corner**
BIO-A034	Green Carpet Mastic	ND	Room 43 Southwest Corner
BIO-A035	Green Carpet	ND	Room 43 Southeast Corner
BIO-A036	Knock Down Wall Tile on Wood Panel Walls	Texture: ND Paint: ND	Corridor, North Side West End
BIO-A037	Knock Down Wall Tile on Wood Panel Walls	Texture: ND Paint: ND	Corridor, East Side Next to Room 37
BIO-A038	Knock Down Wall Tile on Wood Panel Walls	ND	Corridor West, Next to Room 18
BIO-A039	Knock Down Wall Tile on Wood Panel Walls	Texture: ND Paints: ND	Corridor East, Next to Room 13
BIO-A040	Knock Down Wall Tile on Wood Panel Walls	Texture: ND Paints: ND	South End Next to Room 2
BIO-A041	Dark Tan Resilient Sheet Flooring	Sheet Flooring: ND Mastic: ND Concrete Underlayment: ND	Room B-8 Northwest Corner
BIO-A042	Dark Tan Resilient Sheet Flooring	Sheet Flooring: ND Mastic: ND Concrete Underlayment: ND	Room 39 Northwest Corner

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
2600 Mission Bell Drive
San Pablo, California 94806

Sample Number	Material Description	Asbestos Content	Sample Location
BIO-A043	**Pipe Elbow on 4" Pipe Run**	**5% Chrysotile Asbestos**	**Room 41**
BIO-A044	**Pipe Elbow on 4" Pipe Run**	**Not Analyzed (Prior Positive)**	**Room 17**
BIO-A045	**Pipe Elbow on 4" Pipe Run**	**Not Analyzed (Prior Positive)**	**Room 43**
BIO-A046	Plaster	Plaster: ND Skim Coat: ND Paint: ND	West Wall in Washroom
BIO-A047	Plaster	Plaster: ND Skim Coat: ND Paint: ND	North Wall in Study Room
BIO-A048	Plaster	Plaster: ND Skim Coat: ND Paint: ND	Women's Restroom
BIO-A049	Plaster	Plaster: ND Skim Coat: ND Paint: ND	Women's Restroom
BIO-A050	Plaster	Plaster: ND Skim Coat: ND Paint: ND	Men's Restroom
BIO-A051	4"x4" Off-White Ceramic Wall Tile/Off-White Grout	Ceramic Wall Tile: ND Mortar/Grout: ND	East Wall of Room 43
BIO-A052	4"x4" Off-White Ceramic Wall Tile/Off-White Grout	Ceramic Wall Tile: ND Mortar/Grout: ND	East Wall of Room 43
BIO-A053	Yellow Wall Panel Adhesive	ND	East Wall of Room 43
BIO-A054	Yellow Wall Panel Adhesive	ND	West Wall of Room 43
BIO-A055	Yellow/Beige Baseboard Mastic	ND	Room 26
BIO-A056	Yellow/Beige Baseboard Mastic	ND	Room 2
BIO-A057	Pipe Jacket	Fiberglass: ND Jacket: ND	Room 26, On 6" Outside Diameter Pipe Run
BIO-A058	Pipe Jacket	Fiberglass: ND Jacket: ND	Room 3, On 6" Outside Diameter Pipe Run
BIO-A059	Pipe Jacket	Fiberglass: ND Jacket: ND	Room 1, On 6" Outside Diameter Pipe Run
BIO-A060	**Pipe Elbow**	**20% Amosite Asbestos** **5% Chrysotile Asbestos**	**Room 1, On 6" Outside Diameter Pipe Run**
BIO-A061	**Pipe Elbow**	**Not Analyzed (Prior Positive)**	**Room 2, East Wall, South End Above Door on 6" Outside Diameter Pipe Run**
BIO-A062	**Pipe Elbow**	**Not Analyzed (Prior Positive)**	**Room 43 on 6" Outside Diameter Pipe Run**
BIO-A063	**Black Chalkboard**	**20% Chrysotile Asbestos**	**Room 39**
BIO-A064	**Black Chalkboard**	**Not Analyzed (Prior Positive)**	**Room 39**

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
2600 Mission Bell Drive
San Pablo, California 94806

Sample Number	Material Description	Asbestos Content	Sample Location
BIO-A065	White Insulation	ND	Room 24, Sink Pipe Drains
BIO-A066	White Insulation	ND	Room 39, Sink Pipe Drains
BIO-A069	Red Fire Stop	ND	Room 41
BIO-A070	Red Fire Stop	ND	Room 5
BIO-A071	**Black Counter Tops**	**35% Chrysotile Asbestos**	**Room 39**
BIO-A072	**Black Counter Tops**	**Not Analyzed (Prior Positive)**	**Room 22**
BIO-A073	Gray Counter Tops	ND	Room 41, South Wall
BIO-A074	Gray Counter Tops	ND	Room 17
BIO-A075	**Orange Peel Wall Tile on Drywall**	**Texture: 2% Chrysotile Asbestos** **Paint: ND**	**Room 2, East Wall North End**
BIO-A076	**Orange Peel Wall Tile on Drywall**	**Not Analyzed (Prior Positive)**	**Room B8, East Wall, South End**
BIO-A077	**Orange Peel Wall Tile on Drywall**	**Not Analyzed (Prior Positive)**	**Room B8, East Wall, North End**
BIO-A078	**Orange Peel Wall Tile on Drywall**	**Not Analyzed (Prior Positive)**	**Room 6, South Wall**
BIO-A079	**Orange Peel Wall Tile on Drywall**	**Not Analyzed (Prior Positive)**	**Room 12**
BIO-A080	**Joint Compound/Drywall with Orange Peel Wall Tile**	**Drywall: ND** **Joint Compound: 3% Chrysotile Asbestos** **Tape: ND** **Paint: ND**	**Room B8 Southeast Corner**
BIO-A081	**Joint Compound/Drywall with Orange Peel Wall Tile**	**Drywall: ND** **Joint Compound: 3% Chrysotile Asbestos** **Tape: ND** **Paint: ND**	**Room 6, South Wall East End**
BIO-A082	**Joint Compound/Drywall with Orange Peel Wall Tile**	**Drywall: ND** **Joint Compound: 3% Chrysotile Asbestos** **Tape: ND** **Paint: ND**	**Room 12**
BIO-A083	Concrete	Concrete: ND Paint: ND	Room 3 Boiler Room, Upper West Side, on Equipment Pads
BIO-A084	Concrete	Concrete: ND Paint: ND	Room 3 Boiler Room, South Wall, on Equipment Pads
BIO-A085	Pipe Gaskets	ND	Room 3 Boiler Room, Southeast Corner
BIO-A086	Pipe Gaskets	ND	Room 3 Boiler Room, South Wall

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
2600 Mission Bell Drive
San Pablo, California 94806

Sample Number	Material Description	Asbestos Content	Sample Location
BIO-A087	12"x12" Off-White Wall Tiles Over Brown Mastic	Tile: ND Coating (White): ND Mastic: ND	Room 1, North Wall
BIO-A088	12"x12" Off-White Wall Tiles Over Brown Mastic	Tile: ND Coating (White): ND Mastic: ND	Room 1, North Wall
BIO-A089	**Tank Insulation**	**20% Amosite Asbestos** **5% Chrysotile Asbestos**	**Room 3 Boiler Room**
BIO-A090	**Tank Insulation**	**Not Analyzed (Prior Positive)**	**Room 3 Boiler Room**
BIO-A091	**Tank Insulation**	**Not Analyzed (Prior Positive)**	**Room 3 Boiler Room**
BIO-A092	**White HVAC Vibration Dampeners**	**40% Chrysotile Asbestos**	**Room 26**
BIO-A093	**White HVAC Vibration Dampeners**	**Not Analyzed (Prior Positive)**	**Room 37**
BIO-A094	Green HVAC Vibration Dampeners	ND	Room 26
BIO-A095	Green HVAC Vibration Dampeners	ND	Room 37
BIO-A096	**Black Mastic on HVAC Coils Drip Pan**	**15% Chrysotile Asbestos**	**Room 26**
BIO-A097	**Black Mastic on HVAC Coils Drip Pan**	**Not Analyzed (Prior Positive)**	**Room 37**
BIO-A098	**White Cloth HVAC Gasket on HVAC**	**80% Chrysotile Asbestos**	**Room 13**
BIO-A099	**White Cloth HVAC Gasket on HVAC**	**Not Analyzed (Prior Positive)**	**Room 13**
BIO-A100	Roof Curb Flashing	Tar with Gravel: ND Felt: ND Brown Fibrous Insulation: ND	Roof West Side North End
BIO-A101	Roof Curb Flashing	Tar with Gravel: ND Felt: ND Brown Fibrous Insulation: ND	Roof, West Side, North End
BIO-A102	Roof Exhaust Penetration Mastic	ND	Roof
BIO-A103	Roof Exhaust Penetration Mastic	ND	Roof
BIO-A104	Off-White Insulation on Pipe Bracket, Chilled Water Return Line	ND	Roof, Southwest Corner
BIO-A105	Off-White Insulation on Pipe Bracket	ND	Roof, West Side of HVAC Unit
BIO-A106	**HVAC Seam Mastic**	**Mastic: ND** **Paint (Silver): 8% Chrysotile Asbestos** **Mesh: ND**	**Roof, Center, Old HVAC**

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
2600 Mission Bell Drive
San Pablo, California 94806

Sample Number	Material Description	Asbestos Content	Sample Location
BIO-A107	**HVAC Seam Mastic**	**Not Analyzed (Prior Positive)**	**Roof, Southeast Corner, Old HVAC**
BIO-A108	Gray Rolled Roof Patch	Shingle: ND Tar: ND Cellulose Felt: ND	Roof, Southeast Corner
BIO-A110	Gray Rolled Roof Patch	Shingle: ND Tar: ND Cellulose Felt: ND	Roof, North Side
BIO-A111	Gray Roof Mastic on Gray Rolled Roof Patches	ND	Roof, Southeast Corner
BIO-A112	**Dark Gray Sealant on Generator Exhaust Duct Fan**	**2% Chrysotile Asbestos**	**Roof, Southeast Corner**
BIO-A113	**Dark Gray Sealant on Generator Exhaust Duct Fan**	**Not Analyzed (Prior Positive)**	**Roof, Southeast Corner**
BIO-A114	Light Gray HVAC Seam Mastic	ND	Roof, Newer HVAC Unit Duct
BIO-A115	Light Gray HVAC Seam Mastic	ND	Roof, Newer HVAC Unit Duct
BIO-A116	Dark Gray HVAC Seam Mastic	ND	Roof, Southwest Corner of HVAC Unit
BIO-A117	Dark Gray HVAC Seam Mastic	ND	Roof, Northwest Corner of HVAC Unit
BIO-A118	Beige Sealant on Exhaust Fan Seam	ND	Roof, Northwest, Old HVAC Unit
BIO-A119	Beige Sealant on Exhaust Fan Seam	ND	Roof, Northwest, Old HVAC Unit
BIO-A120	Silver Aluminum with Black Adhesive Duct Lining	ND	Northwest from Old HVAC Vent
BIO-A121	Silver Aluminum with Black Adhesive Duct Lining	Aluminum: ND Adhesive: ND	Northwest from Old HVAC Vent
BIO-A124	Black Coating	ND	Room 3 Boiler Room, North East Corner, On Roof Access Ladder
BIO-A125	Black Coating	ND	Room 3 Boiler Room, North East Corner, On Roof Access Ladder
BIO-A126	**Stucco**	**Stucco: ND** **Skim Coat: <1% Chrysotile**	**Exterior, North at Entry Soffit Ceiling**
BIO-A127	**Stucco**	**Stucco: ND** **Skim Coat: <1% Chrysotile**	**Exterior, South at Entry Soffit Ceiling**
BIO-A128	**Stucco**	**Stucco: ND** **Skim Coat: <1% Chrysotile**	**Exterior, South at Entry Soffit Ceiling**
BIO-A129	Concrete	ND	Room 22

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
2600 Mission Bell Drive
San Pablo, California 94806

Sample Number	Material Description	Asbestos Content	Sample Location
BIO-A130	Concrete	ND	Room 4 Boiler Room
BIO-A131	**Concrete**	**2% Chrysotile Asbestos**	**Exterior, West Side South End**
BIO-A131A	Concrete	ND	Exterior West Side, South End Approximately 1.5 Feet away from Sample A131 was Collected
BIO-A131B	Concrete	ND	Exterior East Side, North End
BIO-A132	White Caulk Putty	ND	Exterior, South Side at Entry, Between Brick and Metal Window Frame
BIO-A133	White Caulk Putty	ND	Exterior, South Side at Entry, Between Brick and Metal Window Frame
BIO-A134	**Light Gray Caulk**	**2% Chrysotile Asbestos**	**Exterior, East Side South End, Between Glass and Window Frame**
BIO-A135	**Light Gray Caulk**	**2% Chrysotile Asbestos**	**Exterior, West Side North End, Between Glass and Window Frame**
BIO-A136	Duct Wrap	Insulation: ND Mesh: ND	Room 26, Over Fiberglass
BIO-A137	Duct Wrap	Insulation: ND Mesh: ND	Room 37, Over Fiberglass
BIO-A138	Duct Wrap	Insulation: ND Mesh: ND	Room 13, Over Fiberglass
BIO-A139	Tar and Gravel Roof Field	Tar/Gravel: ND Glossy Tar: ND	Roof, Southeast Corner
BIO-A140	Tar and Gravel Roof Field	Tar/Gravel: ND Glossy Tar: ND	Roof, Center
BIO-A141	Tar and Gravel Roof Field	Tar/Gravel: ND Glossy Tar: ND	Roof, North Side
BIO-A142	Pipe Jacket	Insulation: ND Mesh/Coating: ND	Room 41, Over Fiberglass on 4” Outside Diameter Pipe Run
BIO-A143	Pipe Jacket	Insulation: ND Mesh/Coating: ND	Room 17, Over Fiberglass on 4” Outside Diameter Pipe Run
BIO-A144	Pipe Jacket	Insulation: ND Mesh/Coating: ND	Room 43, Over Fiberglass on 4” Outside Diameter Pipe Run
BIO-A145	1”x1” Gray Ceramic Floor Tile with Gray Grout and Off-White Mortar	Ceramic Tile: ND Grout: ND Mortar: ND	Men’s Restroom
BIO-A146	1”x1” Gray Ceramic Floor Tile with Gray Grout and Off-White Mortar	Ceramic Tile: ND Grout: ND Mortar: ND	Men’s Restroom
BIO-A147	Off-White HVAC Seam Tape	Coating (White): ND Mesh: ND	Room 21

Table 3. Summary of Asbestos Analytical Results			
C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project 2600 Mission Bell Drive San Pablo, California 94806			
Sample Number	**Material Description**	**Asbestos Content**	**Sample Location**
BIO-A148	Off-White HVAC Seam Tape	Coating (White): ND Mesh: ND	East Room 39
BIO-A149	Black Moisture Barrier	Cellulose/Tar: ND	Exterior, East Side South End, Behind Upper Wall Wood Panel
BIO-A150	Black Moisture Barrier	Cellulose/Tar: ND	Exterior, East Side South End, Behind Upper Wall Wood Panel
BIO-A151	Concrete	ND	Room 43
BIO-A152	Concrete Foundation Wall	ND	Exterior West Side, North End
BIO-A153	Concrete Foundation Wall	ND	Exterior South Side Foundation Wall Near Building Entry
Boiler Room Building			
BR-01-A	Mortar	ND	Exterior, Northwest Corner Wall
BR-02-A	Mortar	ND	Exterior, North Side Wall
BR-03-A	**Concrete**	**Trace Chrysotile**	**West Entry Threshold, Pad**
BR-04-A	**Concrete**	**Sample Not Analyzed Due to Prior Positive**	**Northwest Quadrant, Pad**
BR-05-A	Concrete	ND	West Entry, Wall Footer
BR-06-A	Concrete	ND	South Wall, Center, Wall Footer
BR-07-A	Sealant	ND	Exterior, South Wall, Penetration
BR-08-A	Sealant	ND	Exterior, South Wall, Penetration
BR-09-A	**Sealant**	**Trace Chrysotile**	**Exterior, East Side, Louvre, South of Center**
BR-10-A	**Sealant**	**Sample Not Analyzed Due to Prior Positive**	**Exterior, East Side, Louvre, Center**
BR-11-A	Glazing	ND	Exterior, East Side, South of Center
BR-12-A	Glazing	ND	Exterior, East Side, East Door
BR-13-A	Gasket	ND	Exterior, North Side, West of Center
BR-14-A	Gasket	ND	Exterior, North Side, West of Center
BR-15-A	**TSI**	**3% Chrysotile 15% Amosite**	**North Side, West of Center, 10” Line Straight Run Pipe**
BR-16-A	**TSI**	**Sample Not Analyzed Due to Prior Positive**	**North Side, West of Center, 10” Line Straight Run Pipe**
BR-17-A	**TSI**	**Sample Not Analyzed Due to Prior Positive**	**South Side, West of Center, Elevated 10” Straight Run Pipe**
BR-18-A	**TSI**	**3% Chrysotile 10% Amosite**	**South Side, West of Center, Elevated 10” Elbow**

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
2600 Mission Bell Drive
San Pablo, California 94806

Sample Number	Material Description	Asbestos Content	Sample Location
BR-19-A	**TSI**	**Sample Not Analyzed Due to Prior Positive**	**Northwest Quadrant, 10" Elbow**
BR-20-A	Plaster Wall	ND	Boiler Room, West Wall
BR-21-A	Plaster Wall	ND	Boiler Room, Southeast Corner
BR-22-A	Plaster Wall	ND	Boiler Room, Northeast Corner
BR-23-A	Plaster Wall	ND	Boiler Room, Northwest Corner
BR-24-A	Plaster Wall	ND	Boiler Room, Southwest Corner
BR-25-A	TSI	ND	South Side, Near Center, Elevated 4" Straight Run
BR-26-A	TSI	ND	South Side, East of Center, Elevated 4" Straight Run
BR-27-A	TSI	ND	South Side, East of Center, Elevated 4" Straight Run
BR-28-A	**TSI**	**3% Chrysotile 10% Amosite**	**South Side, Straight Run, 6" Vertical**
BR-29-A	**TSI**	**Sample Not Analyzed Due to Prior Positive**	**South Side, Straight Run, 6" Vertical**
BR-30-A	**TSI**	**Sample Not Analyzed Due to Prior Positive**	**South Side, Straight Run, 6" Vertical**
BR-31-A	**TSI**	**Sample Not Analyzed Due to Prior Positive**	**South Side, Elbow, 6"**
BR-RF-A01	Black Penetration Roof Mastic	ND	Boiler Room Roof West Area
BR-RF-A02	Black Penetration Roof Mastic	ND	Boiler Room Roof East Area
BR-RF-A03	Roof Field	Stones: ND Black Tar: ND Black Felt: ND	Boiler Room Roof West Area
BR-RF-A04	Roof Field	Stones: ND Black Tar: ND Black Felt: ND	Boiler Room Roof Center Area
BR-RF-A05	Roof Field	Stones: ND Black Tar: ND Black Felt: ND	Boiler Room Roof East Area
Physical Sciences Building North			
PSBN-001	12"x12" Floor Tile White With Blue Specks over Brown Mastic and Green Mastic	ND	Physical Sciences Building North, Room PS-109, Southeast Area, Floor
PSBN-002	12"x12" Floor Tile White With Blue Specks over Brown Mastic and Green Mastic	ND	Physical Sciences Building North, Corridor 2, Northeast Area, Floor

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
2600 Mission Bell Drive
San Pablo, California 94806

Sample Number	Material Description	Asbestos Content	Sample Location
PSBN-003	Gray Vinyl Sheet Flooring	ND	Physical Sciences Building North, Corridor 1 Stairs, Northwest Area, Floor
PSBN-004	Gray Vinyl Sheet Flooring	ND	Physical Sciences Building North, Corridor 1 Stairs, Southeast Area, Floor
PSBN-005	Blue Carpet Over Brown Mastic	ND	Physical Sciences Building North, Room PS-113, Northeast Area, Floor
PSBN-006	Blue Carpet Over Brown Mastic	ND	Physical Sciences Building North, Room PS-106, Southwest Area, Floor
PSBN-007	Red Carpet Over Brown Mastic	ND	Physical Sciences Building North, Room PS-123, Northwest Area, Floor
PSBN-008	Red Carpet Over Brown Mastic	ND	Physical Sciences Building North, Room PS-131, West Center Area, Floor
PSBN-009	Brown Carpet Over Tan Mastic	ND	Physical Sciences Building North, PS Room 117, East Corner, Floor
PSBN-010	Brown Carpet Over Tan Mastic	ND	Physical Sciences Building North, PS Room 118, Northeast Corner, Floor
PSBN-011	**12”x12” Brown with White Specks Floor Tile Over Black Mastic**	**Tile: ND** **Mastic: 5% Chrysotile Asbestos**	**Physical Sciences Building North, PS Room 101, Southeast Corner, Floor**
PSBN-012	**12”x12” Brown with White Specks Floor Tile Over Black Mastic**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, PS Room 102, Northwest Corner, Floor**
PSBN-013	**12”x12” Blue with White Streaks Floor Tile Over Black Mastic**	**Tile: ND** **Mastic: 5% Chrysotile Asbestos**	**Physical Sciences Building North, PS Room 101, East Area, Floor**
PSBN-014	**12”x12” Blue with White Streaks Floor Tile Over Black Mastic**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, PS Room 101, West Area, Floor**
PSBN-015	**12”x12” Beige with Gray Streaks Floor Tile Over Black Mastic Over Brown Mastic**	**Tile: ND** **Mastic: 5% Chrysotile Asbestos**	**Physical Sciences Building North, PS Room 102, Southwest Area, Floor**
PSBN-016	**12”x12” Beige with Gray Streaks Floor Tile Over Black Mastic Over Brown Mastic**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, PS Room 101, East Area, Floor**
PSBN-017	**12”x12” Red Floor Tile Over Black Mastic**	**Tile: ND** **Black Mastic: 5% Chrysotile Asbestos**	**Physical Sciences Building North, PS Room 102, West Area, Floor**

Table 3. Summary of Asbestos Analytical Results			
C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project 2600 Mission Bell Drive San Pablo, California 94806			
Sample Number	**Material Description**	**Asbestos Content**	**Sample Location**
PSBN-018	**12"x12" Red Floor Tile Over Black Mastic**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, PS Room 102, East Area, Floor**
PSBN-019	**12"x12" Gray with Black Dots Floor Tile Over Black Mastic**	**Tile: ND Mastic: 5% Chrysotile Asbestos**	**Physical Sciences Building North, PS Room 102, South Area, Floor**
PSBN-020	**12"x12" Gray with Black Dots Floor Tile Over Black Mastic**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, PS Room 102, North Area, Floor**
PSBN-021	2"x2" Gray Ceramic Floor Tile and Grout	Tile: ND Grout: ND	Physical Sciences Building North, Men's Bathroom, South Area, Floor
PSBN-022	2"x2" Gray Ceramic Floor Tile and Grout	Tile: ND Grout: ND	Physical Sciences Building North, Women's Bathroom, North Area, Floor
PSBN-023	Beige Baseboard Mastic	ND	Physical Sciences Building North, Corridor, Adjacent to Entry I-031
PSBN-024	Beige Baseboard Mastic	ND	Physical Sciences Building North, Corridor, Adjacent to Entry I-031
PSBN-025	White Wallpaper with Adhesive	ND	Physical Sciences Building North, Room PS-107, Northeast Area, East Wall
PSBN-026	White Wallpaper with Adhesive	ND	Physical Sciences Building North, Corridor 2, Northwest Area, Wall
PSBN-027	**Wallboard and Joint Compound**	**Wallboard: ND Joint Compound: 2% Chrysotile Asbestos Tape: ND Paint: ND**	**Physical Sciences Building North, Room PS-110, Northwest Corner, Wall**
PSBN-028	**Wallboard and Joint Compound**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, Room PS-107, Southeast Corner, Wall**
PSBN-029	**Wallboard and Joint Compound**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, Room PS-106, Northwest Corner, Wall**
PSBN-030	**Wallboard and Joint Compound**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, Room PS-132, North Corner, Wall**
PSBN-031	**Wallboard and Joint Compound**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, Corridor 3, Northeast Corner, Wall**
PSBN-032	Wall Texture Large Splotch	Texture: ND Paint: ND	Physical Sciences Building North, Room PS-101, East Center Area, Wall

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
2600 Mission Bell Drive
San Pablo, California 94806

Sample Number	Material Description	Asbestos Content	Sample Location
PSBN-033	**Wall Texture Large Splotch**	**Texture: 2% Chrysotile Asbestos Paint: ND**	**Physical Sciences Building North, Corridor, Adjacent to Room 106, West Wall**
PSBN-034	**Wall Texture Large Splotch**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, Corridor, Adjacent to Room 102, North Wall**
PSBN-035	**Wall Texture Large Splotch**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, Corridor, Adjacent to Room 116, South Wall**
PSBN-036	**Wall Texture Large Splotch**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, Corridor, Adjacent to Room 101, South Wall**
PSBN-037	**Wall Texture Orange Peel Splotch**	**Texture: 2% Chrysotile Asbestos Paint: ND**	**Physical Sciences Building North, Corridor, Adjacent to Room 116, North Wall**
PSBN-038	**Wall Texture Orange Peel Splotch**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, Corridor, Adjacent to Men’s Restroom, South Wall**
PSBN-039	**Wall Texture Orange Peel Splotch**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, Corridor, Adjacent to Women’s Restroom, North Wall**
PSBN-040	**Wall Texture Orange Peel Splotch**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, Corridor, Adjacent to Room 132, Northwest Corner, Wall**
PSBN-041	**Wall Texture Orange Peel Splotch**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, Room PS-130, Northeast Area, Wall**
PSBN-042	Brick and Mortar	Cementitious Material: ND Mortar: ND	Physical Sciences Building North, Corridor 2, Southwest Area, Wall
PSBN-043	Brick and Mortar	Cementitious Material: ND Mortar: ND	Physical Sciences Building North, Corridor 1, Southeast Area, Wall
PSBN-044	2’x4’ White Ceiling Tile with Pinholes	ND	Physical Sciences Building North, Central Corridor, Northeast Area, Ceiling
PSBN-045	2’x4’ White Ceiling Tile with Pinholes	ND	Physical Sciences Building North, Room PS-101, Northwest Area, Ceiling
PSBN-046	12”x12” White Ceiling Tile with Fissures over Hockey Puck Mastic	ND	Physical Sciences Building North, Room PS-131, Central Area, Ceiling
PSBN-047	12”x12” White Ceiling Tile with Fissures over Hockey Puck Mastic	ND	Physical Sciences Building North, Corridor 1, Southwest Area, Ceiling

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
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Sample Number	Material Description	Asbestos Content	Sample Location
PSBN-048	Gray Window Caulking	ND	Physical Sciences Building North, Room PS-107, Southwest Area, Window
PSBN-049	Gray Window Caulking	ND	Physical Sciences Building North, Room PS-107, Northwest Area, Window
PSBN-050	**White Sink Undercoat**	**Coating: 2% Chrysotile Asbestos**	**Physical Sciences Building North, Room PS-130, Under Sink**
PSBN-051	**White Sink Undercoat**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, Room PS-130, Under Sink**
PSBN-052	Black Sink Undercoat	ND	Physical Sciences Building North, Room PS-110, Under Sink
PSBN-053	Black Sink Undercoat	ND	Physical Sciences Building North, Room PS-110, Under Sink
PSBN-054	3"x6" Red Ceramic Wall Tile with Grout	ND	Physical Sciences Building North, Men's Restroom, Southeast Area, South Wall
PSBN-055	3"x6" Red Ceramic Wall Tile with Grout	ND	Physical Sciences Building North, Women's Restroom, Northeast Area, North Wall
PSBN-056	**Black Lab Table**	**10% Chrysotile Asbestos**	**Physical Sciences Building North, Room PS-113, Lab Table**
PSBN-057	**Black Lab Table**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, Room PS-106, Lab Table**
PSBN-058	**Black Window Caulking**	**2% Chrysotile**	**Physical Sciences Building North, Room PS-109, Southwest Area, Window**
PSBN-059	**Black Window Caulking**	**Sample Not Analyzed Due to Prior Positive**	**Physical Sciences Building North, Room PS-109, Northeast Area, Window**
PSBN-060	Red Firestop	ND	Physical Sciences Building North, Room PS-132, Attic, South Area, Wall
PSBN-061	Red Firestop	ND	Physical Sciences Building North, Room PS-110B, Attic, East Center Area, Wall
PSBN-062	Black Duct Tape	ND	Physical Sciences Building North, Room PS-132, South Area, on Duct

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
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Sample Number	Material Description	Asbestos Content	Sample Location
PSBN-063	Black Duct Tape	ND	Physical Sciences Building North, Room PS-132, Southwest Area, on Duct
PSBN-064	Off-White Duct Vibration Cloth	ND	Physical Sciences Building North, Room PS-130, West Area, on Duct
PSBN-065	Off-White Duct Vibration Cloth	ND	Physical Sciences Building North, Room PS-130, Attic, West Area, on Duct
PSBN-066	Off-White Insulation Wrap	ND	Physical Sciences Building North, Room PS-130, Attic, East Area, on Pipe
PSBN-067	Off-White Insulation Wrap	ND	Physical Sciences Building North, Corridor 3, Center Area, on Pipe
PSBN-068	Off-White Insulation Wrap	ND	Physical Sciences Building North, Room PS-110B, Attic, Southeast Area, on Pipe
PSBN-069	Black Fiberglass Panel Cloth	ND	Physical Sciences Building North, Room PS-132, Attic, Northwest Area, on Ceiling
PSBN-070	Black Fiberglass Panel Cloth	ND	Physical Sciences Building North, Room PS-132, Attic, Northwest Area, on Ceiling
PSBN-071	Yellow Insulation Mastic	ND	Physical Sciences Building North, Room PS-110B, Attic, Southeast Area, on Tank
PSBN-072	Yellow Insulation Mastic	ND	Physical Sciences Building North, Room PS-110B, Attic, Southeast Area, on Tank
PSBN-073	Yellow Insulation Mastic	ND	Physical Sciences Building North, Room PS-110B, Attic, Southeast Area, on Tank
PSBN-074	Silver Duct Tape	ND	Physical Sciences Building North, Room PS-110B, Attic, Northeast Area, on Duct
PSBN-075	Silver Duct Tape	ND	Physical Sciences Building North, Room PS-110B, Attic, Northeast Area, on Duct
PSBN-076	Roof Field	ND	Physical Sciences Building North, Roof I, North Center Area, Floor
PSBN-077	Roof Field	ND	Physical Sciences Building North, Roof I, Central Area, Floor

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
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Sample Number	Material Description	Asbestos Content	Sample Location
PSBN-078	Middle Roof Field	ND	Physical Sciences Building North, Roof B, Central Area, Floor
PSBN-079	Middle Roof Field	ND	Physical Sciences Building North, Roof J, Southwest Area, Floor
PSBN-080	Middle Roof Field	ND	Physical Sciences Building North, Roof F, Central Area, Floor
PSBN-082	Roof Field	ND	Physical Sciences Building North, Roof H, Central Area, Floor
PSBN-083	Upper Roof Field	ND	Physical Sciences Building North, Roof G, South Area, Floor
PSBN-084	Upper Roof Field	ND	Physical Sciences Building North, Roof G, North Area, Floor
PSBN-085	Vent Penetration Mastic	ND	Physical Sciences Building North, Roof F, East Center Area, Vent
PSBN-086	Vent Penetration Mastic	ND	Physical Sciences Building North, Roof I, West Center Area, Vent
PSBN-087	Vent Penetration Mastic	ND	Physical Sciences Building North, Roof D, East Center Area, Vent
PSBN-088	Pipe Penetration Mastic	ND	Physical Sciences Building North, Roof I, Northeast Area, Pipe
PSBN-089	Pipe Penetration Mastic	ND	Physical Sciences Building North, Roof F, Southeast Area, Pipe
PSBN-090	Pipe Penetration Mastic	ND	Physical Sciences Building North, Roof B, East Center Area, Pipe
PSBN-091	Gray Mastic	ND	Physical Sciences Building North, Roof B, Adjacent to Electrical Unit, Floor
PSBN-092	Gray Mastic	ND	Physical Sciences Building North, Roof B, Adjacent to Electrical Unit, Floor
PSBN-093	White Roof Caulking	ND	Physical Sciences Building North, Roof J, West Wall
PSBN-094	White Roof Caulking	ND	Physical Sciences Building North, Roof F, South Wall

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
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Sample Number	Material Description	Asbestos Content	Sample Location
PSBN-095	Black Roof Caulking	ND	Physical Sciences Building North, Roof J, Southeast Area, Gutter
PSBN-096	Black Roof Caulking	ND	Physical Sciences Building North, Roof D, Northeast Area, Gutter
PSBN-097	Roof Flashing	ND	Physical Sciences Building North, Roof H, Northwest Area, South Wall
PSBN-098	Roof Flashing	ND	Physical Sciences Building North, Roof I, Northeast Area, North Wall
PSBN-099	Roof Flashing	ND	Physical Sciences Building North, Roof E, Northeast Area, North Wall
PSBN-100	Concrete Steps	ND	Exterior, Physical Sciences Building North, Lower Stairwell
PSBN-101	Concrete Steps	ND	Exterior, Physical Sciences Building North, Upper Stairwell
PSBN-102	White Window Caulking	ND	Exterior, Physical Sciences Building North, Northwest Area, North Wall
PSBN-103	White Window Caulking	ND	Exterior, Physical Sciences Building North, West Center Area, West Wall
PSBN-104	Stucco Wall	ND	Exterior, Physical Sciences Building North, Northwest Area, Stairwell Wall
PSBN-105	Stucco Wall	ND	Exterior, Physical Sciences Building North, North Area, North Wall
PSBN-106	Stucco Wall	ND	Exterior, Physical Sciences Building North, West Center Area, West Wall
PSBN-107	Stucco Wall	ND	Exterior, Physical Sciences Building North, West Center Area, West Wall
PSBN-108	Stucco Wall	ND	Exterior, Physical Sciences Building North, West Area Wall
PSBN-109	Brick and Mortar	ND	Exterior, Physical Sciences Building North, Northwest Area, Stairwell Wall
PSBN-110	Brick and Mortar	ND	Exterior, Physical Sciences Building North, Southwest Area, South Wall

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
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Sample Number	Material Description	Asbestos Content	Sample Location
PSBN-111	Concrete Floor	ND	Exterior, Physical Sciences Building North, Northwest Area, Adjacent to Entry, Floor
PSBN-112	Concrete Floor	ND	Exterior, Physical Sciences Building North, Southwest Area, Floor
PSBN-113	Concrete Footing	ND	Exterior, Physical Sciences Building North, North Area, Lower Wall
PSBN-114	Concrete Footing	ND	Exterior, Physical Sciences Building North, Southwest Area, West Wall
Physical Sciences Building South			
PSBS-001	12”x12” Gray with Green Floor Tiles Over Tan Mastic	ND	Physical Sciences Building South, Corridor, Southwest Area, Floor
PSBS-002	12”x12” Gray with Green Floor Tiles Over Tan Mastic	ND	Physical Sciences Building South, Corridor, Northeast Area, Floor
PSBS-003	**9”x9 Tan with Brown Streaks Floor Tile Over Black Mastic**	**Tile: 5% Chrysotile** **Mastic: 5% Chrysotile**	**Physical Sciences Building South, Room PS-1, Southeast Area, Floor**
PSBS-004	**9”x9 Tan with Brown Streaks Floor Tile Over Black Mastic**	**Sample Not Analyzed Due to Prior Positive Result**	**Physical Sciences Building South, Room PS-1, Northwest Area, Floor**
PSBS-005	**12”x12” Beige with Dark Gray and White Floor Tiles over Black Mastic**	**Tile: ND** **Mastic: 5% Chrysotile**	**Physical Sciences Building South, Room PS-1, Central Area, Floor**
PSBS-006	**12”x12” Beige with Dark Gray and White Floor Tiles over Black Mastic**	**Sample Not Analyzed Due to Prior Positive Result**	**Physical Sciences Building South, Room PS-1, Northeast Area, Floor**
PSBS-007	**12”x12” Dark gray with White Streaks Floor Tiles over Black Mastic**	**Tile: 3% Chrysotile** **Mastic: 5% Chrysotile**	**Physical Sciences Building South, Room PS-5, Northeast Area, Floor**
PSBS-008	**12”x12” Dark gray with White Streaks Floor Tiles over Black Mastic**	**Sample Not Analyzed Due to Prior Positive Result**	**Physical Sciences Building South, Room 108, Southwest Area, Floor**
PSBS-009	**12”x12” Red with Black Streaks Floor Tile over Black and Yellow Mastic**	**Tile: ND** **Mastic: 5% Chrysotile**	**Physical Sciences Building South, Room PS-5, Southeast Area, Floor**
PSBS-010	**12”x12” Red with Black Streaks Floor Tile over Black and Yellow Mastic**	**Sample Not Analyzed Due to Prior Positive Result**	**Physical Sciences Building South, Room PS-5, Southeast Area, Floor**
PSBS-011	**12”x12” Light Brown with White Streaks Floor Tile over Yellow Mastic**	**Tile: 2% Chrysotile** **Mastic: ND**	**Physical Sciences Building South, Room PS-5, Southwest Area, Floor**

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
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Sample Number	Material Description	Asbestos Content	Sample Location
PSBS-012	**12"x12" Light Brown with White Streaks Floor Tile over Yellow Mastic**	**Sample Not Analyzed Due to Prior Positive Result**	**Physical Sciences Building South, Room PS-5, Southwest Area, Floor**
PSBS-013	Concrete Floor	ND	Physical Sciences Building South, Room PS-6, Southeast Area, Floor
PSBS-014	Concrete Floor	ND	Physical Sciences Building South, Room PS-19, Northeast Area, Floor
PSBS-015	Tan Baseboard Mastic	ND	Physical Sciences Building South, Corridor, Southwest Area, Wall Adjacent to PS-6
PSBS-016	Tan Baseboard Mastic	ND	Physical Sciences Building South, Corridor, Northeast Area, Wall Adjacent to PS-19
PSBS-017	Black Baseboard Mastic	ND	Physical Sciences Building South, Room PS-6, Central Area
PSBS-018	Black Baseboard Mastic	ND	Physical Sciences Building South, Room PS-14, Central Area
PSBS-019	Plaster Wall	ND	Physical Sciences Building South, Room PS-2, Northeast Area, Wall
PSBS-020	Plaster Wall	ND	Physical Sciences Building South, Corridor, Central Area, South Wall
PSBS-021	Plaster Wall	ND	Physical Sciences Building South, Room PS-14, East Wall, Center Area
PSBS-022	Wall Texture	ND	Physical Sciences Building South, Corridor, Southwest Area, West Wall
PSBS-023	Wall Texture	ND	Physical Sciences Building South, Room PS-10, East Wall, Central Area
PSBS-024	Wall Texture	ND	Physical Sciences Building South, Corridor, Northeast Area, North Wall
PSBS-025	2'x4' White Ceiling Tile with Pinholes	ND	Physical Sciences Building South, Corridor, Southwest Area, Ceiling
PSBS-026	2'x4' White Ceiling Tile with Pinholes	ND	Physical Sciences Building South, Corridor, Northeast Area, Ceiling
PSBS-027	12"x12" White Ceiling Tile with Hockey Puck Mastic	ND	Physical Sciences Building South, Corridor, Southwest Area, Ceiling

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
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Sample Number	Material Description	Asbestos Content	Sample Location
PSBS-028	12"x12" White Ceiling Tile with Hockey Puck Mastic	ND	Physical Sciences Building South, Room PS-5, Central Area, Ceiling
PSBS-029	Yellow Pipe Insulation Wrap	ND	Physical Sciences Building South, Corridor, West Area
PSBS-030	Yellow Pipe Insulation Wrap	ND	Physical Sciences Building South, Corridor, West Area
PSBS-031	Off-White Pipe Insulation Wrap	ND	Physical Sciences Building South, Corridor, West Area
PSBS-032	Off-White Pipe Insulation Wrap	ND	Physical Sciences Building South, Room PS-2, Central Area
PSBS-033	Off-White Pipe Insulation Wrap	ND	Physical Sciences Building South, Room PS-2, South Area
PSBS-034	Off-White Pipe Insulation Wrap	ND	Physical Sciences Building South, Room PS-12, Southeast Area
PSBS-035	Off-White Duct Insulation Wrap	ND	Physical Sciences Building South, Room PS-2, Central Area
PSBS-036	Off-White Duct Insulation Wrap	ND	Physical Sciences Building South, Room PS-12, East Central Area
PSBS-037	Off-White Duct Insulation Wrap	ND	Physical Sciences Building South, Room PS-12, East Central Area
PSBS-038	Brick and Mortar	ND	Physical Sciences Building South, Corridor, Northwest Area, North Wall
PSBS-039	Brick and Mortar	ND	Physical Sciences Building South, Room PS-1, Southeast Area, East Wall
PSBS-040	Black Lab Table	ND	Physical Sciences Building South, Room PS-5, Central Area, Lab Table
PSBS-041	Black Lab Table	ND	Physical Sciences Building South, Room PS-6, Northeast Area, Lab Table
PSBS-042	**Black Exhaust System Table Top**	**10% Chrysotile Asbestos**	**Physical Sciences Building South, Room PS-6, West Central Area**
PSBS-043	**Black Exhaust System Table Top**	**Sample Not Analyzed Due to Prior Positive Result**	**Physical Sciences Building South, Room PS-14, East Central Area**
PSBS-044	**Gray Exhaust System Panel**	**10% Chrysotile Asbestos**	**Physical Sciences Building South, Room PS-5, Southwest Area**

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
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Sample Number	Material Description	Asbestos Content	Sample Location
PSBS-045	**Gray Exhaust System Panel**	**Sample Not Analyzed Due to Prior Positive Result**	**Physical Sciences Building South, Room PS-5, Southwest Area**
PSBS-046	Exhaust System Vibration Cloth	ND	Physical Sciences Building South, Room PS-5, Southwest Area
PSBS-047	Exhaust System Vibration Cloth	ND	Physical Sciences Building South, Room PS-5, Southwest Area
PSBS-048	Red Duct Tape	ND	Physical Sciences Building South, Room PS-5, Southwest Area
PSBS-049	Red Duct Tape	ND	Physical Sciences Building South, Room PS-5, Southwest Area
PSBS-050	**Black Exhaust System Panel**	**10% Chrysotile Asbestos**	**Physical Sciences Building South, Room PS-6, West Center Area**
PSBS-051	**Black Exhaust System Panel**	**Sample Not Analyzed Due to Prior Positive Result**	**Physical Sciences Building South, Room PS-14, East Center Area**
PSBS-052	Black Sink Undercoat	ND	Physical Sciences Building South, Room PS-12, Under Sink
PSBS-053	Black Sink Undercoat	ND	Physical Sciences Building South, Room PS-19, Under Sink
PSBS-054	Red Firestop	ND	Physical Sciences Building South, Room 108, South Center Area, Wall
PSBS-055	Red Firestop	ND	Physical Sciences Building South, Room 108, North Center Area, Wall
PSBS-056	**White Insulation Packing**	**10% Amosite Asbestos 5% Chrysotile Asbestos**	**Physical Sciences Building South, Room PS-12, Southeast Area**
PSBS-057	**White Insulation Packing**	**Sample Not Analyzed Due to Prior Positive Result**	**Physical Sciences Building South, Room PS-2, South Center Area**
PSBS-058	**White Insulation Packing**	**Sample Not Analyzed Due to Prior Positive Result**	**Physical Sciences Building South, Room PS-12, Southwest Area**
PSBS-059	Duct Joint Cloth	ND	Physical Sciences Building South, Room PS-12, East Central Area
PSBS-060	Duct Joint Cloth	ND	Physical Sciences Building South, Room PS

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
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Sample Number	Material Description	Asbestos Content	Sample Location
PSBS-061	Plaster Wall	ND	Physical Sciences Building South, Room PS-11, East Wall, Center Area
PSBS-062	Plaster Wall	ND	Physical Sciences Building South, Room PS-15, Northeast Area, East Wall
PSBS-063	Wall Texture	ND	Physical Sciences Building South, Room PS-10, South Wall, Center Area
PSBS-064	Wall Texture	ND	Physical Sciences Building South, Corridor, North Wall, Center Area
PSBS-065	**Wallboard and Joint Compound**	**Drywall: ND** **Joint Compound: 2% Chrysotile**	**Physical Sciences Building South, Room PS-19, Northeast Area, at Wall and Ceiling**
PSBS-066	**Wallboard and Joint Compound**	**Sample Not Analyzed Due to Prior Positive Result**	**Physical Sciences Building South, Room 108, Southwest Corner, Wall**
PSBS-067	**Wallboard and Joint Compound**	**Sample Not Analyzed Due to Prior Positive Result**	**Physical Sciences Building South, Room PS-1, Southeast Area, Wall**
PSBS-068	**Off White Pipe Fitting**	**10% Chrysotile Asbestos** **5% Crocidolite**	**Physical Sciences Building South, Room PS-2, Water Heater Closet, Pipe**
PSBS-069	**Off White Pipe Fitting**	**Sample Not Analyzed Due to Prior Positive Result**	**Physical Sciences Building South, Room PS-2, Water Heater Closet, Pipe**
PSBS-070	**Pipe Penetration Tape and Insulation**	**10% Amosite** **2% Chrysotile**	**Physical Sciences Building South, Room PS-2, Water Heater Closet, Pipe Penetration**
PSBS-071	**Pipe Penetration Tape and Insulation**	**Sample Not Analyzed Due to Prior Positive Result**	**Physical Sciences Building South, Room PS-2, Water Heater Closet, Pipe Penetration**
PSBS-072	**Exhaust Hood**	**10% Chrysotile**	**Physical Sciences Building South, Room PS-6, East Center Area**
PSBS-073	**Exhaust Hood**	**Sample Not Analyzed Due to Prior Positive Result**	**Physical Sciences Building South, Room PS-14, West Center Area**
PSBS-074	Black Lab Floor Mat	ND	Physical Sciences Building South, Room PS-12, Southwest Area, Floor
PSBS-075	Black Lab Floor Mat	ND	Physical Sciences Building South, Room PS-12, Southwest Area, Floor

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
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Sample Number	Material Description	Asbestos Content	Sample Location
PSBS-076	Silver Duct Tape	ND	Physical Sciences Building South, Room PS-12, Central Area, on Duct
PSBS-077	Silver Duct Tape	ND	Physical Sciences Building South, Room PS-12, Central Area, on Duct
PSBS-078	**White Pipe**	**10% Chrysotile 2% Crocidolite**	**Physical Sciences Building South, Room PS-2, Water Heater Closet, Pipe**
PSBS-079	**White Pipe**	**Sample Not Analyzed Due to Prior Positive Result**	**Physical Sciences Building South, Room PS-2, Water Heater Closet, Pipe**
PSBS-080	**Pipe Penetration Tape and Insulation**	**10% Amosite 2% Chrysotile**	**Physical Sciences Building South, Room PS-2, Water Heater Closet, Pipe**
PSBS-081	Concrete Slab	ND	Exterior, Physical Sciences Building South, Southwest Area, South Wall
PSBS-082	Concrete Slab	ND	Exterior, Physical Sciences Building South, South Center Area, South Wall
PSBS-083	**White Window Caulking**	**Trace Chrysotile**	**Exterior, Physical Sciences Building South, North Center Area, Window**
PSBS-084	**White Window Caulking**	**Sample Not Analyzed Due to Prior Positive Result**	**Exterior, Physical Sciences Building South, Northwest Area, Window**
PSBS-085	Brick and Mortar	ND	Exterior, Physical Sciences Building South, Northwest Area, North Wall
PSBS-086	Brick and Mortar	ND	Exterior, Physical Sciences Building South, Southeast Area, East Wall
PSBS-087	**Off-White Expansion Joint**	**5% Chrysotile**	**Exterior, Physical Sciences Building South, Southwest Corner, Wall**
PSBS-088	**Off-White Expansion Joint**	**Sample Not Analyzed Due to Prior Positive Result**	**Exterior, Physical Sciences Building South, Southwest Corner, Wall**
PSBS-089	White Sealant	ND	Exterior, Physical Sciences Building South, Southeast Area, South Wall
PSBS-090	White Sealant	ND	Exterior, Physical Sciences Building South, Southeast Area, South Wall

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
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Sample Number	Material Description	Asbestos Content	Sample Location
PSBS-091	**Black Caulking**	**5% Chrysotile**	**Exterior, Physical Sciences Building South, South Area, South Wall**
PSBS-092	**Black Caulking**	**Sample Not Analyzed Due to Prior Positive Result**	**Exterior, Physical Sciences Building South, South Center Area, South Wall**
PSBS-093	Concrete Wall	ND	Exterior, Physical Sciences Building South, South Center Area, South Wall
PSBS-094	Concrete Wall	ND	Exterior, Physical Sciences Building South, Southeast Area, East Wall
PSBS-095	Stucco Siding	ND	Exterior, Physical Sciences Building South, Southeast Area, South Wall
PSBS-096	Stucco Siding	ND	Exterior, Physical Sciences Building South, Southeast Area, South Wall
PSBS-097	Stucco Siding	ND	Exterior, Physical Sciences Building South, Southeast Area, South Wall
PSBS-098	Upper Roof Field	ND	Exterior, Physical Sciences Building South, Southeast Area, Floor
PSBS-099	Upper Roof Field	ND	Exterior, Physical Sciences Building South, Northwest Area, Floor
PSBS-100	Roof Flashing	ND	Exterior, Physical Sciences Building South, East Area, Flashing
PSBS-101	**Roof Flashing**	**40% Chrysotile Asbestos**	**Exterior, Physical Sciences Building South, West Area, Flashing**
PSBS-102	Lower Roof Field	ND	Physical Sciences Building South, Southwest Area, Floor
PSBS-103	Lower Roof Field	ND	Physical Sciences Building South, Northeast Area, Floor
PSBS-104	**Gray Sealant**	**10% Chrysotile**	**Physical Sciences Building South, Northwest Area, Skylight**
PSBS-105	**Gray Sealant**	**Sample Not Analyzed Due to Prior Positive Result**	**Physical Sciences Building South, Southeast Area, Skylight**
PSBS-106	Black Pipe Penetration Mastic	ND	Physical Sciences Building South, North Center Area, Pipe
PSBS-107	Black Pipe Penetration Mastic	ND	Physical Sciences Building South, South Center Area, Pipe

Table 3. Summary of Asbestos Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
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Sample Number	Material Description	Asbestos Content	Sample Location
PSBS-108	Gray Vibration Cloth	ND	Physical Sciences Building South, Southeast Area, Duct
PSBS-109	Gray Vibration Cloth	ND	Physical Sciences Building South, Northwest Area, Duct
PSBS-110	Gray Duct Mastic	ND	Physical Sciences Building South, Roof, Southeast Area, Duct
PSBS-111	Gray Duct Mastic	ND	Physical Sciences Building South, Roof, Northwest Area, Duct

Analytical Method: Polarized Light Microscopy (PLM), EPA/600/R-93/116
ND = No Asbestos Detected

Table 4. Summary of Lead Analytical Results

C-4016 Increment 3: Physical Sciences & Biology Buildings Demolition Project
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Sample Number	Material Description	Lead Content (wt. %/mg/kg or ppm)	Sample Location
Biological Science Building			
BIO-PB001	**Orange Paint on Gypsum Wallboard**	**0.33%**	**Room 18, Southeast Corner Wall**
BIO-PB002	1"x1" Ceramic Tile Gray with Black Specks	<7.7 ppm	Room 24, Southwest Corner from Countertop
BIO-PB003	**Beige Paint on Gypsum Wallboard**	**0.14%**	**Room 26, Southeast Counter**
BIO-PB004	4"x4" Off-White Ceramic Tile	210 ppm	Room 43, Wall
BIO-PB005	Off-White Paint on Gypsum Wallboard	<0.0078%	Room 12, Southeast Wall
BIO-PB006	**Off-White Paint on Plaster**	**0.38%**	**Room 43, Northeast Corner Wall**
BIO-PB007	**Black Paint on Metal Beam**	**0.75%**	**Room 33, Center I-Beam**

BIO-PB008	**White Paint on Wood Trim**	**0.035%**	**Room 37, Corridor Door**
BIO-PB009	Light Blue Paint on Gypsum Wallboard	<0.0081%	Corridor, South End, West Wall
BIO-PB010	**Blue Paint on Wood**	**0.037%**	**Corridor, South End, Door 7**
BIO-PB011	**Off-White Paint on Wood**	**0.21%**	**Room 1, Southwest Adjacent Room to Electrical Beam**
BIO-PB012	**Beige Paint on Metal**	**0.016%**	**Room 1, Southeast Wall**
BIO-PB013	Blue Paint on Metal	<0.0081	Room 3 Boiler Room, North Side Generator
BIO-PB014	**Yellow Paint on Metal Support Post**	**0.037%**	**Room 3 Boiler Room**
BIO-PB015	**Red Paint on Metal Pipe Valve**	**0.022%**	**Room 3 Boiler Room, South Side**
BIO-PB016	Gray Paint on Concrete	<0.0081%	Room 3 Boiler Room, Floor
BIO-PB017	Blue Paint on Wood	<0.0081%	Room 3 Boiler Room, South Wall Panel
BIO-PB018	1”x1” Gray Ceramic Tile	<8.9 ppm	Men’s Restroom, Floor
BIO-PB019	**Gray Paint on Metal**	**180,000 ppm**	**Roof Exhaust Flue**
BIO-PB20	**White Paint on Stucco**	**0.0073%**	**Exterior, South Side Soffit**
BIO-PB021	Red Paint on Metal Duct	<0.0079%	Exterior, Southwest Corner, Duct Chase
BIO-PB022	**White Paint on Metal Shade**	**0.023%**	**Exterior, West Side, Shade Lower**
BIO-PB023	**Beige Paint on Metal Trim**	**2.9%**	**Exterior, West Side Wall, Lower Header Trim**
BIO-PB024	**Brown Paint on Metal**	**0.063%**	**Exterior, Roof, Southwest Corner Parapet Cap**
BIO-PB025	**Black Paint on Metal**	**0.28%**	**Exterior, West Side I-Beam Column**
BIO-PB026	**White Paint on Wood**	**0.82%**	**Exterior, West Side Eave Joist**
BIO-PB027	Red Paint on Wood	<0.0081%	Exterior, South Box
BIO-PB029	**White Paint on Metal**	**<0.0081%**	**Room 29, Exhaust Hood**
Chemical Storage Building			
CSB-PB-101	Grey Paint on Metal Door	<0.007%	Ante-Chamber, Flammables Door
CSB-PB-102	Beige Paint on Wallboard	<0.007%	Ante-Chamber, Wall Between Hazardous and Flammable Storage Doors
Chiller Units			
CE-PB-101	**Grey Metal Chiller Component**	**0.88%**	**Near Entry, Chiller Component**

111221-CHA-Pb01	**Gray Metal Chiller Component**	**3.3%**	**Chiller 10, housing of the unit**
Physical Sciences Building South			
PSBS-PB01	Baby Blue Paint on Plaster	<0.006%	Physical Sciences Building South, Corridor, South Wall
PSBS-PB02	**Light Orange Paint on Plaster**	**0.96%**	**Physical Sciences Building South, Room PS-8, West Wall**
PSBS-PB03	**Off-White Paint on Plaster**	**0.10%**	**Physical Sciences Building South, Room PS-17, West Wall**
PSBS-PB04	**Orange Paint on Plaster**	**1.9%**	**Physical Sciences Building South, Room PS-12, South Wall**
PSBS-PB05	**Dark Blue Paint on Drywall**	**0.11%**	**Physical Sciences Building South, Room PS-19, North Wall**
PSBS-PB06	**Brown Paint on Metal**	**0.38%**	**Physical Sciences Building South, Room PS-5, North Wall**
PSBS-PB07	**Baby Blue Paint on Metal**	**0.32%**	**Physical Sciences Building South, Room PS-5, North Wall**
PSBS-PB08	**Brown Paint on Plaster**	**0.26%**	**Physical Sciences Building South, Room PS-2, North Wall**
PSBS-PB09	**Black Paint on Glass**	**0.012%**	**Physical Sciences Building South, Room PS-19, Northwest Wall**
PSBS-PB10	**Red Paint on Metal**	**0.029%**	**Physical Sciences Building South, Room PS-5, Southwest Wall**
PSBS-PB11	**Off-White Paint on Metal**	**0.039%**	**Physical Sciences Building South, Room PS-2, East Wall**
PSBS-PB12	**Off-White Paint on Drywall**	**0.32%**	**Physical Sciences Building South, Room PS-1, South Wall**
PSBS-PB13	**Green Paint on Metal Window Frame**	**5.5%**	**Physical Sciences Building South, Room PS-5, North Wall**
PSBS-PB14	**Green Paint on Wood Wall**	**0.090%**	**Physical Sciences Building South, Room PS-5, North Wall**
PSBS-PB15	**Baby Blue Paint on Wood Baseboard**	**0.57%**	**Physical Sciences Building South, Room PS-6, North Wall**
PSBS-PB16	**Brown Paint on Wood Baseboard**	**0.97%**	**Physical Sciences Building South, Room PS-8, North Wall**
PSBS-PB17	**Off-White Paint on Wood Baseboard**	**0.29%**	**Physical Sciences Building South, Room PS-10, South Wall**
PSBS-PB18	**Light Brown Paint on Wood Cabinet**	**0.013%**	**Physical Sciences Building South, Room PS-6, Cabinet**
PSBS-PB19	**Dark Blue Paint on Metal Door Frame**	**0.34%**	**Physical Sciences Building South, Room PS-19, Room-108**
PSBS-PB20	**Black Paint on Metal Door**	**0.11%**	**Physical Sciences Building South, Room PS-19, Room 108**
PSBS-PB21	**Orange Paint on Metal HVAC Unit**	**8.5%**	**Physical Sciences Building South, Room PS-5, North on Hood**
PSBS-PB22	**Light Orange Paint on Transite Exhaust Hood**	**0.47%**	**Physical Sciences Building South, Room PS-6, South Side**
PSBS-PB23	**Dark Blue Paint on Transite Exhaust Hood**	**0.020%**	**Physical Sciences Building South, Room PS-14, South Wall**

PSBS-PB24	**Dark Brown Paint on Metal Post**	**3.2%**	**Physical Sciences Building South, Room PS-6, South Wall**
PSBS-PB25	**White Paint on Stucco Wall**	**0.19%**	**Exterior, Physical Sciences Building South, Southeast Area**
PSBS-PB26	**Brown Paint on Metal Door**	**2.5%**	**Exterior, Physical Sciences Building South, North Center Area**
PSBS-PB27	**Blue Paint on Metal Post**	**0.008%**	**Exterior, Physical Sciences Building South, East Center Area**
Boiler Room Building			
BR-01-P	**Pink Paint on Concrete Wall**	**0.11%**	**Interior, West Wall, Center**
BR-02-P	Blue Paint on Metal Transformer	<0.006%	Interior, Transformer Stand, Southwest Corner
BR-03-P	**Brick Red Paint on Metal Door**	**1.4%**	**Interior, Boiler Room, Entry Door, Southwest Area**
BR-04-P	**Brick Red Paint on Metal Pipe**	**1.2%**	**Exterior, Boiler Room, Southwest Corner, Pipe**
BR-05-P	Fire Red Paint on Metal Control Panel	<0.007%	Interior, Boiler Room, South Wall, Control Panel
BR-06-P	**Ferrari Red Paint on Metal Pipe Flange**	**0.078%**	**Interior, Boiler Room, Northwest Corner, Pipe Flange**
BR-07-P	**Yellow Paint on Metal Pipe**	**0.019%**	**Interior, Boiler Room, West Wall, Pipe Adjacent to Entry**
BR-08-P	**Blue Paint on Thermal System Insulation**	**0.18%**	**Interior, Boiler Room, Southeast Area, Thermal System Insulation on Pipe**
BR-09-P	**Blue Paint on Metal Door Frame**	**1.4%**	**Interior, Boiler Room, Northeast Entry, Door Frame**
BR-10-P	Gray Paint on Pipe	<0.007%	Interior, Boiler Room, Southwest Area Adjacent to Entry
BR-11-P	**Gray Paint on Pipe**	**0.007%**	**Exterior, Boiler Room, Northeast Area, Gas Meter**
BR-12-P	**Gray Paint on Pedestal**	**0.19%**	**Interior, Boiler Room, Northeast Area, Pedestal**
Physical Sciences Building North			
PSBN-PB001	White Paint on Drywall	<0.007%	Physical Sciences Building North, Room PS-109, West Wall
PSBN-PB002	Gray Paint on Metal Door Frame	<0.006%	Physical Sciences Building North, Room PS-109, Entrance
PSBN-PB004	Beige Paint on Wood Trim	<0.006%	Physical Sciences Building North, Corridor 1, Above Entrance
PSBN-PB005	**Gray Paint on Metal Handrail**	**0.089%**	**Physical Sciences Building North, Corridor 1, Center**
PSBN-PB007	**Red Paint on Metal Duct**	**0.032%**	**Physical Sciences Building North, Room PS-113, South**
PSBN-PB008	Baby Blue Paint on Drywall	<0.007%	Physical Sciences Building North, Room PS-113, North Wall
PSBN-PB009	**Black Paint on Metal Door Frame**	**0.32%**	**Physical Sciences Building North, Room PS-123, Door Frame**
PSBN-PB010	**White Paint on Metal Door Frame**	**0.032%**	**Physical Sciences Building North, Room PS-118, Door Frame**
PSBN-PB011	Gray Paint on Wood Wall	<0.006%	Physical Sciences Building North, Room PS-118, Wall

PSBN-PB012	White Paint on Wood Trim	<0.006%	Physical Sciences Building North, Room PS-118, Near Ceiling
PSBN-PB013	**Yellow Paint on Metal Fixture**	**1.9%**	**Physical Sciences Building North, Room PS-113, On Light Fixture**
PSBN-PB014	Baby Blue Paint on Wood Trim	<0.006%	Physical Sciences Building North, Room PS-106, North Wall
PSBN-PB015	**Brown Paint on Metal Door Frame**	**0.20%**	**Physical Sciences Building North, Room PS-106, Door Frame**
PSBN-PB016	Black Paint on Drywall	<0.007%	Physical Sciences Building North, Room PS-132 Lecture Hall, Above Ceiling
PSBN-PB017	Brown Ceramic Floor Tile	<0.006%	Physical Sciences Building North, Women’s Restroom, South Wall
PSBN-PB019	**Red Ceramic Wall Tile**	**0.008%**	**Physical Sciences Building North, Women’s Restroom, South Wall**
PSBN-PB020	**Yellow Paint on Drywall**	**0.034%**	**Physical Sciences Building North, Room 130, Northwest Corner**
PSBN-PB021	Black Paint on Wood Wall	<0.006%	Physical Sciences Building North, Room Exploratorium, 132 Entrance
PSBN-PB022	**Red Paint on Metal Beam**	**0.028%**	**Physical Sciences Building North, Corridor, Above Ceiling Beam**
PSBN-PB023	Brown Paint on Metal Gutter	<0.007%	Physical Sciences Building North, Roof F, West Area
PSBN-PB024	Red Paint on Metal Dome Joint	<0.007%	Physical Sciences Building North, Roof G, Southwest Area
PSBN-PB025	Red Paint on Wood Dome Siding	<0.006%	Physical Sciences Building North, Roof G, Southwest Area
PSBN-PB026	Black Paint on Wood Cabinet Door	<0.007%	Physical Sciences Building North, Roof J, South Area
PSBN-PB027	**Brown Paint on Metal Rail**	**0.12%**	**Physical Sciences Building North, Roof J, South Area**
PSBN-PB028	**Black Paint on Metal Door**	**0.018%**	**Physical Sciences Building North, North Area, North Door**
Analytical Methods: EPA SW-846 Method 7420 and EPA 3050B/7000B < = Below Analytical Limit of Detection			

Bulk Asbestos Analysis

(EPA Method 40CFR, Part 763, Appendix E to Subpart E and EPA 600/R-93-116, Visual Area Estimation)
NVLAP Lab Code: 101459-0

Forensic Analytical Consulting Svcs
Gary Lowe
21228 Cabot Blvd.

Hayward, CA 94545

Client ID: HAY01
Report Number: B318551
Date Received: 05/28/21
Date Analyzed: 06/04/21
Date Printed: 06/04/21
First Reported: 06/04/21

Job ID/Site: PJ63338; Critical Solutions, Inc.

Date(s) Collected: 05/28/2021

SGSFL Job ID: HAY01
Total Samples Submitted: 18
Total Samples Analyzed: 18

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
CSB-01	12429061						
Layer: White Drywall			**ND**				
Layer: White Joint Compound			**ND**				
Layer: White Tape			**ND**				
Layer: White Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							
CSB-02	12429062						
Layer: White Drywall			**ND**				
Layer: White Joint Compound			**ND**				
Layer: White Tape			**ND**				
Layer: White Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (20 %) Fibrous Glass (10 %)							
CSB-03	12429063						
Layer: Black Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
CSB-04	12429064						
Layer: Black Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
CSB-05	12429065						
Layer: White Non-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
CSB-06	12429066						
Layer: White Non-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
CSB-07	12429067						
Layer: Brown Semi-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (10 %)							
CSB-08	12429068						
Layer: Brown Semi-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (10 %)							
CSB-09	12429069						
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
CSB-10	12429070						
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
CSB-11	12429071						
Layer: Grey Cementitious Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
CSB-12	12429072						
Layer: Grey Cementitious Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
CSB-13	12429073						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (55 %)							
Comment: Bulk complex sample.							
CSB-14	12429074						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (55 %)							
Comment: Bulk complex sample.							
CSB-15	12429075						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (55 %) Fibrous Glass (10 %)							
Comment: Bulk complex sample.							

Report Number: B318551

Client Name: Forensic Analytical Consulting Svcs

Date Printed: 06/04/21

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
CSB-16	12429076						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (10 %) Synthetic (55 %)							
Comment: Bulk complex sample.							
CSB-17	12429077						
Layer: Grey Non-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
CSB-18	12429078						
Layer: Grey Non-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

Sampling Data Form / Chain of custody

Page 1 of 2

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: Radzinski

Sample Date: 28 May 2021

Proj #: PJ63338

Turnaround Time: RUSH 24hr 48hr [✓ Extended (5 days)]

Analysis: [✓ PLM Standard:] ______PLM w/ Point Count: (______400pt.______1,000 pt.):

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

NotE: please halt analyses @ 1st positive for each homogeneous material

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
01	TSI, straight run				CE-01	NE quadrant, north chiller line ~~east.~~ east end of E-W run	
01	TSI, straight run				CE-02	NE quadrant, ~~south~~ north chiller line, north end of N-S run.	
01	TSI, straight run				CE-03	NW quadrant, north chiller line, east of valve	
02	TSI, valve jacket				CE-04	NW quadrant, north chiller line, valve jacket	
03	TSI				CE-05	W. side, pump manifold	
04	Packing				CE-06	corrugated ~~cer~~ roof panel and joist	
04	Packing				CE-07	corrugated roof panel and joist	
[illegible]	TSI				CE-08	pipe elbow above west pump	

Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooriing, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by: Radzinski
Date and Time: 28 May 2021 / 1515

Received by:
Date and Time:

Relinquished by:
Date and Time:

Received by: RECEIVED MAY 28 REC'D cym D/O
Date and Time: 320pm

Relinquished by:
Date and Time:

Received by:
Date and Time:

Sampling Data Form / Chain of custody

Page 2 of 2

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: Radzinski

Sample Date: 28 May 2021

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** **Extended (5 days)**
Analysis:	✓ **PLM Standard:** ______ **PLM w/ Point Count:** (______ **400pt.** ______ **1,000 pt.):**
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

Please halt analysis @ 1st positive for each homogeneous material

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
06	Concrete				CE-09	exterior, SW corner, pad	
06	concrete				CE-10	exterior, NW corner, pad	

DW = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooring, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Ceiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by: Radzinski **Date and Time:** 28 May 2021 / 1515	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:**	**Received by:** **Date and Time:** RECEIVED MAY 28 REC'D 320pm	**Received by:** **Date and Time:**

SGS FORENSIC LABORATORIES

Final Report

Bulk Asbestos Analysis

(EPA Method 40CFR, Part 763, Appendix E to Subpart E and EPA 600/R-93-116, Visual Area Estimation)
NVLAP Lab Code: 101459-0

Forensic Analytical Consulting Svcs
Gary Lowe
21228 Cabot Blvd.

Hayward, CA 94545

Client ID: HAY01
Report Number: B318552
Date Received: 05/28/21
Date Analyzed: 06/04/21
Date Printed: 06/04/21
First Reported: 06/04/21

Job ID/Site: PJ63338; Critical Solutions, Inc.

Date(s) Collected: 05/28/2021

SGSFL Job ID: HAY01
Total Samples Submitted: 10
Total Samples Analyzed: 10

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
CE-01	12429079						
Layer: Yellow Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (99 %)							
CE-02	12429080						
Layer: Yellow Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (99 %)							
CE-03	12429081						
Layer: Yellow Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (99 %)							
CE-04	12429082						
Layer: Yellow Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (99 %)							
CE-05	12429083						
Layer: Black Foam			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
CE-06	12429084						
Layer: Black Foam			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
CE-07	12429085						
Layer: Black Foam			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

Report Number: B318552
Client Name: Forensic Analytical Consulting Svcs
Date Printed: 06/04/21

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
CE-08	12429086						
Layer: Yellow Fibrous Material			**ND**				
Layer: Tan Fibrous Material			**ND**				
Layer: Silver Foil			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (90 %)							
CE-09	12429087						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
CE-10	12429088						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

Sam ng Data Form / Chain of custody

Page 1 of 2

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: Radzinski

Sample Date: 28 May 2021

Proj #: PJ63338

Turnaround Time: RUSH 24hr 48hr [✓ Extended (5 days)]

Analysis: ✓ **PLM Standard:** ______ **PLM w/ Point Count:** (______400pt.______1,000 pt.):

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

NotE: please halt analyses @ 1st positive for each homogeneous material

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
01	TSI, straight run				CE-01	NE quadrant, north chiller line ~~east.~~ east end of E - W run	
01	TSI, straight run				CE-02	NE quadrant, ~~south~~ north chiller line, north end of N - S run	
01	TSI, straight run				CE-03	NW quadrant, north chiller line, east of valve	
02	TSI, valve jacket				CE-04	NW quadrant, north chiller line, valve jacket	
03	TSI				CE-05	W. side, pump manifold	
04	Packing				CE-06	corrugated ~~cor~~ roof panel and joist	
4	Packing				CE-07	corrugated roof panel and joist	
2	TSI				CE-08	pipe elbow above west pump	

rywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooring, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

ished by: Radzinski
d Time: 28 May 2021 / 1515

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Relinquished by:
Date and Time:

Received by:
Date and Time:

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D/O
320pm

Relinquished by:
Date and Time:

Received by:
Date and Time:

Sampling Data Form / Chain of custody

Page 2 of 2

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: Radzinski

Sample Date: 28 May 2021

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** **Extended (** 5 **days)**
Analysis:	✓ **PLM Standard:** ______**PLM w/ Point Count:** (______**400pt.**______**1,000 pt.):**
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

Please halt analysis @ 1st & positive for each homogeneous material

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
06	Concrete				CE-09	exterior, SW corner, pad	
06	concrete				CE-10	exterior, NW corner, pad	

DW = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooriing, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Ceiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by: Radzinski **Date and Time:** 28 May 2021 / 1515	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:**	**Received by:** **Date and Time:** RECEIVED MAY 28 REC'D 320 pm	**Received by:** **Date and Time:**

MICRO ANALYTICAL LABORATORIES, INC.

BULK ASBESTOS ANALYSIS - POLARIZED LIGHT MICROSCOPY (PLM)

1212
Gary Lowe
Forensic Analytical Consulting
21228 Cabot Boulevard
Hayward, CA 94545

PROJECT:
PROJECT NO. PJ63338
BIOLOGICAL SCIENCE BUILDING
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In **281877**
Total Samples 144
Date Sampled 05/24/2021
Date Received 06/02/2021
Date Analyzed 06/02/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A001 Micro #: 281877-01 Analyst: JM GR TAN SHEET FLOORING WITH MOTTLE PATTERN ROOM 18 SOUTHEAST CORNER	SHEET FLOORING: ND BACKING / MASTIC: 25% CHRYSOTILE ASBESTOS	5 % CELLULOSE NFM: SYNTHETIC MATERIAL, CARBONATE.
Client #: BIO-A002 Micro #: 281877-02 Analyst: TAN SHEET FLOORING WITH MOTTLE PATTERN ROOM 18 NORTHWEST CORNER	NOT ANALYZED (PRIOR POSITIVE)	NFM:
Client #: BIO-A003 Micro #: 281877-03 Analyst: JM GR BEIGE SHEET FLOORING WITH MOTTLE PATTERN ROOM 18 WEST SIDE POTHOLE ON FLOOR	SHEET FLOORING / BACKING: ND MASTIC: ND	15 % FIBROUS GLASS 5 % SYNTHETIC FIBERS NFM: SYNTHETIC MATERIAL, CARBONATE, ADHESIVE.
Client #: BIO-A004 Micro #: 281877-04 Analyst: JM BEIGE SHEET FLOORING WITH MOTTLE PATTERN ROOM 2 EAST SIDE	SHEET FLOORING / BACKING: ND MASTIC: ND CONCRETE: ND	15 % FIBROUS GLASS 5 % SYNTHETIC FIBERS NFM: SYNTHETIC MATERIAL, CARBONATE, ADHESIVE.
Client #: BIO-A005 Micro #: 281877-05 Analyst: JM WHITE ADHESIVE ON METAL HVAC PINS - ROOM 16	ND	25 % FIBROUS GLASS NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES

Technical Supervisor: Baojia Ke, Ph.D.

6/4/2021
Date Reported

NVLAP Lab Code 101872-0 (TESTING). Analyses use Polarized Light Microscopy (PLM), Micro Analytical SOP PLM-101. Basic techniques follow EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples" (originally published 1982), and EPA-600/R93-116 (1993). The 1993 method covers all types of bulk materials and is based on the 1982 Method, with improved analytical techniques for layered samples as required for NESHAP compliance. Asbestos is quantified by calibrated visual estimation. Detection limit is material dependent. Detection of asbestos traces (much less than 1%) may not be reliable or reproducible by PLM. Weight % cannot be determined by PLM. Asbestos with diameter below ~1 µm may not be detected by PLM. Absence of asbestos in dust, debris, and some compact materials, including floor tiles, cannot be conclusively established by PLM, and should be confirmed by Transmission Electron Microscopy (TEM).Interferences may prevent detection of small asbestos fibers, and hinder determination of some optical properties.Tremolite-asbestos or actinolite- asbestos may be indistinguishable by PLM from some similar, non-regulated amphiboles (e.g. the "Libby Amphiboles" richterite and winchite), and should be confirmed by TEM. The lower quantitation limit (reporting limit) of PLM estimation is 1%. The Cal-OSHA definition of asbestos-containing construction material is 0.1% asbestos; however, reliable determination of asbestos percent at this level cannot be done by PLM estimation; PLM Point Counting or TEM weight percent analysis are recommended. Only dominant non-asbestos materials (fibrous and non-fibrous) are listed. This analysis shall not be construed as conclusive for the presence of any reported materials other than asbestos, or for the absence of any non-asbestos material. Common interferences include, but are not limited to: cellulose, fibrous glass, other man-made vitreous fibers, synthetic fibers, elongate fragments of calcium sulfate, talc, wollastonite, animal hair, and other miscellaneous elongate particles. Sample heterogeneity is indicated by listing more than one distinct layer or material on the report. If more than one distinct sample is received in the same container, samples shall be marked with letters and analyzed separately. Layers within a sample are analyzed separately when feasible; if asbestos is detected, percentages are reported for individual layers. Interlayer contamination is possible among any layers in a sample. The notation ND (or "NONE DETECTED") indicates a result of "NO ASBESTOS DETECTED" in a homogeneous sample, or in a layer of a heterogeneous sample. Composite asbestos percentages from multiple layers are applicable only to wallboard / joint compound systems; compositing is based on customers' descriptions of material as "joint compound". Customers are solely responsible for identification and description of bulk materials listed on field forms. Laboratory descriptions may differ from those given by customers. Quality Control (QC): all results have been determined to be within acceptance limits prior to reporting. Reanalyzed samples are denoted by two sets of analyst initials. Unless otherwise stated herein, all samples were received in acceptable condition for analysis. This report must not be used to claim product endorsement by NIST or any U.S. Government agency. This report shall not be reproduced except in full, without the approval of Micro Analytical Laboratories, Inc., and pertains only to the samples analyzed as received. NFM = Non-fibrous materials.

MICRO ANALYTICAL LABORATORIES, INC.

BULK ASBESTOS ANALYSIS - POLARIZED LIGHT MICROSCOPY (PLM)

1212
Gary Lowe
Forensic Analytical Consulting
21228 Cabot Boulevard
Hayward, CA 94545

PROJECT:
PROJECT NO. PJ63338
BIOLOGICAL SCIENCE BUILDING
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In	**281877**
Total Samples	144
Date Sampled	05/24/2021
Date Received	06/02/2021
Date Analyzed	06/02/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A006 Micro #: 281877-06 Analyst: JM **WHITE ADHESIVE ON METAL HVAC PINS - ROOM 16**	**ADHESIVE: ND**	25 % FIBROUS GLASS NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A007 Micro #: 281877-07 Analyst: JM **GRAY HVAC SEAM MASTIC ROOM 16**	**ND**	NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A008 Micro #: 281877-08 Analyst: JM **GRAY HVAC SEAM MASTIC ROOM 17**	**ND**	NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A009 Micro #: 281877-09 Analyst: JM **2" X 4" WHITE ACOUSTICAL CEILING TILE WITH FISSURE PATTERN - ROOM 18**	**CEILING TILE: ND** **PAINT: ND**	45 % CELLULOSE NFM: PERLITE
Client #: BIO-A010 Micro #: 281877-10 Analyst: JM **2" X 4" WHITE ACOUSTICAL CEILING TILE WITH FISSURE PATTERN CORRIDOR EAST WALL ON SOUTH END**	**CEILING TILE: ND** **PAINT: ND**	45 % CELLULOSE NFM: PERLITE

Technical Supervisor: for Baojia Ke, Ph.D. 6/4/2021 Date Reported

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BULK ASBESTOS ANALYSIS - POLARIZED LIGHT MICROSCOPY (PLM)

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Hayward, CA 94545

PROJECT:

PROJECT NO. PJ63338
BIOLOGICAL SCIENCE BUILDING
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In **281877**
Total Samples 144
Date Sampled 05/24/2021
Date Received 06/02/2021
Date Analyzed 06/02/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A011 Micro #: 281877-11 Analyst: JM **BLACK WITH GRAY STREAKS** **FLOOR MATS - ROOM 16**	**ND**	45 % CELLULOSE NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A012 Micro #: 281877-12 Analyst: JM **BLACK WITH GRAY STREAKS** **FLOOR MATS - ROOM 16**	**ND**	45 % CELLULOSE NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A013 Micro #: 281877-13 Analyst: JM GR **JOINT COMPOUND / WB** **ROOM 18 SOUTHEAST CORNER WALL**	COMPOSITE DW & JC: <1% CHRYSOTILE ASBESTOS **DRYWALL: ND** **JOINT COMPOUND: 2% CHRYSOTILE ASBESTOS** **TAPE / PAINT: ND**	15 % CELLULOSE 5 % FIBROUS GLASS NFM: 'GYPSUM' (CALCIUM SULFATE), CARBONATE.
Client #: BIO-A014 Micro #: 281877-14 Analyst: JM **JOINT COMPOUND / WB** **ROOM 26 SOUTHEAST CORNER**	COMPOSITE DW & JC: <1% CHRYSOTILE ASBESTOS **DRYWALL: ND** **JOINT COMPOUND: 2% CHRYSOTILE ASBESTOS** **TAPE / PAINT: ND**	15 % CELLULOSE 5 % FIBROUS GLASS NFM: 'GYPSUM' (CALCIUM SULFATE), CARBONATE.
Client #: BIO-A015 Micro #: 281877-15 Analyst: JM **JOINT COMPOUND / WB** **ROOM 3 BOILER ROOM**	COMPOSITE DW & JC: <1% CHRYSOTILE ASBESTOS **DRYWALL: ND** **JOINT COMPOUND: 2% CHRYSOTILE ASBESTOS** **TAPE / PAINT: ND**	15 % CELLULOSE 5 % FIBROUS GLASS NFM: 'GYPSUM' (CALCIUM SULFATE), CARBONATE.

Technical Supervisor: Baojia Ke, Ph.D. 6/4/2021
Date Reported

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BULK ASBESTOS ANALYSIS - POLARIZED LIGHT MICROSCOPY (PLM)

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PROJECT:
PROJECT NO. PJ63338
BIOLOGICAL SCIENCE BUILDING
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In **281877**
Total Samples 144
Date Sampled 05/24/2021
Date Received 06/02/2021
Date Analyzed 06/02/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A016 Micro #: 281877-16 Analyst: JM JOINT COMPOUND / WB JANITOR CLOSET NEXT TO ROOM 7	COMPOSITE DW & JC: <1% CHRYSOTILE ASBESTOS DRYWALL: ND JOINT COMPOUND: 2% CHRYSOTILE ASBESTOS TAPE / PAINT: ND	15 % CELLULOSE 5 % FIBROUS GLASS NFM: 'GYPSUM' (CALCIUM SULFATE), CARBONATE.
Client #: BIO-A017 Micro #: 281877-17 Analyst: JM GR BROWN BASEBOARD MASTIC ROOM 18 EAST WALL	MASTIC (BROWN): ND	2 % MISC. FIBERS NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A018 Micro #: 281877-18 Analyst: JM BROWN BASEBOARD ROOM 35	MASTIC (BROWN): ND	2 % MISC. FIBERS NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A019 Micro #: 281877-19 Analyst: JM 1" X 1" GRAY CERAMIC TILE WITH BLACK SPECKS WITH OFF-WHITE GROUT WITH OFF-WHITE MORTAR ROOM 24 COUNTER TOP	CERAMIC TILE: ND GROUT: ND MORTAR: ND	NFM: ROCK FRAGMENTS, CARBONATE, BINDER
Client #: BIO-A020 Micro #: 281877-20 Analyst: JM 1" X 1" GRAY CERAMIC TILE WITH BLACK SPECKS WITH OFF-WHITE GROUT WITH OFF-WHITE MORTAR - ROOM 18	CERAMIC TILE: ND GROUT: ND MORTAR: ND	NFM: ROCK FRAGMENTS, CARBONATE, BINDER

Technical Supervisor: for
Baojia Ke, Ph.D.

6/4/2021
Date Reported

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BULK ASBESTOS ANALYSIS - POLARIZED LIGHT MICROSCOPY (PLM)

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PROJECT:
PROJECT NO. PJ63338
BIOLOGICAL SCIENCE BUILDING
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In	**281877**
Total Samples	144
Date Sampled	05/24/2021
Date Received	06/02/2021
Date Analyzed	06/02/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A021 Micro #: 281877-21 Analyst: JM GR **TSI ON 4" OD PIPE RUN** **ROOM 22 NORTH EAST CORNER**	**TSI: ND** **WRAP: ND**	10 % CELLULOSE NFM: CARBONATE PERLITE
Client #: BIO-A022 Micro #: 281877-22 Analyst: JM **TSI ON 4' OD PIPE RUN** **ROOM 22**	**TSI: ND** **WRAP: ND**	10 % CELLULOSE NFM: CARBONATE PERLITE
Client #: BIO-A023 Micro #: 281877-23 Analyst: JM **TSI ON 4' OD PIPE RUN** **ROOM 22**	**TSI: ND** **WRAP: ND**	10 % CELLULOSE NFM: CARBONATE, MISC. PARTICLES
Client #: BIO-A024 Micro #: 281877-24 Analyst: JM **2" X 4" WHITE ACOUSTICAL CEILING TILE** **WITH PIN HOLE PATTERN - ROOM 24**	**CEILING TILE: ND** **PAINT: ND**	45 % CELLULOSE 15 % FIBROUS GLASS NFM: PERLITE
Client #: BIO-A025 Micro #: 281877-25 Analyst: JM **2" X 4" WHITE ACOUSTICAL CEILING TILE** **WITH PIN HOLE PATTERN** **CENTER OF ROOM 39**	**CEILING TILE: ND** **PAINT: ND**	45 % CELLULOSE 15 % FIBROUS GLASS NFM: PERLITE

Technical Supervisor: Baojia Ke, Ph.D.

6/4/2021
Date Reported

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BIOLOGICAL SCIENCE BUILDING
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2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In	**281877**
Total Samples	144
Date Sampled	05/24/2021
Date Received	06/02/2021
Date Analyzed	06/02/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: **BIO-A026** Micro #: 281877-26 Analyst: JM **12" X 12"FT OFF-WHITE WITH GRAY STREAKS WITH YELLOW MASTIC - ROOM 128A ON FLOOR**	**FLOOR TILE: ND** **MASTIC: ND**	NFM: SYNTHETIC MATERIAL, CARBONATE, ADHESIVE.
Client #: **BIO-A027** Micro #: 281877-27 Analyst: JM **12" X 12" FT OFF-WHITE WITH GRAY STREAKS WITH YELLOW MASTIC ROOM 128A ON FLOOR**	**FLOOR TILE: ND** **MASTIC: ND**	NFM: SYNTHETIC MATERIAL, CARBONATE, ADHESIVE.
Client #: **BIO-A030** Micro #: 281877-28 Analyst: JM **RED BRICK AND GRAY MORTAR ROOM 26 NORTH WALL**	**BRICK: ND** **MORTAR: ND**	NFM: ROCK FRAGMENTS, CARBONATE, BINDER
Client #: **BIO-A031** Micro #: 281877-29 Analyst: JM **RED BRICK AND GRAY MORTAR EXT. SOUTH ENTRANCE**	**BRICK: ND** **MORTAR: ND**	NFM: ROCK FRAGMENTS, CARBONATE, BINDER
Client #: **BIO-A032** Micro #: 281877-30 Analyst: JM **12" X 12" FLOOR TILE WITH BLUE SPECKS OVER YELLOW MASTIC CORRIDOR SOUTH SIDE**	**FLOOR TILE: ND** **MASTIC (YELLOW): ND**	NFM: SYNTHETIC MATERIAL, CARBONATE, ADHESIVE.

Technical Supervisor: Baojia Ke, Ph.D. 6/4/2021
Date Reported

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Micro Log In **281877**
Total Samples 144
Date Sampled 05/24/2021
Date Received 06/02/2021
Date Analyzed 06/02/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A033 Micro #: 281877-31 Analyst: JM GR **12" X 12" FLOOR TILE WITH BLUE SPECKS OVER YELLOW MASTIC MEN'S RESTROOM VESTIBULE NORTHWEST CORNER**	**FLOOR TILE: ND** **MASTICS (YELLOW / TAN): 2% CHRYSOTILE ASBESTOS** **DEBRIS / DUST: ND**	5 % CELLULOSE 5 % SYNTHETIC FIBERS NFM: SYNTHETIC MATERIAL, CARBONATE, ADHESIVE.
Client #: BIO-A034 Micro #: 281877-32 Analyst: JM **GREEN CARPET MASTIC ROOM 43 SOUTHWEST CORNER**	**ND**	5 % SYNTHETIC FIBERS NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A035 Micro #: 281877-33 Analyst: JM **GREEN CARPET ROOM 43 SOUTHEAST CORNER**	**ND**	10 % SYNTHETIC FIBERS NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A036 Micro #: 281877-34 Analyst: JM **KNOCK DOWN WT ON WOOD PANEL WALLS CORRIDOR NORTH SIDE WEST END**	**TEXTURE: ND** **PAINT: ND**	NFM: SYNTHETIC MATERIAL, CARBONATE.
Client #: BIO-A037 Micro #: 281877-35 Analyst: JM **KNOCK DOWN WT ON WOOD PANEL WALLS CORRIDOR EAST NEXT TO ROOM 37**	**TEXTURE: ND** **PAINT: ND**	NFM: SYNTHETIC MATERIAL, CARBONATE.

Technical Supervisor: for: 6/4/2021
Baojia Ke, Ph.D. Date Reported

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MICRO ANALYTICAL LABORATORIES, INC.

BULK ASBESTOS ANALYSIS - POLARIZED LIGHT MICROSCOPY (PLM)

1212
Gary Lowe
Forensic Analytical Consulting
21228 Cabot Boulevard
Hayward, CA 94545

PROJECT:
PROJECT NO. PJ63338
BIOLOGICAL SCIENCE BUILDING
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In	**281877**
Total Samples	144
Date Sampled	05/24/2021
Date Received	06/02/2021
Date Analyzed	06/02/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A038 Micro #: 281877-36 Analyst: JM KNOCK DOWN WT ON WOOD PANEL WALLS CORRIDOR WEST NEST TO ROOM 18	ND	NFM: SYNTHETIC MATERIAL, CARBONATE.
Client #: BIO-A039 Micro #: 281877-37 Analyst: GR KNOCK DOWN WT ON WOOD PANEL WALLS CORRIDOR EAST NEXT TO ROOM 13	TEXTURE: ND PAINTS: ND	NFM: SYNTHETIC MATERIAL, CARBONATE.
Client #: BIO-A040 Micro #: 281877-38 Analyst: GR KNOCK DOWN WT ON WOOD PANEL WALLS SOUTH END NEXT TO ROOM 2	TEXTURE: ND PAINTS: ND	NFM: SYNTHETIC MATERIAL, CARBONATE.
Client #: BIO-A041 Micro #: 281877-39 Analyst: GR DARK TAN RSF WITH MOTTLE PATTERN ROOM B-8 NORTHWEST CORNER	SHEET FLOORING: ND BACKING / MASTICS (YELLOW / BEIGE): ND CONCRETE UNDERLAYMENT: ND	5 % CELLULOSE 25 % SYNTHETIC FIBERS NFM: SYNTHETIC MATERIAL, CARBONATE.
Client #: BIO-A042 Micro #: 281877-40 Analyst: GR DARK TAN RSF WITH MOTTLE PATTERN ROOM 39 NORTHWEST CORNER	SHEET FLOORING: ND BACKING / MASTICS (YELLOW / BEIGE): ND CONCRETE UNDERLAYMENT: ND	5 % CELLULOSE 25 % SYNTHETIC FIBERS NFM: SYNTHETIC MATERIAL, CARBONATE.

Technical Supervisor: Baojia Ke, Ph.D. 6/4/2021
Date Reported

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BIOLOGICAL SCIENCE BUILDING
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SAN PABLO, CA

Micro Log In **281877**
Total Samples 144
Date Sampled 05/24/2021
Date Received 06/02/2021
Date Analyzed 06/02/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A043 Micro #: 281877-41 Analyst: GR **PIPE ELBOW ON 4" OD PIPE RUN** **ROOM 41**	**5% CHRYSOTILE ASBESTOS**	5 % CELLULOSE 70 % FIBROUS GLASS NFM: CARBONATE SYNTHETIC MATERIAL GLASS FRAGMENTS
Client #: BIO-A044 Micro #: 281877-42 Analyst: **PIPE ELBOW ON 4" OD PIPE RUN** **ROOM 17**	**NOT ANALYZED (PRIOR POSITIVE)**	NFM:
Client #: BIO-A045 Micro #: 281877-43 Analyst: **PIPE ELBOW ON 4" OD PIPE RUN** **ROOM 43**	**NOT ANALYZED (PRIOR POSITIVE)**	NFM:
Client #: BIO-A046 Micro #: 281877-44 Analyst: GR **PLASTER** **WEST WALL IN WASHROOM**	**PLASTER: ND** **SKIM COAT: ND** **PAINT: ND**	3 % CELLULOSE NFM: "GYPSUM" (CALCIUM SULFATE) CARBONATE SYNTHETIC MATERIAL
Client #: BIO-A047 Micro #: 281877-45 Analyst: GR **PLASTER** **NORTH WALL IN STUDY ROOM**	**PLASTER: ND** **SKIM COAT: ND** **PAINT: ND**	3 % CELLULOSE NFM: "GYPSUM" (CALCIUM SULFATE) CARBONATE SYNTHETIC MATERIAL

Technical Supervisor: Baojia Ke, Ph.D. 6/4/2021 Date Reported

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SAN PABLO, CA

Micro Log In	**281877**
Total Samples	144
Date Sampled	05/24/2021
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Date Analyzed	06/02/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A048 Micro #: 281877-46 Analyst: GR **PLASTER** **WOMEN'S RESTROOM**	**PLASTER: ND** **SKIM COAT: ND** **PAINT: ND**	3 % CELLULOSE NFM: "GYPSUM' (CALCIUM SULFATE) CARBONATE SYNTHETIC MATERIAL
Client #: BIO-A049 Micro #: 281877-47 Analyst: GR **PLASTER** **WOMEN'S RESTROOM**	**PLASTER: ND** **SKIM COAT: ND** **PAINT: ND**	3 % CELLULOSE NFM: "GYPSUM' (CALCIUM SULFATE) CARBONATE SYNTHETIC MATERIAL
Client #: BIO-A050 Micro #: 281877-48 Analyst: GR GR **PLASTER** **MEN'S RESTROOM**	**PLASTER: ND** **SKIM COAT: ND** **PAINT: ND**	3 % CELLULOSE NFM: "GYPSUM' (CALCIUM SULFATE) CARBONATE SYNTHETIC MATERIAL
Client #: BIO-A051 Micro #: 281877-49 Analyst: GR **4" X 4" OFF-WHITE CERAMIC WALL TILE WITH OFF-WHITE GROUT WITH OFF-WHITE GROUT** **EAST WALL OF ROOM 43**	**CERAMIC WALL TILE: ND** **MORTAR / GROUT: ND**	NFM: CARBONATE ROCK FRAGMENTS CERAMIC
Client #: BIO-A052 Micro #: 281877-50 Analyst: GR **4" X 4" OFF-WHITE CERAMIC WALL TILE WITH OFF-WHITE GROUT WITH OFF-WHITE GROUT** **EAST WALL OF ROOM 43**	**CERAMIC WALL TILE: ND** **MORTAR / GROUT: ND**	NFM: CARBONATE ROCK FRAGMENTS CERAMIC

Technical Supervisor: Baojia Ke, Ph.D.

6/4/2021
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Micro Log In **281877**
Total Samples 144
Date Sampled 05/24/2021
Date Received 06/02/2021
Date Analyzed 06/03/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A053 Micro #: 281877-51 Analyst: JM **YELLOW WALL PANEL ADHESIVE** **EAST WALL OF ROOM 43**	**ND**	NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A054 Micro #: 281877-52 Analyst: JM **YELLOW WALL PANEL ADHESIVE** **WEST WALL OF ROOM 43**	**ND**	NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A055 Micro #: 281877-53 Analyst: JM **YELLOW / BEIGE BASEBOARD** **MASTIC ROOM 26**	**ND**	NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A056 Micro #: 281877-54 Analyst: JM **YELLOW / BEIGE BASEBOARD** **MASTIC ROOM 2**	**ND**	5 % CELLULOSE NFM: RESILIENT ORGANICALLY BOUND. MATERIALS, MISC. PARTICLES
Client #: BIO-A057 Micro #: 281877-55 Analyst: JM **FIBERGLASS PIPE LAGGING (JACKET)** **OVER ON 6" OD PIPE RUN - ROOM 26**	**FIBERGLASS: ND** **JACKET: ND**	10 % CELLULOSE 80 % FIBROUS GLASS NFM: GLASS FRAGMENTS, BINDER.

Technical Supervisor: Baojia Ke, Ph.D. 6/4/2021
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Total Samples 144
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Client #: BIO-A058 Micro #: 281877-56 Analyst: JM FIBERGLASS PIPE LAGGING (JACKET) OVER ON 6" OD PIPE RUN - ROOM 3	FIBERGLASS: ND JACKET: ND	10 % CELLULOSE 80 % FIBROUS GLASS NFM: GLASS FRAGMENTS, BINDER.
Client #: BIO-A059 Micro #: 281877-57 Analyst: JM PIPE LAGGING (JACKET) OVER FIBERGLASS ON 6" OD PIPE RUN ROOM 1	FIBERGLASS: ND JACKET: ND	10 % CELLULOSE 80 % FIBROUS GLASS NFM: GLASS FRAGMENTS, BINDER.
Client #: BIO-A060 Micro #: 281877-58 Analyst: JM PIPE ELBOW ON 6" OD PIPE RUN ROOM 1	20% AMOSITE ASBESTOS 5% CHRYSOTILE ASBESTOS	NFM: CARBONATE, MISC. PARTICLES
Client #: BIO-A061 Micro #: 281877-59 Analyst: PIPE ELBOW ON 6" OD PIPE RUN ROOM 2 EAST WALL SOUTH END ABOVE DOOR	NOT ANALYZED (PRIOR POSITIVE)	NFM:
Client #: BIO-A062 Micro #: 281877-60 Analyst: PIPE ELBOW ON 6" OD PIPE RUN ROOM 43	NOT ANALYZED (PRIOR POSITIVE)	NFM:

Technical Supervisor: for
Baojia Ke, Ph.D.

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Date Analyzed	06/03/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A063 Micro #: 281877-61 Analyst: JM **BLACK CHALK BOARD** **ROOM 39**	**20% CHRYSOTILE ASBESTOS**	NFM: CARBONATE, MISC. PARTICLES
Client #: BIO-A064 Micro #: 281877-62 Analyst: **BLACK CHALK BOARD** **ROOM 2**	**NOT ANALYZED (PRIOR POSITIVE)**	NFM:
Client #: BIO-A065 Micro #: 281877-63 Analyst: JM AF **WHITE INSULATION** **ON SINK PIPE DRAINS - ROOM 24**	**ND**	NFM: CARBONATE, MISC. PARTICLES
Client #: BIO-A066 Micro #: 281877-64 Analyst: JM **WHITE INSULATION** **ON SINK PIPE DRAINS - ROOM 39**	**ND**	NFM: CARBONATE, MISC. PARTICLES
Client #: BIO-A069 Micro #: 281877-65 Analyst: JM **RED FIRE STOP** **ROOM 41**	**ND**	15 % FIBROUS GLASS NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES

Technical Supervisor: Baojia Ke, Ph.D.

6/4/2021
Date Reported

NVLAP Lab Code 101872-0 (TESTING). Analyses use Polarized Light Microscopy (PLM), Micro Analytical SOP PLM-101. Basic techniques follow EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples" (originally published 1982), and EPA-600/R93-116 (1993). The 1993 method covers all types of bulk materials and is based on the 1982 Method, with improved analytical techniques for layered samples as required for NESHAP compliance. Asbestos is quantified by calibrated visual estimation. Detection limit is material dependent. Detection of asbestos traces (much less than 1%) may not be reliable or reproducible by PLM. Weight % cannot be determined by PLM. Asbestos with diameter below ~1 μm may not be detected by PLM. Absence of asbestos in dust, debris, and some compact materials, including floor tiles, cannot be conclusively established by PLM, and should be confirmed by Transmission Electron Microscopy (TEM).Interferences may prevent detection of small asbestos fibers, and hinder determination of some optical properties.Tremolite-asbestos or actinolite- asbestos may be indistinguishable by PLM from some similar, non-regulated amphiboles (e.g. the "Libby Amphiboles" richterite and winchite), and should be confirmed by TEM. The lower quantitation limit (reporting limit) of PLM estimation is 1%. The Cal-OSHA definition of asbestos-containing construction material is 0.1% asbestos; however, reliable determination of asbestos percent at this level cannot be done by PLM estimation; PLM Point Counting or TEM weight percent analysis are recommended. Only dominant non-asbestos materials (fibrous and non-fibrous) are listed. This analysis shall not be construed as conclusive for the presence of any reported materials other than asbestos, or for the absence of any non-asbestos material. Common interferences include, but are not limited to: cellulose, fibrous glass, other man-made vitreous fibers, synthetic fibers, elongate fragments of calcium sulfate, talc, wollastonite, animal hair, and other miscellaneous elongate particles. Sample heterogeneity is indicated by listing more than one distinct layer or material on the report. If more than one distinct sample is received in the same container, samples shall be marked with letters and analyzed separately. Layers within a sample are analyzed separately when feasible; if asbestos is detected, percentages are reported for individual layers. Interlayer contamination is possible among any layers in a sample. The notation ND (or "NONE DETECTED") indicates a result of "NO ASBESTOS DETECTED" in a homogeneous sample, or in a layer of a heterogeneous sample. Composite asbestos percentages from multiple layers are applicable only to wallboard / joint compound systems; compositing is based on customers' descriptions of material as "joint compound". Customers are solely responsible for identification and description of bulk materials listed on field forms. Laboratory descriptions may differ from those given by customers. Quality Control (QC): all results have been determined to be within acceptance limits prior to reporting. Reanalyzed samples are denoted by two sets of analyst initials. Unless otherwise stated herein, all samples were received in acceptable condition for analysis. This report must not be used to claim product endorsement by NIST or any U.S. Government agency. This report shall not be reproduced except in full, without the approval of Micro Analytical Laboratories, Inc., and pertains only to the samples analyzed as received. NFM = Non-fibrous materials.

MICRO ANALYTICAL LABORATORIES, INC.

BULK ASBESTOS ANALYSIS - POLARIZED LIGHT MICROSCOPY (PLM)

1212
Gary Lowe
Forensic Analytical Consulting
21228 Cabot Boulevard
Hayward, CA 94545

PROJECT:
PROJECT NO. PJ63338
BIOLOGICAL SCIENCE BUILDING
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In **281877**
Total Samples 144
Date Sampled 05/24/2021
Date Received 06/02/2021
Date Analyzed 06/03/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A070 Micro #: 281877-66 Analyst: JM **RED FIRE STOP ROOM 5**	**ND**	15 % FIBROUS GLASS NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A071 Micro #: 281877-67 Analyst: JM **BLACK COUNTER TOPS ROOM 39**	**35% CHRYSOTILE ASBESTOS**	NFM: ROCK FRAGMENTS, CARBONATE, BINDER
Client #: BIO-A072 Micro #: 281877-68 Analyst: **BLACK COUNTER TOPS ROOM 22**	**NOT ANALYZED (PRIOR POSITIVE)**	NFM:
Client #: BIO-A073 Micro #: 281877-69 Analyst: JM AF **GRAY COUNTER TOPS SOUTH WALL OF ROOM 41**	**ND**	NFM: ROCK FRAGMENTS, CARBONATE, BINDER
Client #: BIO-A074 Micro #: 281877-70 Analyst: JM AF **GRAY COUNTER TOPS ROOM 17**	**ND**	NFM: ROCK FRAGMENTS, CARBONATE, BINDER

Technical Supervisor: Baojia Ke, Ph.D. 6/4/2021
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PROJECT:

PROJECT NO. PJ63338
BIOLOGICAL SCIENCE BUILDING
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In **281877**
Total Samples 144
Date Sampled 05/24/2021
Date Received 06/02/2021
Date Analyzed 06/02/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A075 Micro #: 281877-71 Analyst: BK ORANGE PEEL WT ON DRYWALL EAST WALL NORTH END ROOM 2	**TEXTURE: 2% CHRYSOTILE ASBESTOS** **PAINT: ND**	NFM: CARBONATE, MISC. PARTICLES
Client #: BIO-A076 Micro #: 281877-72 Analyst: ORANGE PEEL WT ON DRYWALL ROOM B8 EAST WALL SOUTH END	NOT ANALYZED (PRIOR POSITIVE)	NFM:
Client #: BIO-A077 Micro #: 281877-73 Analyst: ORANGE PEEL WT ON DRYWALL ROOM B8 EAST WALL NORTH END	NOT ANALYZED (PRIOR POSITIVE)	NFM:
Client #: BIO-A078 Micro #: 281877-74 Analyst: ORANGE PEEL WT ON DRYWALL ROOM 6 SOUTH WALL	NOT ANALYZED (PRIOR POSITIVE)	NFM:
Client #: BIO-A079 Micro #: 281877-75 Analyst: ORANGE PEEL WT ON DRYWALL ROOM 12	NOT ANALYZED (PRIOR POSITIVE)	NFM:

Technical Supervisor: Baojia Ke, Ph.D.

6/4/2021
Date Reported

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PROJECT:
PROJECT NO. PJ63338
BIOLOGICAL SCIENCE BUILDING
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In	**281877**
Total Samples	144
Date Sampled	05/24/2021
Date Received	06/02/2021
Date Analyzed	06/02/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A080 Micro #: 281877-76 Analyst: BK **JOINT COMPOUND / WB ON DRYWALL WITH ORANGE PEEL WT ROOM B8 SOUTH EAST CORNER**	COMPOSITE DW & JC: <1% CHRYSOTILE ASBESTOS **DRYWALL: ND** **JOINT COMPOUND: 3% CHRYSOTILE ASBESTOS** **TAPE: ND** **PAINT: ND**	10 % CELLULOSE NFM: 'GYPSUM' (CALCIUM SULFATE), CARBONATE.
Client #: BIO-A081 Micro #: 281877-77 Analyst: BK **JOINT COMPOUND / WB ON DRYWALL WITH ORANGE PEEL WT ROOM 6 SOUTH WALL EAST END**	COMPOSITE DW & JC: <1% CHRYSOTILE ASBESTOS **DRYWALL: ND** **JOINT COMPOUND: 3% CHRYSOTILE ASBESTOS** **TAPE: ND** **PAINT: ND**	10 % CELLULOSE NFM: 'GYPSUM' (CALCIUM SULFATE), CARBONATE.
Client #: BIO-A082 Micro #: 281877-78 Analyst: BK **JOINT COMPOUND / WB ON DRYWALL WITH ORANGE PEEL WT - ROOM 12**	COMPOSITE DW & JC: <1% CHRYSOTILE ASBESTOS **DRYWALL: ND** **JOINT COMPOUND: 3% CHRYSOTILE ASBESTOS** **TAPE: ND** **PAINT: ND**	10 % CELLULOSE NFM: 'GYPSUM' (CALCIUM SULFATE), CARBONATE.
Client #: BIO-A083 Micro #: 281877-79 Analyst: BK AF **CONCRETE ON EQUIPMENT PADS ROOM 3 BOILER ROOM UPPER WEST SIDE**	**CONCRETE: ND** **PAINT: ND**	NFM: ROCK FRAGMENTS, CARBONATE, BINDER
Client #: BIO-A084 Micro #: 281877-80 Analyst: BK **CONCRETE ON EQUIPMENT PADS ROOM 3 BOILER ROOM SOUTH WALL**	**CONCRETE: ND** **PAINT: ND**	NFM: ROCK FRAGMENTS, CARBONATE, BINDER

Technical Supervisor: for
Baojia Ke, Ph.D.

6/4/2021
Date Reported

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SAN PABLO, CA

Micro Log In	**281877**
Total Samples	144
Date Sampled	05/24/2021
Date Received	06/02/2021
Date Analyzed	06/02/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: **BIO-A085** Micro #: 281877-81 Analyst: BK **PIPE GASKETS ROOM 3 BOILER ROOM SOUTH EAST CORNER**	**ND**	70 % CELLULOSE NFM:
Client #: **BIO-A086** Micro #: 281877-82 Analyst: BK **PIPE GASKETS ROOM 3 BOILER ROOM CENTRAL SOUTH WALL**	**ND**	70 % CELLULOSE NFM:
Client #: **BIO-A087** Micro #: 281877-83 Analyst: BK **12" X 12" OFF-WHITE WALL TILES OVER BROWN MASTIC ROOM 1 NORTH WALL**	**TILE: ND** **COATING (WHITE): ND** **MASTIC: ND**	90 % CELLULOSE NFM: SYNTHETIC MATERIAL
Client #: **BIO-A088** Micro #: 281877-84 Analyst: BK **12" X 12" OFF-WHITE WALL TILES OVER BROWN MASTIC ROOM 1 NORTH WALL**	**TILE: ND** **COATING (WHITE): ND** **MASTIC: ND**	90 % CELLULOSE NFM: SYNTHETIC MATERIAL
Client #: **BIO-A089** Micro #: 281877-85 Analyst: BK **TANK INSULATION ROOM 3 BOILER ROOM**	**20% AMOSITE ASBESTOS** **5% CHRYSOTILE ASBESTOS**	NFM: CARBONATE, MISC. PARTICLES

Technical Supervisor: Baojia Ke, Ph.D. 6/4/2021 Date Reported

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Micro Log In **281877**
Total Samples 144
Date Sampled 05/24/2021
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Date Analyzed

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: **BIO-A090** Micro #: 281877-86 Analyst: **TANK INSULATION** **ROOM 3 BOILER ROOM**	**NOT ANALYZED (PRIOR POSITIVE)**	NFM:
Client #: **BIO-A091** Micro #: 281877-87 Analyst: **TANK INSULATION** **ROOM 3 BOILER ROOM**	**NOT ANALYZED (PRIOR POSITIVE)**	NFM:
Client #: **BIO-A092** Micro #: 281877-88 Analyst: BK **WHITE HVAC VIBRATION** **DAMPENERS - ROOM 26**	**40% CHRYSOTILE ASBESTOS**	60 % SYNTHETIC FIBERS NFM: CARBONATE, MISC. PARTICLES
Client #: **BIO-A093** Micro #: 281877-89 Analyst: **WHITE HVAC VIBRATION** **DAMPENERS- ROOM 37**	**NOT ANALYZED (PRIOR POSITIVE)**	NFM:
Client #: **BIO-A094** Micro #: 281877-90 Analyst: BK **GREEN HVAC VIBRATION** **DAMPENER ROOM 26**	**ND**	95 % CELLULOSE NFM: MISCELLANEOUS PARTICLES

Technical Supervisor: for
Baojia Ke, Ph.D.

6/4/2021
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Hayward, CA 94545

PROJECT:
PROJECT NO. PJ63338
BIOLOGICAL SCIENCE BUILDING
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In **281877**
Total Samples 144
Date Sampled 05/24/2021
Date Received 06/02/2021
Date Analyzed 06/02/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A095 Micro #: 281877-91 Analyst: BK GREEN HVAC VIBRATION DAMPENER ROOM 37	ND	95 % CELLULOSE NFM: MISCELLANEOUS PARTICLES
Client #: BIO-A096 Micro #: 281877-92 Analyst: BK BLACK MASTIC ON HVAC COILS DRIP PAN ROOM 26	15% CHRYSOTILE ASBESTOS	NFM: TAR
Client #: BIO-A097 Micro #: 281877-93 Analyst: BLACK MASTIC ON HVAC COILS DRIP PAN ROOM 37	NOT ANALYZED (PRIOR POSITIVE)	NFM:
Client #: BIO-A098 Micro #: 281877-94 Analyst: BK WHITE CLOTH HVAC GASKET ON HVAC CONNECTION ROOM 13	80% CHRYSOTILE ASBESTOS	5 % CELLULOSE NFM: BINDER, OTHER, MISCELLANEOUS.
Client #: BIO-A099 Micro #: 281877-95 Analyst: WHITE CLOTH HVAC GASKET ON HVAC CONNECTION ROOM 13	NOT ANALYZED (PRIOR POSITIVE)	NFM:

Technical Supervisor: Baojia Ke, Ph.D. 6/4/2021 Date Reported

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BULK ASBESTOS ANALYSIS - POLARIZED LIGHT MICROSCOPY (PLM)

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SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A100 Micro #: 281877-96 Analyst: BK **ROOF CURB FLASHING** **ROOF SOUTH SIDE**	**TAR WITH GRAVEL: ND** **FELT: ND** **BROWN FIBROUS INSULATION: ND**	40 % CELLULOSE 5 % FIBROUS GLASS NFM: TAR/ASPHALT, BINDER
Client #: BIO-A101 Micro #: 281877-97 Analyst: BK **ROOF CURB FLASHING** **ROOF WEST SIDE NORTH END**	**TAR WITH GRAVEL: ND** **FELT: ND** **BROWN FIBROUS INSULATION: ND**	40 % CELLULOSE 5 % FIBROUS GLASS NFM: TAR/ASPHALT, BINDER
Client #: BIO-A102 Micro #: 281877-98 Analyst: BK AF **GRAY / BLACK ROOF** **PENETRATION MASTIC ROOF** **EXHAUST PENETRATION FLUE**	**ND**	10 % CELLULOSE NFM: TAR/ASPHALT, BINDER
Client #: BIO-A103 Micro #: 281877-99 Analyst: BK **GRAY / BLACK ROOF** **PENETRATION MASTIC ROOF** **EXHAUST PENETRATION FLUE**	**ND**	10 % CELLULOSE NFM: TAR/ASPHALT, BINDER
Client #: BIO-A104 Micro #: 281877-100 Analyst: BK **OFF-WHITE INSULATION ON PIPE BRACKET** **SUPPORT ROOF SOUTHWEST CORNER** **CHILLED WATER RETURN LINE**	**ND**	30 % CELLULOSE NFM: CARBONATE, MISC. PARTICLES

Technical Supervisor: for Baojia Ke, Ph.D.

6/4/2021
Date Reported

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BULK ASBESTOS ANALYSIS - POLARIZED LIGHT MICROSCOPY (PLM)

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Gary Lowe
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PROJECT:
PROJECT NO. PJ63338
BIOLOGICAL SCIENCE BUILDING
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In **281877**
Total Samples 144
Date Sampled 05/24/2021
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Date Analyzed 06/03/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A105 Micro #: 281877-101 Analyst: JM OFF-WHITE INSULATION ON PIPE BRACKET SUPPORT ROOF WEST SIDE OF HVAC UNIT	ND	15 % CELLULOSE 5 % FIBROUS GLASS NFM: CARBONATE, MISC. PARTICLES
Client #: BIO-A106 Micro #: 281877-102 Analyst: JM GRAY HVAC SEAM MASTIC ROOF CENTRAL FROM OLD HVAC	MASTIC: ND PAINT (SILVER): 8% CHRYSOTILE ASBESTOS MESH: ND	15 % CELLULOSE 5 % FIBROUS GLASS NFM: CARBONATE, MISC. PARTICLES
Client #: BIO-A107 Micro #: 281877-103 Analyst: GRAY HVAC SEAM MASTIC ROOF SOUTHEAST CORNER FROM OLD HVAC	NOT ANALYZED (PRIOR POSITIVE)	NFM:
Client #: BIO-A108 Micro #: 281877-104 Analyst: JM GRAY ROLLED ROOF PATCH ROOF SOUTHEAST CORNER	SHINGLE: ND TAR: ND CELLULOSE FELT: ND	25 % CELLULOSE 5 % FIBROUS GLASS NFM: TAR/ASPHALT, BINDER
Client #: BIO-A109 Micro #: 281877-105 Analyst: JM GRAY ROLLED ROOF PATCH ROOF NORTH SIDE	SHINGLE: ND TAR: ND CELLULOSE FELT: ND	25 % CELLULOSE 5 % FIBROUS GLASS NFM: TAR/ASPHALT, BINDER

Technical Supervisor: Baojia Ke, Ph.D.   6/4/2021
Date Reported

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Total Samples 144
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Client #: BIO-A110 Micro #: 281877-106 Analyst: JM GRAY ROOF MASTIC ON GRAY ROLLED ROOF PATCHES ROOF SOUTHEAST CORNER	ND	20 % CELLULOSE 5 % FIBROUS GLASS NFM: TAR/ASPHALT, BINDER
Client #: BIO-A111 Micro #: 281877-107 Analyst: JM GRAY ROOF MASTIC ON GRAY ROLLED ROOF PATCHES ROOF SOUTHEAST CORNER	ND	20 % CELLULOSE 5 % FIBROUS GLASS NFM: TAR/ASPHALT, BINDER
Client #: BIO-A112 Micro #: 281877-108 Analyst: JM DARK GRAY SEALANT ON GENERATOR EXHAUST DUCT FAN ROOF SOUTHEAST CORNER	2% CHRYSOTILE ASBESTOS	NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A113 Micro #: 281877-109 Analyst: DARK GRAY SEALANT ON GENERATOR EXHAUST DUCT FAN ROOF SOUTHEAST CORNER	NOT ANALYZED (PRIOR POSITIVE)	NFM:
Client #: BIO-A114 Micro #: 281877-110 Analyst: JM LIGHT GRAY HVAC SEAM MASTIC ROOF FROM NEWER HVAC UNIT DUCT	ND	NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES

Technical Supervisor: for
Baojia Ke, Ph.D.

6/4/2021
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Client #: BIO-A115 Micro #: 281877-111 Analyst: JM LIGHT GRAY HVAC SEAM MASTIC ROOF FROM NEWER HVAC UNIT DUCT	ND	NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A116 Micro #: 281877-112 Analyst: JM DARK GRAY HVAC SEAM MASTIC ROOF SOUTHWEST CORNER OF HVAC UNIT	ND	NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A117 Micro #: 281877-113 Analyst: JM DARK GRAY HVAC SEAM MASTIC ROOF NORTHWEST CORNER OF HVAC UNIT	ND	2 % CELLULOSE NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A118 Micro #: 281877-114 Analyst: JM BEIGE SEALANT ON EXHAUST FAN SEAM ROOF NORTHWEST FROM OLD HVAC VENT	ND	NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A119 Micro #: 281877-115 Analyst: JM BEIGE SEALANT ON EXHAUST FAN SEAM ROOF NORTHWEST FROM OLD HVAC VENT	ND	NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES

Technical Supervisor: for: 6/4/2021
Baojia Ke, Ph.D. Date Reported

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Client #: BIO-A120 Micro #: 281877-116 Analyst: JM **SILVER ALUMINUM WITH BLACK ADHESIVE DUCT LINING NORTHWEST FROM OLD HVAC VENT**	**ALUMINUM: ND** **ADHESIVE (BLACK): ND**	NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A121 Micro #: 281877-117 Analyst: JM **SILVER ALUMINUM WITH BLACK ADHESIVE DUCT LINING NORTHWEST FROM OLD HVAC VENT**	**ALUMINUM: ND** **ADHESIVE (BLACK): ND**	NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A124 Micro #: 281877-118 Analyst: JM **BLACK COATING ON ROOF ACCESS LADDER ROOM 3 BOILER ROOM NORTHEAST CORNER**	**ND**	NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A115 Micro #: 281877-119 Analyst: JM **BLACK COATING ON ROOF ACCESS LADDER ROOM 3 BOILER ROOM NORTHEAST CORNER**	**ND**	NFM: RESILIENT ORGANICALLY BOUND MATERIALS, MISC. PARTICLES
Client #: BIO-A126 Micro #: 281877-120 Analyst: SS AF **STUCCO EXT. NORTH AT ENTRY SOFFIT CEILING**	**STUCCO: ND** **SKIM COAT: < 1% CHRYSOTILE ASBESTOS**	NFM: ROCK FRAGMENTS, CARBONATE, BINDER

Technical Supervisor: Baojia Ke, Ph.D. 6/4/2021 Date Reported

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MICRO ANALYTICAL LABORATORIES, INC.

BULK ASBESTOS ANALYSIS - POLARIZED LIGHT MICROSCOPY (PLM)

1212
Gary Lowe
Forensic Analytical Consulting
21228 Cabot Boulevard
Hayward, CA 94545

PROJECT:
PROJECT NO. PJ63338
BIOLOGICAL SCIENCE BUILDING
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In **281877**
Total Samples 144
Date Sampled 05/24/2021
Date Received 06/02/2021
Date Analyzed 06/03/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: **BIO-A127** Micro #: 281877-121 Analyst: SS AF **STUCCO SOUTH** **AT ENTRY SOFFIT**	**STUCCO: ND** **SKIM COAT: < 1% CHRYSOTILE ASBESTOS**	NFM: ROCK FRAGMENTS, CARBONATE, BINDER
Client #: **BIO-A128** Micro #: 281877-122 Analyst: AF **STUCCO EXT. SOUTH** **AT ENTRY SOFFIT**	**STUCCO: ND** **SKIM COAT: < 1% CHRYSOTILE ASBESTOS**	NFM: ROCK FRAGMENTS, CARBONATE, BINDER
Client #: **BIO-A129** Micro #: 281877-123 Analyst: SS **CONCRETE SLAB** **ROOM 22**	**ND**	NFM: ROCK FRAGMENTS, CARBONATE, BINDER
Client #: **BIO-A130** Micro #: 281877-124 Analyst: SS **CONCRETE SLAB** **ROOM 4 BOILER ROOM**	**ND**	NFM: ROCK FRAGMENTS, CARBONATE, BINDER
Client #: **BIO-A131** Micro #: 281877-125 Analyst: SS **CONCRETE SLAB EXT.** **WEST SIDED SOUTH END**	**2% CHRYSOTILE ASBESTOS**	NFM: ROCK FRAGMENTS, CARBONATE, BINDER.

Technical Supervisor: Baojia Ke, Ph.D.

6/4/2021
Date Reported

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BULK ASBESTOS ANALYSIS - POLARIZED LIGHT MICROSCOPY (PLM)

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Gary Lowe
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Hayward, CA 94545

PROJECT:
PROJECT NO. PJ63338
BIOLOGICAL SCIENCE BUILDING
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In	**281877**
Total Samples	144
Date Sampled	05/24/2021
Date Received	06/02/2021
Date Analyzed	06/03/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: **BIO-A132** Micro #: 281877-126 Analyst: SS AF **WHITE CAULK PUTTY LIKE EXT. SOUTH SIDE AT ENTRY BETWEEN BRICK AND METAL WINDOW FRAME**	**ND**	25 % TALC NFM: CARBONATE, BINDER.
Client #: **BIO-A133** Micro #: 281877-127 Analyst: SS **WHITE CAULK PUTTY LIKE EXT. NORTH SIDE AT ENTRY BETWEEN BRICK AND METAL WINDOW FRAME**	**ND**	25 % TALC NFM: CARBONATE, BINDER.
Client #: **BIO-A134** Micro #: 281877-128 Analyst: SS **LIGHT GRAY CAULK EXT. EAST SIDE SOUTH END BETWEEN GLASS AND WINDOW FRAME**	**2% CHRYSOTILE ASBESTOS**	2 % TALC NFM: CARBONATE, BINDER.
Client #: **BIO-A135** Micro #: 281877-129 Analyst: **LIGHT GRAY CAULK EXT. WEST SIDE NORTH END BETWEEN GLASS AND WINDOW FRAME**	**NOT ANALYZED (PRIOR POSITIVE)**	NFM:
Client #: **BIO-A136** Micro #: 281877-130 Analyst: SS **DUCT WRAP OVER FIBERGLASS ROOM 26**	**INSULATION: ND** **MESH: ND**	12 % CELLULOSE 85 % FIBROUS GLASS NFM: GLASS FRAGMENTS, BINDER.

Technical Supervisor: for
Baojia Ke, Ph.D.

6/4/2021
Date Reported

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BULK ASBESTOS ANALYSIS - POLARIZED LIGHT MICROSCOPY (PLM)

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21228 Cabot Boulevard
Hayward, CA 94545

PROJECT:
PROJECT NO. PJ63338
BIOLOGICAL SCIENCE BUILDING
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In	**281877**
Total Samples	144
Date Sampled	05/24/2021
Date Received	06/02/2021
Date Analyzed	06/03/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A137 Micro #: 281877-131 Analyst: SS **DUCT WRAP OVER FIBERGLASS ROOM 37**	**INSULATION: ND** **MESH: ND**	12 % CELLULOSE 85 % FIBROUS GLASS NFM: GLASS FRAGMENTS, BINDER.
Client #: BIO-A138 Micro #: 281877-132 Analyst: SS **DUCT WRAP OVER FIBERGLASS ROOM 13**	**INSULATION: ND** **MESH: ND**	10 % CELLULOSE 85 % FIBROUS GLASS NFM: GLASS FRAGMENTS, BINDER.
Client #: BIO-A139 Micro #: 281877-133 Analyst: SS **TAR AND GRAVEL ROOF FIELD ROOF SOUTHEAST CORNER**	**TAR / GRAVEL: ND** **GLOSSY TAR: ND**	15 % CELLULOSE 5 % FIBROUS GLASS NFM: TAR/ASPHALT, BINDER
Client #: BIO-A140 Micro #: 281877-134 Analyst: SS **TAR AND GRAVEL ROOF FIELD ROOF CENTRAL**	**TAR / GRAVEL: ND** **GLOSSY TAR: ND**	15 % CELLULOSE 5 % FIBROUS GLASS NFM: TAR/ASPHALT, BINDER
Client #: BIO-A141 Micro #: 281877-135 Analyst: SS **TAR AND GRAVEL ROOF FIELD ROOF NORTH SIDE**	**TAR / GRAVEL: ND** **GLOSSY TAR: ND**	15 % CELLULOSE 5 % FIBROUS GLASS NFM: TAR/ASPHALT, BINDER

Technical Supervisor: Baojia Ke, Ph.D. 6/4/2021 Date Reported

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BULK ASBESTOS ANALYSIS - POLARIZED LIGHT MICROSCOPY (PLM)

1212
Gary Lowe
Forensic Analytical Consulting
21228 Cabot Boulevard
Hayward, CA 94545

PROJECT:

PROJECT NO. PJ63338
BIOLOGICAL SCIENCE BUILDING
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In **281877**
Total Samples 144
Date Sampled 05/24/2021
Date Received 06/02/2021
Date Analyzed 06/03/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: **BIO-A142** Micro #: 281877-136 Analyst: SS **PIPE LAGGING (JACKET) OVER FIBERGLASS ON 4" OD PIPE RUN ROOM 41**	**INSULATION: ND** **MESH / COATING: ND**	15 % CELLULOSE 80 % FIBROUS GLASS NFM: BINDER, OTHER, MISCELLANEOUS.
Client #: **BIO-A143** Micro #: 281877-137 Analyst: SS **PIPE LAGGING (JACKET) OVER FIBERGLASS ON 4" OD PIPE RUN ROOM 17**	**INSULATION: ND** **MESH / COATING: ND**	15 % CELLULOSE 80 % FIBROUS GLASS NFM: BINDER, OTHER, MISCELLANEOUS.
Client #: **BIO-A144** Micro #: 281877-138 Analyst: SS **PIPE LAGGING (JACKET) OVER FIBERGLASS ON 4" OD PIPE RUN ROOM 43**	**INSULATION: ND** **MESH / COATING: ND**	15 % CELLULOSE 80 % FIBROUS GLASS NFM: BINDER, OTHER, MISCELLANEOUS.
Client #: **BIO-A145** Micro #: 281877-139 Analyst: SS **1" X 1" GRAY CERAMIC FLOOR TILE WITH GRAY GROUT OFF-WHITE MORTAR MEN'S RESTROOM**	**CERAMIC TILE: ND** **GROUT: ND** **MORTAR: ND**	NFM: ROCK FRAGMENTS, CARBONATE, BINDER
Client #: **BIO-A146** Micro #: 281877-140 Analyst: SS **1" X 1" GRAY CERAMIC FLOOR TILE WITH GRAY GROUT OFF-WHITE MORTAR MEN'S RESTROOM**	**CERAMIC TILE: ND** **GROUT: ND** **MORTAR: ND**	NFM: ROCK FRAGMENTS, CARBONATE, BINDER

Technical Supervisor: for
Baojia Ke, Ph.D.

6/4/2021
Date Reported

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PROJECT:

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BIOLOGICAL SCIENCE BUILDING
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2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In	**281877**
Total Samples	144
Date Sampled	05/24/2021
Date Received	06/02/2021
Date Analyzed	06/03/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: BIO-A147 Micro #: 281877-141 Analyst: SS **OFF-WHITE HVAC SEAM TAPE** **EAST ROOM 39**	**COATING (WHITE): ND** **MESH: ND**	30 % CELLULOSE NFM: CARBONATE, BINDER.
Client #: BIO-A148 Micro #: 281877-142 Analyst: SS **OFF-WHITE HVAC SEAM TAPE** **ROOM 21**	**COATING (WHITE): ND** **MESH: ND**	30 % CELLULOSE NFM: CARBONATE, BINDER.
Client #: BIO-A149 Micro #: 281877-143 Analyst: SS **BLACK MOISTURE BARRIER EXT.** **EAST SIDE SOUTH END** **BEHIND UPPER WALL WOOD PANEL**	**CELLULOSE / TAR: ND**	45 % CELLULOSE NFM: TAR BINDER
Client #: BIO-A150 Micro #: 281877-144 Analyst: SS **BLACK MOISTURE BARRIER EXT.** **EAST SIDE SOUTH END** **BEHIND UPPER WALL WOOD PANEL**	**CELLULOSE / TAR: ND**	45 % CELLULOSE NFM: TAR BINDER

Technical Supervisor: Baojia Ke, Ph.D.

6/4/2021
Date Reported

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Sampling Data Form / Chain of custody

NOTE Stop @ first positive !!

Page 1 19

281877

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc. (Biological Science Bldg)

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

PO02886

Sampled By: M.A.

Sample Date: 05/24/21 – 05/28/21

Proj #: PJ63338

Turnaround Time: RUSH 24hr 48hr Extended (5 days)

Analysis: ✓ **PLM Standard:** ______ **PLM w/ Point Count:** (______ **400pt.** ______ **1,000 pt.):**

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com & malvarez@forensicanalytical.com

NOTE Stop @ first Positive !!

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
01	TAN sheetflooring w/ mottle pattern		Y	G	Bio-A001	RM 18, SE. Corner	1
↓	↓		↓	↓	-A002	RM 7, NW Corner	2
02	Beige Sheetflooring w/ mottle Pattern				-A003	RM 18, West Side, Patches on floor	3
↓	↓		↓		-A004	RM 2, East Side	4
04	white Adhesive (on metal HVAC pins)		N		-A005	RM 16	5
↓	↓				-A006	RM16	6
05	Gray HVAC Seam mastic				-A007	RM 16	7
↓	↓		↓	↓	-A008	RM 7	8

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elinquished by:
ate and Time: ~~05/31/21~~ 06/02/21

eceived by: Kau Saukel
ate and Time: 6/2/2021 8h

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Date and Time:

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Date and Time:

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Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: M.A.

Sample Date: 05/24/21 – 05/28/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** **Extended (** 5 **days)**
Analysis:	✓ **PLM Standard:** ____ **PLM w/ Point Count:** (____ **400pt.** ____ **1,000 pt.):**
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HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
03	2'x4' white Acoustical Ceiling Tile w/ Fissure pattern		Y	G	B10-A009	RM 18	9
↓	↓		↓	↓	-A010	corridor East wall on South END	10
06	Black w/ gray Streaks Floor Mat		N		-A011	RM 16	11
↓	↓		↓		-A012	RM 16	12
07	JC/WB		Y		-A013	RM 18, South East corner wall	13
					-A014	RM 26, South east corner	14
					-A015	RM 3 (Boiler Room)	15
↓	↓		↓	↓	↓ -A016	Jan Closet, next to RM7	16

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elinquished by: **ate and Time:** ~~05/31/21~~ 06/02/21	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
eceived by: Kao Saelee **ate and Time:** 6/2/2021 8Am	**Received by:** **Date and Time:**	**Received by:** **Date and Time:**

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Client: HAY01

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HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
08	Brown BBM		N	G	Bio-A017	RM 18, East Wall	17
↓	↓		↓	↓	-A018	RM 35	18
09	1"x1" Gray ceramic tile w/ Black specks w/ off white grout, w/ off white motar		↓	↓	-A019	RM 24, Counter top	19
↓	↓		↓	↓	-A020	RM 18	20
10	TSI (on 4" OD pipe run)		Y	↓	-A021	RM 22, North west corner	21
↓	↓		↓	↓	-A022	RM 22	22
↓	↓		↓	↓	-A023	RM 22	23
12	2'x4' White Accustical ceiling tile w/ Pin hole Pattern		Y	↓	-A024	RM 24	24

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HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
12	2'x4' white Accustical ceiling tile w/ Pinhole Pattern		Y	G	BIO-A025	Center of RM 39	25
13	12"x12" Ft off white w/ Gray streaks w/ yellow mastic		N	↓	-A026	RM, 28A on FL	26
↓	↓		↓	↓	-A027	RM, 28A on FL	27
14	Red Brick and Gray mortar		↓	↓	-A030	RM, 26, North wall	28
↓	↓		↓	↓	-A031	Ext. South entrance	29
15	12"x12" FL tile w/ blue specks over yellow mastic		↓	↓	-A032	Corridor, South side	30
↓	↓		↓	↓	-A033	Mens restroom vestibule, NW Corner	31
18	Green Carpet Mastic		↓	↓	-A034	RM 43, SW Corner	32

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Client: HAY01

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Sample Date: 05/24/21 - 05/28/21

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HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
18	Green Carpet Mastic		N	G	Bio-035	RM 43, SE Corner	33
16	Knock down WT (on wood panel walls)		Y		-036	corridor, NORTH SIDE-WEST END	34
					-037	corridor, East, Next TO RM37	35
					-038	corridor, west Next TO RM18	36
					-039	corridor, East Next TO RM13	37
↓	↓		↓		-040	South END, Next TO RM2	38
26	Dark Tan RSF with Mottle Pattern				-041	RM B-8, NW Corner	39
↓	↓		↓	↓	-042	RM 39 NW Corner	40

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Sample Date: 05/24/21 – 05/28/21

Proj #: PJ63338

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HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
11	Pipe Elbow (on 4" OD pipe run)		Y	G ✓	Bio-A043	RM 41	Y1
↓	↓		↓	↓ ✓	-A044	RM 17	Y2
↓	↓		↓	↓ ✓	-A045	RM 43	Y3
17	Plaster		N	↓ ✓	-A046	West wall in Wash Room	Y4
↓	↓		↓	↓ ✓	-A047	NORT wall in STUDY ROOM	Y5
↓	↓		↓	↓ ✓	-A048	Women's RR	Y6
↓	↓		↓	↓ ✓	-A049	↓	Y7
↓	↓		↓	↓ ✓	-A050	Men's RR	Y8

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Sample Date: 05/24/21 – 05/28/21

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Turnaround Time:	**RUSH**	**24hr**	**48hr**	**Extended (5 days)**
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HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
19	4"x4" off-white Ceramic wall tile w/off-white grout/w off-white grout		N	G ✓	Bio-A051	East wall of RM 43	49
↓	↓		↓	↓ ✓	-A052	East wall of RM 43	50
20	yellow wall panel Adhesieve		↓	↓ ✓	-A053	East wall of RM43	51
↓	↓		↓	↓ ✓	-A054	West Wall of RM43	52
21	Yellow/Beige BBM		↓	↓ ✓	-A055	RM 26	53
↓	↓		↓	↓ ✓	-A056	RM2	54
22	fiberglass Pipe Lagging (Jacket) over (on 6" OD pipe run)		Y	↓ ✓	-A057	RM 26	55
↓	↓		↓	↓ ✓	-A058	RM3	56

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Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com			

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
22	Pipe lagging (Jacket) over fiberglass (on 6" OD pipe run)		Y	G	✓ BIO-A059	RM1	57
23	Pipe Elbow (on 6" OD piperun)		↓	↓	✓ -A060	RM 1	58
↓	↓		↓	↓	✓ -A061	RM2 East wall South end above door	59
↓	↓		↓	↓	✓ -A062	RM43	60
24	Black Chaulk Board		N	↓	✓ -A063	RM39	61
↓	↓		↓	↓	✓ -A064	RM 2	62
25	White Insulation (on sink pipe drains)		Y	↓	✓ -A065	RM24	63
↓	↓		↓	↓	✓ -A066	RM39	64

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Client: HAY01

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Sample Date: 05/24/21 – 05/28/21

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Turnaround Time:	**RUSH** **24hr** **48hr** **Extended (** 5 **days)**
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HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
27 V	~~Transite~~ O I D Exhaust Flue	V O	I D	G V	3IC-A067 O I	D ~~RM~~ 41	X
↓ V	O I D ↓	V O	I D ↓	↓	V A068 O ↓	I D	X
28	RED Fire stop				✓ -A069	RM 41	65
↓	↓				✓ -A070	RM3	66
29	Black Counter tops				✓ -A071	RM 39	67
↓	↓				✓ -A072	RM 22	68
30	Gray Counter tops				✓ -A073	South Wall of RM 41	69
↓	↓		↓	↓	✓ -A074 ↓	RM 17	70

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281877

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HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
31	Orange Peel WT (on drywall)		Y	G	Bio-A075	East wall northend RM2	71
					-A076	RM B8 East wall South end	72
					-A077	RM B8 East wall North end	73
					-A078	RM 6 South wall	74
					-A079	RM 12	75
32	JC/WB (on drywall w/orange Peel WT)				-A080	RM B8 southeast corner	76
					-A081	RM 6, S. wall, East END	77
					-A082	RM12	78

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HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
33	Concrete (on Equipment pads)		N	G	Bio-A083	RM 3 (Boiler RM), upper west side	79
↓	↓		↓	↓	-A084	↓ south wall	80
34	Pipe Gaskets		N		-A085	Southeast corner	81
↓	↓		↓		-A086	↓ central South wall	82
35	12"x12" off-white wall tiles over brown mastic		Y		-A087	RM 1 North Wall	83
↓	↓		↓		-A088	↓ North wall	84
36	TANK Insulation		Y		-A089	RM 3 (Boiler RM),	85
↓	↓		↓	↓	-A090	↓ ,	86

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HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
36	TANK Insulation		Y	G	✓ Bio-A091	RM 3 (Boiler RM)	87
37	White HVAC vibration Dampener		↓	↓	✓ -A092	RM 26	88
↓	↓				✓ -A093	RM 37	89
38	Green HVAC vibration Dampener		↓		✓ -A094	RM 26	90
↓	↓		↓		✓ -A095	RM 37	91
39	Black mastic (on HVAC Coils drip pan)		N		✓ -A096	RM 26	92
↓	↓		↓		✓ -A097	RM 37	93
58	White cloth HVAC gasket (on HVAC Connection)		Y	↓	✓ -A098	RM 13	94

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HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
* 58	white cloth HVAC gasket (on HVAC Connection)		Y	G	Bio-A099	RM13	95
40	Roof Curb flashing		N		Bio-A100	Roof South side	96
↓	↓				- A101	West side , North END	97
41	Gray / Black Roof penetration mastic				- A102	exhaust penetration flue	98
↓	↓				- A103	exhaust penetration flue	99
42	Off-white Insulation (on pipe bracket support)		Y		- A104	south, west corner chilled water return line	100
↓	↓		↓		- A105	west side of HVAC unit	101
43	Gray HVAC seam mastic		N	↓	↓ - A106	Central , from old HVAC	102

DW = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooriing, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Ceiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by: **Date and Time:** ~~05/31/21~~ 06/02/21	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: Kao Salee **Date and Time:** 6/2/2021 8A	**Received by:** **Date and Time:**	**Received by:** **Date and Time:**

Sam‿ng Data Form / Chain of custody

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281877

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: M.A.

Sample Date: 05/24/21 - 05/29/21

Proj #: PJ63338

Turnaround Time:	**RUSH**	**24hr**	**48hr**	**Extended (** 5 **days)**
Analysis:	✓ **PLM Standard:**	____ **PLM w/ Point Count:**	**(____400pt.____1,000 pt.):**	
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com			

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
43	Gray HVAC seam mastic		N	G	Bio-A107	Roof, S.E. Corner, from old HVAC	103
44	Gray Rolled Roof patch		↓	↓	-A108	S.E. Corner	104
↓	↓				-A109	North side	105
45	Gray roof mastic ~~of~~ (on Gray rolled Roof patches)				-A110	S.E. corner	106
↓	↓				-A111	N.E. Corner	107
46	Dark Gray sealant (on Generator exhaust Fan DUCT)				-A112	S.E. Corner	108
↓	↓				-A113	↓	109
47	light gray HVAC seam mastic		↓	↓	-A114	from newer HVAC Units DUCT	110

W = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Floorling, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic eiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

elinquished by: **ate and Time:** ~~05/31/21~~ 06/02/21	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
eceived by: Kao Saelel **ate and Time:** 6/2/2021 8A	**Received by:** **Date and Time:**	**Received by:** **Date and Time:**

Sampling Data Form / Chain of custody

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281877

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: M.A.

Sample Date: 05/24/21 - 05/28/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** **Extended (** 5 **days)**
Analysis:	✓ **PLM Standard:** ____ **PLM w/ Point Count:** (____ **400pt.** ____ **1,000 pt.):**
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
47	light gray HVAC seam mastic		N	G	Bio-A115	Roof, from newer HVAC unit Duct	111
48	Dark Gray HVAC seam mastic				-A116	south west corner of HVAC unit	112
↓	↓				-A117	North wes corner of HVAC unit	113
49	Berge Sealant (on Exhaust FAN seam)				-A118	northwest From old HVAC vent	114
↓	↓				-A119	northwest From old HVAC vent	115
50	Silver Aluminum w/ black Adhesive Duct lining				-A120		116
↓	↓				-A121	↓	117
51	~~Black~~ Black seam and penetration mastic VOID		↓	↓ X	↓ -A122	↓ VOID	X

W = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooriing, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic eiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

elinquished by: **ate and Time:** ~~05/31/21~~ 06/02/21	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
eceived by: Kao Saelee **ate and Time:** 6/2/2021 8Am	**Received by:** **Date and Time:**	**Received by:** **Date and Time:**

Sampling Data Form / Chain of custody

Page 16 19
281877

Client: HAY01

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: M.A.

FACS: San Francisco, CA Office

Sample Date: 05-24-21 – 05/28/21

Critical Solutions, Inc.

Proj #: PJ63338

Turnaround Time: RUSH 24hr 48hr [✓ Extended (5 days)]

Analysis: ✓ PLM Standard: ______PLM w/ Point Count: (______400pt.______1,000 pt.):

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
51	Black seam and penetration mastic VOID Ⓦ		N	G	Bio-A123	Roof VOID Ⓦ	X
52	Black Coating (on roof Access ladder)		↓	↓	-A124	RM 3 (Boiler RM) NORTHEast Corner	118
↓	↓				-A125	↓ Northeast corner	119
53	Stucco				-A126	Ext. ~~South~~ Ⓦ, North, @ Entry, Soffit ceiling	120
↓	↓				-A127	↓ , South, @ Entry, Soffit	121
↓	↓				-A128	Ext. ~~North~~ Ⓦ, South, @ Entry soffit	122
54	Concrete (slab)				-A129	RM 22	123
54	↓		↓	↓	-A130	RM 3 (Boile-RM)	124

W = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooring, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic eiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

elinquished by:
ate and Time: ~~05/31/21~~ Ⓦ 06/02/21

eceived by:
ate and Time: 6/2/2021 8Am

Relinquished by:
Date and Time:

Received by:
Date and Time:

Relinquished by:
Date and Time:

Received by:
Date and Time:

Sampling Data Form / Chain of custody

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28/877

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: M.A.

Sample Date: 05-24-21 - 05/28/21

Proj #: PJ63338

Turnaround Time:	RUSH 24hr 48hr Extended (5 days)
Analysis:	✓ PLM Standard: ______PLM w/ Point Count: (______400pt.______1,000 pt.):
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
54	Concrete (slab)		N	G	Bio-A131	Ext. West side, South END	125
55	White Caulk "putty like"		↓	↓	-A132	Ext. South side @ Entry, between brick & Metal window frame	126
↓	↓				-A133	Ext. North side @ Entry, between brick & Metal window frame	127
56	light Gray Caulk				-A134	Ext., East side, ~~North E~~ South End, ~~betwn~~ between glass & window frame	128
↓	↓		↓		-A135	↓, West side, North END, between glass & window frame	129
57	Duct wrap over fiberglass		Y		-A136	RM 26	130
↓	↓		↓		-A137	RM 37	131
↓	↓		↓	↓	↓ -A138	RM 13	132

DW = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooring, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Ceiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by: **Date and Time:** ~~05/31/21~~ 06/02/21	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:** 6/2/2021 8A	**Received by:** **Date and Time:**	**Received by:** **Date and Time:**

Sampling Data Form / Chain of custody

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28/877

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: M.A.

Sample Date: 05-24-21 – 05-28-21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** **Extended (5 days)**
Analysis:	✓ **PLM Standard:** ______**PLM w/ Point Count:** (______**400pt.**______**1,000 pt.**):
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
59	TAR & gravel Roof Field		N	G ✓	B10-A139	Roof, S.E. Corner	133
↓	↓		↓	↓ ✓	-A140	Central	134
↓	↓		↓	↓ ✓	-A141	North side	135
60	Pipe Laggings (Jacket) over fiberglass (on 4" OD pipe run)		Y	✓	-A142	RM 41	136
↓	↓		↓	✓	-A143	RM 17	137
↓	↓		↓	↓ ✓	-A144	RM 43	138
61	1"x1" gray Ceramic FL Tile w/ gray grout and Off-white Mortar		N	G ✓	-A145	Men's RR	139
↓	↓		↓	↓ ✓	-A146	↓	140

DW = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooriing, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Ceiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by: **Date and Time:** 05/31/21 06/02/21	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: Kay Sulzer **Date and Time:** 6/2/2021 8Am	**Received by:** **Date and Time:**	**Received by:** **Date and Time:**

Sampling Data Form / Chain of custody

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28/877

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: M.A.

Sample Date: 05/24/21 - 05/28/21

Proj #: PJ63338

Turnaround Time: RUSH 24hr 48hr Extended (5 days)

Analysis: ✓ **PLM Standard:** ______ **PLM w/ Point Count:** (______ **400pt.** ______ **1,000 pt.):**

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
62	Off-White HVAC Seam Tape		Y	G	✓ B10-A147	East RM 39	141
↓	↓		↓	↓	✓ -A148	RM 21	142
63	Black Moisture Barrier		N	↓	✓ -A149	Ext. East side, South END, behind upper wall wood panel	143
↓	↓		↓	↓	✓ -A150	Ext. ↓	144

DW = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooriing, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Ceiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by:
Date and Time: ~~05/31/21~~ 06/02/21

Received by: Kao Sueker
Date and Time: 6/2/2021 8A

Relinquished by:
Date and Time:

Received by:
Date and Time:

Relinquished by:
Date and Time:

Received by:
Date and Time:

Final Report

Bulk Asbestos Analysis

(EPA Method 40CFR, Part 763, Appendix E to Subpart E and EPA 600/R-93-116, Visual Area Estimation)
NVLAP Lab Code: 101459-0

Forensic Analytical Consulting Svcs
Gary Lowe
21228 Cabot Blvd.

Hayward, CA 94545

Client ID: HAY01
Report Number: B319974
Date Received: 07/02/21
Date Analyzed: 07/06/21
Date Printed: 07/07/21
First Reported: 07/07/21

Job ID/Site: PJ63338; Critical Solutions, Inc. Contra Costa College 2600 Mission Bell Drive San Pablo CA

Date(s) Collected: 07/02/2021

SGSFL Job ID: HAY01
Total Samples Submitted: 5
Total Samples Analyzed: 5

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BIO-A151	12443231						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
BIO-A131A	12443232						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
BIO-A131B	12443233						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
BIO-A152	12443234						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
BIO-A153	12443235						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

Sampling Data Form / Chain of custody

Page 1 of 1

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: Martin Alvarez

Sample Date: 07/02/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** **Extended (** 3 **days)**
Analysis:	✓ **PLM Standard:** ______**PLM w/ Point Count:** (______**400pt.**______**1,000 pt.):**
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com and malvarez@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
54	Concrete Slab		N	G	Bio-A151	RM 43	
~~54~~ 64	Concrete slab		↓	↓	Bio-A131A	Ext. West side, South END. Approx 1'.6" away from where A131 was collected	
↓	↓				Bio-A131B	Ext. East side, North END	
65	Concrete (Foundation wall)				Bio-A152	Ext. West side, North END	
↓	↓				Bio-A153	Ext. South side, Foundation wall, Near Bldg Entry	

DW = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooriing, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Ceiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by: **Date and Time:** 07/02/21	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:**	**Received by:** CYM **Date and Time:** RECEIVED JUL 02 REC'D 345pm	**Received by:** **Date and Time:**

Bulk Asbestos Analysis

(EPA Method 40CFR, Part 763, Appendix E to Subpart E and EPA 600/R-93-116, Visual Area Estimation)
NVLAP Lab Code: 101459-0

Forensic Analytical Consulting Svcs
Gary Lowe
21228 Cabot Blvd.

Hayward, CA 94545

Client ID: HAY01
Report Number: B318732
Date Received: 06/03/21
Date Analyzed: 06/08/21
Date Printed: 06/09/21
First Reported: 06/09/21

Job ID/Site: PJ63338; Critical Solutions, Inc.

Date(s) Collected: 06/03/2021

SGSFL Job ID: HAY01
Total Samples Submitted: 31
Total Samples Analyzed: 23

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BR-01-A	12430484						
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
BR-02-A	12430485						
Layer: Grey Mortar			**ND**				
Layer: Red Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
BR-03-A	12430486						
Layer: Grey Cementitious Material		Chrysotile	**Trace**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (Trace)**					
BR-04-A	12430487						
Comment: Sample not analyzed due to prior positive result in series.							
BR-05-A	12430488						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
BR-06-A	12430489						
Layer: Grey Cementitious Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
BR-07-A	12430490						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
BR-08-A	12430491						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BR-09-A	12430492						
Layer: Beige Non-Fibrous Material		Chrysotile	**Trace**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
BR-10-A	12430493						
Comment: Sample not analyzed due to prior positive result in series.							
BR-11-A	12430494						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (2 %)		**Asbestos (ND)**					
BR-12-A	12430495						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (2 %)		**Asbestos (ND)**					
BR-13-A	12430496						
Layer: Black Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
BR-14-A	12430497						
Layer: Green Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (10 %)		**Asbestos (ND)**					
BR-15-A	12430498						
Layer: White Semi-Fibrous Material		Chrysotile	**3 %**	Amosite	**15 %**		
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (18%)**					
BR-16-A	12430499						
Comment: Sample not analyzed due to prior positive result in series.							
BR-17-A	12430500						
Comment: Sample not analyzed due to prior positive result in series.							
BR-18-A	12430501						
Layer: White Semi-Fibrous Material		Chrysotile	**3 %**	Amosite	**10 %**		
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (13%)**					
BR-19-A	12430502						
Comment: Sample not analyzed due to prior positive result in series.							
BR-20-A	12430503						
Layer: White Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BR-21-A	12430504						
Layer: White Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BR-22-A	12430505						
Layer: White Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BR-23-A	12430506						
Layer: White Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BR-24-A	12430507						
Layer: White Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
BR-25-A	12430508						
Layer: Yellow Fibrous Tile			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (2 %) Fibrous Glass (90 %)							
BR-26-A	12430509						
Layer: Yellow Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (99 %)							
BR-27-A	12430510						
Layer: Yellow Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (99 %)							
BR-28-A	12430511						
Layer: White Semi-Fibrous Material		Chrysotile	**3 %**	Amosite	**10 %**		
Total Composite Values of Fibrous Components:		**Asbestos (13%)**					
Cellulose (Trace)							
BR-29-A	12430512						
Comment: Sample not analyzed due to prior positive result in series.							
BR-30-A	12430513						
Comment: Sample not analyzed due to prior positive result in series.							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BR-31-A	12430514						

Comment: Sample not analyzed due to prior positive result in series.

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

Sampling Data Form / Chain of custody

Page 1 of 4

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: Sevilla / Radzinski

Sample Date: 03 June 2021

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (5 days)**]
Analysis:	✓ **PLM Standard:** ______ **PLM w/ Point Count:** (______ **400pt.** ______ **1,000 pt.**):
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

prior positive per P. Radzinski -cym

HM ~~HA#~~	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
01	mortar				BR-01-A	Ext. wall, NW corner	
01	mortar				BR-02-A	Ext. wall, N. side	
03	concrete				BR-03-A	pad, @ W. entry threshold	
03 ~~02~~	Concrete				BR-04-A	pad, NW quadrant	
04	concrete				BR-05-A	wall footer, @ W. entry	
04	concrete				BR-06-A	wall fotter, S. wall, center	
02	sealant				BR-07-A	S. wall, ext. penetration	
02	sealant				BR-08-A	S. wall, ext. peretration	

DW = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooring, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Ceiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by: Radzinski **Date and Time:** 03 June 2021 / 1310	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:**	**Received by:** cym **Date and Time:** RECEIVED JUN 03 REC'D D/O 1315PM	**Received by:** **Date and Time:**

Sampling Data Form / Chain of custody

Page 2 of 4

Client: HAY01

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: Sevilla/Radzinski

FACS: San Francisco, CA Office

Sample Date: 03 June 2021

Critical Solutions, Inc.

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (5 days)**]
Analysis:	√ **PLM Standard:** ______ **PLM w/ Point Count:** (______ **400pt.** ______ **1,000 pt.):**
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HM ~~HA#~~	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
10	sealant,				BR-09-A	E. side, ext., Louvre, S. of center	
10	sealant,				BR-10-A	E. side, ext., Louvre, center	
05	glazing,				BR-11-A	E. side, ext., window, S. of center	
05	glazing,				BR-12-A	E. side, ext., @ E door	
08	gasket				BR-13-A	Ext., N-side, flange, Westerly	
08	gasket				BR-14-A	Ext., N. side, flang, W. of center	
06	TSI				BR-15-A	10" line, straight run, N. pipe W. of center	
06	TSI				BR-16-A	10" line, straight run, N. pipe ~ center	

DW = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooring, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Ceiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by: Radzinski **Date and Time:** 03 June 2021 / 1310	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:**	**Received by:** **Date and Time:**	**Received by:** **Date and Time:**

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D/O 1315

Sampling Data Form / Chain of custody

Page 3 of 4

Client: HAY01

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: Seville/Radzinski

FACS: San Francisco, CA Office

Sample Date: 03 June 2021

Critical Solutions, Inc.

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** **Extended (5 days)**
Analysis:	✓ **PLM Standard:** ______ **PLM w/ Point Count:** (______ **400pt.** ______ **1,000 pt.**):
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
06	TSI				BR-17-A	10" straight run, S. side, elevated, W. of center	
07	TSI				BR-18-A	10" elbow, elevated, S-side, W-of center	
07	TSI				BR-19-A	10" elbow, NW quadrant	
09	PLASTER WALL				BR-20-A	BOILER ROOM / W. WALL	
09	PLASTER WALL				BR-21-A	BOILER ROOM / SE CORNER / WALL	
09	PLASTER WALL				BR-22-A	BOILER ROOM / NE CORNER / WALL	
09	PLASTER WALL				BR-23-A	BOILER ROOM / NW CORNER / WALL	
09	PLASTER WALL				BR-24-A	BOILER ROOM / SW CORNER / WALL	

DW = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooriing, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Ceiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by: Radzinski **Date and Time:** 03 June 2021/ 1310	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:**	**Received by:** cym **Date and Time:** 06 1315	**Received by:** **Date and Time:**

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Sampling Data Form / Chain of custody

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Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: Sevilla / Radzinski

Sample Date: 03 June 2021

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (** 5 **days)**]
Analysis:	✓ **PLM Standard:** ______ **PLM w/ Point Count:** (______ **400pt.**______ **1,000 pt.):**
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
14	TSI				BR-25-A	~~6"~~ (4") straight run, elevated, S-side near center	
14	TSI				BR-26-A	straight run, elevated, S. side ~~6"~~ (4") east of center	
14	TSI				BR-27-A	straigh run, elevated, S-side, ~~6"~~ (4")	
12	TSI				BR-28-A	Straight run, 6" verticle	
12	TSI				BR-29-A	Straight run, 6" verticle	
12	TSI				BR-30-A	Straight run, 6" verticle	
13	TSI				BR-31-A	elbow, 6"	

DW = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooring, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Ceiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by: Radzinski **Date and Time:** 03 June 2021 / 1310	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:**	**Received by:** **Date and Time:**	**Received by:** **Date and Time:**

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SGS FORENSIC LABORATORIES

Final Report

Bulk Asbestos Analysis

(EPA Method 40CFR, Part 763, Appendix E to Subpart E and EPA 600/R-93-116, Visual Area Estimation)
NVLAP Lab Code: 101459-0

Forensic Analytical Consulting Svcs
Gary Lowe
21228 Cabot Blvd.

Hayward, CA 94545

Client ID: HAY01
Report Number: B319975
Date Received: 07/02/21
Date Analyzed: 07/06/21
Date Printed: 07/07/21
First Reported: 07/07/21

Job ID/Site: PJ63338; Critical Solutions, Inc. Contra Costa College 2600 Mission Bell Drive San Pablo CA

Date(s) Collected: 07/02/2021

SGSFL Job ID: HAY01
Total Samples Submitted: 5
Total Samples Analyzed: 5

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BR-RF-A01	12443240						
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (15 %)							
BR-RF-A02	12443241						
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (15 %)							
BR-RF-A03	12443242						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (45 %)							
Comment: Bulk complex sample.							
BR-RF-A04	12443243						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (45 %)							
Comment: Bulk complex sample.							

Report Number: B319975
Client Name: Forensic Analytical Consulting Svcs
Date Printed: 07/07/21

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
BR-RF-A05	12443244						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				

Total Composite Values of Fibrous Components: **Asbestos (ND)**
Cellulose (Trace) Fibrous Glass (45 %)
Comment: Bulk complex sample.

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

Analytical results and reports are generated by SGS Forensic Laboratories (SGSFL) at the request of and for the exclusive use of the person or entity (client) named on such report. Results, reports or copies of same will not be released by SGSFL to any third party without prior written request from client. This report applies only to the sample(s) tested. Supporting laboratory documentation is available upon request. This report must not be reproduced except in full, unless approved by SGSFL. The client is solely responsible for the use and interpretation of test results and reports requested from SGSFL. SGSFL is not able to assess the degree of hazard resulting from materials analyzed. SGS Forensic Laboratories reserves the right to dispose of all samples after a period of thirty (30) days, according to all state and federal guidelines, unless otherwise specified. All samples were received in acceptable condition unless otherwise noted.

Sampling Data Form / Chain of custody

Page 1 of 1

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: J. SEVILLA

Sample Date: 07/02/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** **Extended (~~3~~ 3 days)** JS
Analysis:	X **PLM Standard:** ____ **PLM w/ Point Count:** (____ **400pt.** ____ **1,000 pt.):**
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
01	BLACK PENETRATION ROOF MASTIC	100 LF		G	BR-RF-A01	BOILER ROOM / ROOF / W. AREA	
↓	↓	↓		↓	BR-RF-A02	↓ ↓ / E. AREA	
02	ROOF FIELD	3000 SF ~~250~~ JS		G	BR-RF-A03	BOILER ROOM / ROOF / W. AREA	
↓	↓	↓		↓	BR-RF-A04	↓ / ↓ / CENTER	
↓	↓	↓		↓	BR-RF-A05	↓ / ↓ / E. AREA	

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Relinquished by:
Date and Time: 07/02/21

Received by:
Date and Time:

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Date and Time:

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Date and Time:

Received by:
Date and Time:

Bulk Asbestos Analysis

(EPA Method 40CFR, Part 763, Appendix E to Subpart E and EPA 600/R-93-116, Visual Area Estimation)
NVLAP Lab Code: 101459-0

Forensic Analytical Consulting Svcs
Gary Lowe
21228 Cabot Blvd.

Hayward, CA 94545

Client ID: HAY01
Report Number: B318755
Date Received: 06/03/21
Date Analyzed: 06/08/21
Date Printed: 06/09/21
First Reported: 06/09/21

Job ID/Site: PJ63338; Critical Solutions, Inc.

Date(s) Collected: 05/26/2021

SGSFL Job ID: HAY01
Total Samples Submitted: 114
Total Samples Analyzed: 94

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBN-001	12430792						
Layer: White Tile			**ND**				
Layer: Brown/Green Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-002	12430793						
Layer: White Tile			**ND**				
Layer: Brown/Green Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-003	12430794						
Layer: Grey Sheet Flooring			**ND**				
Layer: Tan Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-004	12430795						
Layer: Grey Sheet Flooring			**ND**				
Layer: Tan Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-005	12430796						
Layer: Brown/Green Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-006	12430797						
Layer: Brown/Green Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-007	12430798						
Layer: Brown Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBN-008	12430799						
Layer: Brown Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-009	12430800						
Layer: Brown/Tan Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-010	12430801						
Layer: Brown/Tan Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-011	12430802						
Layer: Brown Tile			**ND**				
Layer: Black Mastic		Chrysotile	**5 %**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (Trace)							
PSBN-012	12430803						
Comment: Sample not analyzed due to prior positive result in series.							
PSBN-013	12430804						
Layer: Blue Tile			**ND**				
Layer: Black Mastic		Chrysotile	**5 %**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (Trace)							
PSBN-014	12430805						
Comment: Sample not analyzed due to prior positive result in series.							
PSBN-015	12430806						
Layer: Beige Tile			**ND**				
Layer: Black Mastic		Chrysotile	**5 %**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (Trace)							
PSBN-016	12430807						
Comment: Sample not analyzed due to prior positive result in series.							
PSBN-017	12430808						
Layer: Red Tile			**ND**				
Layer: Black Mastic		Chrysotile	**5 %**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (Trace)							
PSBN-018	12430809						
Comment: Sample not analyzed due to prior positive result in series.							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBN-019	12430810						
Layer: Grey Tile			**ND**				
Layer: Black Mastic		Chrysotile	**5 %**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (Trace)							
PSBN-020	12430811						
Comment: Sample not analyzed due to prior positive result in series.							
PSBN-021	12430812						
Layer: Grey Ceramic Tile			**ND**				
Layer: Grey Grout			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-022	12430813						
Layer: Grey Ceramic Tile			**ND**				
Layer: Grey Grout			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-023	12430814						
Layer: Beige Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-024	12430815						
Layer: Beige Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-025	12430816						
Layer: White Semi-Fibrous Material			**ND**				
Layer: Off-White Adhesive			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (50 %)							
PSBN-026	12430817						
Layer: White Semi-Fibrous Material			**ND**				
Layer: Off-White Adhesive			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (50 %)							
PSBN-027	12430818						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBN-028	12430819						
Comment: Sample not analyzed due to prior positive result in series.							
PSBN-029	12430820						
Comment: Sample not analyzed due to prior positive result in series.							
PSBN-030	12430821						
Comment: Sample not analyzed due to prior positive result in series.							
PSBN-031	12430822						
Comment: Sample not analyzed due to prior positive result in series.							
PSBN-032	12430823						
Layer: White Texture			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-033	12430824						
Layer: Off-White Texture		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (2%)**					
Cellulose (Trace)							
PSBN-034	12430825						
Comment: Sample not analyzed due to prior positive result in series.							
PSBN-035	12430826						
Comment: Sample not analyzed due to prior positive result in series.							
PSBN-036	12430827						
Comment: Sample not analyzed due to prior positive result in series.							
PSBN-037	12430828						
Layer: Off-White Texture		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (2%)**					
Cellulose (Trace)							
PSBN-038	12430829						
Comment: Sample not analyzed due to prior positive result in series.							
PSBN-039	12430830						
Comment: Sample not analyzed due to prior positive result in series.							
PSBN-040	12430831						
Comment: Sample not analyzed due to prior positive result in series.							
PSBN-041	12430832						
Comment: Sample not analyzed due to prior positive result in series.							
PSBN-042	12430833						
Layer: Red Cementitious Material			**ND**				
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBN-043	12430834						
Layer: Red Cementitious Material			**ND**				
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-044	12430835						
Layer: Beige Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (35 %) Fibrous Glass (45 %)							
PSBN-045	12430836						
Layer: Beige Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (35 %) Fibrous Glass (45 %)							
PSBN-046	12430837						
Layer: Brown Mastic			**ND**				
Layer: Beige Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (35 %) Fibrous Glass (45 %)							
PSBN-047	12430838						
Layer: Brown Mastic			**ND**				
Layer: Beige Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (35 %) Fibrous Glass (45 %)							
PSBN-048	12430839						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-049	12430840						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-050	12430841						
Layer: White Coating		Chrysotile	**2 %**				
Total Composite Values of Fibrous Components:		**Asbestos (2%)**					
Cellulose (Trace)							
PSBN-051	12430842						
Comment: Sample not analyzed due to prior positive result in series.							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBN-052	12430843						
Layer: Black Coating			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
PSBN-053	12430844						
Layer: Black Coating			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
PSBN-054	12430845						
Layer: Red Cementitious Material			**ND**				
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
PSBN-055	12430846						
Layer: Red Cementitious Material			**ND**				
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
PSBN-056	12430847						
Layer: Black Semi-Fibrous Material		Chrysotile	**10 %**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (10%)**					
PSBN-057	12430848						
Comment: Sample not analyzed due to prior positive result in series.							
PSBN-058	12430849						
Layer: Black Non-Fibrous Material		Chrysotile	**2 %**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (2%)**					
PSBN-059	12430850						
Comment: Sample not analyzed due to prior positive result in series.							
PSBN-060	12430851						
Layer: Red Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace) Synthetic (10 %)		**Asbestos (ND)**					
PSBN-061	12430852						
Layer: Red Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace) Synthetic (10 %)		**Asbestos (ND)**					
PSBN-062	12430853						
Layer: Black Tape			**ND**				
Total Composite Values of Fibrous Components: Cellulose (95 %)		**Asbestos (ND)**					

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBN-063	12430854						
Layer: Black Tape			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (95 %)							
PSBN-064	12430855						
Layer: Grey Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Synthetic (25 %)							
PSBN-065	12430856						
Layer: Grey Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Synthetic (25 %)							
PSBN-066	12430857						
Layer: Tan Fibrous Material			**ND**				
Layer: Silver Foil			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (95 %)							
PSBN-067	12430858						
Layer: Tan Fibrous Material			**ND**				
Layer: Silver Foil			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (95 %)							
PSBN-068	12430859						
Layer: Tan Fibrous Material			**ND**				
Layer: Silver Foil			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (95 %)							
PSBN-069	12430860						
Layer: Black Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (99 %)							
PSBN-070	12430861						
Layer: Black Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (99 %)							
PSBN-071	12430862						
Layer: Yellow Fibrous Material			**ND**				
Layer: Tan Fibrous Material			**ND**				
Layer: Silver Foil			**ND**				
Layer: Yellow Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (80 %)							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBN-072	12430863						
Layer: Yellow Fibrous Material			**ND**				
Layer: Tan Fibrous Material			**ND**				
Layer: Silver Foil			**ND**				
Layer: Yellow Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (80 %)							
PSBN-073	12430864						
Layer: Yellow Fibrous Material			**ND**				
Layer: Tan Fibrous Material			**ND**				
Layer: Silver Foil			**ND**				
Layer: Yellow Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (80 %)							
PSBN-074	12430865						
Layer: Silver Tape			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (50 %)							
PSBN-075	12430866						
Layer: Silver Tape			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (50 %)							
PSBN-076	12430867						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Tan Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (45 %)							
Comment: Bulk complex sample.							

Report Number: B318755
Client Name: Forensic Analytical Consulting Svcs **Date Printed:** 06/09/21

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBN-077	12430868						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Tan Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (45 %)							
Comment: Bulk complex sample.							
PSBN-078	12430869						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Tan Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (45 %)							
Comment: Bulk complex sample.							
PSBN-079	12430870						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Tan Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (45 %)							
Comment: Bulk complex sample.							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBN-080	12430871						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (45 %)							
Comment: Bulk complex sample.							
PSBN-082	12430873						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Tan Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %) Fibrous Glass (45 %)							
Comment: Bulk complex sample.							
PSBN-083	12430874						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (2 %) Fibrous Glass (50 %)							
Comment: Bulk complex sample.							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBN-084	12430875						
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (2 %) Fibrous Glass (50 %)							
Comment: Bulk complex sample.							
PSBN-085	12430876						
Layer: Black Mastic			**ND**				
Layer: White Coating			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (15 %) Synthetic (10 %)							
PSBN-086	12430877						
Layer: Black Mastic			**ND**				
Layer: White Coating			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (15 %) Synthetic (10 %)							
PSBN-087	12430878						
Layer: Black Mastic			**ND**				
Layer: White Coating			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (15 %) Synthetic (10 %)							
PSBN-088	12430879						
Layer: Black Mastic			**ND**				
Layer: White Stones			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (15 %) Synthetic (10 %)							
PSBN-089	12430880						
Layer: Black Mastic			**ND**				
Layer: White Stones			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (15 %) Synthetic (10 %)							
PSBN-090	12430881						
Layer: Black Mastic			**ND**				
Layer: White Stones			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (15 %) Synthetic (10 %)							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBN-091	12430882						
Layer: Grey Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (15 %) Synthetic (10 %)							
PSBN-092	12430883						
Layer: Grey Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (15 %) Synthetic (10 %)							
PSBN-093	12430884						
Layer: White Non-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-094	12430885						
Layer: White Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-095	12430886						
Layer: Black Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-096	12430887						
Layer: Black Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-097	12430888						
Layer: White Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (45 %)							
Comment: Bulk complex sample.							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBN-098	12430889						
Layer: White Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (45 %)							
Comment: Bulk complex sample.							
PSBN-099	12430890						
Layer: White Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (45 %)							
Comment: Bulk complex sample.							
PSBN-100	12430891						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-101	12430892						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-102	12430893						
Layer: White Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-103	12430894						
Layer: White Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-104	12430895						
Layer: White Cementitious Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBN-105	12430896						
Layer: White Cementitious Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-106	12430897						
Layer: White Cementitious Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-107	12430898						
Layer: White Cementitious Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-108	12430899						
Layer: White Cementitious Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-109	12430900						
Layer: Red Cementitious Material			**ND**				
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-110	12430901						
Layer: Red Cementitious Material			**ND**				
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-111	12430902						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-112	12430903						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBN-113	12430904						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBN-114	12430905						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

Sampling Data Form / Chain of custody

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Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA

Sample Date: 5/26/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (** 5 **days)**] * PRIOR POSITIVE *
Analysis:	X **PLM Standard:** ____**PLM w/ Point Count:** (____**400pt.**____**1,000 pt.):**
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
01	12"x12" white w/ blue specks FT over brown mastic and green mastic		N	G	PSBN-001	PSB North / Rm PS-109 / SE area, floor	
↓	↓ ↓		↓	↓	↓ -002	/ Corridor 2 / NE area, floor	
02	Gray VSF		N	G	-003	/ Corridor 1 stairs / NW area, floor	
↓	↓ ↓		↓	↓	-004	/ ↓ / SE area, floor	
03	Blue carpet over brown mastic		N	G	-005	/ Rm PS-113 / NE area, floor	
↓	↓ ↓		↓	↓	-006	/ Rm PS-106 / SW area, floor	
04	Red carpet over brown mastic		N	G	-007	/ Rm PS-123 / NW area, floor	
↓	↓ ↓		↓	↓	↓ -008	↓ / Rm PS-131 / West center area, floor	

W = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Floorling, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic eiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

elinquished by: Radzinski **ate and Time:** 03 June 2021 / 1210	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
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Sampling Data Form / Chain of custody

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Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA / JS

Sample Date: 5/26/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (** 5 **days)**]
Analysis:	X **PLM Standard:** ____ **PLM w/ Point Count:** (____ **400pt.** ____ **1,000 pt.):**
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
05	Brown carpet OVER TAN CARPET MASTIC		N	G	PSBN-009	PSB North / PS RM 117 / E CORNER / FLOOR	
	↓ ↓		N	↓	-010	↓ / PS RM 118 / NE CORNER / FLOOR	
06	12"X12" Brown w/ white specks FT OVER BLACK MASTIC		N	G	-011	↓ / PS RM 101 / SE CORNER / FLOOR	
	↓ ↓		↓	↓	-012	↓ / PS RM 102 / N W CORNER / FLOOR	
07	12"X12" Blue w/ white streaks FT OVER BLACK MASTIC		N	G	-013	↓ / PS RM 101 / E AREA / FLOOR	
	↓ ↓		↓	↓	-014	↓ / PS RM 101 / W. AREA / FLOOR	
08	12"X12" Beige w/ gray streaks FT OVER BLACK MASTIC OVER BROWN MASTIC		N	G	-015	↓ / PS RM 102 / SW AREA / FLOOR	
	↓ ↓		↓	↓	↓ -016	↓ / PS RM 101 / E AREA / FLOOR	

W = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooriing, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic eiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

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FACS: San Francisco, CA Office
Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA & JS
Sample Date: 5/26/21
Proj #: PJ63338

Turnaround Time: RUSH 24hr 48hr [✓ Extended (5 days)]

Analysis: X **PLM Standard:** ______ **PLM w/ Point Count:** (______ **400pt.**______ **1,000 pt.):**

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
09	12"x12" Red FT OVER BLACK MASTIC		N	G	PSBN-017	PSB North / PS RM 102 / W AREA / FLOOR	
↓	↓ ↓		↓	↓	-018	/ ↓ / E AREA / FLOOR	
10	12"x12" Gray w/ black dots FT OVER BLACK MASTIC		N	G	-019	/ PS RM 102 / S AREA / FLOOR	
↓	↓ ↓		↓	↓	-020	/ ↓ / N AREA / FLOOR	
11	2"x2" Gray ceramic FT and grout		N	G	-021	/ MENS BATHROOM / S AREA / FLOOR	
↓	↓ ↓		↓	↓	-022	/ WOMENS BATHROOM / N AREA / FLOOR	
12	Beige BBM		N	G	-023	/ CORRIDOR / ADJ TO ENTRY 1-031	
↓	↓ ↓		↓	↓	↓ -024	↓ / ↓ / ADJ TO ENTRY 1-030	

W = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooriing, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic eiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

elinquished by: Radzwiski **ate and Time:** 03 June 2021 / 1310	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
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Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA & JS

Sample Date: 5/26/21

Proj #: PJ63338

Turnaround Time:	**RUSH**	**24hr**	**48hr**	[✓ **Extended (** 5 **days)**]	
Analysis:	X **PLM Standard:**		____ **PLM w/ Point Count:**	(____ **400pt.** ____ **1,000 pt.):**	
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com				

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
13	White wallpaper w/ adhesive		N	G	PSBN-025	PSB AA North / Rm PS-107 / NE area, East wall	
↓	↓ ↓		↓	↓	-026	/ Corridor 2 / NW area, wall	
14	WB/JC		Y	G	-027	/ Rm PS-110 / NW corner, wall	
					-028	/ Rm PS-107 / SE corner, wall	
					-029	/ Rm PS-106 / NW corner, wall	
					-030	/ Rm PS-132 / North corner, wall	
↓	↓		↓	↓	-031	/ Corridor 3 ~~Rm PS-1~~ AA / NE corner, wall	
15	Wall texture large splotch		Y	G	↓ -032	↓ / Rm PS-101 / East center area, wall	

W = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooriing, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic eiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

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Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA & JS

Sample Date: 5/26/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (5 days)**]
Analysis:	X **PLM Standard:** ______ **PLM w/ Point Count:** (______ **400pt.** ______ **1,000 pt.):**
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
15	Wall texture large splotch		Y	G	PSBN-033	PSBN / CORRIDOR / ADJ TO PSBN RM 106 / W WALL	
↓	↓		↓	↓	-034	↓ / ↓ / ABJ TO PSBN RM 102 / N. WALL	
↓	↓		↓	↓	-035	↓ / CORRIDOR / ADJ TO PSBN RM 116 / S WALL	
↓	↓		↓	↓	-036	↓ / ↓ / ADJ TO PSBN RM 101 / S. WALL	
16	Wall texture orange peel splotch		Y	G	-037	↓ / CORRIDOR / ADJ TO PSBN RM 116 / N. WALL	
↓	↓		↓	↓	-038	↓ / ↓ / ADJ TO MENS BATHROOM / S. WALL	
↓	↓		↓	↓	-039	↓ / ↓ / ADJ TO WOMENS BATHROO / S. WALL	
↓	↓		↓	↓	-040	↓ / PSBN RM 132 / NW CORNER / WALL	

W = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooriing, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic eiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

elinquished by: Rodzinsko **ate and Time:** 03 June 2021 / 1216	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
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Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA & JS

Sample Date: 5/26/21

Proj #: PJ63338

Turnaround Time:	**RUSH**	**24hr**	**48hr**	[✓ **Extended (** 5 **days)**]
Analysis:	X **PLM Standard:**	____**PLM w/ Point Count:**	**(____400pt.____1,000 pt.):**	
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com			

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
16	Wall texture orange peel splotch		Y	G	PSBN-041	PSB North /Rm PS-130/NE area, wall	
17	Brick and mortar		N	G	-042	/Corridor 2/SW area, wall	
↓	↓ ↓		↓	↓	-043	/Corridor 1/SE area, wall	
18	2'x4' white ACT w/ pinholes		Y	G	-044	/Central Corridor/NE area, ceiling	
↓	↓ ↓		↓	↓	-045	/Rm PS-101/NW area, ceiling	
19	12"x12" white ACT w/ fissures over hockey puck mastic		Y	G	-046	/Rm PS-131/Central area, ceiling	
↓	↓ ↓		↓	↓	-047	/Corridor 1/SW area, ceiling	
20	AA Gray ~~Black~~ window caulking		N	G	↓ -048	↓ /Rm PS-107/SW area, window	

W = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooriing, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic eiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

elinquished by: Radzinski **ate and Time:** 03 June 2021 / 1210	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
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Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA & JS

Sample Date: 5/26/21

Proj #: PJ63338

Turnaround Time: RUSH 24hr 48hr [✓ Extended (5 days)]

Analysis: X **PLM Standard:** ____ **PLM w/ Point Count:** (____ **400pt.** ____ **1,000 pt.):**

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location			Lab result
20	Gray ~~Black~~ window caulking AH		N	G	PSBN-049	PSB North	Rm PS-107	NW area, window	
21	White sink undercoat		N	G	-050	↓	Rm PS-130	Under sink	
↓	↓ ↓		↓	↓	-051		Rm PS-130	↓	
22	Black sink undercoat		N	G	-052		Rm PS-110		
↓	↓ ↓		↓	↓	-053		Rm PS-110	↓	
23	3"x6" Red ceramic wall tile w/ grout		N	G	-054		Men's Restroom	SE area, South wall	
↓	↓ ↓		↓	↓	-055		Women's Restroom	NE area, North wall	
24	Black lab table		N	G	↓ -056	↓	Rm PS-113	Lab table	

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ate and Time: 03 June 2021/1216
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Date and Time:

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Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA & JS

Sample Date: 5/26/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (** 5 **days)**]
Analysis:	X **PLM Standard:** ______ **PLM w/ Point Count:** (______ **400pt.** ______ **1,000 pt.):**
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
24	Black lab table		N	G	PSBN-057	PSB North / Rm PS-106 / Lab table	
25	Black window caulking		N	G	-058	↓ / Rm PS-109 / SW area, window	
↓	↓ ↓		↓	↓	↓ -059	↓ / Rm PS-109 / NE area, window	
26	Red firestop		N	G	-060	/ Rm PS-132 Attic / South area, wall	
↓	↓ ↓		↓	↓	-061	/ Rm PS-110B Attic / East center area, wall	
27	Black duct tape		Y	G	-062	/ Rm PS-132 Attic / south area, on duct	
↓	↓ ↓		↓	↓	-063	/ ↓ / SW area, on duct	
28	off-white duct vibration cloth				↓ -064	↓ / Rm PS-130 Attic / West area, on duct	

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elinquished by: Radzinski **ate and Time:** 03 June 2021/1310	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
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Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA & JS

Sample Date: 5/26/21

Proj #: PJ63338

Turnaround Time:	RUSH 24hr 48hr [✓ Extended (5 days)]
Analysis:	X PLM Standard: ____ PLM w/ Point Count: (____400pt.____1,000 pt.):
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
28	off-white duct vibration cloth		Y	F	PSBN-065	PSB North / Rm PS-130 Attic / West area, on duct	
29	off-white inslulation wrap		Y	F	-066	↓ / Rm PS-130 Attic / East area, on pipe	
↓	↓ ↓		↓	↓	-067	↓ / Corridor 3 / Center area, on pipe	
↓	↓ ↓		↓	↓	-068	↓ / Rm PS-110B Attic / SE area, on pipe	
30	Black fiberglass panel cloth		Y	G	-069	↓ / Rm PS-132 Attic / NW area, on ceiling	
↓	↓ ↓		↓	↓	-070	↓ / ↓ / NE area, on ceiling	
31	Yellow insulation mastic		Y	G	-071	↓ / Rm PS-110B Attic / SE area, on tank	
↓	↓ ↓		↓	↓	↓ -072	↓ / ↓ / ↓	

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Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA & JS

Sample Date: 5/26/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (** 5 **days)**]
Analysis:	X **PLM Standard:** ____ **PLM w/ Point Count:** (____ **400pt.** ____ **1,000 pt.):**
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
31	Yellow insulation mastic		Y	G	PSBN-673	PSB North / RM PS-110B Attic / SE area, on tank	
32	Silver duct tape		N	F	↓ -074	↓ / ↓ / NE area, on duct	
↓	↓ ↓		↓	↓	↓ -075	↓ / ↓ / ↓	

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elinquished by: Redzinski **ate and Time:** 03 June 2021/1310	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
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lient: HAY01	**Site:** Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA	**Sampled By:**	AA & VS
ACS: San Francisco, CA Office		**Sample Date:**	5/28/21
Critical Solutions, Inc.		**Proj #:**	PJ63338

Turnaround Time:	**RUSH**	**24hr**	**48hr**	[✓ **Extended (5 days)**]	
Analysis:	X **PLM Standard:**	____ **PLM w/ Point Count:**	(____**400pt.**	____**1,000 pt.):**	
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com				

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
33	Roof field		N	G	PSBN-076	PSB North Roof / Roof I / North center area, floor	
↓	↓ ↓		↓	↓	-077	/ ↓ / Central area, floor	
34	AA ~~Upper~~ Middle roof field		N	G	-078	/ Roof B / Central area, floor	
↓	↓ ↓		↓	↓	-079	/ Roof J / SW area, floor	
↓	↓ ↓		↓	↓	↓ -080	/ Roof F / Central area, floor	
~~↓~~	~~↓ ↓~~	VOID	~~↓~~	~~↓~~	~~-081~~	~~/~~	AA
33	Roof field		N	G	PSBN-082	/ Roof H / Central area, floor	
35	Upper roof field		N	G	↓ -083	↓ / Roof G / South area, floor	

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elinquished by: Radzinski **ate and Time:** 03 June 2021/1310	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
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Client: HAY01
FACS: San Francisco, CA Office
Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA & JS
Sample Date: 5/28/21
Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (** 5 **days)**]
Analysis:	X **PLM Standard:** ____**PLM w/ Point Count:** (____**400pt.**____**1,000 pt.):**
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
35	Upper roof field		N	G	PSBN-084	PSB North/Roof/Roof G/North area floor	
36	Vent penetration mastic		N	G	-085	↓/↓/Roof F/~~East~~ center area, vent	
↓	↓	↓	↓	↓	-086	/Roof I/West center area, vent	
↓	↓	↓	↓	↓	-087	/Roof D/East center area, vent	
37	pipe penetration mastic		N	G	-088	/Roof I/~~Sean~~ Northeast area, pipe	
↓	↓	↓	↓	↓	-089	/Roof F/SE area, pipe	
↓	↓	↓	↓	↓	-090	/Roof B/East center area, pipe	
38	Gray mastic		N	G	↓ -091	↓/↓/Roof B/Adj to elec unit, floor	

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ate and Time: 03 June 2021/1310
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Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA + JS

Sample Date: 5/28/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (5 days)**]
Analysis:	X **PLM Standard:** ______**PLM w/ Point Count:** (______**400pt.**______**1,000 pt.):**
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
38	Gray mastic		N	G	PSBN-092	PSB North Roof / Roof B / Adj to elec unit, floor	
39	White roof caulking		N	G	-093	/ Roof J / West wall	
↓	↓ ↓		↓	↓	-094	/ Roof F / South wall	
40	Black roof caulking		N	G	-095	/ Roof J / SE area, gutter	
↓	↓ ↓		↓	↓	-096	/ Roof D / NE area, gutter	
41	Roof flashing		N	G	-097	/ Roof H / NW area, South wall	
↓	↓ ↓		↓	↓	-098	/ Roof I / NE area, North wall	
↓	↓ ↓		↓	↓	-099	/ Roof E / NE area, North wall	

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elinquished by: Radzinski **ate and Time:** 03 June 2021 / 1310	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
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Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA & JS

Sample Date: 5/28/21

Proj #: PJ63338

Turnaround Time:	RUSH 24hr 48hr [✓ Extended (5 days)]
Analysis:	X PLM Standard: ____ PLM w/ Point Count: (____400pt.____1,000 pt.):
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
42	Concrete steps		N	G	PSBN-100	PSB North / Exterior / Lower Stairwell	
↓	↓ ↓		↓	↓	-101	/ / Upper stairwell	
43	White window caulking		N	G	-102	/ / NW area, North wall	
↓	↓ ↓		↓	↓	-103	/ / West center area, West wall	
44	Stucco wall		N	G	-104	/ / NW area, Stairwell wall	
					-105	/ / North area, North wall	
					-106	/ / West center area west wall	
↓	↓ ↓		↓	↓	↓ -107	↓ / ↓ / West center area west wall	

DW = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooring, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Ceiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by: Redzinski **Date and Time:** 03 June 2021 / 1210	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
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Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA & JS

Sample Date: 5/28/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (** 5 **days)**]
Analysis:	X **PLM Standard:** ____ **PLM w/ Point Count:** (____ **400pt.** ____ **1,000 pt.):**
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result	
44	Stucco wall		N	G	PSBN-108	PSB North / Exterior / West area wall		
45	Brick and mortar		N	G	-109	/ / NW area, Stairwell wall		
↓	↓ ↓		↓	↓	-110	/ / SW area, South wall		✓
46	Concrete floor		N	G	-111	/ / NW area, floor adj to entry		
↓	↓ ↓		↓	↓	-112	/ / SW area, floor		✓
47	Concrete footing		N	G	-113	/ / North area, lower wall		
↓	↓ ↓		↓	↓	-114 ↓	↓ / ↓ / SW area, West wall		✓

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Relinquished by: Radzinski **Date and Time:** 03 June 2021/1310	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
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SGS FORENSIC LABORATORIES

Final Report

Bulk Asbestos Analysis

(EPA Method 40CFR, Part 763, Appendix E to Subpart E and EPA 600/R-93-116, Visual Area Estimation)
NVLAP Lab Code: 101459-0

Forensic Analytical Consulting Svcs
Gary Lowe
21228 Cabot Blvd.

Hayward, CA 94545

Client ID: HAY01
Report Number: B318754
Date Received: 06/03/21
Date Analyzed: 06/09/21
Date Printed: 06/10/21
First Reported: 06/10/21

Job ID/Site: PJ63338; Critical Solutions, Inc.

Date(s) Collected: 05/24/2021

SGSFL Job ID: HAY01
Total Samples Submitted: 111
Total Samples Analyzed: 91

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBS-001	12430681						
Layer: Grey Tile			**ND**				
Layer: Tan Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-002	12430682						
Layer: Grey Tile			**ND**				
Layer: Tan Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-003	12430683						
Layer: Tan Tile		Chrysotile	**5 %**				
Layer: Black Mastic		Chrysotile	**5 %**				
Total Composite Values of Fibrous Components:		**Asbestos (5%)**					
Cellulose (Trace)							
PSBS-004	12430684						
Comment: Sample not analyzed due to prior positive result in series.							
PSBS-005	12430685						
Layer: Beige Tile			**ND**				
Layer: Black Mastic		Chrysotile	**5 %**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (Trace)							
PSBS-006	12430686						
Comment: Sample not analyzed due to prior positive result in series.							
PSBS-007	12430687						
Layer: Dark Grey Tile		Chrysotile	**3 %**				
Layer: Black Mastic		Chrysotile	**5 %**				
Total Composite Values of Fibrous Components:		**Asbestos (3%)**					
Cellulose (Trace)							
PSBS-008	12430688						
Comment: Sample not analyzed due to prior positive result in series.							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBS-009	12430689						
Layer: Red Tile			**ND**				
Layer: Black/Yellow Mastic		Chrysotile	**5 %**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (Trace)							
PSBS-010	12430690						
Comment: Sample not analyzed due to prior positive result in series.							
PSBS-011	12430691						
Layer: Light Brown Tile		Chrysotile	**2 %**				
Layer: Yellow Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (2%)**					
Cellulose (Trace)							
PSBS-012	12430692						
Comment: Sample not analyzed due to prior positive result in series.							
PSBS-013	12430693						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-014	12430694						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-015	12430695						
Layer: Tan Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-016	12430696						
Layer: Tan Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-017	12430697						
Layer: Brown Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-018	12430698						
Layer: Brown Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-019	12430699						
Layer: White Plaster			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBS-020	12430700						
Layer: White Plaster			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-021	12430701						
Layer: White Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-022	12430702						
Layer: White Texture			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-023	12430703						
Layer: White Texture			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-024	12430704						
Layer: White Texture			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-025	12430705						
Layer: Beige Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (35 %) Fibrous Glass (45 %)							
PSBS-026	12430706						
Layer: Beige Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (35 %) Fibrous Glass (45 %)							
PSBS-027	12430707						
Layer: Tan Fibrous Material			**ND**				
Layer: Tan Mastic			**ND**				
Layer: Brown Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %)							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBS-028	12430708						
Layer: Tan Fibrous Material			**ND**				
Layer: Tan Mastic			**ND**				
Layer: Brown Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (10 %)							
PSBS-029	12430709						
Layer: Yellow Fibrous Material			**ND**				
Layer: Off-White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (2 %) Fibrous Glass (90 %)							
PSBS-030	12430710						
Layer: Yellow Fibrous Material			**ND**				
Layer: Off-White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (2 %) Fibrous Glass (90 %)							
PSBS-031	12430711						
Layer: Yellow Fibrous Material			**ND**				
Layer: Off-White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (2 %) Fibrous Glass (90 %)							
PSBS-032	12430712						
Layer: Yellow Fibrous Material			**ND**				
Layer: Off-White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (2 %) Fibrous Glass (90 %)							
PSBS-033	12430713						
Layer: Yellow Fibrous Material			**ND**				
Layer: Off-White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (2 %) Fibrous Glass (90 %)							
PSBS-034	12430714						
Layer: Yellow Fibrous Material			**ND**				
Layer: Off-White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (2 %) Fibrous Glass (90 %)							
PSBS-035	12430715						
Layer: Yellow Fibrous Material			**ND**				
Layer: Off-White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (2 %) Fibrous Glass (90 %)							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBS-036	12430716						
Layer: Grey Fibrous Material			**ND**				
Layer: Off-White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (2 %) Fibrous Glass (90 %)		**Asbestos (ND)**					
PSBS-037	12430717						
Layer: Grey Fibrous Material			**ND**				
Layer: Off-White Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (2 %) Fibrous Glass (90 %)		**Asbestos (ND)**					
PSBS-038	12430718						
Layer: Red Cementitious Material			**ND**				
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
PSBS-039	12430719						
Layer: Red Cementitious Material			**ND**				
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
PSBS-040	12430720						
Layer: Black Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
PSBS-041	12430721						
Layer: Black Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
PSBS-042	12430722						
Layer: Black Semi-Fibrous Material		Chrysotile	**10 %**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (10%)**					
PSBS-043	12430723						
Comment: Sample not analyzed due to prior positive result in series.							
PSBS-044	12430724						
Layer: Grey Semi-Fibrous Material		Chrysotile	**10 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (10%)**					
PSBS-045	12430725						
Comment: Sample not analyzed due to prior positive result in series.							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBS-046	12430726						
Layer: Black Semi-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (70 %)							
PSBS-047	12430727						
Layer: Black Semi-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (70 %)							
PSBS-048	12430728						
Layer: Red Tape			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Synthetic (60 %)							
PSBS-049	12430729						
Layer: Red Tape			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Synthetic (60 %)							
PSBS-050	12430730						
Layer: Grey Semi-Fibrous Material		Chrysotile	**10 %**				
Layer: Black Coating			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (10%)**					
Cellulose (Trace)							
PSBS-051	12430731						
Comment: Sample not analyzed due to prior positive result in series.							
PSBS-052	12430732						
Layer: Black Coating			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-053	12430733						
Layer: Black Coating			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-054	12430734						
Layer: Red Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Synthetic (10 %)							
PSBS-055	12430735						
Layer: Red Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Synthetic (10 %)							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBS-056	12430736						
Layer: White Semi-Fibrous Material		Amosite	**10 %**	Chrysotile	**5 %**		
Layer: White Woven Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (14%)**					
Cellulose (5 %)							
PSBS-057	12430737						
Comment: Sample not analyzed due to prior positive result in series.							
PSBS-058	12430738						
Comment: Sample not analyzed due to prior positive result in series.							
PSBS-059	12430739						
Layer: Grey Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Synthetic (50 %)							
PSBS-060	12430740						
Layer: Grey Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Synthetic (50 %)							
PSBS-061	12430741						
Layer: White Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-062	12430742						
Layer: White Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-063	12430743						
Layer: White Texture			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-064	12430744						
Layer: White Texture			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBS-065	12430745						
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: White Tape			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (Trace)**					
Cellulose (20 %) Fibrous Glass (10 %)							
PSBS-066	12430746						
Comment: Sample not analyzed due to prior positive result in series.							
PSBS-067	12430747						
Comment: Sample not analyzed due to prior positive result in series.							
PSBS-068	12430748						
Layer: Grey Semi-Fibrous Material		Chrysotile	**10 %**	Crocidolite	**5 %**		
Total Composite Values of Fibrous Components:		**Asbestos (15%)**					
Cellulose (Trace)							
PSBS-069	12430749						
Comment: Sample not analyzed due to prior positive result in series.							
PSBS-070	12430750						
Layer: White Semi-Fibrous Material		Amosite	**10 %**	Chrysotile	**2 %**		
Total Composite Values of Fibrous Components:		**Asbestos (12%)**					
Cellulose (Trace)							
PSBS-071	12430751						
Comment: Sample not analyzed due to prior positive result in series.							
PSBS-072	12430752						
Layer: Grey Semi-Fibrous Material		Chrysotile	**10 %**				
Layer: Black Coating			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (10%)**					
Cellulose (Trace)							
PSBS-073	12430753						
Comment: Sample not analyzed due to prior positive result in series.							
PSBS-074	12430754						
Layer: Black Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-075	12430755						
Layer: Black Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBS-076	12430756						
Layer: Silver Tape			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
PSBS-077	12430757						
Layer: Silver Tape			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
PSBS-078	12430758						
Layer: Grey Semi-Fibrous Material		Chrysotile	**10 %**	Crocidolite	**2 %**		
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (12%)**					
PSBS-079	12430759						
Comment: Sample not analyzed due to prior positive result in series.							
PSBS-080	12430760						
Layer: White Semi-Fibrous Material		Amosite	**10 %**	Chrysotile	**2 %**		
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (12%)**					
PSBS-081	12430761						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
PSBS-082	12430762						
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
PSBS-083	12430763						
Layer: White Non-Fibrous Material		Chrysotile	**Trace**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (Trace)**					
PSBS-084	12430764						
Comment: Sample not analyzed due to prior positive result in series.							
PSBS-085	12430765						
Layer: Red Cementitious Material			**ND**				
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBS-086	12430766						
Layer: Red Cementitious Material			**ND**				
Layer: Grey Mortar			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-087	12430767						
Layer: Off-White Semi-Fibrous Material		Chrysotile	**5 %**				
Total Composite Values of Fibrous Components:		**Asbestos (5%)**					
Cellulose (Trace)							
PSBS-088	12430768						
Comment: Sample not analyzed due to prior positive result in series.							
PSBS-089	12430769						
Layer: White Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-090	12430770						
Layer: White Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-091	12430771						
Layer: Black Semi-Fibrous Material		Chrysotile	**5 %**				
Total Composite Values of Fibrous Components:		**Asbestos (5%)**					
Cellulose (Trace)							
PSBS-092	12430772						
Comment: Sample not analyzed due to prior positive result in series.							
PSBS-093	12430773						
Layer: Grey Cementitious Material			**ND**				
Layer: Brown Cementitious Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-094	12430774						
Layer: Grey Cementitious Material			**ND**				
Layer: Brown Cementitious Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-095	12430775						
Layer: Tan Non-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBS-096	12430776						
Layer: Tan Non-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-097	12430777						
Layer: Tan Non-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-098	12430778						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (40 %)							
Comment: Bulk complex sample.							
PSBS-099	12430779						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (40 %)							
Comment: Bulk complex sample.							
PSBS-100	12430780						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (40 %)							
Comment: Bulk complex sample.							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBS-101	12430781						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt		Chrysotile	**40 %**				
Layer: Black Tar			**ND**				
Layer: Black Felt		Chrysotile	**40 %**				
Total Composite Values of Fibrous Components:		**Asbestos (16%)**					
Cellulose (20 %) Fibrous Glass (40 %)							
Comment: Bulk complex sample.							
PSBS-102	12430782						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (40 %)							
Comment: Bulk complex sample.							
PSBS-103	12430783						
Layer: Stones			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (5 %) Fibrous Glass (40 %)							
Comment: Bulk complex sample.							
PSBS-104	12430784						
Layer: Grey Mastic		Chrysotile	**10 %**				
Total Composite Values of Fibrous Components:		**Asbestos (10%)**					
Cellulose (Trace)							
PSBS-105	12430785						
Comment: Sample not analyzed due to prior positive result in series.							

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
PSBS-106	12430786						
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-107	12430787						
Layer: Black Mastic			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-108	12430788						
Layer: Grey Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (50 %)							
PSBS-109	12430789						
Layer: Grey Semi-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (50 %)							
PSBS-110	12430790						
Layer: Silver Non-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
PSBS-111	12430791						
Layer: Silver Non-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							

Tad Thrower

Tad Thrower, Laboratory Supervisor, Hayward Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

Sampling Data Form / Chain of custody

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Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA

Sample Date: 5/24/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (5 days)**] *PRIOR POSITIVE*
Analysis:	X **PLM Standard:** ______**PLM w/ Point Count:** (______**400pt.**______**1,000 pt.):**
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
01	12"x12" Gray w/ green FT over tan mastic		N	G	PSBS-001	PSB South / Corridor / SW area, floor	
↓	↓ ↓		↓	↓	-002	/ ↓ / NE area, floor	
02	9"x9" Tan w/ brown streaks FT over black mastic		N	G	-003	/ Rm PS-1 / SE area, floor	
↓	↓ ↓		↓	↓	-004	/ ↓ / NW area, floor	
03	12"x12" Beige w/ dark gray and white FT over black mastic		N	G	-005	/ Rm PS-1 / Central area, floor	
↓	↓ ↓		↓	↓	-006	/ ↓ / NE area, floor	
04	12"x12" Dark gray w/ white streaks FT over black mastic		N	G	-007	/ Rm PS-5 / NE area, floor	
↓	↓ ↓		↓	↓	-008	/ Rm 108 / SW area, floor	

DW = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooring, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Ceiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by: Redzinski **Date and Time:** 03 June 2021 / 1315	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:**	**Received by:** **Date and Time:** RECEIVED JUN 03 2021 By 1315	**Received by:** **Date and Time:**

Sampling Data Form / Chain of custody

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Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA

Sample Date: 5/24/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (5 days)**]
Analysis:	X **PLM Standard:** ____ **PLM w/ Point Count:** (____ 400pt. ____ 1,000 pt.):
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
05	12"x12" Red w/ black streaks FT over black and yellow mastic		N	G	PSBS-009	PSB South / Rm PS-5 / SE area, floor	
↓	↓ ↓		↓	↓	-010	/ ↓ / ↓	
06	12"x12" Light brown w/ white streaks FT over yellow mastic		N	G	-011	/ Rm PS-5 / SW area, floor	
↓	↓ ↓		↓	↓	-012	/ ↓ / ↓	
07	Concrete floor		N	G	-013	/ Rm PS-6 ~~SE AA~~ / SE area, floor	
↓	↓ ↓		↓	↓	-014	/ Rm-PS-19 / NE area, floor	
08	Tan BBM		N	G	-015	/ Corridor / SW area, wall adj to PS-6	
↓	↓ ↓		↓	↓	↓ -016	↓ / ↓ / NE area, wall adj to PS-19	

DW = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooring, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Ceiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by: Radzinski **Date and Time:** 03 June 2021 / 1315	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:**	**Received by:** **Date and Time:**	**Received by:** **Date and Time:**

RECEIVED
JUN 03 2021
By 6/3 1315

Sampling Data Form / Chain of custody

Page 3 of 15

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA

Sample Date: 5/24/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (** 5 **days)**]
Analysis:	X **PLM Standard:** ______ **PLM w/ Point Count:** (______ **400pt.**______ **1,000 pt.):**
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
09	Black BBM		N	G	PSBS-017	PSB South / Rm PS-6 / Central area	
↓	↓ ↓		↓	↓	-018	/ Rm PS-14 / ↓	
10	Plaster wall		N	G	-019	/ Rm PS-2 / NE area, wall	
↓	↓ ↓		↓	↓	-020	/ Corridor / Central area, South wall	
↓	↓ ↓		↓	↓	-021	/ Rm PS-14 / East wall, Center area	
11	Wall texture		Y	G	-022	/ Corridor / SW area, West wall	
↓	↓ ↓		↓	↓	-023	/ Rm PS-10 / East wall Central area	
↓	↓ ↓		↓	↓	↓ -024	↓ / Corridor / NE area, North wall	

W = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooriing, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic eiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

elinquished by: Radzinski **ate and Time:** 03 June 2021 / 1315	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
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Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA

Sample Date: 5/24/21

Proj #: PJ63338

Turnaround Time:	**RUSH**	**24hr**	**48hr**	[✓ **Extended (** 5 **days)**]
Analysis:	X **PLM Standard:**	____ **PLM w/ Point Count:**	(____ **400pt.** ____ **1,000 pt.):**	
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com			

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
12	2'x4' white ACT w/ pinholes		Y	G	PSBS-025	PSB South / Corridor / SW area, ceiling	
↓	↓ ↓		↓	↓	-026	/ ↓ / NE area, ceiling	
13	12"x12" white ACT w/ hockey puck mastic		Y	G	-027	/ Corridor / Sw area, ceiling	
↓	↓ ↓		↓	↓	-028	/ Rm PS-5 / Central area, ceiling	
~~14~~	~~Pipe insulation (Run)~~ ~~Pipe wrap~~		~~Y~~	~~G~~	~~-029~~	~~/ Corridor~~	~~JLA~~
~~↓~~	~~↓~~		~~↓~~	~~↓~~	~~-~~	~~/~~	~~JLA~~
~~↓~~	~~↓~~		~~↓~~	~~↓~~	~~-~~	~~/~~	~~JLA~~
14	yellow pipe insulation wrap		N ~~Y~~ AA	G	↓ -029	↓ / Corridor / west area	

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Sampled By: AA

Sample Date: 5/24/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (5 days)**]
Analysis:	X **PLM Standard:** ____ **PLM w/ Point Count:** (____400pt.____1,000 pt.):
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
14	yellow pipe insulation wrap		N ~~Y~~ AA	G	PSBS ~~PSB~~-030	BD South / Corridor / west Area	
↓	↓		↓	↓	-031	/ Corridor / west Area	
15	off-white pipe insulation wrap		N ~~Y~~ AA	G	-032	/ Rm PS-2 / central area	
↓	↓		↓	↓	-033	/ Rm PS-2 / South area	
↓	↓		↓	↓	-034	/ Rm PS-12 ~~PS-10~~ AA / SE area	
16	off white duct insulation wrap ~~Beige duct tape~~ AA		N	G	-035	/ Rm PS-2 / Central area	
↓	↓		↓	↓	-036	/ Rm PS-12 ~~PS-10~~ AA / East central area	
↓	↓		↓	↓	-037	/ Rm PS-12 ~~PS-10~~ AA / East central area	

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Sampled By: AA

Sample Date: 5/24/21

Proj #: PJ63338

Turnaround Time:	**RUSH**	**24hr**	**48hr**	[✓ **Extended (5 days)**]
Analysis:	X **PLM Standard:**	____ **PLM w/ Point Count:**	(____**400pt.**____**1,000 pt.**):	
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com			

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
17	Brick and mortar		N	G	PSBS-038	PSB South / Corridor / NW area, North wall	
↓	↓ ↓		↓	↓	-039	/ Rm PS-1 / SE area, East wall	
18	Black lab table		N	G	-040	/ Rm PS-5 ~~↓~~ AA / Central area, lab table	
↓	↓ ↓		↓	↓	-041	/ Rm PS-6 / NE area, lab table	
19	Black exhaust system table top		N	G	-042	/ Rm PS-6 / West central area	
↓	↓ ↓		↓	↓	-043	/ Rm PS-14 / East central area	
20	Gray exhaust system transite panel		N	G	-044	/ Rm PS-5 / SW area	
↓	↓ ↓		↓	↓	-045	/ Rm PS-5 / SW area	

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Turnaround Time:	**RUSH**	**24hr**	**48hr**	[✓ **Extended (** 5 **days)**]
Analysis:	X **PLM Standard:**	______**PLM w/ Point Count:**	(______**400pt.**______**1,000 pt.):**	
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com			

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
21	Exhaust system ~~duct gasket~~ AA vibration cloth		N	G	PSBS-046	PSB South / Rm PS-5 / SW area	
↓	↓ ↓		↓	↓	↓ -047	↓ / ↓ / ↓	
22	Red duct tape		N	G	-048	/ /	
↓	↓ ↓		↓	↓	-049	/ ↓ / ↓	
23	Black exhaust system transite panel		N	G	-050	/ Rm PS-6 / West center area	
↓	↓ ↓		↓	↓	-051	/ Rm PS-14 / East center area	
24	Black sink undercoat		N	G	-052	/ Rm PS-12 / Under sink	
↓	↓ ↓		↓	↓	↓ -053	↓ / Rm PS-19 / Under sink	

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Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (5 days)**]
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HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
25	Red Firestop		N	G	PSBS-054	PSB South / Rm 108 / south center area, wall	
↓	↓ ↓		↓	↓	-055	/ ↓ / North center area, wall	
26	White insulation packing		Y	F	-056	/ Rm PS-12 / SE area	
↓	↓ ↓		↓	↓	-057	/ Rm PS-2 / South center area	
↓	↓ ↓		↓	↓	-058	/ Rm PS-12 / SW area	
27	Duct joint cloth		N	P	-059	/ Rm PS-12 / East central area	
↓	↓ ↓		↓	↓	-060	/ ↓ / West central area	
10	Plaster wall		N	G	↓ -061	↓ / Rm PS-11 / East wall, center area	

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Sampled By: AA

Sample Date: 5/24/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (** 5 **days)**]
Analysis:	X **PLM Standard:** ______**PLM w/ Point Count:** (______**400pt.**______**1,000 pt.):**
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
10	Plaster wall		N	G	PSBS-062	PSB South / Rm PS-15 / NE area, East Wall	
11	Wall texture		Y	G	-063	/ Rm PS-10 / South wall center area	
↓	↓ ↓		↓	↓	-064	/ Corridor ~~Rm PS AA~~ / North wall, Center area	
28	WB/JC		Y	G	-065	/ Rm PS-19 / NE area, @ wall/ceiling	
↓	↓ ↓		↓	↓	-066	/ Rm 108 / SW corner, wall	
↓	↓ ↓		↓	↓	-067	↓ / Rm PS-1 / SE area, wall	
29	Off white transite pipe fitting		N	G	-068	/ Rm PS-2 / Water heater closet, pipe	
↓	↓ ↓		↓	↓	↓ -069	↓ / ↓ / ↓	

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Sampled By: AA

Sample Date: 5/24/21

Proj #: PJ63338

Turnaround Time:	RUSH	24hr	48hr	[✓ Extended (5 days)]	
Analysis:	X PLM Standard:	___ PLM w/ Point Count:	(___400pt.___1,000 pt.):		
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com				

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
30	pipe penetration tape ~~+ mastic~~ AA and insulation		N	G	PSBS-070	PSB South / Rm PS-2 / Water heater closet, pipe penetration	
↓	↓ ↓		↓	↓	-071	/ ↓ / ↓	
31	Transite exhaust hood		N	G	-072	/ Rm PS-6 / East center area	
↓	↓ ↓		↓	↓	-073	/ Rm PS-14 / West center area	
32	Black lab floor mat		N	G	-074	/ Rm PS-12 / SW area, floor	
↓	↓ ↓		↓	↓	-075	/ / ↓	
33	Silver duct tape		N	G	-076	/ / Central area, on duct	
↓	↓ ↓		↓	↓	↓ -077	↓ / ↓ / ↓	

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Sample Date: 5/24/21 - 5/28/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (5 days)**]
Analysis:	X **PLM Standard:** ______**PLM w/ Point Count:** (______**400pt.**______**1,000 pt.):**
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HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
34	white transite pipe		N	G	PSBS-078	PSB South / Rm PS-2 / Water heater closet, pipe	
↓	↓ ↓		↓	↓	↓ -079	↓ / ↓ / ↓	
30	pipe penetration tape and insulation		Y	G	PSBS -080	↓ / ↓ / ↓	
35	CONCRETE SLAB		N	G	PSBS -081	PSB South Exterior / SW area, South wall	
↓	↓ ↓ ↓		↓	↓	↓ -082	/ South center area South wall	
36	White window caulking		N	G	-083	/ North center area, window	
↓	↓ ↓		↓	↓	-084	/ NW area, window	
37	Brick and mortar		N	G	↓ -085	↓ / NW area, North wall	

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Sample Date: 5/24/21 - 5/28/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (5 days)**]
Analysis:	X **PLM Standard:** ____ **PLM w/ Point Count:** (____400pt.____1,000 pt.):
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
37	Brick and mortar		N	G	PSBS-086	PSB South Exterior / SE area, East wall	
38	off-white expansion joint		N	G	-087	↓ / SW corner, wall	
↓	↓ ↓		↓	↓	-088	/ ↓	
39	White sealant		N	G	-089	/ South ~~SE~~ AA area, South wall	
↓	↓ ↓		↓	↓	-090	/ ↓	
40	Black caulking		N	G	-091	/ South ~~SE~~ AA area, South wall	
↓	↓ ↓		N ~~G~~ A	↓	-092	/ South center area South wall	
41	Concrete wall		N	G	↓ -093	↓ / South center area, South wall	

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Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (5 days)**]
Analysis:	X **PLM Standard:** ______ **PLM w/ Point Count:** (______400pt.______1,000 pt.):
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
41	Concrete wall		N	G	PSBS-094	PSB South Exterior / Southeast area East wall	
42	Stucco siding		N	G	-095	↓ / SE area, South wall	
↓	↓ ↓		↓	↓	-096	/ ↓	
					-097	/	
43	UPPER ROOF FIELD		N	G	-098	PSB South Roof / SE area, floor	
	↓ ↓ ↓		↓	↓	-099	↓ / NW area, floor	
44	ROOF FLASHING		N	G	-100	/ East area, flashing	
	↓ ↓ ↓		↓	↓	-101	↓ / West area, flashing	

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Proj #: PJ63338

Turnaround Time: RUSH 24hr 48hr [✓ Extended (5 days)]

Analysis: X PLM Standard: ______PLM w/ Point Count: (______400pt.______1,000 pt.):

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HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
45	LOWER ROOF FIELD		N	G	PSBS-102	PSB South Roof / SW area, floor	
↓	↓ ↓ ↓		↓	↓	-103	↓ / NE area, floor	
46	GRAY SEALANT		N	G	-104	/ NW area, skylight	
↓	↓ ↓ ↓		↓	↓	-105	/ SE area, skylight	
47	Black ~~duct~~ pipe AA penetration mastic		N	G	-106	/ North center area, pipe	
↓	↓ ↓		↓	↓	-107	/ South center area, pipe	
48	Gray vibration cloth		N	G	-108	/ SE area, dact	
↓	↓ ↓		↓	↓	-109	/ NW area, duct	

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Turnaround Time:	**RUSH** **24hr** **48hr** [✓ **Extended (** 5 **days)**]
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Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
49	Gray duct mastic		N	G	PSBS-110	PSB South Roof / SE area, duct	
↓	↓ ↓		↓	↓	↓ -111	↓ / NW area, duct	

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By AK 6/3 1315

MICRO ANALYTICAL LABORATORIES, INC.

BULK ASBESTOS ANALYSIS - POLARIZED LIGHT MICROSCOPY (PLM)

1212
Gary Lowe
Forensic Analytical Consulting
21228 Cabot Boulevard
Hayward, CA 94545

PROJECT:
PROJECT NO. PJ63338
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In **286879**
Total Samples 11
Date Sampled 11/12/2021
Date Received 11/12/2021
Date Analyzed 11/12/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: **111221-CHA-A01** Micro #: 286879-01 Analyst: GDS **GRAY INSULATION WRAP (FIBROUS)** **CHILLER / AREA, CHILLER 10 / ON PIPE**	**TSI: ND** **JACKET: ND** **MASTIC (BROWN): 8% CHRYSOTILE ASBESTOS**	15 % CELLULOSE 30 % FIBROUS GLASS NFM: BINDER, OTHER, MISCELLANEOUS.
Client #: **111221-CHA-A02** Micro #: 286879-02 Analyst: GDS **GRAY INSULATION WRAP (FIBROUS)** **CHILLER / ON PIPE BETWEEN** **CHILLER 9 AND CHILLER 10**	**TSI: ND** **JACKET: ND** **MASTIC (BROWN): 8% CHRYSOTILE ASBESTOS**	15 % CELLULOSE 30 % FIBROUS GLASS NFM: BINDER, OTHER, MISCELLANEOUS.
Client #: **111221-CHA-A03** Micro #: 286879-03 Analyst: GDS **CONCRETE SLAB** **CHILLER / CHILLER 9 / FOOTING**	**CONCRETE: ND**	5 % CELLULOSE NFM: ROCK FRAGMENTS
Client #: **111221-CHA-A04** Micro #: 286879-04 Analyst: GDS **CONCRETE SLAB** **CHILLER / CHILLER 10 / FOOTING**	**CONCRETE: ND**	5 % CELLULOSE NFM: ROCK FRAGMENTS
Client #: **111221-CHA-A05** Micro #: 286879-05 Analyst: GDS GR **BLACK PIPE INSULATION WRAP** **CHILLER AREA / CHILLER 9** **PIPE UNDER UNIT**	**INSULATION: ND** **WRAP W/ MASTIC (BLACK) : ND**	12 % CELLULOSE 5 % MISC. FIBERS NFM: TAR/ASPHALT, BINDER

Technical Supervisor: Baojia Ke, Ph.D. 11/12/2021
Date Reported

NVLAP Lab Code 101872-0 (TESTING). Analyses use Polarized Light Microscopy (PLM), Micro Analytical SOP PLM-101. Basic techniques follow EPA – Appendix E to Subpart E of 40 CFR Part 763; Interim Method for the Determination of Asbestos in Bulk Insulation Samples" (originally published 1982), and EPA-600/R93-116 (1993). The 1993 method covers all types of bulk materials and is based on the 1982 Method, with improved analytical techniques for layered samples as required for NESHAP compliance. Asbestos is quantified by calibrated visual estimation. Detection limit is material dependent. Detection of asbestos traces (much less than 1%) may not be reliable or reproducible by PLM. Weight % cannot be determined by PLM. Asbestos with diameter below ~1 µm may not be detected by PLM. Absence of asbestos in dust, debris, and some compact materials, including floor tiles, cannot be conclusively established by PLM, and should be confirmed by Transmission Electron Microscopy (TEM).Interferences may prevent detection of small asbestos fibers, and hinder determination of some optical properties.Tremolite-asbestos or actinolite- asbestos may be indistinguishable by PLM from some similar, non-regulated amphiboles (e.g. the "Libby Amphiboles" richterite and winchite), and should be confirmed by TEM. The lower quantitation limit (reporting limit) of PLM estimation is 1%. The Cal-OSHA definition of asbestos-containing construction material is 0.1% asbestos; however, reliable determination of asbestos percent at this level cannot be done by PLM estimation; PLM Point Counting or TEM weight percent analysis are recommended. Only dominant non-asbestos materials (fibrous and non-fibrous) are listed. This analysis shall not be construed as conclusive for the presence of any reported materials other than asbestos, or for the absence of any non-asbestos material. Common interferences include, but are not limited to: cellulose, fibrous glass, other man-made vitreous fibers, synthetic fibers, elongate fragments of calcium sulfate, talc, wollastonite, animal hair, and other miscellaneous elongate particles. Sample heterogeneity is indicated by listing more than one distinct layer or material on the report. If more than one distinct sample is received in the same container, samples shall be marked with letters and analyzed separately. Layers within a sample are analyzed separately when feasible; if asbestos is detected, percentages are reported for individual layers. Interlayer contamination is possible among any layers in a sample. The notation ND (or "NONE DETECTED") indicates a result of "NO ASBESTOS DETECTED" in a homogeneous sample, or in a layer of a heterogeneous sample. Composite asbestos percentages from multiple layers are applicable only to wallboard / joint compound systems; compositing is based on customers' descriptions of material as "joint compound". Customers are solely responsible for identification and description of bulk materials listed on field forms. Laboratory descriptions may differ from those given by customers. Quality Control (QC): all results have been determined to be within acceptance limits prior to reporting. Reanalyzed samples are denoted by two sets of analyst initials. Unless otherwise stated herein, all samples were received in acceptable condition for analysis. This report must not be used to claim product endorsement by NIST or any U.S. Government agency. This report shall not be reproduced except in full, without the approval of Micro Analytical Laboratories, Inc., and pertains only to the samples analyzed as received. NFM = Non-fibrous materials.

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PROJECT:
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2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In	**286879**
Total Samples	11
Date Sampled	11/12/2021
Date Received	11/12/2021
Date Analyzed	11/12/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: **111221-CHA-A06** Micro #: 286879-06 Analyst: GDS **BLACK PIPE INSULATION WRAP** **CHILLER AREA / CHILLER 9** **PIPE UNDER UNIT**	**INSULATION: ND** **WRAP W/ MASTIC (BLACK) : ND**	12 % CELLULOSE 5 % MISC. FIBERS NFM: TAR/ASPHALT, BINDER
Client #: **111221-CHA-A07** Micro #: 286879-07 Analyst: GDS GR **BLACK PIPE INSULATION WRAP** **CHILLER AREA / CHILLER 10** **PIPE UNDER UNIT**	**INSULATION: ND** **WRAP W/ MASTIC (BLACK) : < 1% CHRYSOTILE ASBESTOS**	12 % CELLULOSE 5 % MISC. FIBERS NFM: TAR/ASPHALT, BINDER
Client #: **111221-CHA-A08** Micro #: 286879-08 Analyst: GDS **GRAY INSULATION WRAP (FIBROUS)** **CHILLER AREA / CHILLER 9 / ON PIPE**	**TSI: ND** **MESH: ND** **MASTIC (BROWN): 8% CHRYSOTILE ASBESTOS**	10 % CELLULOSE 20 % FIBROUS GLASS NFM: TAR/ASPHALT, BINDER
Client #: **111221-CHA-A09** Micro #: 286879-09 Analyst: GDS **WHITE / YELLOW FIBROUS PIPE INSULATION** **CHILLER AREA / PIPES CONNECTED TO** **CHEM STORAGE, NORTH AREA OF PIPE**	**INSULATION: ND**	1 % CELLULOSE 90 % FIBROUS GLASS NFM: SYNTHETIC MATERIAL GLASS FRAGMENTS
Client #: **111221-CHA-A10** Micro #: 286879-10 Analyst: GDS **WHITE / YELLOW FIBROUS PIPE INSULATION** **CHILLER AREA / PIPES CONNECTED TO** **CHEM STORAGE, NORTH AREA OF PIPE**	**INSULATION: ND**	1 % CELLULOSE 90 % FIBROUS GLASS NFM: SYNTHETIC MATERIAL GLASS FRAGMENTS

Technical Supervisor: Baojia Ke, Ph.D. 11/12/2021
Date Reported

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PROJECT:
PROJECT NO. PJ63338
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA

Micro Log In	**286879**
Total Samples	11
Date Sampled	11/12/2021
Date Received	11/12/2021
Date Analyzed	11/12/2021

SAMPLE IDENTIFICATION	ASBESTOS QUANTITY (AREA %) / TYPES / LAYERS If absent, ND Is Reported (No Asbestos Detected)	DOMINANT OTHER MATERIALS
Client #: 111221-CHA-A11 Micro #: 286879-11 Analyst: GDS **WHITE / YELLOW FIBROUS PIPE INSULATION CHILLER AREA / PIPES CONNECTED TO CHEM STORAGE, SOUTH AREA OF PIPE**	**INSULATION: ND**	1 % CELLULOSE 90 % FIBROUS GLASS NFM: SYNTHETIC MATERIAL GLASS FRAGMENTS

Technical Supervisor: Baojia Ke, Ph.D. 11/12/2021
Date Reported

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Sampling Data Form / Chain of custody #PO4158

Page 1 of 2

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA

Sample Date: 11/12/21

Proj #: PJ63338

280879

Turnaround Time: RUSH 24hr 48hr [✓ Extended (5 days)]

Analysis: X **PLM Standard:** ______ **PLM w/ Point Count:** (______ **400pt.** ______ **1,000 pt.**):

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com and wwong@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
01	Gray insulation wrap (fibrous)		NF	P	111221-CHA-A01	Chiller area / Chiller 10 / On pipe	1
01	↓ ↓ ↓		↓	↓	111221-CHA-A02	↓ / On pipe between Chiller 9 and chiller 10	2
02	Concrete Slab		NF	G	111221-CHA-A03	↓ / Chiller 9 / Footing	3
02	↓ ↓ ↓		↓	↓	111221-CHA-A04	↓ / Chiller 10 / Footing	4
03	Black pipe insulation wrap		NF	~~G~~ P	111221 CHA-A05	↓ / Chiller 9 / Pipe under unit	5
03	↓ ↓ ↓		↓	↓	111221 CHA-A06	↓ / Chiller 9 / ↓ ↓	4
03	~~Gray insu~~ AA ↓ ↓ ↓		↓	↓	111221 CHA-A07	↓ / Chiller 10 / ↓ ↓	7
01	Gray insulation wrap (fibrous)		NF	P	111221 CHA-A08	↓ / Chiller 9 / On pipe	8

DW = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooring, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Ceiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by: **Date and Time:** 11/12/21	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:** 11/12/21 @ 09:56 am	**Received by:** **Date and Time:**	**Received by:** **Date and Time:**

Sampling Data Form / Chain of custody

#PO4158

Page 2 of 2

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: AA

Sample Date: 11/12/21

Proj #: PJ63338

286879

Turnaround Time: RUSH 24hr 48hr [✓ Extended (5 days)]

Analysis: X **PLM Standard:** ______ **PLM w/ Point Count:** (______ **400pt.** ______ **1,000 pt.):**

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com and wwong@forensicanalytical.com

HA#	Homogeneous Material Description	Quant. in SF	Friable/Cat I./Cat II.	Condition	Sample #	Sample Location	Lab result
04	white/yellow fibrous pipe insulation		F	G	111221-CHA-A09	Chiller area / pipes connected to chem Storage, North area of pipe	9
04	↓ ↓		↓	↓	111221-CHA-A10	↓ / ↓ ↓	10
04	↓ ↓		↓	↓	111221-CHA-A11	↓ / pipes connected to chem Storage, South area of pipe	11

DW = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooriing, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Ceiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by:
Date and Time: 11/12/21

Received by:
Date and Time: 11/12/21 @ 9:30am

Relinquished by:
Date and Time:

Received by:
Date and Time:

Relinquished by:
Date and Time:

Received by:
Date and Time:

MICRO ANALYTICAL LABORATORIES, INC.

LEAD IN PAINT - FLAME AAS (SW846)

1212
Gary Lowe
Forensic Analytical Consulting
21228 Cabot Boulevard
Hayward, CA 94545

PROJECT:
PROJECT NO. PJ63338
CLIENT'S NO. C26770
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA
BIOLOGICAL SCIENCE BUILDING

Micro Log In	281875
Total Samples	24
Date Sampled	05/24/2021
Date Received	06/02/2021
Date Analyzed	06/03/2021

	Lead Concentration		
Sample ID	Weight Percent	mg/kg (ppm)	RDL
Client: BIO-PB001 Lab: 281875-01 ROOM 18 SOUTHEAST CORNER WALL - WALL ORANGE DRYWALL	0.33 %	3300	0.0370 % 370 mg/kg
Client: BIO-PB003 Lab: 281875-02 ROOM 26 SOUTHEAST COUNTER WALL BEIGE DRYWALL	0.14 %	1400	0.0079 % 79 mg/kg
Client: BIO-PB005 Lab: 281875-03 ROOM 12 SOUTHEAST WALL WALL - OFF-WHITE DRYWALL	< 0.0078 %	< 78	0.0078 % 78 mg/kg
Client: BIO-PB006 Lab: 281875-04 ROOM 43 NORTHEAST CORNER WALL OFF-WHITE PLASTER	0.38 %	3800	0.0370 % 370 mg/kg
Client: BIO-PB007 Lab: 281875-05 ROOM 33 CENTER I BEAM I-BEAM BLACK METAL	0.75 %	7500	0.0790 % 790 mg/kg

Technical Supervisor: 6/3/2021
Long T: Nguyen, Chemistry Supervisor — Date Reported

Analyst: KG

AIHA-LAP, LLC Accredited Laboratory, ID #101768. Samples are analyzed by Flame Atomic Absorption Spectrometry (AAS) using SOP 23-Paint. This SOP is based on U.S. EPA SW-846 Method 7420 for instrumental analysis, and on ASTM E-1645-16 for nitric acid and hydrogen peroxide digestion Unless otherwise indicated on this report, all required Quality Control samples have been determined to be in control prior to releasing these analytical results. Unless otherwise stated in this report, all samples were received in acceptable condition for analysis. Note: due to software limitations, the number of reported significant figures does not necessarily reflect the uncertainty of the analysis. If the amount of sample available for analysis is lower than advisable for this method, detection limits and uncertainty will be higher. This report must not be reproduced except in full, without the approval of Micro Analytical Laboratories, Inc., and pertains only to the samples analyzed as received. Unit explanations: mg = milligrams; kg = kilograms; ppm = parts per million. N/A = Not Applicable. RDL = Report Detection Limit.

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SAN PABLO, CA
BIOLOGICAL SCIENCE BUILDING

Micro Log In 281875
Total Samples 24
Date Sampled 05/24/2021
Date Received 06/02/2021
Date Analyzed 06/03/2021

	Lead Concentration		
Sample ID	Weight Percent	mg/kg (ppm)	RDL
Client: BIO-PB008 Lab: 281875-06 CORRIDOR ROOM 37 DOOR TRIM WALL TRIM WHITE WOOD	0.035 %	350	0.0075 % 75 mg/kg
Client: BIO-PB009 Lab: 281875-07 CORRIDOR SOUTH END WEST WALL WALL LIGHT BLUE DRYWALL	< 0.0081 %	< 81	0.0081 % 81 mg/kg
Client: BIO-PB010 Lab: 281875-08 CORRIDOR SOUTH END DOOR 7 DOOR BLUE WOOD	0.037 %	370	0.0077 % 77 mg/kg
Client: BIO-PB011 Lab: 281875-09 ROOM 1 SOUTHWEST ADJACENT ROOM TO ELECTRICAL BEAM OFF-WHITE WOOD	0.21 %	2100	0.0320 % 320 mg/kg
Client: BIO-PB012 Lab: 281875-10 ROOM 1 SOUTHEAST WALL WALL BEIGE METAL	0.016 %	160	0.0075 % 75 mg/kg

Technical Supervisor: 6/3/2021
Long T. Nguyen, Chemistry Supervisor Date Reported

Analyst: KG

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Micro Log In 281875
Total Samples 24
Date Sampled 05/24/2021
Date Received 06/02/2021
Date Analyzed 06/03/2021

	Lead Concentration		
Sample ID	Weight Percent	mg/kg (ppm)	RDL
Client: BIO-PB013 Lab: 281875-11 ROOM 3 BOILER ROOM NORTH SIDE GENERATOR BLUE METAL	< 0.0081 %	< 81	0.0081 % 81 mg/kg
Client: BIO-PB014 Lab: 281875-12 ROOM 3 BOILER ROOM SUPPORT POST PIPE YELLOW METAL	0.037 %	370	0.0079 % 79 mg/kg
Client: BIO-PB015 Lab: 281875-13 ROOM 3 BOILER ROOM SOUTH SIDE PIPE VALVE RED METAL	0.022 %	220	0.0076 % 76 mg/kg
Client: BIO-PB016 Lab: 281875-14 ROOM 3 BOILER ROOM FLOOR FLOOR GRAY CONCRETE	< 0.0081 %	< 81	0.0081 % 81 mg/kg
Client: BIO-PB017 Lab: 281875-15 ROOM 3 BOILER ROOM PANEL SOUTH WALL PANEL BLUE WOOD	< 0.0081 %	< 81	0.0081 % 81 mg/kg

Technical Supervisor: 6/3/2021
Long T. Nguyen, Chemistry Supervisor Date Reported

Analyst: KG

AIHA-LAP, LLC Accredited Laboratory ID #101768. Samples are analyzed by Flame Atomic Absorption Spectrometry (AAS) using SOP 23-Paint. This SOP is based on U.S. EPA SW-846 Method 7420 for instrumental analysis, and on ASTM E-1645-16 for nitric acid and hydrogen peroxide digestion Unless otherwise indicated on this report, all required Quality Control samples have been determined to be in control prior to releasing these analytical results. Unless otherwise stated in this report, all samples were received in acceptable condition for analysis. Note: due to software limitations, the number of reported significant figures does not necessarily reflect the uncertainty of the analysis. If the amount of sample available for analysis is lower than advisable for this method, detection limits and uncertainty will be higher. This report must not be reproduced except in full, without the approval of Micro Analytical Laboratories, Inc., and pertains only to the samples analyzed as received. Unit explanations: mg = milligrams; kg = kilograms; ppm = parts per million. N/A = Not Applicable. RDL = Report Detection Limit.

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Total Samples 24
Date Sampled 05/24/2021
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Date Analyzed 06/03/2021

	Lead Concentration		
Sample ID	Weight Percent	mg/kg (ppm)	RDL
Client: BIO-PB020 Lab: 281875-16 EXT SOUTH SIDE SOFFIT WHITE STUCCO	0.0073 %	73	0.0073 % 73 mg/kg
Client: BIO-PB021 Lab: 281875-17 EXT SOUTHWEST CORNER DUCT CHASE RED METAL	< 0.0079 %	< 79	0.0079 % 79 mg/kg
Client: BIO-PB022 Lab: 281875-18 EXT. WEST SIDE SHADE LOWER WHITE METAL	0.023 %	230	0.0080 % 80 mg/kg
Client: BIO-PB023 Lab: 281875-19 EXT. WEST SIDE WALL LOWER HEADER TRIM BEIGE METAL	2.9 %	29000	0.1900 % 1,900 mg/kg
Client: BIO-PB024 Lab: 281875-20 ROOF SOUTH WEST CORNER PARAPET CAP BROWN METAL	0.063 %	630	0.0076 % 76 mg/kg

Technical Supervisor: 6/3/2021
Long T. Nguyen, Chemistry Supervisor — Date Reported

Analyst: KG

AIHA-LAP, LLC Accredited Laboratory, ID #101768. Samples are analyzed by Flame Atomic Absorption Spectrometry (AAS) using SOP 23-Paint. This SOP is based on U.S. EPA SW-846 Method 7420 for instrumental analysis, and on ASTM E-1645-16 for nitric acid and hydrogen peroxide digestion Unless otherwise indicated on this report, all required Quality Control samples have been determined to be in control prior to releasing these analytical results. Unless otherwise stated in this report, all samples were received in acceptable condition for analysis. Note: due to software limitations, the number of reported significant figures does not necessarily reflect the uncertainty of the analysis. If the amount of sample available for analysis is lower than advisable for this method, detection limits and uncertainty will be higher. This report must not be reproduced except in full, without the approval of Micro Analytical Laboratories, Inc., and pertains only to the samples analyzed as received. Unit explanations: mg = milligrams; kg = kilograms; ppm = parts per million. N/A = Not Applicable. RDL = Report Detection Limit.

MICRO ANALYTICAL LABORATORIES, INC.

LEAD IN PAINT - FLAME AAS (SW846)

1212
Gary Lowe
Forensic Analytical Consulting
21228 Cabot Boulevard
Hayward, CA 94545

PROJECT:
PROJECT NO. PJ63338
CLIENT'S NO. C26770
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA
BIOLOGICAL SCIENCE BUILDING

Micro Log In	281875
Total Samples	24
Date Sampled	05/24/2021
Date Received	06/02/2021
Date Analyzed	06/03/2021

	Lead Concentration		
Sample ID	**Weight Percent**	**mg/kg (ppm)**	RDL
Client: BIO-PB25 Lab: 281875-21 **EXT. WEST SIDE I-BEAM COLUMN BLACK METAL**	0.28 %	2800	0.0370 % 370 mg/kg
Client: BIO-PB026 Lab: 281875-22 **EXT. WEST SIDE EAVE JOIST WHITE WOOD**	0.082 %	820	0.0081 % 81 mg/kg
Client: BIO-PB026 Lab: 281875-23 **EXT. SOUTH BOX RED WOOD**	< 0.0081 %	< 81	0.0081 % 81 mg/kg
Client: BIO-PB29 Lab: 281875-24 **ROOM 29 EXHAUST HOOD WHITE METAL**	< 0.0081 %	< 81	0.0081 % 81 mg/kg

Technical Supervisor: 6/3/2021
Long T. Nguyen, Chemistry Supervisor   Date Reported

Analyst: KG

AIHA-LAP, LLC Accredited Laboratory, ID #101768. Samples are analyzed by Flame Atomic Absorption Spectrometry (AAS) using SOP 23-Paint. This SOP is based on U.S. EPA SW-846 Method 7420 for instrumental analysis, and on ASTM E-1645-16 for nitric acid and hydrogen peroxide digestion. Unless otherwise indicated on this report, all required Quality Control samples have been determined to be in control prior to releasing these analytical results. Unless otherwise stated in this report, all samples were received in acceptable condition for analysis. Note: due to software limitations, the number of reported significant figures does not necessarily reflect the uncertainty of the analysis. If the amount of sample available for analysis is lower than advisable for this method, detection limits and uncertainty will be higher. This report must not be reproduced except in full, without the approval of Micro Analytical Laboratories, Inc., and pertains only to the samples analyzed as received. Unit explanations: mg = milligrams; kg = kilograms; ppm = parts per million. N/A = Not Applicable. RDL = Report Detection Limit.

Paint Chip Sample Request Form

PO02886

Page 1 5

281875
PAINT

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Contact: Gary Bruce Lowe

(Biological Science Bldg)

Site: Contra Costa College 2600 Mission Bell Drive
San Pablo, CA USA

Client #: C26770

Phone: 510-266-4600

Sampled By: M.A., JA

Date: 05/24/21 - 05/28/21

PM: Gary Bruce Lowe

Proj #: PJ63338

Turnaround Time: <12hr Same-D 1-Day 2-Day 3-Day [✓ 5-Day] **Other Due Date & Time:**

Analysis: [✓ Flame AA (Pb)] Other

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com & malvarez@forensicanalytical.com

Sample #	Sample Location	Component	Color	Substrate	Condition	
Bio-Pb001	RM 18, South East corner wall	Wall	Orange	Drywall	G	1
Bio-Pb002	RM 24, South west corner, From 1"x1" Ceramic tile counter	Counter top	Gray w/ Black specks	Ceramic tile	G	*
Bio-Pb003	RM 26, south east corner	wall	Beige	Drywall	G	2
-Pb004	RM 43, 4"x4" wall tile	wall	Off-white	Ceramic	G	*
-Pb005	RM 12, South east wall	wall	Off-white	Drywall	G	3
-Pb006	~~Men~~ RM 43 RM 43 / North East corner	wall	Off-white	plaster	G	4
-Pb007	RM 33 Center I Beam	I-Beam	Black	Metal		5

Substrate: wood, metal, concrete, plaster, drywall, brick

Shipped via: FedEx Airborne UPS US Mail Courier Drop Off Other

Relinquished by: **Date and Time:** ~~05/31/21~~ 06/02/21	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: Ken **Date and Time:** 6/2/2021 750Am	**Received by:** **Date and Time:**	**Received by:** **Date and Time:**

Paint Chip Sample Request Form

P002886

Page 2 5

281875
PAINT

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Contact: Gary Bruce Lowe

Site: Contra Costa College 2600 Mission Bell Drive
San Pablo, CA USA

Client #: C26770

Phone: 510-266-4600

Sampled By: M.A., JA

Date: 05/24/21 - 05/28/21

PM: Gary Bruce Lowe

Proj #: PJ63338

Turnaround Time: <12hr Same-D 1-Day 2-Day 3-Day [✓ 5-Day] **Other Due Date & Time:**

Analysis: [✓ Flame AA (Pb)] Other

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

Sample #	Sample Location	Component	Color	Substrate	Condition	
Bio-Pb008	Corridor, RM 37 Door Trim	~~Door Frame~~ Wall Trim	White	Wood	G	6
Bio-Pb009	Corridor, South end / West wall	Wall	Light blue	drywall	G	7
Bio-Pb010	Corridor / South end / Door 7	Door	blue	wood	G	8
Bio-Pb011	RM 1 / South West / Adjectnt ROOM to Electrical	Beam	OFF-white	↓	G	9
Bio-Pb012	RM 1 / South East wall	Wall	Beige	drywall	G	10
Bio-Pb013	RM 3 (Boiler RM) / North Side	Generator	Blue	Metal	G	11
Bio-Pb014	RM 3 (Boiler RM) / Support Post	Pipe	Yellow	Metal	G	12

Substrate: wood, metal, concrete, plaster, drywall, brick

Shipped via: FedEx Airborne UPS US Mail Courier Drop Off Other

Relinquished by:
Date and Time: ~~5/31/~~21, 06/02/21

Received by: Kao Sc
Date and Time: 6/2/2021 750A

Relinquished by:
Date and Time:

Received by:
Date and Time:

Relinquished by:
Date and Time:

Received by:
Date and Time:

Pair_Chip Sample Request Form

P002886

Page 3 5

28/875
PAINT

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Contact: Gary Bruce Lowe

Site: Contra Costa College 2600 Mission Bell Drive
San Pablo, CA USA

Client #: C26770

Phone: 510-266-4600

Sampled By: M.A., JA

Date: 05/24/21 - 05/28/21

PM: Gary Bruce Lowe

Proj #: PJ63338

Turnaround Time: <12hr Same-D 1-Day 2-Day 3-Day [✓ 5-Day] **Other Due Date & Time:**

Analysis: Flame AA (Pb) Other

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

Sample #	Sample Location	Component	Color	Substrate	Condition	
Bio-Pb015	RM 3 (Boiler RM) / South Side	Pipe valve	Red	Metal	G	13
-Pb016	RM 3 (Boiler RM), Floor	Floor	Gray	Concrete	P	14
-Pb017	RM 3 (Boiler RM) Panel, South	wall panel	blue	wood	G	15
-Pb018	Men's RR , 1"x1" tile	Floor	Gray	Ceramic	G	x
-Pb019	Roof	Exhaust Flue	Gray	metal	G	x
-Pb020	Ext. South Side	Soffit	White	Stucco	P	16
-Pb021	Ext. S.W. Corner	DUCT CHASE	RED	Metal		17

Substrate: wood, metal, concrete, plaster, drywall, brick

Shipped via: FedEx Airborne UPS US Mail Courier Drop Off Other

Relinquished by:
Date and Time: ~~5/31/21~~ 06/02/21

Received by: Kao Saelee
Date and Time: 6/2/2021 750A

Relinquished by:
Date and Time:

Received by:
Date and Time:

Relinquished by:
Date and Time:

Received by:
Date and Time:

Paint Chip Sample Request Form

P002886

Page 4 5

28/875
PAINT

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Contact: Gary Bruce Lowe

Site: Contra Costa College 2600 Mission Bell Drive
San Pablo, CA USA

Client #: C26770

Phone: 510-266-4600

Sampled By: M.A., JA

Date: 05/24/21 - 05/28/21

PM: Gary Bruce Lowe

Proj #: PJ63338

Turnaround Time: <12hr Same-D 1-Day 2-Day 3-Day [✓ 5-Day] **Other Due Date & Time:**

Analysis: [✓ Flame AA (Pb)] Other

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

Sample #	Sample Location	Component	Color	Substrate	Condition	
Bio-Pb022	Ext. West side	~~Wall~~ Louver Shade	White	Metal		18
-Pb023	Ext. West Side	Wall Louver Header Trim	Beige	Metal	P	19
-Pb024	Roof South west corner	Parapet Cap	Brown	↓		20
-Pb025	Ext. / west side	I-BEAM (Column)	Black	↓		21
-Pb026	Ext. / west side	Eave joist	White	wood		22
-Pb027	Ext. South	Box	RED	↓		23
~~Pb028~~	~~Int.~~ void	~~Window sill~~	~~Brown~~	↓ JLA		X

Substrate: wood, metal, concrete, plaster, drywall, brick

Shipped via: FedEx Airborne UPS US Mail Courier Drop Off Other

Relinquished by:
Date and Time: ~~5/31/21~~ 06/02/21

Received by: Leo Sudel
Date and Time: 6/2/2021 7:00

Relinquished by:
Date and Time:

Received by:
Date and Time:

Relinquished by:
Date and Time:

Received by:
Date and Time:

Paint Chip Sample Request Form

P002886

Page 5 5

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Contact: Gary Bruce Lowe

Site: Contra Costa College 2600 Mission Bell Drive
San Pablo, CA USA

Client #: C26770

Phone: 510-266-4600

Sampled By: M.A & JA

281875
PAINT

Date: 05-24-21 → 05/28/21

PM: Gary Bruce Lowe

Proj #: PJ63338

Turnaround Time: <12hr Same-D 1-Day 2-Day 3-Day [✓ 5-Day] **Other Due Date & Time:**

Analysis: [✓ Flame AA (Pb)] Other

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

Sample #	Sample Location	Component	Color	Substrate	Condition
BIO-Pb029	RM 29	Exhaust Hood	White	Metal	G

24

Substrate: wood, metal, concrete, plaster, drywall, brick

Shipped via: FedEx Airborne UPS US Mail Courier Drop Off Other

Relinquished by:
Date and Time: ~~5/24/21~~ 06/02/21

Received by:
Date and Time: 6/2/2021 750am

Relinquished by:
Date and Time:

Received by:
Date and Time:

Relinquished by:
Date and Time:

Received by:
Date and Time:

MICRO ANALYTICAL LABORATORIES, INC.

EPA SW-846 LEAD-TTLC

1212
Gary Lowe
Forensic Analytical Consulting
21228 Cabot Boulevard
Hayward, CA 94545

PROJECT:

PROJECT NO. PJ63338
CLIENT'S NO. C26770
CONTRA COSTA COLLEGE
2600 MISSION BELL DRIVE
SAN PABLO, CA
BIOLOGICAL SCIENCE BUILDING

Micro Log In	281876
Total Samples	4
Date Sampled	05/24/2021
Date Received	06/02/2021
Date Analyzed	06/02/2021

Sample ID	Lead Concentration, ppm	RDL, ppm	Comments
Client **BIO-PB002** Micro 281876-01 **ROOM 24 SOUTH WEST CORNER 1" X 1" CERAMIC TILE FROM COUNTER COUNTER TOP GRAY WITH BLACK SPECKS CERAMIC TILE**	< 7.7	7.7	
Client **BIO-PB004** Micro 281876-02 **ROOM 43 4" X 4" WHITE TILE WALL OFF-WHITE CERAMIC**	210	39	
Client **BIO-PB18** Micro 281876-03 **MEN'S RESTROOM 1" X 1" TILE FLOOR GRAY CERAMIC**	< 8.9	8.9	
Client **BIO-PB19** Micro 281876-04 **ROOF EXHAUST FLUE GRAY METAL**	180000	18000	

Technical Supervisor: ______________________ 6/2/2021
Long T. Nguyen, Chemistry Supervisor Date Reported

Analyst: CZ

AIHA-LAP LLC ELLAP Accredited Laboratory, ID #101768. Samples are analyzed by Flame Atomic Absorption Spectrometry (FLAA) using SOP 23-Soil (in accordance with EPA Methods 3050B for Acid Digestion (SW 846, 3rd edition, 2007) and 7420 for Analysis (SW-846, 3rd edition, 2007)). NOTE: Water samples are analyzed by FLAA in accordance with Method 3111B (Standard Methods for the Examination of Water and Wastewater, 18th edition). Unless otherwise indicated on this report, all required Quality Control samples have been determined to be in control prior to releasing these analytical results. Unless otherwise stated in this report, all samples were received in acceptable condition for analysis. Note: due to software limitations, the number of reported significant figures does not necessarily reflect the uncertainty of the analysis. This report must not be reproduced except in full without the approval of Micro Analytical Laboratories, Inc., and pertains only to the samples analyzed as received. Unit explanations: mg = milligrams; kg = kilograms; ppm = parts per million. TTLC = TOTAL THRESHOLD LIMIT CONCENTRATION. L = liters. RDL = Report Detection Limit. Note: mg / Kg is the same as ppm for solids, and mg/L is the same as ppm for water.

Paint Chip Sample Request Form

P0D2886

Page 1 5

281876
TTLC

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

(Biological Science Bldg)

ontact: Gary Bruce Lowe

Site: Contra Costa College 2600 Mission Bell Drive
San Pablo, CA USA

Client #: C26770

Phone: 510-266-4600

Sampled By: M.A., JA

Date: 05/24/21 - 05/28/21

PM: Gary Bruce Lowe

Proj #: PJ63338

Turnaround Time: <12hr Same-D 1-Day 2-Day 3-Day [✓ 5-Day] **Other Due Date & Time:**

Analysis: [✓ Flame AA (Pb)] Other

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com & malvarez@forensicanalytical.com

Sample #	Sample Location	Component	Color	Substrate	Condition
Bio-Pb001	RM 18, South East corner wall	Wall	Orange	Drywall	G
Bio-Pb002	RM 24, South west corner, From 1"x1" Ceramic tile counter	Counter top	Gray w/ Black specks	Ceramic tile	G ①
Bio-Pb003	RM 26, south East corner	wall	Beige	Drywall	G
-Pb004	RM 43, 4"x4" Wall tile	wall	Off white	Ceramic	G ②
-Pb005	RM 12, South East wall	Wall	Off-white	Drywall	G
-Pb006	~~Metal~~ RM 43 RM 43 / North East corner	Wall	Off-white	plaster	G
-Pb007	RM 33 Center I Beam	I-Beam	Black	Metal	

ıbstrate: wood, metal, concrete, plaster, drywall, brick

Shipped via: FedEx Airborne UPS US Mail Courier Drop Off Other

elinquished by:
ate and Time: ~~05/31/21~~ ② 06/02/21

eceived by: Ken
ate and Time: 6/2/2021 7:50Am

Relinquished by:
Date and Time:

Received by:
Date and Time:

Relinquished by:
Date and Time:

Received by:
Date and Time:

Paint Chip Sample Request Form

P002886

Page 3 5

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

ontact: Gary Bruce Lowe

Site: Contra Costa College 2600 Mission Bell Drive
San Pablo, CA USA

Client #: C26770

Phone: 510-266-4600

Sampled By: M.A., JA

Date: 05/24/21 - 05/28/21

281876
TTLC

PM: Gary Bruce Lowe

Proj #: PJ63338

Turnaround Time: <12hr Same-D 1-Day 2-Day 3-Day [✓ 5-Day] **Other Due Date & Time:**

Analysis: Flame AA (Pb) Other

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

Sample #	Sample Location	Component	Color	Substrate	Condition	
Bio-Pb015	RM 3 (Boiler RM) / South Side	Pipe valve	Red	Metal	G	
-Pb016	RM 3 (Boiler RM), Floor	Floor	Gray	Concrete	P	
-Pb017	RM 3 (Boiler RM) Panel, South	wall panel	blue	wood	G	
-Pb018	Men's RR , 1"X1" tile	Floor	Gray	Ceramic	G	3
-Pb019	Roof	Exhaust Flue	Gray	Metal	G	4
-Pb020	Ext. South Side	Soffit	White	Stucco	P	
-Pb021	Ext. S.W. Corner	DUCT CHASE	RED	Metal		

bstrate: wood, metal, concrete, plaster, drywall, brick

Shipped via: FedEx Airborne UPS US Mail Courier Drop Off Other

elinquished by:
ate and Time: ~~5/31/21~~ 06/02/21

eceived by: Kao Saeel
ate and Time: 6/2/2021 750A

Relinquished by:
Date and Time:

Received by:
Date and Time:

Relinquished by:
Date and Time:

Received by:
Date and Time:

SGS FORENSIC LABORATORIES

Final Report

Metals Analysis of Paints

(AIHA-LAP, LLC Accreditation, Lab ID #101762)

Forensic Analytical Consulting Svcs
Gary Lowe
21228 Cabot Blvd.

Hayward, CA 94545

Client ID: HAY01
Report Number: M234202
Date Received: 05/28/21
Date Analyzed: 06/07/21
Date Printed: 06/07/21
First Reported: 06/07/21

Job ID / Site: PJ63338; Critical Solutions, Inc.
Date(s) Collected: 05/28/21

SGSFL Job ID: HAY01
Total Samples Submitted: 2
Total Samples Analyzed: 2

Sample Number	Lab Number	Analyte	Result	Result Units	Reporting Limit*	Method Reference
CSB-PB-101	30889311	Pb	< 0.007	wt%	0.007	EPA 3050B/7000B
CSB-PB-102	30889312	Pb	< 0.007	wt%	0.007	EPA 3050B/7000B

* The Reporting Limit represents the lowest amount of analyte that the laboratory can confidently detect in the sample, and is not a regulatory level. The Units for the Reporting Limit are the same as the Units for the Final Results.

Kevin Poon

Kevin Poon, Laboratory Analyst, Hayward Laboratory

Note* Sampling data used in this report was provided by the client as noted on the associated chain of custody form.

Paint Chip Sample Request Form

Page

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Contact: Gary Bruce Lowe

Site: Contra Costa College 2600 Mission Bell Drive
San Pablo, CA USA

Client #: C26770

Phone: 510-266-4600

Sampled By: Radzinski

Date: 28 May 2021

PM: Gary Bruce Lowe

Proj #: PJ63338

Turnaround Time:	<12hr	Same-D	1-Day	2-Day	3-Day	[✓ 5-Day]	Other Due Date & Time:

Analysis: Flame AA (Pb) ✓ Other

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

Sample #	Sample Location	Component	Color	Substrate	Condition
CSB-Pb-101	ante-chamber, Flammables door	door	grey	metal	G
CSB-Pb-102	ante-chamber, wall between Hazardous and Flammable storage doors	wall	beige	wallboard	G

Substrate: wood, metal, concrete, plaster, drywall, brick

Shipped via: FedEx Airborne UPS US Mail Courier Drop Off Other

Relinquished by: Radzinski **Date and Time:** 28 May 2021 / 1522	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:**	**Received by:** **Date and Time:**	**Received by:** **Date and Time:**

RECEIVED
MAY 28 2021
By 1530

Metals Analysis of Paints

(AIHA-LAP, LLC Accreditation, Lab ID #101762)

Forensic Analytical Consulting Svcs
Gary Lowe
21228 Cabot Blvd.

Hayward, CA 94545

Client ID: HAY01
Report Number: M234203
Date Received: 05/28/21
Date Analyzed: 06/07/21
Date Printed: 06/07/21
First Reported: 06/07/21

Job ID / Site: PJ63338; Critical Solutions, Inc.
Date(s) Collected: 05/28/21

SGSFL Job ID: HAY01
Total Samples Submitted: 1
Total Samples Analyzed: 1

Sample Number	Lab Number	Analyte	Result	Result Units	Reporting Limit*	Method Reference
CE-PB-101	30889313	Pb	0.88	wt%	0.07	EPA 3050B/7000B

* The Reporting Limit represents the lowest amount of analyte that the laboratory can confidently detect in the sample, and is not a regulatory level. The Units for the Reporting Limit are the same as the Units for the Final Results.

Kevin Poon

Kevin Poon, Laboratory Analyst, Hayward Laboratory

Note* Sampling data used in this report was provided by the client as noted on the associated chain of custody form.

Paint Chip Sample Request Form

Page 1 of 1

Client: HAY01
FACS: San Francisco, CA Office
Critical Solutions, Inc.
Contact: Gary Bruce Lowe

Site: Contra Costa College 2600 Mission Bell Drive
San Pablo, CA USA
Client #: C26770
Phone: 510-266-4600

Sampled By: Redzinski
Date: 28 May 2021
PM: Gary Bruce Lowe
Proj #: PJ63338

Turnaround Time: <12hr Same-D 1-Day 2-Day 3-Day [✓ 5-Day] **Other Due Date & Time:**

Analysis: [✓ Flame AA (Pb)] Other

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

Sample #	Sample Location	Component	Color	Substrate	Condition
CE-Pb-101	Chiller component near entry	chiller component, near entry	grey	metal	good

ubstrate: wood, metal, concrete, plaster, drywall, brick

Shipped via: FedEx Airborne UPS US Mail Courier Drop Off Other

elinquished by: Redzinski
ate and Time: 28 May 2021 / 1515
eceived by:
ate and Time:

Relinquished by:
Date and Time:
Received by:
Date and Time:

RECEIVED
MAY 28 2021
By 1530

Relinquished by:
Date and Time:
Received by:
Date and Time:

SGS FORENSIC LABORATORIES

Metals Analysis of Paints

(AIHA-LAP, LLC Accreditation, Lab ID #101762)

Forensic Analytical Consulting Svcs
Gary Lowe
21228 Cabot Blvd.

Hayward, CA 94545

Client ID: HAY01
Report Number: M234278
Date Received: 06/03/21
Date Analyzed: 06/10/21
Date Printed: 06/10/21
First Reported: 06/10/21

Job ID / Site: PJ63338; Critical Solutions, Inc.
Date(s) Collected: 5/25/21

SGSFL Job ID: HAY01
Total Samples Submitted: 27
Total Samples Analyzed: 27

Sample Number	Lab Number	Analyte	Result	Result Units	Reporting Limit*	Method Reference
PSBS-PB01	30889501	Pb	< 0.006	wt%	0.006	EPA 3050B/7000B
PSBS-PB02	30889502	Pb	0.96	wt%	0.06	EPA 3050B/7000B
PSBS-PB03	30889503	Pb	0.10	wt%	0.007	EPA 3050B/7000B
PSBS-PB04	30889504	Pb	1.9	wt%	0.2	EPA 3050B/7000B
PSBS-PB05	30889505	Pb	0.11	wt%	0.006	EPA 3050B/7000B
PSBS-PB06	30889506	Pb	0.38	wt%	0.04	EPA 3050B/7000B
PSBS-PB07	30889507	Pb	0.32	wt%	0.02	EPA 3050B/7000B
PSBS-PB08	30889508	Pb	0.26	wt%	0.02	EPA 3050B/7000B
PSBS-PB09	30889509	Pb	0.012	wt%	0.007	EPA 3050B/7000B
PSBS-PB10	30889510	Pb	0.029	wt%	0.006	EPA 3050B/7000B
PSBS-PB11	30889511	Pb	0.039	wt%	0.006	EPA 3050B/7000B
PSBS-PB12	30889512	Pb	0.32	wt%	0.02	EPA 3050B/7000B
PSBS-PB13	30889513	Pb	5.5	wt%	0.4	EPA 3050B/7000B
PSBS-PB14	30889514	Pb	0.090	wt%	0.006	EPA 3050B/7000B
PSBS-PB15	30889515	Pb	0.57	wt%	0.03	EPA 3050B/7000B
PSBS-PB16	30889516	Pb	0.97	wt%	0.06	EPA 3050B/7000B
PSBS-PB17	30889517	Pb	0.29	wt%	0.02	EPA 3050B/7000B
PSBS-PB18	30889518	Pb	0.013	wt%	0.006	EPA 3050B/7000B
PSBS-PB18	30889519	Pb	0.34	wt%	0.02	EPA 3050B/7000B
PSBS-PB20	30889520	Pb	0.11	wt%	0.006	EPA 3050B/7000B
PSBS-PB21	30889521	Pb	8.5	wt%	0.6	EPA 3050B/7000B
PSBS-PB22	30889522	Pb	0.47	wt%	0.06	EPA 3050B/7000B
PSBS-PB23	30889523	Pb	0.020	wt%	0.006	EPA 3050B/7000B
PSBS-PB24	30889524	Pb	3.2	wt%	0.3	EPA 3050B/7000B
PSBS-PB25	30889525	Pb	0.19	wt%	0.02	EPA 3050B/7000B
PSBS-PB26	30889526	Pb	2.5	wt%	0.2	EPA 3050B/7000B
PSBS-PB27	30889527	Pb	0.008	wt%	0.006	EPA 3050B/7000B

Metals Analysis of Paints

(AIHA-LAP, LLC Accreditation, Lab ID #101762)

Forensic Analytical Consulting Svcs
Gary Lowe
21228 Cabot Blvd.

Hayward, CA 94545

Client ID: HAY01
Report Number: M234278
Date Received: 06/03/21
Date Analyzed: 06/10/21
Date Printed: 06/10/21
First Reported: 06/10/21

Job ID / Site: PJ63338; Critical Solutions, Inc.
Date(s) Collected: 5/25/21

SGSFL Job ID: HAY01
Total Samples Submitted: 27
Total Samples Analyzed: 27

Sample Number	Lab Number	Analyte	Result	Result Units	Reporting Limit*	Method Reference

* The Reporting Limit represents the lowest amount of analyte that the laboratory can confidently detect in the sample, and is not a regulatory level. The Units for the Reporting Limit are the same as the Units for the Final Results.

Kevin Poon

Kevin Poon, Laboratory Analyst, Hayward Laboratory

Note* Sampling data used in this report was provided by the client as noted on the associated chain of custody form.

Paint Chip Sample Request Form

Page 1 5

Client:	HAY01	**Site:**	Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA	**Sampled By:**	AA & JA
FACS:	San Francisco, CA Office			**Date:**	5/25/21
	Critical Solutions, Inc.	**Client #:**	C26770	**PM:**	Gary Bruce Lowe
Contact:	Gary Bruce Lowe	**Phone:**	510-266-4600	**Proj #:**	PJ63338

Turnaround Time: <12hr Same-D 1-Day 2-Day 3-Day [✓ 5-Day] **Other Due Date & Time:**

Analysis: [✓ Flame AA (Pb)] Other

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

Sample #	~~PSB South~~ Sample Location	Component	Color	Substrate	Condition
PSBS-Pb001	PSB South / Corridor / Southwall ~~North wall~~	JLA ~~Plaster~~ wall	Baby Blue	Plaster	I
Pb002	RM PS-8 / Westwall	Wall	Light orange	Plaster	~~P~~ I
-Pb003	RM PS-17 / Westwall	Wall	off white	Plaster	G
-Pb004	RM PS-12 / South wall	Wall	Orange	Plaster	G
-Pb005	RM PS-19 / North wall	Wall	Dark Blue	Drywall	G
-Pb006	RM PS-5 / North wall	Door ~~Wall~~ Frame	Brown	Metal	I
-Pb007	RM PS-5 / North	Door Frame	Baby Blue	metal	I

Substrate: wood, metal, concrete, plaster, drywall, brick

Shipped via: FedEx Airborne UPS US Mail Courier [✓ Drop Off] Other

Relinquished by: Radzinski **Date and Time:** 03 June 2021 / 1310	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:**	**Received by:** **Date and Time:** 1316 D/O	**Received by:** **Date and Time:**

RECEIVED
JUN 03 REC'D

Paint Chip Sample Request Form

Client: HAY01
FACS: San Francisco, CA Office
Critical Solutions, Inc.
Contact: Gary Bruce Lowe

Site: Contra Costa College 2600 Mission Bell Drive
San Pablo, CA USA
Client #: C26770
Phone: 510-266-4600

Sampled By: AA & JA
Date: 5/25/21
PM: Gary Bruce Lowe
Proj #: PJ63338

Turnaround Time: <12hr Same-D 1-Day 2-Day 3-Day [✓ 5-Day] Other Due Date & Time:

Analysis: [✓ Flame AA (Pb)] Other

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

Sample #	Sample Location	Component	Color	Substrate	Condition
PSBS-Pb008	Psb South / RM PS-2 / North	Wall	Brown	Plaster	P
↓ -Pb009	↓ / RM PS-1a / North west	Wall	Black	Glass	F
-Pb010	/ RM PS-5 / South west	Duct	Red	Metal	G
-Pb011	/ RM PS-2 / East wall	Duct	Off white	Metal	G
-Pb012	/ RM PS-1 / South wall	Wall	Off white	Drywall	G
-Pb013	/ RM PS-5 / North wall	Window frame	Green	Metal ~~Wood~~ AA	I
↓ -Pb014	↓ / RM PS-5 / North wall	Wall	Green	Wood	↓

Substrate: wood, metal, concrete, plaster, drywall, brick

Shipped via: FedEx Airborne UPS US Mail Courier [✓ Drop Off] Other

Relinquished by: Rodzinski **Date and Time:** 03 June 2021 / 1310	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:**	**Received by:** cym **Date and Time:** 1315 D/O	**Received by:** **Date and Time:**

Paint Chip Sample Request Form

Page 3 5

Client:	HAY01	**Site:**	Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA	**Sampled By:**	AA & JA
FACS:	San Francisco, CA Office			**Date:**	5/25/21
	Critical Solutions, Inc.	**Client #:**	C26770	**PM:**	Gary Bruce Lowe
Contact:	Gary Bruce Lowe	**Phone:**	510-266-4600	**Proj #:**	PJ63338

Turnaround Time: <12hr Same-D 1-Day 2-Day 3-Day [✓ 5-Day] Other Due Date & Time:

Analysis: [✓ Flame AA (Pb)] Other

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

Sample #	Sample Location	Component	Color	Substrate	Condition
PSBS-Pb015	PSB South / RM PS-~~4~~6 / North wall	Base board	Baby blue	Wood	I
-Pb016	/ RM PS-8 / North wall	Baseboard	Brown	Wood	I
-Pb017	/ RM PS-10 / South wall	Baseboard	off white	Wood	I
-Pb018	/ RM PS-6 / Cabinet	Cabinet	Light Brown	Wood	I
-Pb019	/Rm PS19 / RM-108	Door frame	Dark blue	Metal	I
~~-Pb020~~	~~/~~ VOID	~~Duct~~	~~off white~~	~~Metal~~	AA
-Pb020	/Rm PS-19 / RM-108	Door	Black	Metal	I

Substrate: wood, metal, concrete, plaster, drywall, brick

Shipped via: FedEx Airborne UPS US Mail Courier [✓ Drop Off] Other

Relinquished by: Redzinski **Date and Time:** 03 2021 June / 1310	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:**	**Received by:** **Date and Time:** 1315	**Received by:** **Date and Time:**

RECEIVED

JUN 03 REC'D

Paint Chip Sample Request Form

Page 4 5

Client: HAY01
FACS: San Francisco, CA Office
Critical Solutions, Inc.
Contact: Gary Bruce Lowe

Site: Contra Costa College 2600 Mission Bell Drive
San Pablo, CA USA
Client #: C26770
Phone: 510-266-4600

Sampled By: AA & JA
Date: 5/25/21
PM: Gary Bruce Lowe
Proj #: PJ63338

Turnaround Time: <12hr Same-D 1-Day 2-Day 3-Day [✓ 5-Day] **Other Due Date & Time:**

Analysis: [✓ Flame AA (Pb)] Other

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

Sample #	Sample Location	Component	Color	Substrate	Condition
PSBS-Pb21	PSB South / RM-PS-5 / North on Hood	HVAC unit	Orange	Metal	I
-Pb22	/ RM PS-6 / South side	Exhaust hood	Light Orange	Transite	
-Pb23	/ RM-PS-14 / South wall	Exhaust hood	Dark blue	Transite	
-Pb24	/ RM PS-6 / South Wall	Post	Dark Brown	Metal	
AA					
AA		AA			
AA					

Substrate: wood, metal, concrete, plaster, drywall, brick

Shipped via: FedEx Airborne UPS US Mail Courier [✓ Drop Off] Other

Relinquished by: Radzinski
Date and Time: 03 June 2021 / 1310
Received by:
Date and Time:

Relinquished by:
Date and Time:
Received by: eym
Date and Time: 6/3

RECEIVED JUN 03 REC'D

Relinquished by:
Date and Time:
Received by:
Date and Time:

Paint Chip Sample Request Form

Page 5 of 5

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Contact: Gary Bruce Lowe

Site: Contra Costa College 2600 Mission Bell Drive
San Pablo, CA USA

Client #: C26770

Phone: 510-266-4600

Sampled By: AA/SS

Date: 05/28/21

PM: Gary Bruce Lowe

Proj #: PJ63338

Turnaround Time: <12hr Same-D 1-Day 2-Day 3-Day [✓ 5-Day] **Other Due Date & Time:**

Analysis: [✓ Flame AA (Pb)] Other

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

Sample #	Sample Location	Component	Color	Substrate	Condition
PSBS - PB 25	PSB SOUTH EXTERIOR / Southeast area	Wall	White	Stucco	I
PB 26	/ North center area	Door	Brown	Metal	↓
PB 27	/ East center area	Post	Blue	Metal	↓
↓	↓				
		AA			

Substrate: wood, metal, concrete, plaster, drywall, brick

Shipped via: FedEx Airborne UPS US Mail Courier [✓ Drop Off] Other

RECEIVED
JUN 03 REC'D

Relinquished by: Rudzinski **Date and Time:** 03 June 2021 / 1330	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:**	**Received by:** **Date and Time:** D/O	**Received by:** **Date and Time:**

Final Report

Metals Analysis of Paints

(AIHA-LAP, LLC Accreditation, Lab ID #101762)

Forensic Analytical Consulting Svcs
Gary Lowe
21228 Cabot Blvd.

Hayward, CA 94545

Client ID: HAY01
Report Number: M234279
Date Received: 06/03/21
Date Analyzed: 06/10/21
Date Printed: 06/10/21
First Reported: 06/10/21

Job ID / Site: PJ63338; Critical Solutions, Inc.
Date(s) Collected: 6/3/21

SGSFL Job ID: HAY01
Total Samples Submitted: 12
Total Samples Analyzed: 12

Sample Number	Lab Number	Analyte	Result	Result Units	Reporting Limit*	Method Reference
BR-01-P	30889528	Pb	0.11	wt%	0.007	EPA 3050B/7000B
BR-02-P	30889529	Pb	< 0.006	wt%	0.006	EPA 3050B/7000B
BR-03-P	30889530	Pb	1.4	wt%	0.07	EPA 3050B/7000B
BR-04-P	30889531	Pb	1.2	wt%	0.07	EPA 3050B/7000B
BR-05-P	30889532	Pb	< 0.007	wt%	0.007	EPA 3050B/7000B
BR-06-P	30889533	Pb	0.078	wt%	0.007	EPA 3050B/7000B
BR-07-P	30889534	Pb	0.019	wt%	0.007	EPA 3050B/7000B
BR-08-P	30889535	Pb	0.18	wt%	0.02	EPA 3050B/7000B
BR-09-P	30889536	Pb	1.4	wt%	0.2	EPA 3050B/7000B
BR-10-P	30889537	Pb	< 0.007	wt%	0.007	EPA 3050B/7000B
BR-11-P	30889538	Pb	0.007	wt%	0.006	EPA 3050B/7000B
BR-12-P	30889539	Pb	0.19	wt%	0.02	EPA 3050B/7000B

* The Reporting Limit represents the lowest amount of analyte that the laboratory can confidently detect in the sample, and is not a regulatory level. The Units for the Reporting Limit are the same as the Units for the Final Results.

Kevin Poon

Kevin Poon, Laboratory Analyst, Hayward Laboratory

Note* Sampling data used in this report was provided by the client as noted on the associated chain of custody form.

Sampling Data Form / Chain of custody

Page 1 of 2

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: Sevilla / Radzinski

Sample Date: 03 June 2021

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** **Extended (5 days)**
Analysis:	______**PLM Standard:** ______**PLM w/ Point Count:** (______**400pt.**______**1,000 pt.):** [✓ X : FLAME AA]
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

# ~~HA#~~	Homogeneous Material Description	component ~~Quant. in SF~~	color ~~Friable/Cat I./Cat II.~~	Condition	Sample #	Sample Location	substrate ~~Lab result~~
05	Paint, pink	wall	pink	G	~~0702~~ ② BR-01-P	int., W. wall, v center	concrete ~~metal~~
07	paint	Transformer	blue	G	BR-02-P	int., transformer stand SW corner	metal
01	PAINT, BRICK RED	DOOR	BRICK RED	G	BR-03-P	BOILER ROOM / ENTRY DOOR / SW AREA	METAL
02	PAINT, BRICK RED #2	PIPE	BRICK RED	G	BR-04-P	↓ / EXT / SW CORNER / PIPE	METAL
03	PAINT, FIRE RED	CONTROL PANEL	FIRE RED	G	BR-05-P	BOILER ROOM / INT. / S. WALL / CONTROL PANEL	METAL
04	PAINT, FERRARI RED	PIPE FLANGE / CAPS	FERRARI RED	G	BR-06-P	↓ / INT. / NW. CORNER / PIPE FLANGE	METAL
06	PAINT, YELLOW	PIPES / FLANGES	YELLOW	G	BR-07-P	↓ / ↓ / W. WALL / PIPE ADJ TO ENTRY	METAL
08	PAINT, BLUE	TSI	BLUE	G	BR-08-P	↓ / INT / SE AREA / TSI ON PIPE	

DW = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooriing, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Ceiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by: Radzinski **Date and Time:** 03 June 2021 / 1310	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:**	**Received by:** ajm **Date and Time:** RECEIVED JUN 03 REC'D 1310 D/D	**Received by:** **Date and Time:**

Sampling Data Form / Chain of custody

Page 2 of 2

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA

Sampled By: SEVILLA / RADZINSKI

Sample Date: 06/03/21

Proj #: PJ63338

Turnaround Time:	**RUSH** **24hr** **48hr** **Extended (** 5 **days)**
Analysis:	____**PLM Standard:** ____**PLM w/ Point Count:** (____**400pt.**____**1,000 pt.):** × FLAME AA
Email results to:	FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

HA#	Homogeneous Material Description	~~Quant. in SF~~ COMPONENT	~~Friable/Cat I/Cat II.~~ COLOR	Condition	Sample #	Sample Location	Lab result
09	PAINT, BLUE	DOOR FRAME	BLUE	G	BR-09-P	BOILER ROOM / INT / NE ENTRY / DOOR FRAME	
10	PAINT, GRAY / BLUE	FLOOR	GRAY / BLUE	P	BR-10-P	↓ / ↓ / SW AREA ADJ TO ENTRY	
11	PAINT, GRAY	PIPE	GRAY	F	BR-11-P	↓ / EXT / N~~E~~ (SS) AREA / GAS METER	
12	PAINT, GRAY	PEDESTAL	GRAY	F	BR-12-P	↓ / INT / NE AREA / PEDESTAL	

DW = Drywall, JC = Joint Compound, WT=Wall Texture, VFT = Vinyl Floor Tile, VSF = Vinyl Sheet Flooriing, BB = Baseboard, BBM = Baseboard Mastic, CM = Carpet Mastic, ACT = Acoustic Ceiling Tile, ACS = Sprayed-on Acoustic Ceiling Material, FP = Fireproofing, PI = Pipe Insulation, PFI = Pipe fitting insulation, WP = Plaster, CP = Ceiling Plaster, ES = Exterior Stucco

Relinquished by: Radzinski **Date and Time:** 03 June 2021 / 1310	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:**	**Received by:** RECEIVED JUN 03 REC'D **Date and Time:** 0/3 1310pm	**Received by:** **Date and Time:**

Metals Analysis of Paints

(AIHA-LAP, LLC Accreditation, Lab ID #101762)

Forensic Analytical Consulting Svcs
Gary Lowe
21228 Cabot Blvd.

Hayward, CA 94545

Client ID: HAY01
Report Number: M234287
Date Received: 06/03/21
Date Analyzed: 06/11/21
Date Printed: 06/11/21
First Reported: 06/11/21

Job ID / Site: PJ63338; Critical Solutions, Inc.
Date(s) Collected: 05/26/21

SGSFL Job ID: HAY01
Total Samples Submitted: 25
Total Samples Analyzed: 25

Sample Number	Lab Number	Analyte	Result	Result Units	Reporting Limit*	Method Reference
PSBN-PB001	30889562	Pb	< 0.007	wt%	0.007	EPA 3050B/7000B
PSBN-PB002	30889563	Pb	< 0.006	wt%	0.006	EPA 3050B/7000B
PSBN-PB004	30889564	Pb	< 0.006	wt%	0.006	EPA 3050B/7000B
PSBN-PB005	30889565	Pb	0.089	wt%	0.006	EPA 3050B/7000B
PSBN-PB007	30889567	Pb	0.032	wt%	0.007	EPA 3050B/7000B
PSBN-PB008	30889568	Pb	< 0.007	wt%	0.007	EPA 3050B/7000B
PSBN-PB009	30889569	Pb	0.32	wt%	0.02	EPA 3050B/7000B
PSBN-PB010	30889570	Pb	0.032	wt%	0.007	EPA 3050B/7000B
PSBN-PB011	30889571	Pb	< 0.006	wt%	0.006	EPA 3050B/7000B
PSBN-PB012	30889572	Pb	< 0.006	wt%	0.006	EPA 3050B/7000B
PSBN-PB013	30889573	Pb	1.9	wt%	0.2	EPA 3050B/7000B
PSBN-PB014	30889574	Pb	< 0.006	wt%	0.006	EPA 3050B/7000B
PSBN-PB015	30889575	Pb	0.20	wt%	0.02	EPA 3050B/7000B
PSBN-PB016	30889576	Pb	< 0.007	wt%	0.007	EPA 3050B/7000B
PSBN-PB017	30889577	Pb	< 0.006	wt%	0.006	EPA 3050B/7000B
PSBN-PB019	30889579	Pb	0.008	wt%	0.007	EPA 3050B/7000B
PSBN-PB020	30889580	Pb	0.034	wt%	0.006	EPA 3050B/7000B
PSBN-PB021	30889581	Pb	< 0.006	wt%	0.006	EPA 3050B/7000B
PSBN-PB022	30889582	Pb	0.028	wt%	0.007	EPA 3050B/7000B
PSBN-PB023	30889583	Pb	< 0.007	wt%	0.007	EPA 3050B/7000B
PSBN-PB024	30889584	Pb	< 0.007	wt%	0.007	EPA 3050B/7000B
PSBN-PB025	30889585	Pb	< 0.006	wt%	0.006	EPA 3050B/7000B
PSBN-PB026	30889586	Pb	< 0.007	wt%	0.007	EPA 3050B/7000B
PSBN-PB027	30889587	Pb	0.12	wt%	0.007	EPA 3050B/7000B
PSBN-PB028	30889588	Pb	0.018	wt%	0.007	EPA 3050B/7000B

Final Report

Metals Analysis of Paints

(AIHA-LAP, LLC Accreditation, Lab ID #101762)

Forensic Analytical Consulting Svcs
Gary Lowe
21228 Cabot Blvd.

Hayward, CA 94545

Client ID: HAY01
Report Number: M234287
Date Received: 06/03/21
Date Analyzed: 06/11/21
Date Printed: 06/11/21
First Reported: 06/11/21

Job ID / Site: PJ63338; Critical Solutions, Inc.
Date(s) Collected: 05/26/21

SGSFL Job ID: HAY01
Total Samples Submitted: 25
Total Samples Analyzed: 25

Sample Number	Lab Number	Analyte	Result	Result Units	Reporting Limit*	Method Reference

* The Reporting Limit represents the lowest amount of analyte that the laboratory can confidently detect in the sample, and is not a regulatory level. The Units for the Reporting Limit are the same as the Units for the Final Results.

Kevin Poon

Kevin Poon, Laboratory Analyst, Hayward Laboratory

Note* Sampling data used in this report was provided by the client as noted on the associated chain of custody form.

Pair Chip Sample Request Form

Page 1 4

Client: HAY01
FACS: San Francisco, CA Office
Critical Solutions, Inc.
:ontact: Gary Bruce Lowe

Site: Contra Costa College 2600 Mission Bell Drive
San Pablo, CA USA
Client #: C26770
Phone: 510-266-4600

Sampled By: Jose Acosta
Date: 05/26/2021 - 05/28/2021
PM: Gary Bruce Lowe
Proj #: PJ63338

Turnaround Time: <12hr Same-D 1-Day 2-Day 3-Day [✓ 5-Day] Other Due Date & Time:

Analysis: [✓ Flame AA (Pb)] Other

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

Sample #	Sample Location	Component	Color	Substrate	Condition
PsbN-Pb001	PsbN / PS-109 / west wall	Wall	White	Drywall	I
-Pb002	/ PS-109 / Entrance	Door Frame	Gray	Metal	↓
~~-Pb003~~	~~VOID~~	~~Door~~	~~Gray~~	~~Metal~~	JLA
-Pb004	Corridor 1 above Entrance	Trim	Beige	Wood	I
-Pb005	Corridor 1 / Center	hand Rail	Gray	Metal	↓
~~-Pb006~~	~~VOID~~	~~Trim~~	~~Brown~~	~~wood~~	JLA
-Pb007	RM PS-113 / South above	Duct	Red	metal	I

ubstrate: wood, metal, concrete, plaster, drywall, brick

Shipped via: FedEx Airborne UPS US Mail Courier [✓ Drop Off] Other

elinquished by: Rufzinski **ate and Time:** 03 June 2021 / 1310	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
eceived by: **ate and Time:**	**Received by:** **Date and Time:**	**Received by:** **Date and Time:**

RECEIVED
JUN 03 2021
By 1315

Pain Chip Sample Request Form

Page 2 4

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

ontact: Gary Bruce Lowe

Site: Contra Costa College 2600 Mission Bell Drive
San Pablo, CA USA

Client #: C26770

Phone: 510-266-4600

Sampled By: JA

Date: 5/26/21 - 5/28/21

PM: Gary Bruce Lowe

Proj #: PJ63338

Turnaround Time: <12hr Same-D 1-Day 2-Day 3-Day [✓ 5-Day] **Other Due Date & Time:**

Analysis: [✓ Flame AA (Pb)] Other

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

Sample #	Sample Location	Component	Color	Substrate	Condition
Psbn-Pb008	Psbn RM-PS-113 / North wall	Wall	Baby Blue	Drywall	I
-Pb009	RM-PS-123 / Door Frame	Door frame	Black	metal	
-Pb010	RM-PS-118 / Door Frame	Door Frame	white	metal	
-Pb011	RM-PS-118 / wall	wall	Gray	wood	
-Pb012	RM-PS-118 / close to Ceiling	Trim	white	wood	
-Pb013	RM-PS-113 / on Light Fixture	Fixture	Yellow	metal	
-Pb014	RM-PS-106 / North wall	Trim	Baby Blue	wood	

ubstrate: wood, metal, concrete, plaster, drywall, brick

Shipped via: FedEx Airborne UPS US Mail Courier [✓ Drop Off] Other

elinquished by: Radzinski.
ate and Time: 03 June 2021 /1310
eceived by:
ate and Time:

Relinquished by:
Date and Time:
Received by:
Date and Time:

RECEIVED
JUN 03 2021
By 1315

Relinquished by:
Date and Time:
Received by:
Date and Time:

Pain Chip Sample Request Form

Page 3 4

Client: HAY01
Site: Contra Costa College 2600 Mission Bell Drive San Pablo, CA USA
Sampled By: JA
FACS: San Francisco, CA Office
Date: 5/26/21 - 5/28/21
Critical Solutions, Inc.
Client #: C26770
PM: Gary Bruce Lowe
Contact: Gary Bruce Lowe
Phone: 510-266-4600
Proj #: PJ63338

Turnaround Time: <12hr Same-D 1-Day 2-Day 3-Day [✓ 5-Day] **Other Due Date & Time:**

Analysis: [✓ Flame AA (Pb)] Other

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

Sample #	Sample Location	Component	Color	Substrate	Condition
Psbn -Pb015	Psbn / RM PS-106 / Door Frame	Door Frame	Brown	metal	I
-Pb016	RM-PS-132 Lecture Hall / above ceiling	wall ~~Column~~	Black	Drywall	
-Pb017	womans RR / south wall	Floor tile ~~Ceramic FT~~ JA	Brown	ceramic	
~~-Pb018~~	~~Corridor 2 / Casing~~	~~Casing~~ Void	~~Beige~~	~~metal~~	
-Pb019	woman's RR / south wall	wall ~~Tile~~ tile JA	Red	ceramic	
-Pb020	RM 130 / North west corner	wall	yellow	Drywall	
-Pb021	RM Exploritorium / 132 Entrance	wall	Black	wood	

ubstrate: wood, metal, concrete, plaster, drywall, brick

Shipped via: FedEx Airborne UPS US Mail Courier [✓ Drop Off] Other

RECEIVED
JUN 03 2021
By 6/3 1315

Relinquished by: Ruczinski **Date and Time:** 03 June 2021 / 1310	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
Received by: **Date and Time:**	**Received by:** **Date and Time:**	**Received by:** **Date and Time:**

Paint Chip Sample Request Form

Client: HAY01

FACS: San Francisco, CA Office

Critical Solutions, Inc.

Contact: Gary Bruce Lowe

Site: Contra Costa College 2600 Mission Bell Drive
San Pablo, CA USA

Client #: C26770

Phone: 510-266-4600

Sampled By: JA & AA

Date: 5/26/21 - 5/28/21

PM: Gary Bruce Lowe

Proj #: PJ63338

Turnaround Time: <12hr Same-D 1-Day 2-Day 3-Day [✓ 5-Day] **Other Due Date & Time:**

Analysis: [✓ Flame AA (Pb)] Other

Email results to: FACSLabsSF@forensicanalytical.com and gary.lowe@forensicanalytical.com

Sample #	Sample Location	Component	Color	Substrate	Condition
Psbn-Pb022	Psbnorth/ Corridor / above Ceiling Beam	Beam	Red	Metal	I
-Pb023	PSBNorth Roof / Roof F / West area	Gutter	Brown	Metal	↓
-Pb024	↓ / Roof G / SW area	Dome joint	Red	Metal	↓
-Pb025	↓ / ↓ / ↓	Dome siding	Red	Wood	↓
-Pb026	↓ / Roof J / South area	Cabinet door	Black	Wood	P
-Pb027	↓ / Roof J / South area	Rail	Brown	Metal	I
-Pb028	PSBNorth exterior / North area, North door	Door	Black	Metal	↓

ubstrate: wood, metal, concrete, plaster, drywall, brick

Shipped via: FedEx Airborne UPS US Mail Courier [✓ Drop Off] Other

elinquished by: Radzaiki **ate and Time:** 03 June 2021 / 1310	**Relinquished by:** **Date and Time:**	**Relinquished by:** **Date and Time:**
eceived by: **ate and Time:**	**Received by:** **Date and Time:**	**Received by:** **Date and Time:**

RECEIVED
JUN 03 2021
By 1315

MICRO ANALYTICAL LABORATORIES, INC.

LEAD IN PAINT - FLAME AAS (SW846)

1212
Gary Lowe
Forensic Analytical Consulting
21228 Cabot Boulevard
Hayward, CA 94545

PROJECT:
PROJECT NO. PJ63338
HAYWARD HOJ
24405 AMADOR STREET

Micro Log In 286880
Total Samples 1
Date Sampled 11/12/2021
Date Received 11/12/2021
Date Analyzed 11/13/2021

	Lead Concentration		
Sample ID	Weight Percent	mg/kg (ppm)	RDL
Client: 111221-CHA-PB01 Lab: 286880-01 CHILLER AREA / CHILLER 10 / SOUTH AREA OF UNIT HOUSING HOUSING SIDE - GRAY - METAL	3.3 %	33000	0.6800 % 6,800 mg/kg

Technical Supervisor: 11/13/2021
Long T. Nguyen, Chemistry Supervisor — Date Reported

Analyst: TLN

AIHA-LAP, LLC Accredited Laboratory, ID #101768. Samples are analyzed by Flame Atomic Absorption Spectrometry (AAS) using SOP 23-Paint. This SOP is based on U.S. EPA SW-846 Method 7420 for instrumental analysis, and on ASTM E-1645-16 for niitric acid and hydrogen peroxide digestion Unless otherwise indicated on this report, all required Quality Control samples have been determined to be in control prior to releasing these analytical results. Unless otherwise stated in this report, all samples were received in acceptable condition for analysis. Note: due to software limitations, the number of reported significant figures does not necessarily reflect the uncertainty of the analysis. If the amount of sample available for analysis is lower than advisable for this method, detection limits and uncertainty will be higher. This report must not be reproduced except in full, without the approval of Micro Analytical Laboratories, Inc., and pertains only to the samples analyzed as received. Unit explanations: mg = milligrams; kg = kilograms; ppm = parts per million. N/A = Not Applicable. RDL = Report Detection Limit.

#P04158

2868880

FACS
Forensic Analytical Consulting Services

PAINT CHIP SAMPLE REQUEST FORM

Page 1 of 1

Client: **HAY01 FACS San Francisco**

Sampled by: **Anthony Aguilar** PM: ~~**Mark Smith**~~ AA Gary Lowe Date: ~~11/3/21~~ AA 11/12/21

Contact: ~~**Mark Smith**~~ AA Gary Lowe Phone: **(510) 266-4600**

Special Instructions: E-mail results to ~~msmith@forensicanalytical.com~~ AA and marina.gonzalez-cortez@forensicanalytical.com and ~~sparpan~~ AA wwong@forensicanalytical.com

Site: **Hayward HOJ**
24405 Amador Street

Turnaround Time: 1-Day ☐ 2-Day ☐ 3-Day ☐ 5-Day ☒ Other ☐ Due Date and Time:

Client No.:

FACS Job #: PJ63338

Analysis: ☒ Flame AA (Pb) /
☐ Other:

Sample Number	Sample Location	Component	Color	Substrate	Condition
1 111221-CHA-Pb01	Chiller Area / Chiller 10 / South area of Unit housing	Housing side	Gray	Metal	I

AA

Substrate: wood metal concrete plaster drywall brick

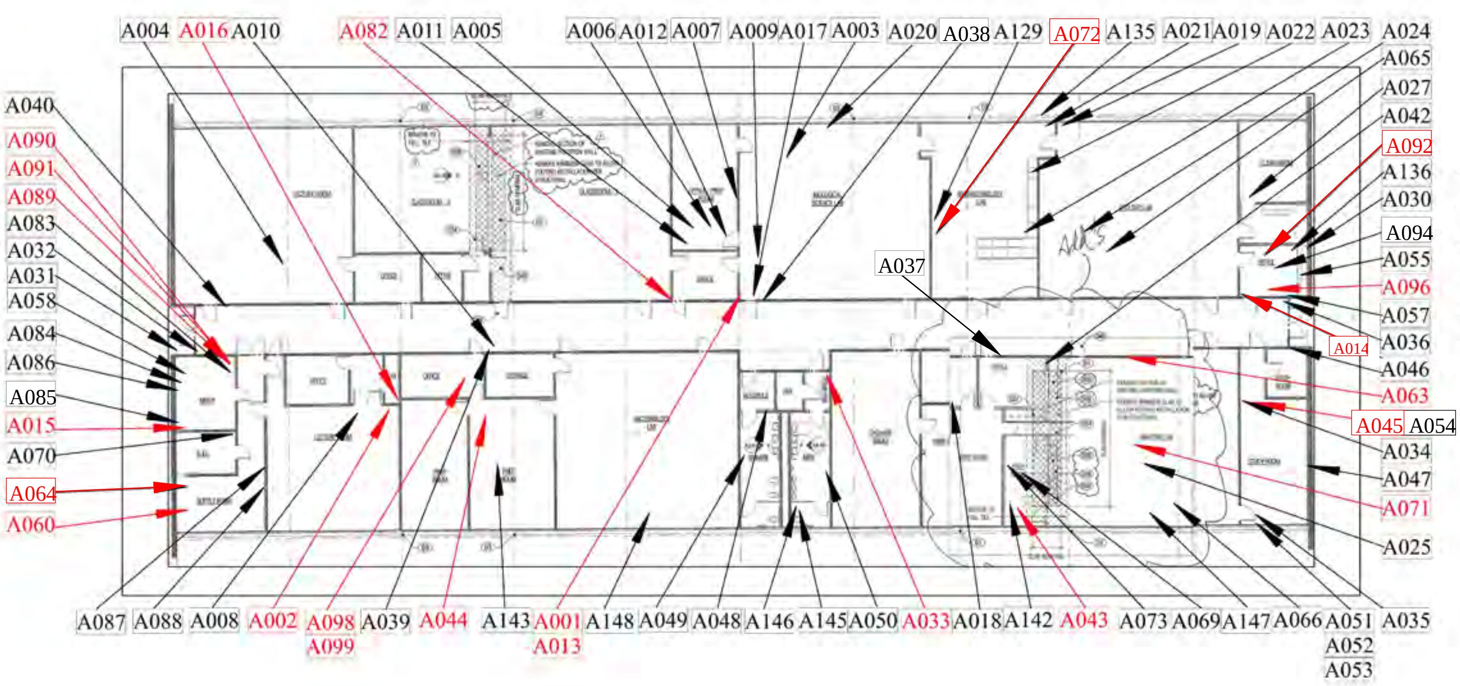
Shipped via: ☐ Fed Ex ☐ Airborne ☐ UPS ☐ US Mail ☐ Courier ☒ Drop Off ☐ Other:

Relinquished by: *Date & Time:* 11/12/21 *Received by:* *Date & Time:* 11/12/21 @ 9:50am
Condition Acceptable ☑ Yes ☐ No

Relinquished by: *Date & Time:* *Received by:* *Date & Time:*
Condition Acceptable ☐ Yes ☐ No

Appendix B

Sample Location Drawings



Asbestos-Containing Materials

- Backing/ mastic
- Joint compound/WB
- Mastics(yellow/ tan)
- Pipe elbow on 6” OD pipe run
- Pipe elbow on 8" OD pipe run
- Black chalkbaord
- Black countertops
- Joint compound/WB on drywall with orange peel
- Tank insulation
- White HVAC vibration dampeners
- Black mastic on HVAC
- White cloth HVAC gasket

Biological Science Building – Asbestos Sample Location Map, Page 1

SAMPLE LOCATION MAP

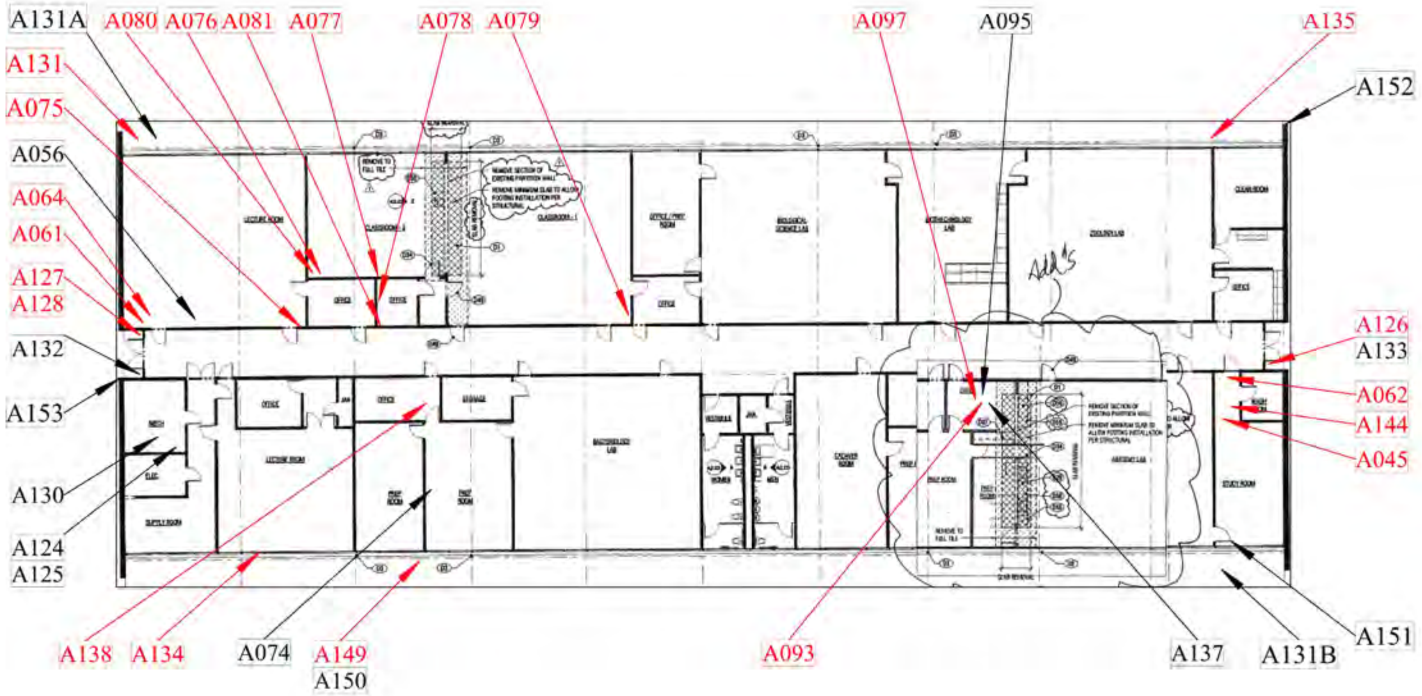
Contra Costa College New Science Building Project
2600 Mission Bell Drive
San Pablo, CA 94806
FACS # PJ63338, May 24 to June 2, 2021

LEGEND

Positive Asbestos Bulk Sample Location: BIO – A001, A002, A013-A016, A033, A043-A045, A060, A063, A064, A071, A072, A082, A089-A092, A096, A098, A099

FACS 35
Forensic Analytical Consulting Services
CELEBRATING 35 YEARS OF EXCELLENCE · 1986-2021

N



Asbestos-Containing Materials

- Pipe elbow on 6" OD pipe run
- Black chalkbaord
- Texture
- Joint compound/WB on drywall with orange peel
- White HVAC vibration dampeners
- Black mastic on HVAC
- Skim coat
- Concrete slab exterior
- Light gray caulk exterior

Biological Science Building – Asbestos Sample Location Map, Page 2

SAMPLE LOCATION MAP

Contra Costa College New Science Building Project
2600 Mission Bell Drive
San Pablo, CA 94806
FACS # PJ63338, May 24 to June 2, 2021

LEGEND

Positive Asbestos Bulk Sample Location: BIO – A045, A061, A062, A064, A075-A081, A093, A097, A126-A128, A131, A134, A135, A138, A144, A149

FACS 35
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CELEBRATING 35 YEARS OF EXCELLENCE · 1986–2021

–N→

▨ - Tan sheet flooring w/ mottle pattern

🟩 - Green carpet mastic

⬜ - 12" x 12" FT off-white w/ blue specks over yellow mastic

🟪 - 12" x 12" FT off-white w/ gray streaks w/ yellow mastic

🟩 - Beige sheet flooring w/ mottle pattern

🟥 - Dark tan RSF w/ mottle pattern

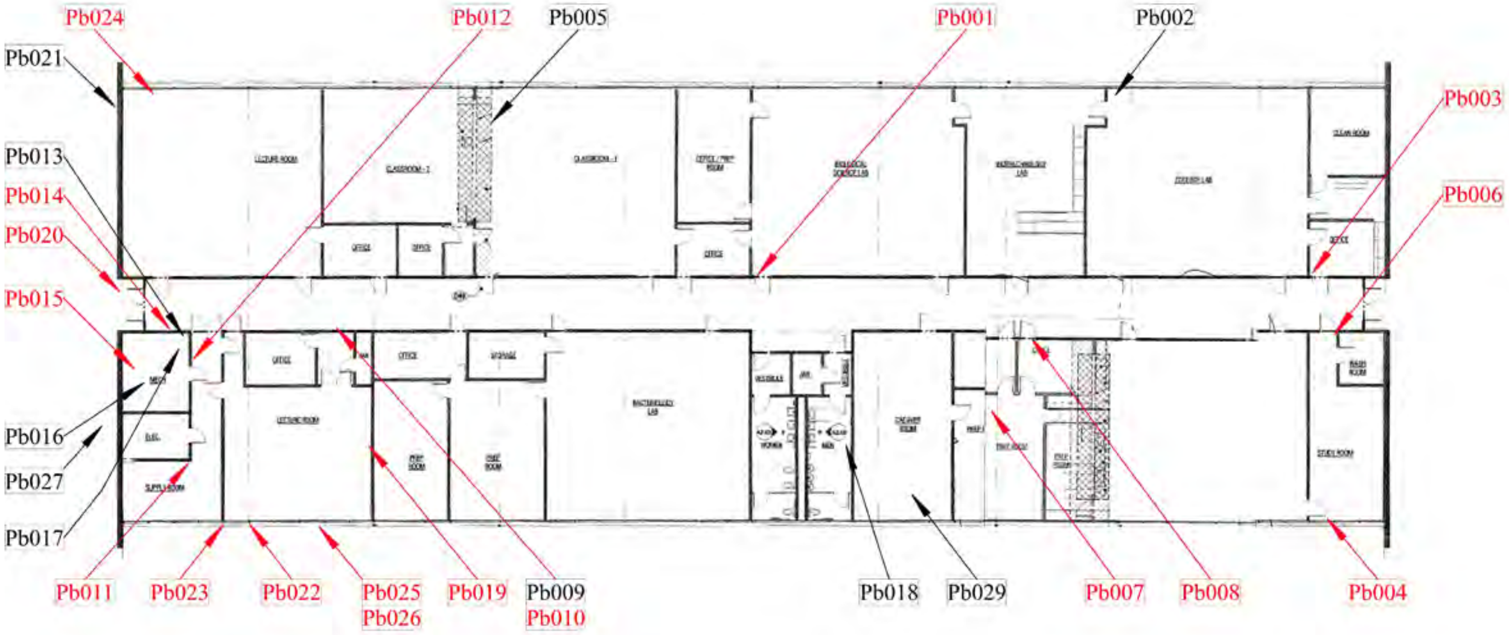
Biological Science Building – Homogeneous Area Map

HOMOGENEOUS AREA MAP

Contra Costa College New Science Building Project
2600 Mission Bell Drive
San Pablo, CA 94806
FACS # PJ63338, May 24 to June 2, 2021

FACS 35
Forensic Analytical Consulting Services
CELEBRATING 35 YEARS OF EXCELLENCE · 1986–2021

—N→



Lead-Containing Materials

- Orange paint on gypsum board wall
- Beige paint on gypsum board wall
- Off-white paint on plaster wall
- Black paint on metal I-beam
- White paint on wood wall trim
- Blue paint on wood door
- Off-white paint on wood beam
- Yellow paint on metal pipe
- Red paint on metal pipe valve
- White paint on stucco soffit
- White paint on metal louver shade
- Beige paint on metal wall louver header trim
- Brown paint on metal parapet cap
- White paint on wood eave joist
- Gray paint on metal exhaust flue
- Off-white ceramic wall

Biological Science Building – Lead Sample Location Map

SAMPLE LOCATION MAP

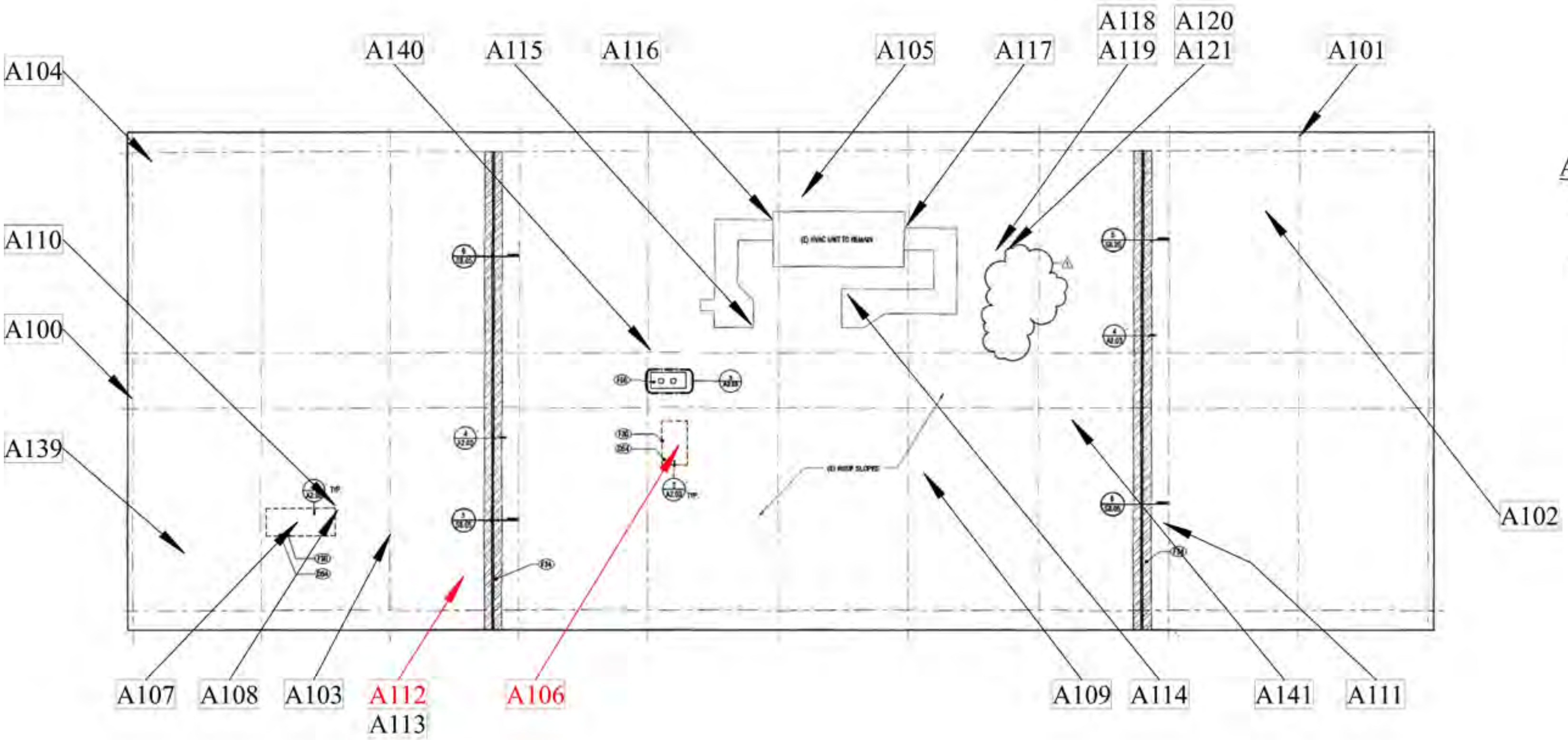
Contra Costa College New Science Building Project
2600 Mission Bell Drive
San Pablo, CA 94806
FACS # PJ63338, May 24 to June 2, 2021

LEGEND

Positive Lead Bulk Sample Location: BIO – Pb001, Pb003, Pb004, Pb006, Pb007, Pb008, Pb010, Pb011, Pb012, Pb014, Pb015, Pb019, Pb020, Pb022, Pb023, Pb024, Pb025, Pb026

FACS 35
Forensic Analytical Consulting Services
CELEBRATING 35 YEARS OF EXCELLENCE · 1986–2021

–N→



Asbestos-Containing Materials

- Paint (silver)
- Dark gray sealant

Biological Science Building, Roof – Asbestos Sample Location Map

SAMPLE LOCATION MAP

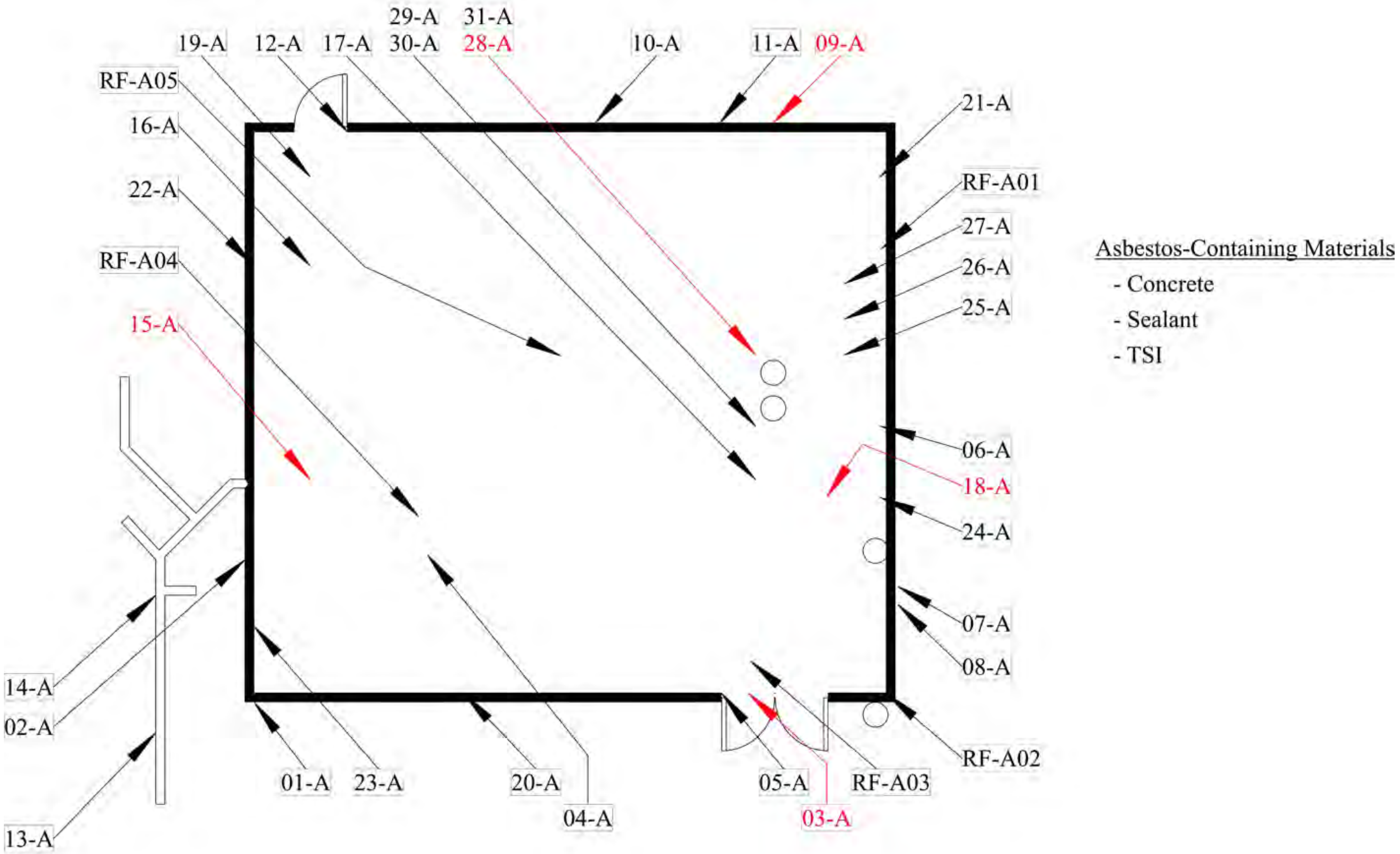
Contra Costa College New Science Building Project
2600 Mission Bell Drive
San Pablo, CA 94806
FACS # PJ63338, May 24 to June 2, 2021

LEGEND

Positive Asbestos Bulk Sample Location: BIO – A106, A112

FACS 35
Forensic Analytical Consulting Services
CELEBRATING 35 YEARS OF EXCELLENCE · 1986-2021

–N→



Boiler Room

SAMPLE LOCATION DRAWING

Contra Costa College New Science Building Project
2600 Mission Bell Drive
San Pablo, CA 94806
FACS # PJ63338, May 24 to June 2, 2021

LEGEND

Positive Asbestos Bulk Sample Location: BR - 03-A, 09-A, 15-A, 18-A, 28-A

FACS 35
Forensic Analytical Consulting Services
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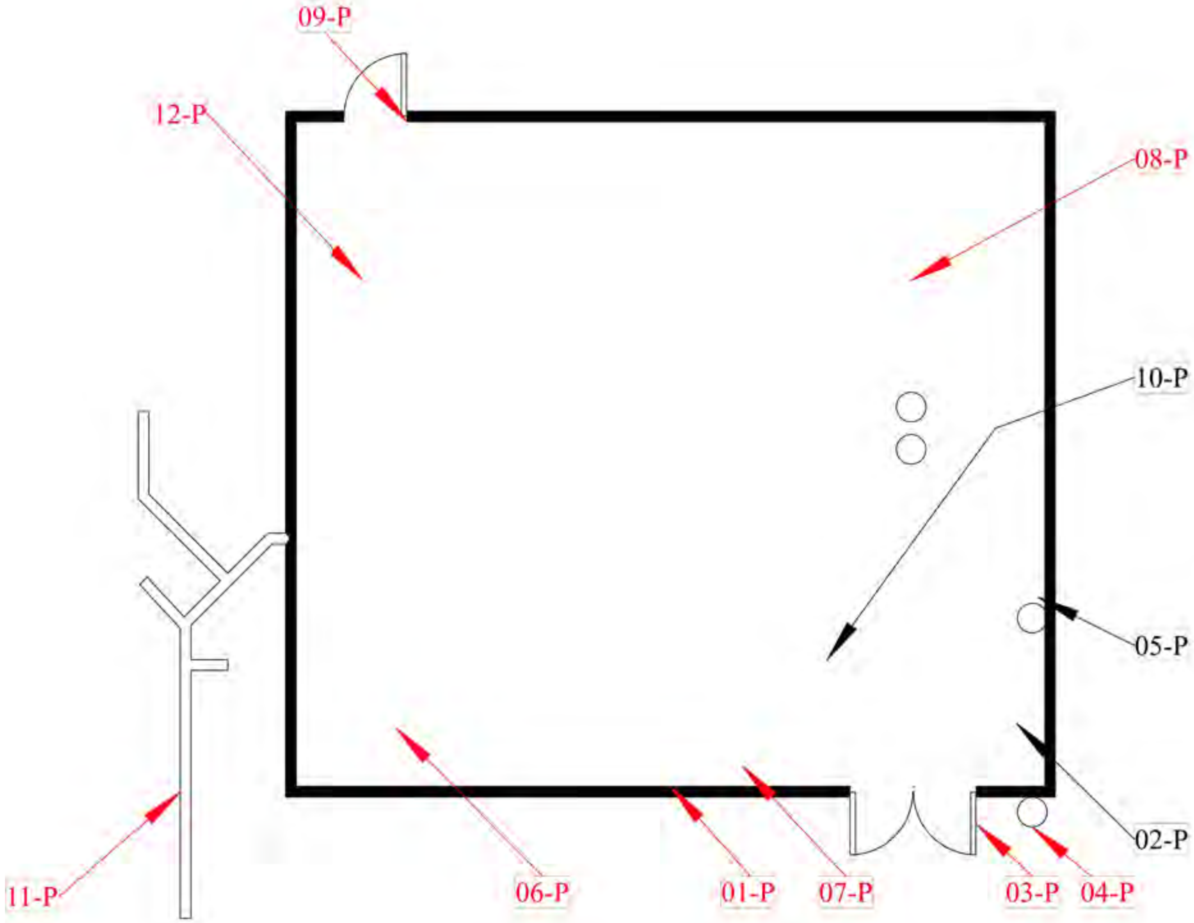
←N–



Lead-Containing Materials

- Pink paint on concrete wall
- Brick red paint on metal door
- Brick red paint on metal pipe
- Ferrari red paint on metal pipe flange/caps
- Yellow paint on metal pipes/flanges
- Blue paint on TSI
- Blue paint on metal doorframe
- Grey paint on metal pipe
- Grey paint on metal pedestal

Boiler Room – Lead Sample Location Drawing

SAMPLE LOCATION DRAWING

Contra Costa College New Science Building Project
2600 Mission Bell Drive
San Pablo, CA 94806
FACS # PJ63338, May 24 to June 2, 2021

LEGEND

Positive Lead Bulk Sample Location: BR – 01-P, 03-P, 04-P, 06-P, 07-P, 08-P, 09-P, 11-P, 12-P

FACS 35
Forensic Analytical Consulting Services
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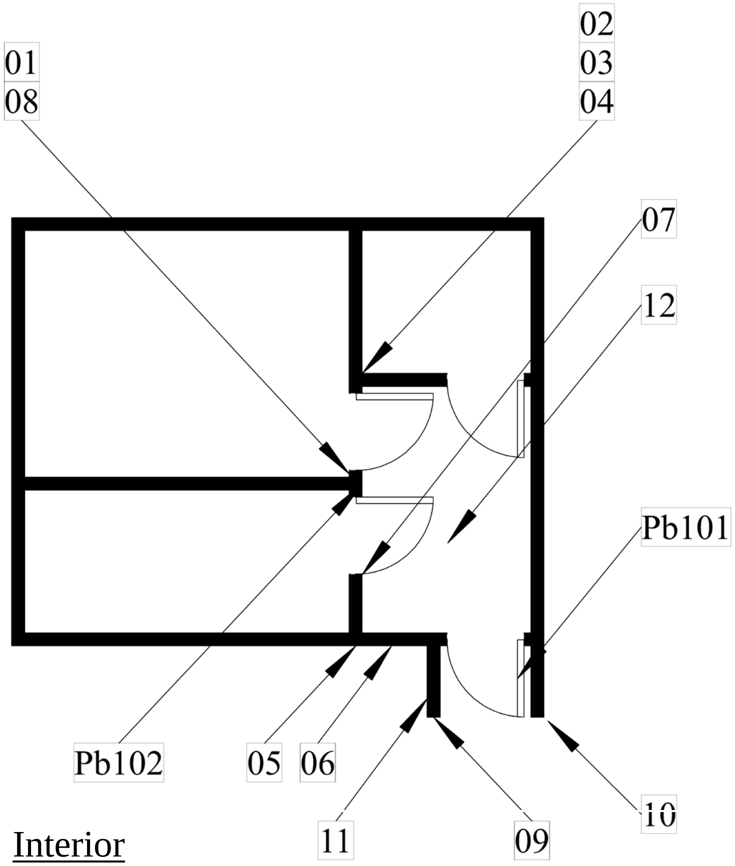
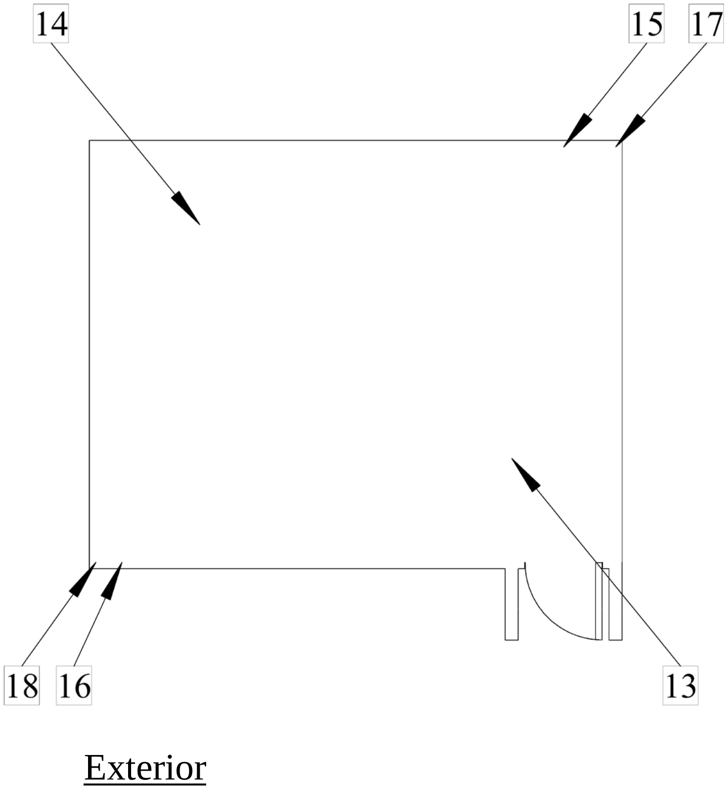
←N−





Chemical Storage Building – Asbestos and Lead Sample Location Drawing

SAMPLE LOCATION DRAWING

Contra Costa College New Science Building Project
2600 Mission Bell Drive
San Pablo, CA 94806
FACS # PJ63338, May 24 to June 2, 2021

LEGEND

Positive Asbestos Bulk Sample Location: N/A

Positive Lead Bulk Sample Location: N/A

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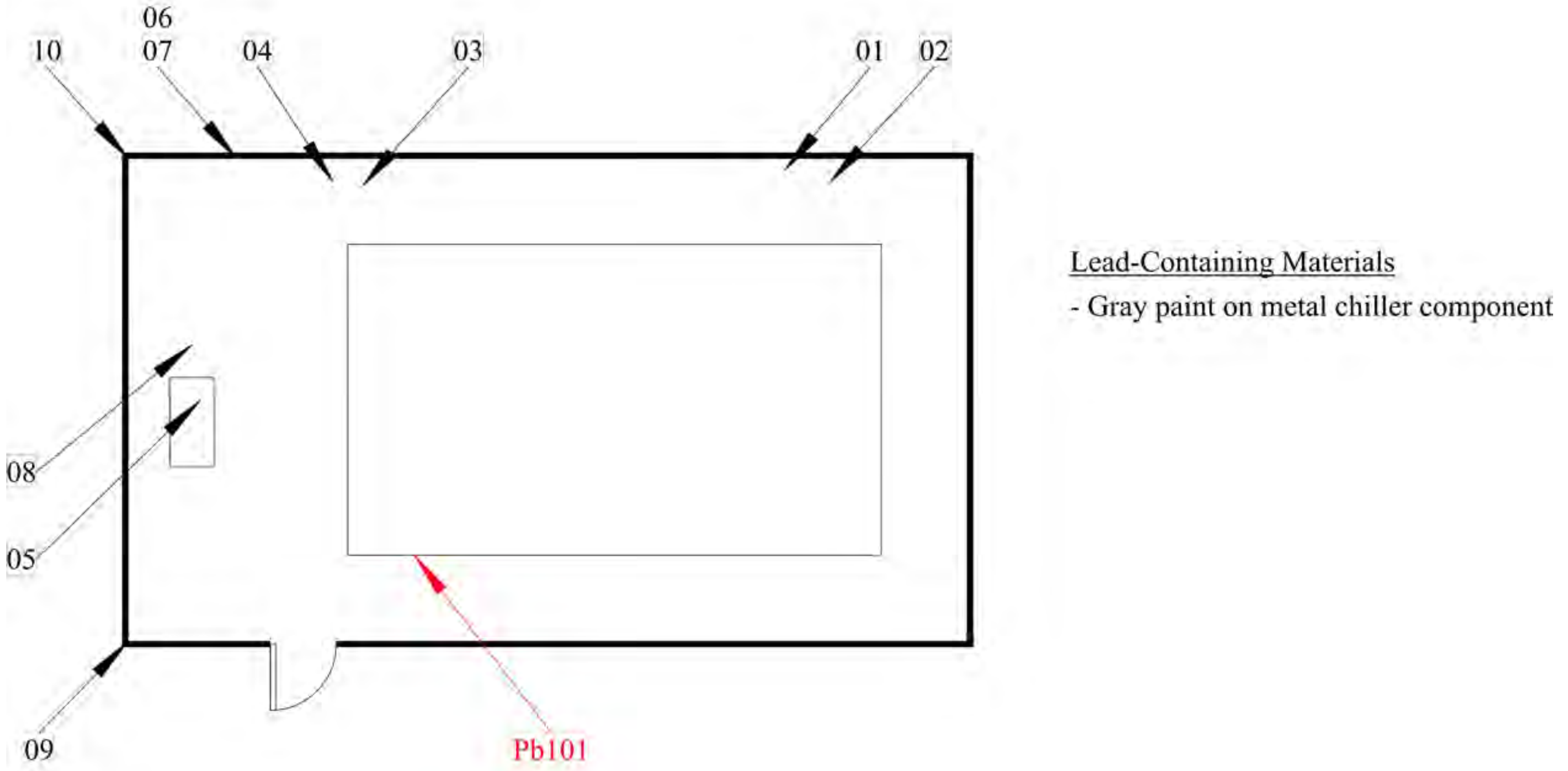
N



Chiller Enclosure – Asbestos and Lead Sample Location Drawing

SAMPLE LOCATION DRAWING

Contra Costa College New Science Building Project
2600 Mission Bell Drive
San Pablo, CA 94806
FACS # PJ63338, May 24 to June 2, 2021

LEGEND

Positive Asbestos Bulk Sample Location: N/A

Positive Lead Bulk Sample Location: CE-Pb-101

FACS 35
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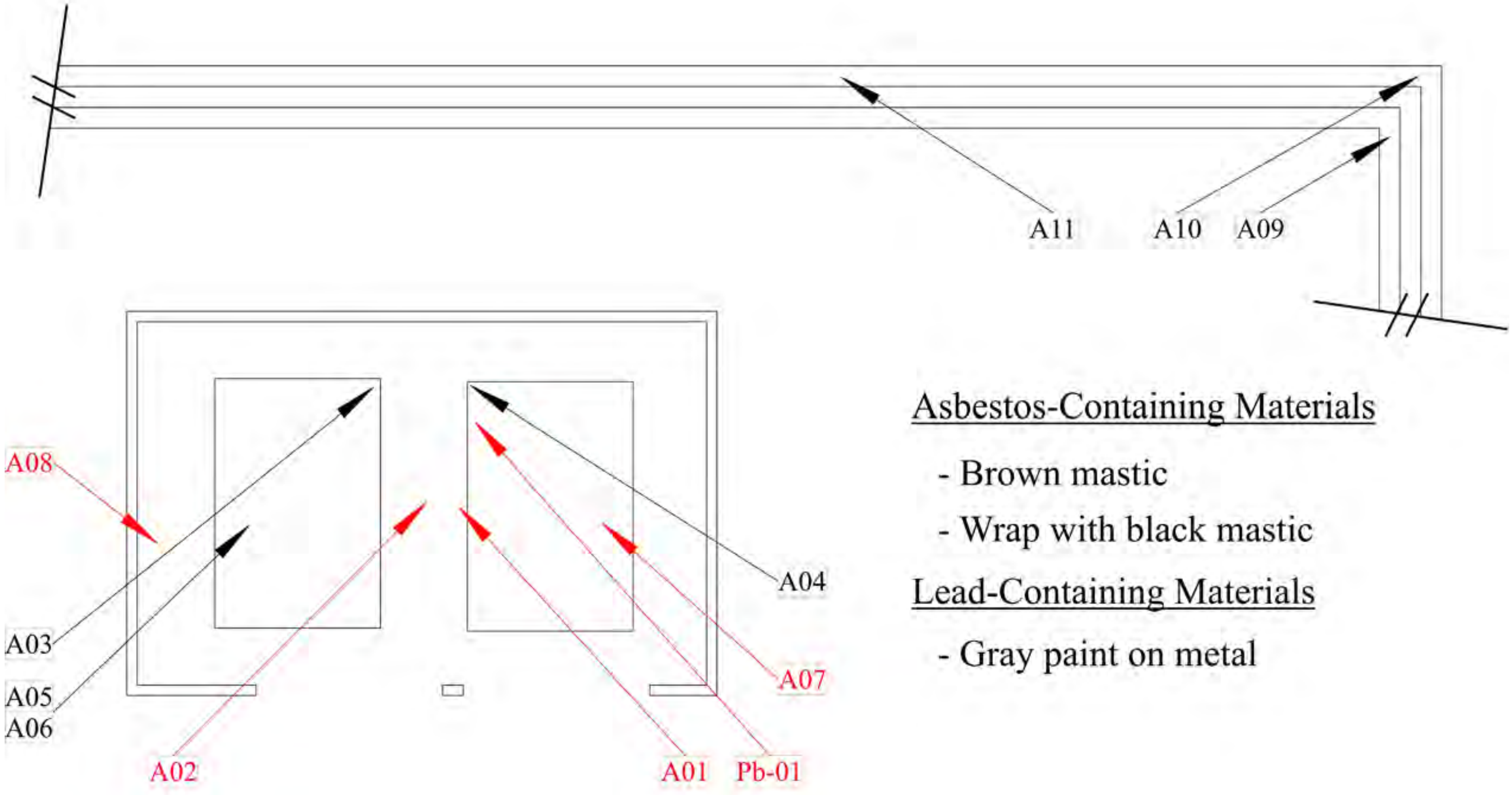
N



Asbestos-Containing Materials

- Brown mastic
- Wrap with black mastic

Lead-Containing Materials

- Gray paint on metal

Chiller Area (Chiller Unit 10 and 9) and exterior pipes

SAMPLE LOCATION DRAWING

Contra Costa College New Science Building Project
2600 Mission Bell Drive
San Pablo, CA 94806
FACS # PJ63338, November 12, 2021

LEGEND

Positive Asbestos Bulk Sample Location: 111221-CHA – A01, A02, A07, A08
Positive Lead Bulk Sample Location: 111221-CHA – Pb-01

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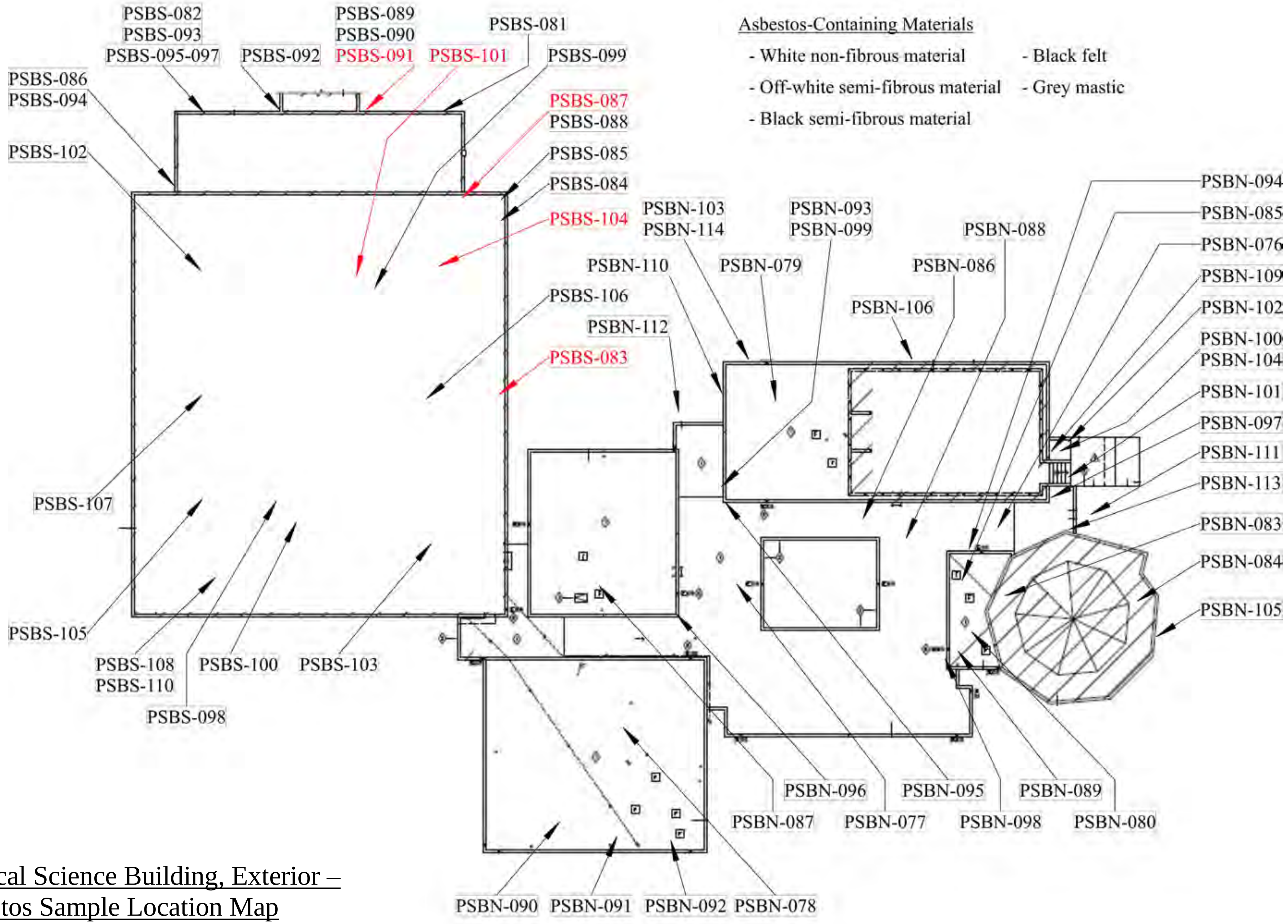
–N→



Asbestos-Containing Materials

- White non-fibrous material
- Off-white semi-fibrous material
- Black semi-fibrous material
- Black felt
- Grey mastic

Physical Science Building, Exterior –
Asbestos Sample Location Map

SAMPLE LOCATION MAP

Contra Costa College New Science Building Project
2600 Mission Bell Drive
San Pablo, CA 94806
FACS # PJ63338, May 24 to June 2, 2021

LEGEND

Positive Asbestos Bulk Sample Location: PSBS – 083, 087, 091, 101, 104

FACS 35
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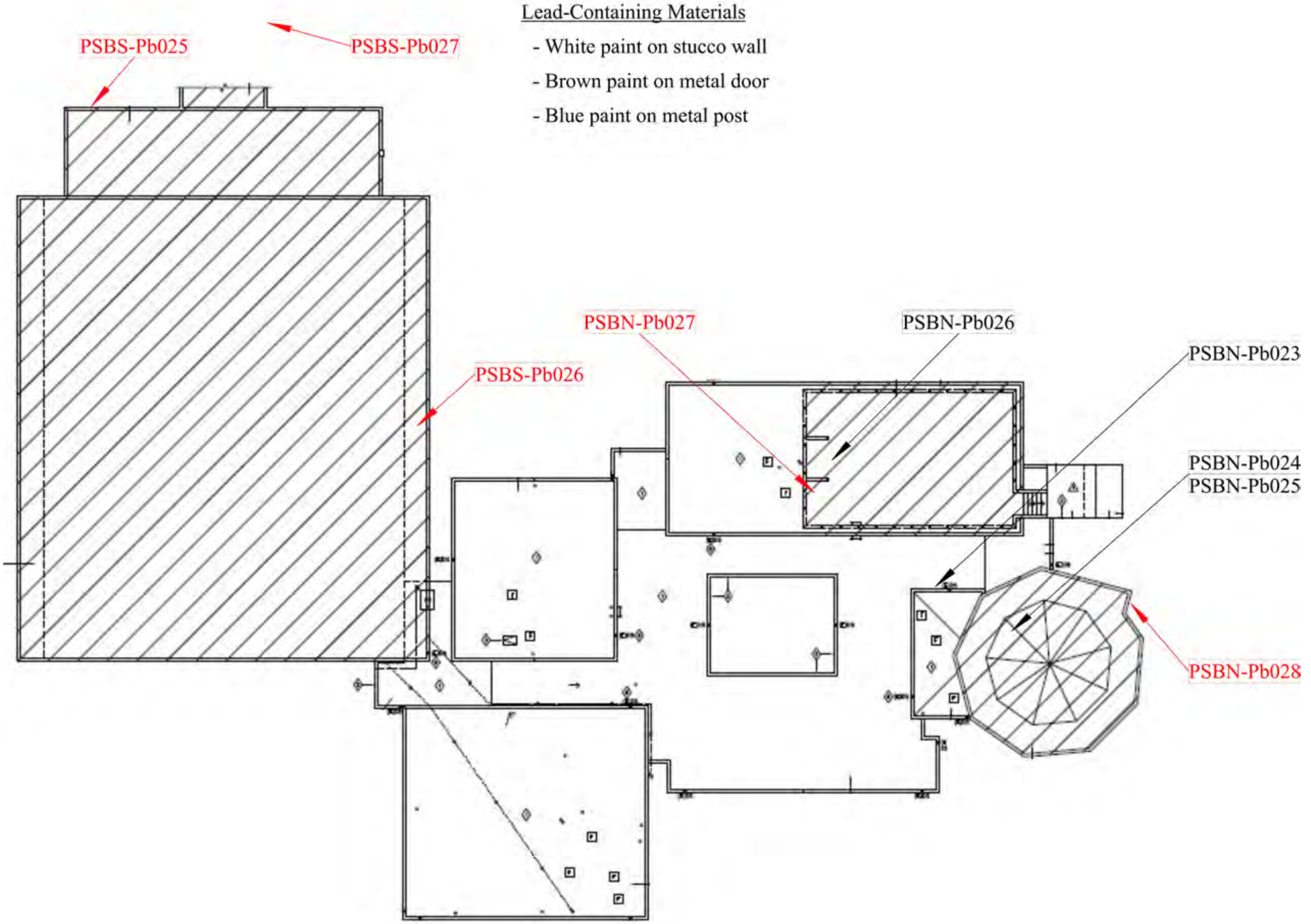
CELEBRATING 35 YEARS OF EXCELLENCE · 1986-2021

–N→



Physical Science Building, Exterior – Lead Sample Location Map

SAMPLE LOCATION MAP

Contra Costa College New Science Building Project
2600 Mission Bell Drive
San Pablo, CA 94806
FACS # PJ63338, May 24 to June 2, 2021

LEGEND

Positive Lead Bulk Sample Location: PSBS – Pb025, Pb026, Pb027
PSBN – Pb027, Pb028

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–N→

▨ - 12" x 12" White w/ blue specks FT

▧ - Gray VSF

▨ - Blue carpet

▨ - Red carpet

▧ - Brown carpet

▧ - 12" x 12" Brown w/ white specks FT

▧ - 12" x 12" Dark gray w/ white streaks FT

🟦 - 12" x 12" Blue w/ white streaks FT

🟥 - 12" x 12" Red FT

▦ - 2" x 2" Gray ceramic FT and grout

Physical Science Building, North Area – Homogeneous Area Map

HOMOGENEOUS AREA MAP

Contra Costa College New Science Building
Project
2600 Mission Bell Drive
San Pablo, CA 94806
FACS # PJ63338, May 24 to June 2, 2021

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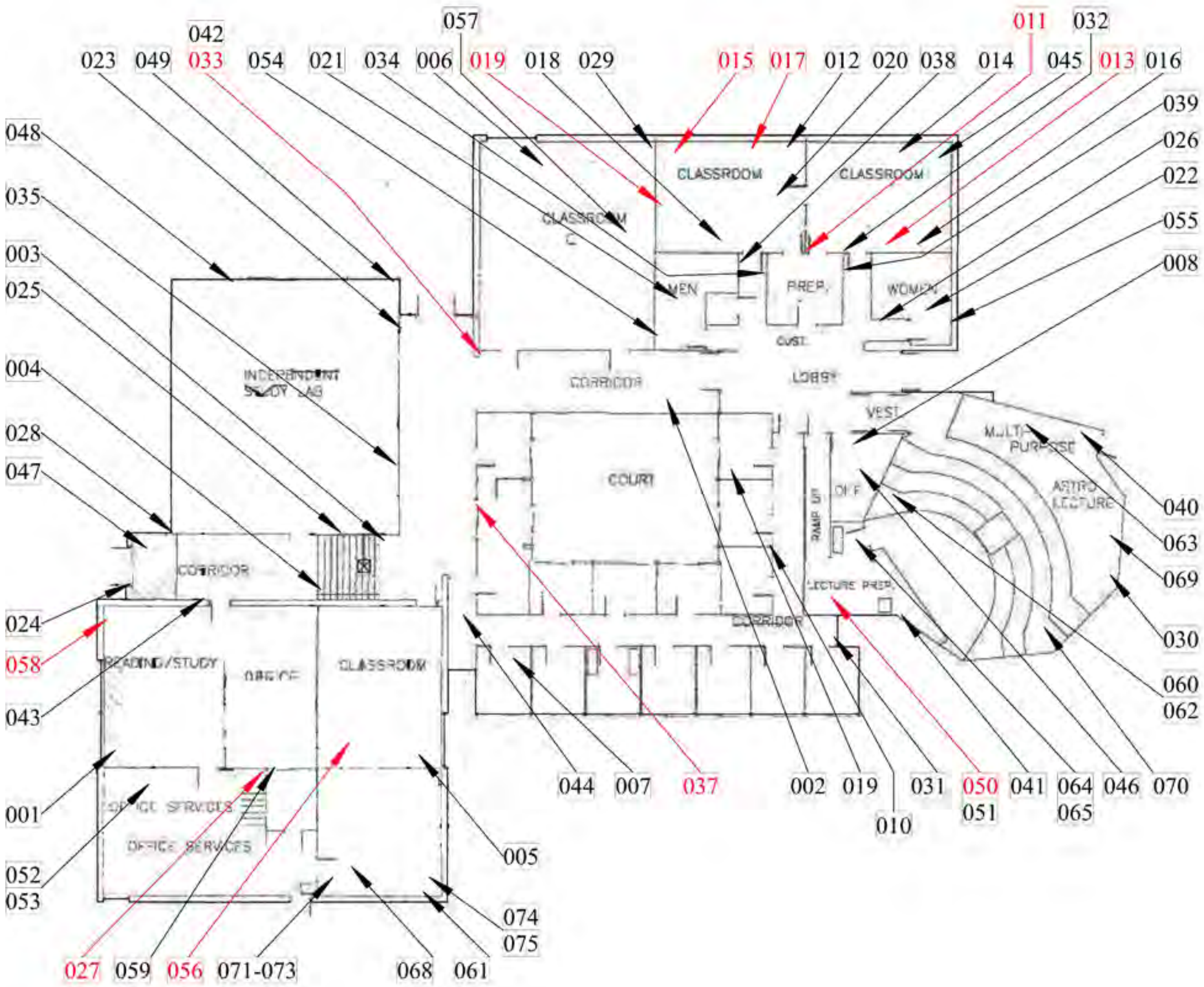
Forensic Analytical Consulting Services
CELEBRATING 35 YEARS OF EXCELLENCE · 1986–2021

–N→



Asbestos-Containing Materials

- 12" x 12" Brown w/ white specks FT over black mastic
- 12" x 12" Blue w/ white streaks FT over black mastic
- 12" x 12" Beige w/ gray streaks FT over black and brown mastic
- 12" x 12" Red FT over black mastic
- 12" x 12" Gray w/ black dots FT over black mastic
- Wallboard/ joint compound
- Wall texture large splotch
- Wall texture orange peel splotch
- White sink undercoat
- Black lab table
- Black window caulking

Physical Science Building – North Area

SAMPLE LOCATION DRAWING

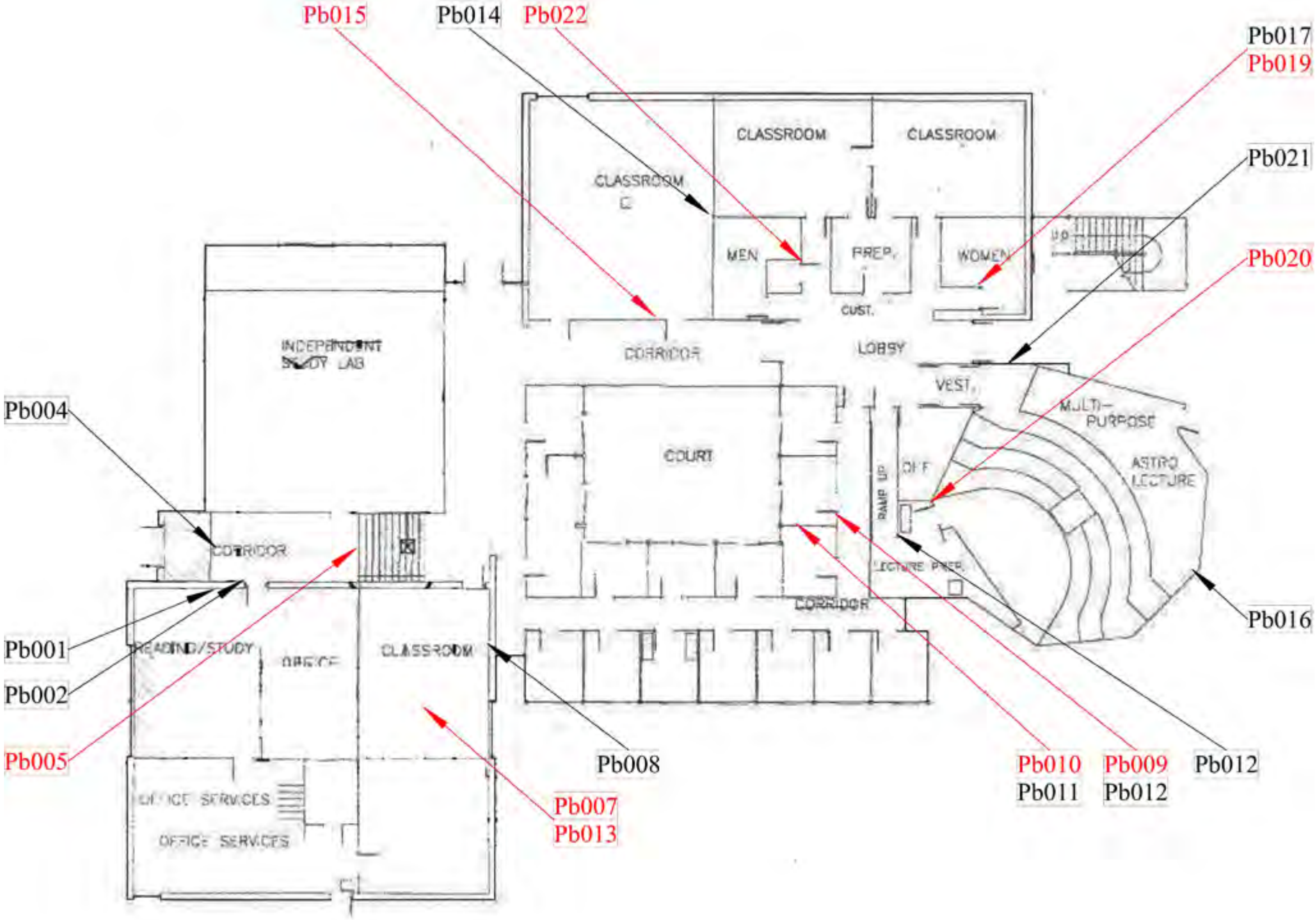
Contra Costa College New Science Building Project
2600 Mission Bell Drive
San Pablo, CA 94806
FACS # PJ63338, May 24 to May 28, 2021

LEGEND

Positive Asbestos Bulk Sample Location: PSBN – 011, 013, 015, 017, 019, 027, 033, 037, 050, 056, 058

FACS 35
Forensic Analytical Consulting Services
CELEBRATING 35 YEARS OF EXCELLENCE · 1986–2021

–N→



Lead-Containing Materials

- Gray paint on metal handrail
- Red paint on metal duct
- Black paint on metal doorframe
- White paint on metal doorframe
- Yellow paint on metal fixture
- Brown paint on metal doorframe
- Red ceramic wall tile
- Yellow paint on gypsum board wall
- Red paint on metal beam

Physical Science Building, North Area, Interior – Lead Sample Location Map

SAMPLE LOCATION MAP

Contra Costa College New Science Building Project
2600 Mission Bell Drive
San Pablo, CA 94806
FACS # PJ63338, May 24 to June 2, 2021

LEGEND

Positive Lead Bulk Sample Location: PSBN – Pb005, Pb007, Pb009, Pb010, Pb013, Pb015, Pb019, Pb020, Pb022

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Forensic Analytical Consulting Services
CELEBRATING 35 YEARS OF EXCELLENCE · 1986–2021

N →

▨ - 12" x 12" Gray w/ green streaks FT
▨ - 9" x 9" Tan w/ brown streaks FT
▩ - 12" x 12" Beige w/ dark gray and white specks FT
▨ - 12" x 12" Dark gray w/ white streaks FT
▨ - 12" x 12" Red w/ black streaks FT
▩ - 12" x 12" Light brown w/ white streaks FT

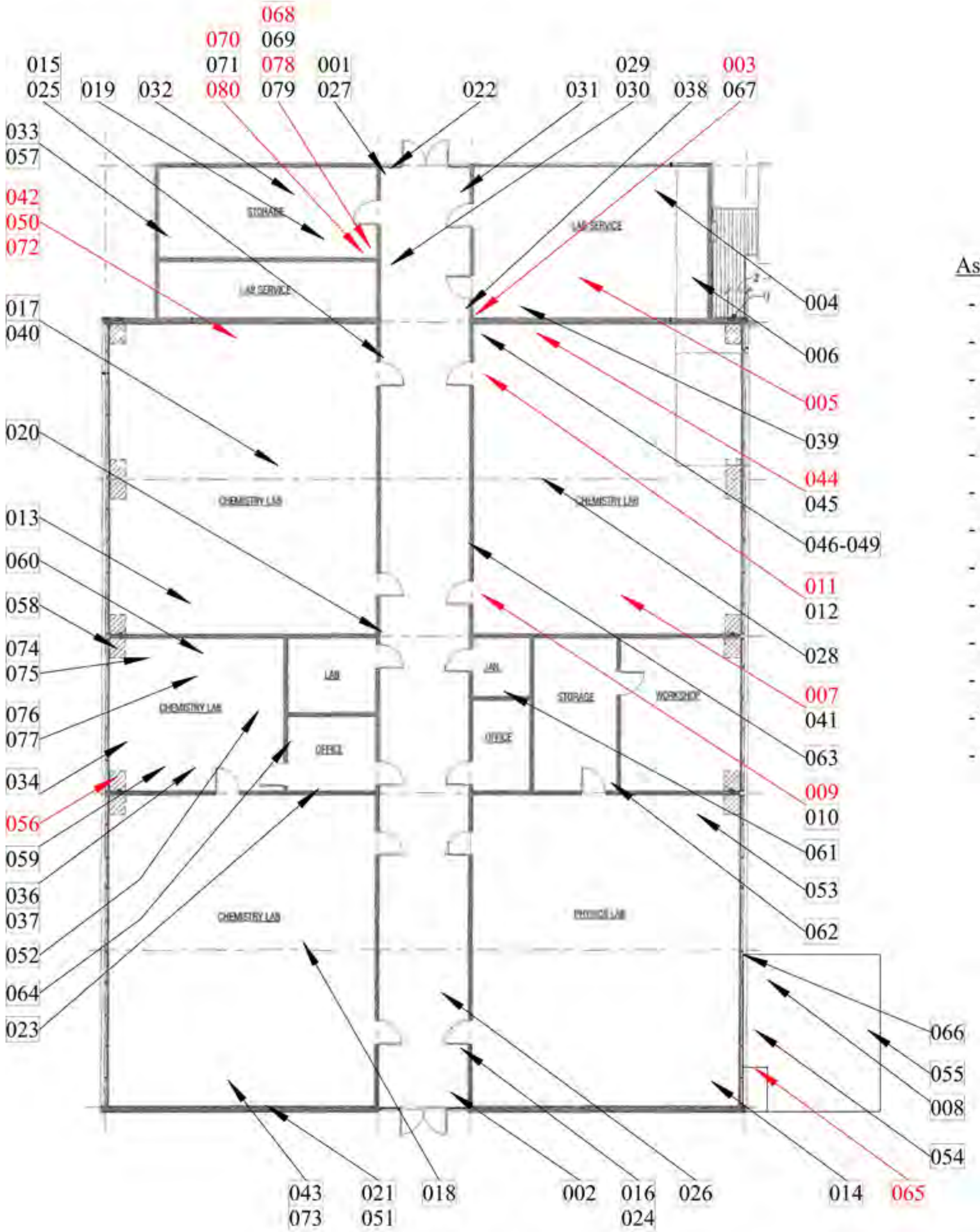
Physical Science Building, South Area – Homogeneous Area Map

HOMOGENEOUS AREA MAP

Contra Costa College New Science Building Project
2600 Mission Bell Drive
San Pablo, CA 94806
FACS # PJ63338, May 24 to June 2, 2021

FACS 35
Forensic Analytical Consulting Services
CELEBRATING 35 YEARS OF EXCELLENCE · 1986–2021

–N→



Asbestos-Containing Materials

- 9" x 9" Tan w/ brown streaks FT over black mastic
- 12" x 12" Beige w/ dark brown and white streaks FT over black mastic
- 12" x 12" Dark gray w/ white streaks FT over black mastic
- 12" x 12" Red w/ black streaks FT over black and yellow mastic
- 12" x 12" Light brown w/ white streaks FT over yellow mastic
- Black exhaust system table top
- Gray exhaust system transite panel
- Black exhaust system transite panel
- Wallboard/ joint compound
- Off-white transite pipe fitting
- Pipe penetration tape and insulation
- Transite exhaust hood
- White transite pipe

Physical Science Building – South Area

SAMPLE LOCATION DRAWING

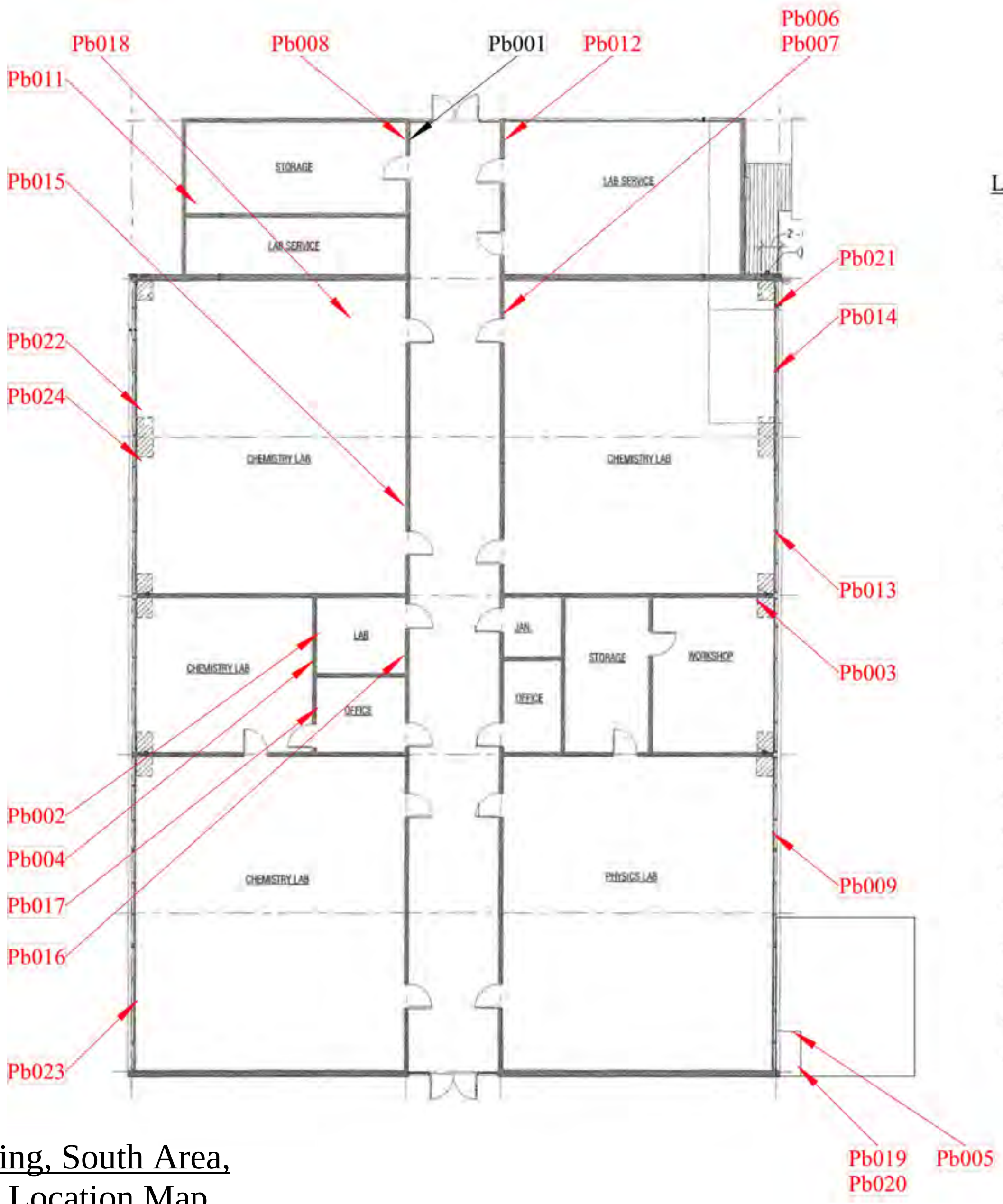
Contra Costa College New Science Building Project
2600 Mission Bell Drive
San Pablo, CA 94806
FACS # PJ63338, May 24 to May 28, 2021

LEGEND

Positive Asbestos Bulk Sample Location: PSBS - 003, 005, 007, 009, 011, 042, 044, 050, 056, 065, 068, 070, 072, 078, 080

FACS 35
Forensic Analytical Consulting Services
CELEBRATING 35 YEARS OF EXCELLENCE · 1986-2021

–N→



Lead-Containing Materials

- Light orange paint on plaster
- Off-white paint on plaster
- Orange paint on plaster
- Dark blue paint on drywall
- Brown paint on metal
- Baby blue paint on metal
- Brown paint on plaster
- Black paint on glass
- Red paint on metal
- Off-white paint on metal
- Off-white paint on drywall
- Green paint on metal
- Green paint on wood
- Baby blue paint on wood
- Brown paint on wood
- Off-white paint on wood
- Light brown paint on wood
- Dark blue paint on metal
- Black paint on metal
- Orange paint on metal
- Light orange paint on transite
- Dark blue paint on transite
- Dark brown paint on metal

Physical Science Building, South Area, Interior – Lead Sample Location Map

SAMPLE LOCATION MAP

Contra Costa College New Science Building Project
2600 Mission Bell Drive
San Pablo, CA 94806
FACS # PJ63338, May 24 to June 2, 2021

LEGEND

Positive Lead Bulk Sample Location: PSBS – Pb002, Pb003, Pb004, Pb005, Pb006, Pb007, Pb008, Pb009, Pb011, Pb012, Pb013, Pb014, Pb015, Pb016, Pb017, Pb018, Pb019, Pb020, Pb021, Pb022, Pb023, Pb024

FACS 35
Forensic Analytical Consulting Services
CELEBRATING 35 YEARS OF EXCELLENCE · 1986–2021

N

Appendix C

CDPH Form

State of California—Health and Human Services Agency
California Department of Public Health

LEAD HAZARD EVALUATION REPORT

Section 1 — Date of Lead Hazard Evaluation July 2, 2021

Section 2 — Type of Lead Hazard Evaluation (Check one box only)

☐ Lead Inspection ☐ Risk assessment ☐ Clearance Inspection ☑ Other (specify) Pre-Construction Inspection

Section 3 — Structure Where Lead Hazard Evaluation Was Conducted

Address [number, street, apartment (if applicable)]	City	County	Zip Code
2600 Mission Bell Drive	San Pablo	Contra Costa	94806

Construction date (year) of structure: Unknown

Type of structure: ☐ Multi-unit building ☐ School or daycare ☐ Single family dwelling ☑ Other College

Children living in structure? ☐ Yes ☑ No ☐ Don't Know

Section 4 — Owner of Structure (if business/agency, list contact person)

Name	Telephone number
Contra Costa Community College District	

Address [number, street, apartment (if applicable)]	City	State	Zip Code
500 Court Street	Martinez	CA	94553

Section 5 — Results of Lead Hazard Evaluation (check all that apply)

☐ No lead-based paint detected ☑ Intact lead-based paint detected ☐ Deteriorated lead-based paint detected

☐ No lead hazards detected ☐ Lead-contaminated dust found ☐ Lead-contaminated soil found ☐ Other

Section 6 — Individual Conducting Lead Hazard Evaluation

Name	Telephone number
Gary Lowe	(510) 266-4610

Address [number, street, apartment (if applicable)]	City	State	Zip Code
21228 Cabot Road	Hayward	CA	94545

CDPH certification number	Signature	Date
LRC-00003464	Gary B Lowe	7/30/2021

Name and CDPH certification number of any other individuals conducting sampling or testing (if applicable)

Martin Alvarez LRC-00001062, Peter Radzinski LRC-00002184

Section 7 — Attachments

A. A foundation diagram or sketch of the structure indicating the specifc locations of each lead hazard or presence of lead-based paint;
B. Each testing method, device, and sampling procedure used;
C. All data collected, including quality control data, laboratory results, including laboratory name, address, and phone number.

First copy and attachments retained by inspector

Second copy and attachments retained by owner

Third copy only (no attachments) mailed or faxed to:

California Department of Public Health
Childhood Lead Poisoning Prevention Branch Reports
850 Marina Bay Parkway, Building P, Third Floor
Richmond, CA 94804-6403
Fax: (510) 620-5656

CDPH 8552 (6/07)

Appendix D

FACS Personnel Certifications

State of California
Division of Occupational Safety and Health
Certified Site Surveillance Technician

Anthony T Aguilar
Name

Certification No. **19-6525**

Expires on **06/12/22**

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:	CERTIFICATE TYPE:	NUMBER:	EXPIRATION DATE:
 **Anthony Aguilar**	Lead Sampling Technician	LRC-00001334	6/11/2022

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD.

State of California
Division of Occupational Safety and Health
Certified Site Surveillance Technician

Virgilito C. Sevilla
Name

Certification No. **19-6720**

Expires on **10/06/21**

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

California Department of Public Health

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:	CERTIFICATE TYPE:	NUMBER:	EXPIRATION DATE:
 **Virgilito Sevilla**	Lead Sampling Technician	LRC-00002983	9/12/2021

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD.

STATE OF CALIFORNIA Gavin Newsom, Governor

DEPARTMENT OF INDUSTRIAL RELATIONS
Division of Occupational Safety and Health
Asbestos Certification & Training Unit
1750 Howe Avenue, Suite 460
Sacramento, CA 95825
(916) 574-2993 Office http://www.dir.ca.gov/dosh/asbestos.html acru@dir.ca.gov

805042382C **163**

April 07, 2021

Martin G Alvarez
344 Egret Place
Pittsburg CA 94565

Dear Certified Asbestos Consultant or Technician:

Enclosed is your certification card. **To maintain your certification, you must abide by the rules printed on the back of the certification card.**

Your certification is valid for a period of one year. If you wish to renew your certification, you must apply for renewal at least 60 days before the expiration date shown on your card. [8 CCR 341.15(h)(1)].

Please hold and do not send copies of your required AHERA refresher renewal certificates to our office until you apply for renewal of your certification.

Certificates must be kept current if you are actively working as a CAC or CSST. The grace period is only for those who are not actively working as an asbestos consultant or site surveillance technician.

Please notify our office via U.S. Postal Service or other carrier of any changes in your mailing or work address within 15 days of the change.

Sincerely,

Jeff Ferrell
Senior Safety Engineer

Attachment: Certification Card

cc: File

Renewal – Card Attached (Revised 06/2020)

State of California
Division of Occupational Safety and Health
Certified Asbestos Consultant

Martin G Alvarez
Name

Certification No. **98-2382**

Expires on **05/27/22**

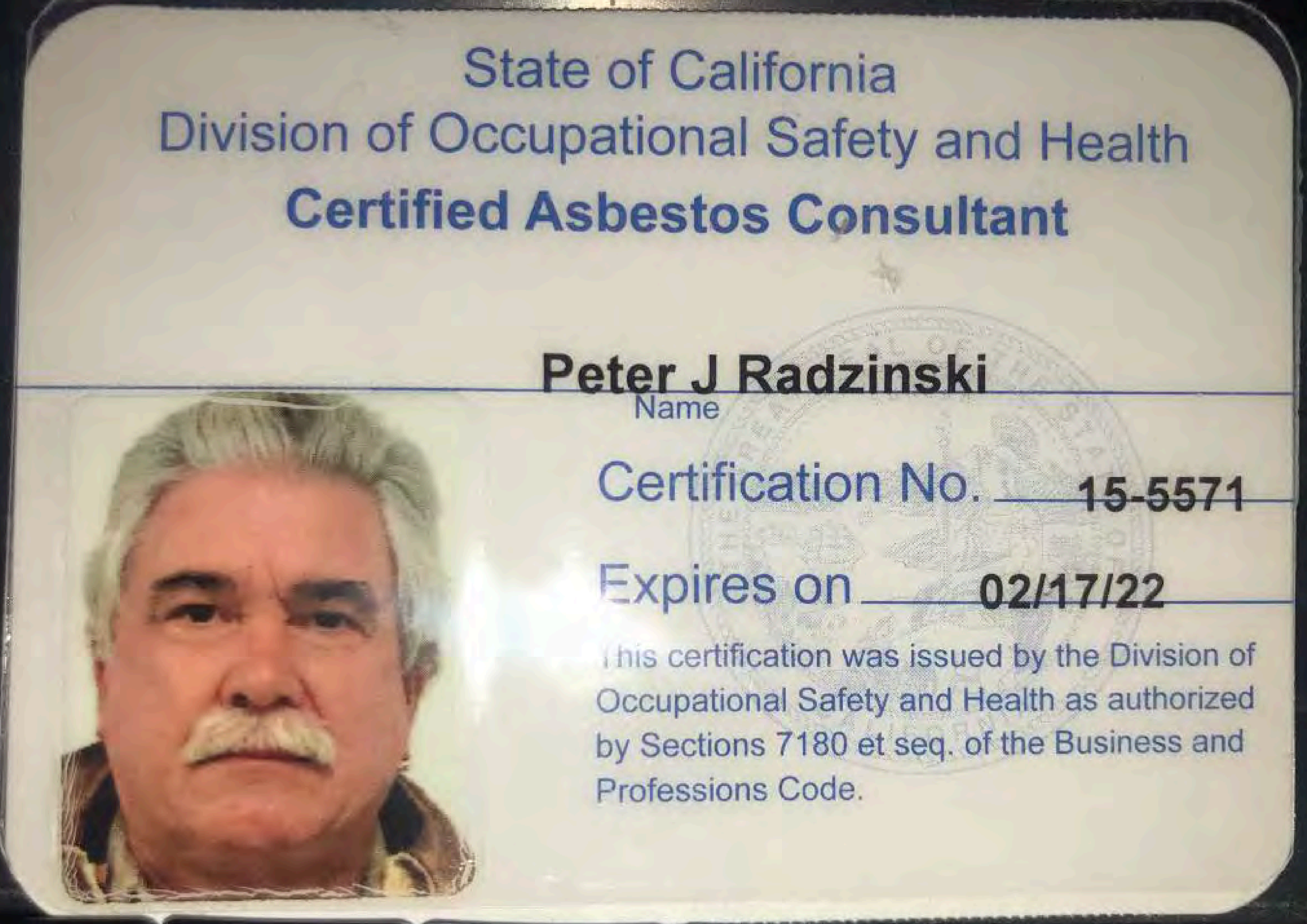
This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:	CERTIFICATE TYPE:	NUMBER:	EXPIRATION DATE:
 **Martin Alvarez**	Lead Inspector/Assessor	LRC-00001062	7/22/2021
	Lead Project Monitor	LRC-00001061	7/22/2021

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD.



State of California

Division of Occupational Safety and Health

Certified Asbestos Consultant

Peter J Radzinski

Name

Certification No. **15-5571**

Expires on **02/17/22**

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

California Department of
PublicHealth

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:	CERTIFICATE TYPE:	NUMBER:	EXPIRATION DATE:
 **Peter Radzinski**	Lead Project Monitor	LRC-00002185	8/7/2022
	Lead Sampling Technician	LRC-00002184	8/7/2022

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD.

STATE OF CALIFORNIA Gavin Newsom, Governor

DEPARTMENT OF INDUSTRIAL RELATIONS
Division of Occupational Safety and Health
Asbestos Certification & Training Unit
1750 Howe Avenue, Suite 460
Sacramento, CA 95825
(916) 574-2993 Office http://www.dir.ca.gov/dosh/asbestos.html acru@dir.ca.gov

609214079C 297 301

February 24, 2021

Gary B Lowe
2036 Fir Street
Concord CA 94519

Dear Certified Asbestos Consultant or Technician:

Enclosed is your certification card. **To maintain your certification, you must abide by the rules printed on the back of the certification card.**

Your certification is valid for a period of one year. If you wish to renew your certification, you must apply for renewal at least 60 days before the expiration date shown on your card. [8 CCR 341.15(h)(1)].

Please hold and do not send copies of your required AHERA refresher renewal certificates to our office until you apply for renewal of your certification.

Certificates must be kept current if you are actively working as a CAC or CSST. The grace period is only for those who are not actively working as an asbestos consultant or site surveillance technician.

Please notify our office via U.S. Postal Service or other carrier of any changes in your mailing or work address within 15 days of the change.

Sincerely,

Jeff Ferrell
Senior Safety Engineer

Attachment: Certification Card

cc: File

State of California
Division of Occupational Safety and Health
Certified Asbestos Consultant

Gary B Lowe
Name

Certification No. **06-4079**

Expires on **04/19/22**

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

Renewal – Card Attached (Revised 06/2020)

California Department of
PublicHealth

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:	**CERTIFICATE TYPE:**	**NUMBER:**	**EXPIRATION DATE:**
 **Gary Lowe**	Lead Inspector/Assessor	LRC-00003464	12/7/2021
	Lead Project Monitor	LRC-00003463	12/7/2021

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD.

Right People

Right Perspective

Right Now

www.forensicanalytical.com

Storm Water Pollution Prevention Plan

For:
Contra Costa College
New Science Building
2600 Mission Bell Drive
San Pablo, California 94806
APN: 416-140-021

Grading Permit No: TBD

Discharger:
Ines Zildzic
500 Court Street
Martinez, CA 94553

Contractor:
TBD

Qualified SWPPP Practitioner (QSP)
TBD (By Contractor)

Qualified SWPPP Developer (QSD)
Dayne Johnson
BKF Engineers
1646 N. California Blvd, Suite 400
Walnut Creek, California 94596
(925) 940-2200

SWPPP Preparation Date:
November 11, 2021
BKF # 20175092

Estimated Project Phased Dates:
Increment 3: From approximately January 31, 2022 through July 11, 2022

WDID No.:___TBD____

Contents

SWPPP Certification Statement by Qualified SWPPP Developer (QSD)

Project Name: **Contra Costa College New Science Building**

City Permits: ***Not Applicable –No local agency permit required - Project under jurisdiction of Division of the State Architect***

BKF Project Number: ***20175092***

“This document and all attachments were prepared under my direction or supervision as a Qualified SWPPP Developer. To the best of my knowledge and belief, the information submitted is true, accurate, and complete."

QSD’s Signature

November 11, 2021
Date of SWPPP Preparation

Dayne Johnson, Project Manager
QSD’s name and title

(925) 940-2200
Telephone Number

QSP/QSD #C61408
QSD’s Qualifying Professional Registration

SWPPP Certification Statement by Discharger

Discharger (Owner or Legally Responsible Person - LRP)
Certification of the Storm Water Pollution Prevention Plan

Project Name: **Contra Costa College New Science Building**

City Permits: ***Not Applicable –No local agency permit required - Project under jurisdiction of Division of the State Architect***

BKF Project Number: ***20175092***

"I certify under penalty of law that this document and all attachments were under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Discharger (LRP)'s Signature

Date

Ines Zildzic , Authorized Representative
Discharger's name and title

Telephone Number

Section 1 SWPPP Requirements

1.1 Introduction

This SWPPP has been prepared to comply with the California's General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (General Permit) - State Water Resources Control Board (SWRCB) Order No. 2009-0009-DWQ under NPDES No. CAS000002 and modified by 2010-0014-DWQ and 2012-006-DWQ.

The Contractor shall designate a Qualified SWPPP Practitioner (QSP) to implement the provisions of the SWPPP and the Construction Site Monitoring Program (CSMP), and shall comply with the narrative effluent standards listed below:

- Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.
- Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT (Best *"economically"* Available Technology) for toxic and non-conventional pollutants and BCT (Best Conventional *"pollution control"* Technology) for conventional pollutants.

The contractor shall notify the Owner if the QSP is no longer associated with the work. The Owner shall be notified within 24 hours and a qualified replacement named within 72 hours. The replacement QSP shall meet the Permit certification requirements.

The QSP shall have the training described in Section 5 of this SWPPP and shall be listed on the SMARTS system prior to the start of construction. The Legally Responsible Person (LRP) shall ensure that SWPPPs for all traditional project sites are developed and amended or revised by a Qualified SWPPP Developer (QSD).

The QSP is responsible for erosion control on the site and shall supplement the erosion control plan shown on Construction Documents where the facilities shown on the Construction Documents are not preventing erosion. The QSP shall make corrective measures as soon as erosion is observed and shall report these measures to the QSD by e-mail within 24 hours.

This SWPPP has been designed to address the following objectives:

1. All pollutants and their sources, including sources of sediment associated with construction, construction site erosion and all other activities associated with construction activity are controlled.
2. Where not otherwise required to be under a Regional Water Quality Control Board (RWQCB) permit, all non-stormwater discharges are identified and either eliminated, controlled, or treated.
3. Site BMPs are effective and result in the reduction or elimination of pollutants in stormwater discharges and authorized non-stormwater discharges from construction activity to the Best Available Technology/Best Control Technology (BAT/BCT) standard.
4. Calculations and design details as well as BMP controls for site run-on are complete and correct.
5. Stabilization BMPs installed to reduce or eliminate pollutants after construction are completed.

6. Identify post-construction BMPs, which are those measures to be installed during construction that are intended to reduce or eliminate pollutants after construction is completed. See Section 3.4 for post-construction BMPs.
7. Identify and provide methods to implement BMP inspection, visual monitoring, and Construction Site Monitoring Program (CSMP) requirements to comply with the General Permit.

1.2 Permit Registration Documents

The LRP must electronically file Permit Registration Documents (PRDs) prior to the commencement of construction activity. PRDs are to be submitted to the Storm Water Multiple Application and Report Tracking System (SMARTS). Failure to obtain coverage under this General Permit for storm water discharges to waters of the United States is a violation of the Clean Water Act and the California Water Code. See Appendix B for submitted Permit Registration Documents.

	Name of PRD	Date of Preparation	Date of Online Submittal
☒	Notice of Intent (NOI)	11/12/2021	11/12/2021
☒	Risk Assessment	11/12/2021	11/12/2021
☒	Site Map	11/12/2021	11/12/2021
☒	SWPPP	11/12/2021	11/12/2021
☒	Annual Fee	-	-
☒	Signed Certification Statement	TBD	TBD

1.3 SWPPP Availability and Implementation

The QSP is responsible for making available the original SWPPP at the construction site during working hours while construction is occurring. The SWPPP shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle, and is not currently at the construction site, current copies of the BMPs and map/drawing shall be left with the field crew, and the original SWPPP shall be made available via a request by radio/telephone.

This SWPPP shall be implemented concurrently with the start of ground disturbing activities and remain in effect until a Notice of Termination for the site is approved by the Regional Water Quality Control Board.

1.4 SWPPP Amendments

All amendments proposed or implemented to the SWPPP shall be approved and signed by the QSD. Amendments are to be dated, included in the SWPPP in Appendix C, and logged in Appendix C.

1.5 Retention of Records

The QSP is required to maintain a paper or electronic copy of all required records throughout construction, and provide copies of these reports to the LRP when requested during the job and at the end of the job. The LRP shall retain a copy of all required records for three years from the date generated or the date submitted to the State Water Board or Regional Water Boards, whichever is the latter. A copy of these records must be available at the construction site and within Appendix O of this SWPPP until construction is complete. The LRP shall furnish the RWQCB, SWRCB, or US Environmental Protection Agency (EPA) any requested information to determine compliance with this General Permit within a reasonable time.

1.6 Required Non-Compliance Reporting

The QSP is required to properly document reportable discharges or other violations of the General Permit. ***Please see Section 2.3 for potential impacts to SWPPP requirements.*** As discussed in the CSMP in Appendix S, the QSP shall submit all sampling reports and all field or laboratory analytical data electronically using the SMARTS system, as part of the Annual Report, including but not limited to the following:

- Any discharge violations or to comply with RWQCB enforcement actions.
- Discharges which contain a hazardous substance in excess of reportable quantities established in 40 CFR §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

Documentation of all reportable exceedances shall be included in this SWPPP under Appendix D**.**

1.7 Annual Report

The QSP is responsible for preparing and electronically submitting an Annual Report, which must be certified by the LRP no later than September 1st of each year. Reporting requirements are identified in Section XVI of the General Permit and include (but are not limited to) providing a summary of:

1) Sampling and analysis results including laboratory reports, analytical methods and reporting limits and chain of custody forms (if applicable to this Risk Level 1 site);
2) Corrective actions and compliance activities, including those not implemented;
3) Violations of the General Permit;
4) Date, time, place, and name(s) of the inspector(s) for all sampling, inspections, and field measurement activities;
5) Visual observation and sample collection exception records; and
6) Training documentation of all personnel responsible for General Permit compliance activities.

The LRP is responsible for certifying the Annual Report via SMARTS, and is required to retain paper copies of all submitted documents for a period of 3 years after the Notice of Termination is accepted.

1.8 Changes to Permit Coverage

The Construction General Permit allows a permittee to reduce or increase the total acreage covered under the General Permit when a portion of the project is complete and/or conditions for termination of coverage have been met; when ownership of a portion of the project is sold to a different entity; or when new acreage is added to the project. To change the acreage covered, the permittee must electronically file modifications to PRDs (revised NOI, site map, SWPPP revisions as appropriate, and certification that new landowners have been notified of applicable requirements to obtain permit coverage, including name, address, phone number, and e-mail address of new landowners) in accordance with requirements of the General Permit within 30 days of a reduction or increase in total disturbed area.

Include any updates to PRDs submitted via SMARTS in Appendix E. Document any related SWPPP revisions/amendments in Appendix C.

1.9 Construction Site Monitoring Program

The QSP is to implement the Construction Site Monitoring Program (CSMP) in accordance with the requirements found in Appendix A. The CSMP is included in this SWPPP in Appendix N.

1.10 Notice of Termination

To terminate coverage under the General Permit, a Notice of Termination (NOT) must be submitted electronically via SMARTS. A "final site map" and photos are required to be submitted with the NOT. Filing a NOT certifies that all General Permit requirements have been met. The NOT is submitted when the construction project is complete, and within 90 days of meeting all General Permit requirements for termination and final stabilization including:

- The site will not pose any additional sediment discharge risk than it did prior to construction activity.
- All construction related equipment, materials and any temporary BMPs no longer needed are removed from the site.
- Post-construction storm water management measures are installed, and a long-term maintenance plan that is designed for a minimum of five years has been developed.

The NOT must demonstrate through photos that the project meets all of the requirements of Section II.D.1 of the General Permit by the 70% final cover method (no computational proof required)

1.11 Contractor Activities Location Map

Locations of storage areas for waste, vehicles, service, loading/unloading of materials, access (entrance/exits) points to construction site, fueling, and water storage, water transfer for dust control and compaction practices shall be shown on this map and updated regularly by the QSP. All updates of the Contractor Activities Location Map shall be included in Appendix S.

1.12 Other Plans/Permits

The following list indicates other local, state, and federal permits that are known to be associated with this project, as well as other pertinent reports and investigations. Information regarding these permits, approvals, reports or investigations may be obtained through the owner of the project and may be included in Appendix P ~ Agency Approvals and Miscellaneous Documents.

- "Geotechnical Engineering Investigation Report, C-4016 New Allied Science Building, Contra Costa College, 2600 Mission Bell Drive, San Pablo, California." Kleinfelder Project No.: 20181569.001A, Dated: October 17, 2017
- "Contra Costa College New Science Building" plans, prepared by Smithgroup and BKF Engineers dated October 08, 2021, revised Novermber 05, 2021

Section 2 Project Information

2.1 Project and Site Description

The Contra Costa College New Science Building project is located at 2600 Mission Bell Drive in San Pablo, California. The site is accessible from Campus Drive. The 2.64 acre site is contained within the Contra Costa College property. The New Science Building project involves three incements. Increment 3 will involve the demolition of existing buildings, hardscape, utilities, and landscape.

Initial construction activities during Increment 3 will include:
- Demolition of Existing Site
- Rough Grading

To reduce pollutant run-off, construction practices may include, but are not held or limited to:
- Soil Stabilization Practices
- Practices to Reduce Tracking Sediment Onto Public and Private Roads
- Practices to Minimize Wind Erosion
- Practices to Minimize Contact with Storm Water
- Pre-Construction Control Practices

Site improvements will include:
- Fine Grading

The rainy season in this area is October 15th through April 15th. However, rainfall does occur outside this period and BMPs are required year round.

Site elevations range from approximately 122 at the northeast draining west to an elevation of approximately 95. Existing overland release paths across the site will be maintained to accommodate run-off from upstream properties. The proposed developed project run-off will be detained and treated on site per City of San Pablo and Contra Costa County requirements before discharging to the public storm drain system. Run-on from off-site tributary areas enters the site from the street and neighboring open space to the north, and flows overland into the adjacent storm drain system within the limits of the property. Run-off will be collected through a network of area drains, subdrains, and pipes throughout the site and directed to the existing storm drain system on the property.

2.2 Site Data / Storm Water Run-On from Off-Site Areas

Site Data

Total Site Area = **115,025 sf = 2.64 acres**

Existing / Pre-Construction Site Conditions
Impervious Area Percentage = **59.3%**
Impervious Site Area = 68,247 sf = 1.57 acres

Impervious Site Area Weighted Run-off Coefficient = 0.95
Pervious Site Area = 46,778 sf = 1.074 acres
Pervious Site Area Weighted Run-off Coefficient = 0.50
Total Existing Site Area Weighted Run-off Coefficient = **0.77**

Proposed / Post-Construction Site Conditions
Impervious Area Percentage = **10.3%**
Impervious Site Area = 12,300 sf = 0.28 acres
Impervious Site Area Weighted Run-off Coefficient = 0.95
Pervious Site Area = 102,725 sf = 2.34 acres
Pervious Site Area Weighted Run-off Coefficient = 0.50
Total Proposed Site Area Weighted Run-off Coefficient = **0.55**

Run-On Discharges from Off-Site Areas
(Existing Conditions - 100 Year Event)
Area Run-off Coefficient = 0.77
Area Rainfall Intensity = 4.42 in/hr
Drainage Area = 2.64 acres
Site Area Run-on Discharge = **8.95 cfs**

Run-on from off-site tributary areas enters the site from the northeast and flows overland to the southwest. The site geometry and topography this flow can be accommodated in overland swales at depths less than 0.3’. The flows across the site are incorporated into the site grading and drainage design. The QSP is responsible for maintaining a non-erosive channel lining for the swales that convey off-site flows through the site.

2.3 Findings of the Construction Site Sediment and Receiving Water Risk Determination

The risk level for this project is 1.

The site’s RUSLE factors were determined as follows:

- Rainfall/Runoff (R) - EPA On-Line Rainfall Erosivity Factor Calculator
- Soil Erodibility (K) - GIS Map
- Length and Steepness of Slope (LS) - Site Specific Option

Since this is a Risk Level 1 site, NALs and NELs are not applicable.

All risk determination calculations are included in the SWPPP as a part of Appendix B.

As described above in Section 1.6 “Required Non-Compliance Reporting”, the QSP is required to properly document reportable discharges or other violations of the General Permit. Exceedances and violations may result in the project being subject to the more stringent monitoring and reporting requirements applicable to a Risk Level 2 or 3 project. This would require a major amendment to the project SWPPP, including an expanded CSMP.

2.4 Construction Schedule

Listed below are the identified phases of construction and their proposed start dates:

Increment 3 - From approximately January 21, 2022 through July 11, 2022.
Abatement and Demolition

This schedule is subject to change depending on permitting processes, phasing, and conditions encountered during construction and weather conditions. The QSP is required to keep an updated and detailed schedule in Appendix F.

2.5 Potential Construction Site Pollutant Sources

The following is a list of example construction materials and activities that have the potential to contribute pollutants, other than sediment, to storm water run-off:

- Vehicle fluids, including oil, grease, petroleum, and coolants
- Asphaltic emulsions associated with asphalt concrete paving operations
- Cement materials associated with Portland cement concrete (PCC) paving operations, drainage structures, and median barriers
- Base and subbase material
- Joint and curing compounds
- Concrete curing compounds
- Paints
- Solvents, thinners, and acids
- Sandblasting materials
- Raw landscaping materials and wastes (topsoil, plant materials, herbicides, fertilizers, mulch, pesticides)
- BMP materials (sandbags)
- Treated lumber (materials and waste)
- PCC rubble
- General litter

Construction activities that have the potential to contribute sediment to storm water discharges include:

- Clear and grub operations
- Grading operations
- Soil import and export operations
- Utility excavation operations
- Sandblasting operations
- Landscaping operations
- Painting

The QSP is required to maintain an ongoing and active list of potential pollutant sources, construction activities, and identify areas of the site where additional BMPs are necessary to reduce or prevent pollutants in discharges. This “SWPPP Construction Site Pollutant Checklist” must be consistent with the Material Safety Data Sheets (MSDS) for the project. It is recommended that the SWPPP and MSDS be kept together at the site office, together with the Stormwater Management Plan.

A template for the SWPPP Construction Site Pollutant Checklist is provided in Appendix G. In completing the list, the QSP, contractor, and subcontractors shall address at a minimum:

1) The quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.
2) The degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.
3) In describing method of control and protection, Contractor shall consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

2.6 Identification of Non-Storm Water Discharges

Non-storm water discharges include a wide variety of sources, including improper dumping, spills, or leakage from storage tanks or transfer areas. Any release of contained stormwater that is not concurrent with rainfall is considered as a non-stormwater discharge (including pumping from excavaations). Non-storm water discharges may contribute significant pollutant loads to receiving waters. Measures to control spills, leakage, and dumping, and to prevent illicit connections during construction, must be addressed through structural as well as non-structural BMPs.

The QSD is required to identify all potential non-storm water discharges within the project. All project activities shall be examined to determine what discharges will be generated or may be required in order to complete each activity, including mobile-type operations.

Examples of common construction activities that may result in non-storm water discharges on a project:

- Vehicle and equipment cleaning, fueling and maintenance
- Surface water diversions,
- Dewatering operations
- Saw-cutting
- Drilling
- Boring
- AC and PCC grinding
- AC and PCC recycling
- Concrete mixing
- Crushing
- Bridge cleaning
- Blasting
- Painting

- Hydro-demolition
- Mortar mixing
- Air-blown mortar

Section 3 Best Management Practices

3.1 BMP Implementation

The Contractor is required to install BMPs as shown on the Erosion Control Plans included in Appendix R and implement/install the BMPs listed in this section of the SWPPP. The Contractor shall modify the Erosion Control Plan to reflect the phase of construction and the weather conditions. The Contractor shall install BMPs before the site is disturbed (e.g., to provide protection during grading operations or to reduce or minimize pollution from historic areas of contamination during construction). The erosion control plan shall be implemented year round.

A BMP Consideration Checklist has been provided in Appendix H, followed by the Fact Sheets for the BMPs that are recommended for this project, which are included in the following sections. BMPs will be installed in a sequence to follow the progress of the grading and construction. As each area of the site is disturbed, BMPs will be installed to conform to the specific site requirements. In general, the project will have limited areas exposed at any time. Where practical, grading will occur during dry periods. Plantings shall be installed with sufficient time before rainfall begins to stabilize the soil. If this is not practical, physical means such as erosion blankets shall be used or sediment trapping devices shall be installed.

3.2 Erosion and Sediment Control

Identified in this section is a system of erosion and sediment control BMPs that have been found to be effective. As a result, there is a reduction of sediment related pollutants in storm water discharges and authorized non-storm water discharges from construction activity to the BAT/BCT standard. This General Permit additionally requires that SWPPPs be designed to address post-construction BMPs installed to reduce pollutants after construction.

3.2.1 Erosion Control

Erosion control is any source control practice that protects the soil surface and prevents soil particles from being detached by rainfall, flowing water, or wind. Erosion control consists of using project scheduling and planning to reduce soil or vegetation disturbance (particularly during the rainy season), preventing or reducing erosion potential by diverting or controlling drainage, as well as preparing and stabilizing disturbed soil areas. It should be noted that several additional BMPs, such as Check Dams (SE-4) and Fiber Rolls (SE-5) can be used for erosion control, by reducing slope length or steepness, as well as for sediment control (i.e., perimeter control or retention of sediment).

All inactive soil disturbed areas on the project site, and most active areas prior to the onset of rain, must be protected from erosion. Soil disturbed areas may include relatively flat areas as well as slopes. Typically, steep slopes and large exposed areas require the most robust erosion controls. Flatter slopes and smaller areas still require protection, but less costly materials may be appropriate for these areas, allowing savings to be directed to the more robust BMPs for steep slopes and large exposed areas. To be effective, erosion control BMPs for slopes at disturbed areas must be protected from concentrated flows.

Some erosion control BMPs can be used effectively to temporarily prevent erosion by concentrated flows. These BMPs, used alone or in combination, prevent erosion by intercepting, diverting, conveying, and discharging concentrated flows in a manner that prevents soil detachment and transport. Temporary concentrated flow conveyance controls, such as Earth Dikes and Drainage Swales (EC-9) and Velocity Dissipation Devices (EC-10) may be required to direct run-on around or through the project in a non-erodible fashion.

The Contractor will implement the following practices for effective erosion control during construction:

- Provide effective soil cover for inactive areas and all finished slopes, open space, utility backfill, and completed lots. Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.
- Limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.
- Implement/install the erosion control BMPs listed below.

Erosion Control BMPs

The California Stormwater BMP Handbook - Construction contains fact sheets for erosion control BMPs applicable to a wide range of project types and potential construction activities. The table below indicates the erosion control BMPs that are required, because they are certain to be needed, and those that should be implemented as needed. As indicated in the footnotes under "Required", some BMPs serve similar purposes and shall be implemented/installed in the combination deemed most suitable for the site conditions by the QSP.

BMP#	BMP Name	Required	Implement as Needed
EC-1	Scheduling	X	
EC-2	Preservation of Existing Vegetation	X	
EC-3	Hydraulic Mulch [1]	X	
EC-5	Soil Binders [1]	X	
EC-6	Straw Mulch [1]	X	
EC-8	Wood Mulching	X	
EC-9	Earth Dikes and Drainage Swales		X
EC-10	Velocity Dissipation Devices		X
EC-15	Soil Preparation / Roughening [2]		X
EC-16	Non-Vegetative Stabilization [2]		X
1) BMP fact sheet updated in 2009 2) New BMP fact sheet added in 2009			

Appendix H includes copies of the fact sheets of all the BMPs selected for this project.

Temporary Erosion Control BMPs as shown in the above table will be implemented per the SWPPP.

EC-1 Scheduling

The project is scheduled to complete tasks requiring soil disturbance by June 10, 2020. Much of the work during the winter will on vertical construction.

EC-2 Preservation of Existing Vegetation

Areas of protected vegetation are identified on the plans and will be protected using safety fence.

EC-3 Temporary Hydraulic Mulch (Bonded Stabilized Fiber Matrix)

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. Temporary hydraulic mulch will be used to stabilize disturbed soils.

- 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.
- Avoid mulch over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.
- 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.
- Use a mulch with a tackifier component.

EC-5, EC-6 and EC- 8 Temporary Erosion Control (various)

Temporary erosion control (various) may be used.

EC-9 Earth Dikes

No earth dikes are necessary on the project.

EC-10 Outlet Protection

There are no outlets on the project sites. EC-10 is not necessary

EC-15 Slope Roughening

There are no locations on the project where slope roughening is necessary.

EC-16 Non-vegetative StabilizationStreambank Stabilization

There are no locations on the project where non-vegetative stabilization is necessary.

3.2.2 Sediment Control

Sediment control is any practice that traps soil particles after they have been detached and moved by rain, flowing water, or wind. Sediment control measures are usually passive systems that rely on filtering or settling the particles out of the water or wind that is transporting them.

Sediment control BMPs include those practices that intercept and slow or detain the flow of storm water to allow sediment to settle and be trapped. Sediment control practices can consist of installing linear sediment barriers (such as silt fences, gravel bag berms, or fiber rolls); and constructing check dams, a sediment trap or sediment basin to retain sediment on site. Linear sediment barriers are typically placed below the toe of exposed and erodible slopes, down-slope of exposed soil areas, around soil stockpiles, and at other appropriate locations along the site perimeter. Some BMPs are dual-purpose, such as Fiber Rolls and Check Dams. By reducing effective slope length or steepness, these BMPs reduce erosion as well as promote sedimentation.

Sediment control BMPs are most effective when used in conjunction with erosion control BMPs. The combination of erosion control and sediment control is the most effective means to prevent sediment from leaving the project site and potentially entering storm drains or receiving waters. This General Permit requires that sediment controls be established and maintained at all sites, and requires the combined use with erosion controls to protect disturbed areas at most sites.

The QSP shall assure that the following practices for effective sediment control are implemented during construction:

- Effective perimeter controls are established and maintained to sufficiently control sediment discharges from the site.
- Streets are cleaned as needed to prevent unauthorized non-storm water discharges from reaching surface water or Municipal Separate Storm Sewer Systems (MS4 drainage systems).
- All run-on, all run-off within the site and all run-off that discharges off the site are effectively managed. Run-on from off-site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.
- Erodible landscape material is not applied at least 2 days prior to forecast rain or during rain events.
- Erodible landscape materials are stacked on pallets and covered when they are not being used or applied.
- Erodible landscape material is applied at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.
- Sediment control BMPs listed in the following section are implemented and installed.

Sediment Control BMPs

The California Stormwater BMP Handbook - Construction contains fact sheets for sediment control BMPs applicable to a wide range of project types and potential construction activities. The table below indicates the sediment control BMPs that are required, because they are certain to be needed, and those that should be implemented as needed. As indicated in the footnotes under “Required”, some BMPs serve similar purposes and shall be implemented/installed in the combination deemed most suitable for the site conditions by the QSP.

BMP#	BMP Name	Required	Implement as Needed
SE-1	Silt Fence [1]	X[3]	
SE-3	Sediment Trap		X
SE-5	Fiber Rolls [1]	X[3]	
SE-6	Gravel Bag Berm [1]	X[3]	
SE-7	Street Sweeping and Vacuuming		X
SE-8	Sand Bag Barrier [1]	X[3]	
SE-10	Storm Drain Inlet Protection [1]	X	
SE-12	Temporary Silt Dike [2]	X[3]	
SE-13	Compost Socks and Berms [2]		X
SE-14	Biofilter Bags [2]		X
1) BMP fact sheet updated in 2009 2) New BMP fact sheet added in 2009		3) Linear sediment barriers (must use at least one of these)	

Appendix H includes copies of the fact sheets of all the BMPs selected for this project.

Temporary Sediment Control BMPs as shown in the above table will be implemented per the WPCDs.

SE-1 Temporary Silt Fence

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 sediment by intercepting and detaining small amounts of sediment-laden runoff from disturbed areas in order to promote sedimentation behind the fence. Silt fences are proposed on top of slopes to reduce the potential for wind to carry sediment from disturbed soils. Silt fences shall remain in place until the disturbed area is permanently stabilized, after which, the silt fence shall be removed and properly disposed.

SE-3 Temporary Sediment Trap

Temporary sediment traps are not necessary because storage behind SE-5 and SE-10 will be adequate to retain sediments.

SE-5 Temporary Fiber Rolls

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). Fiber rolls are proposed at the toe and on the face of slopes along the contours. Fiber rolls 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. Install fiber rolls as noted on plans.

SE-6 Temporary Gravel Bag Berm

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. 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.

SE-7 Street Sweeping

Power Brooms will be used for street sweeping. Sweeping will occur daily in areas with construction activity where needed.

SE-8 Temporary Sandbag Barrier

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. 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.
- Stack sandbags at least three bags high.
- 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.

SE-10 Temporary Drain Inlet Protection

Storm drain inlet protection consisting of a fiber roll around a storm drain, drop inlet, or curb inlet will be used. Storm drain inlet protection measures temporarily pond runoff before it enters the storm drain, allowing sediment to settle. Temporary geotextile storm drain inserts attach underneath storm drain grates to capture and filter storm water.

SE-12, 13, 14 Temporary Silt Dike, Compost Socks and Berm and Biofilter Bags

Measures not proposed. Storm drain inlet protection and fiber rolls will be used.

3.2.3 Tracking Control

Tracking control consists of preventing or reducing the tracking of sediment off-site by vehicles leaving the construction area. Street Sweeping and Vacuuming (SE-7) is also a tracking control practice. All sites must have a stabilized construction entrance and implement controls to prevent off-site tracking of sediment or other loose construction-related materials. These controls should be inspected daily.

Attention to control of tracking sediment off site is essential, as dirty streets and roads near a construction site create a nuisance to the public and can generate complaints to elected officials and regulators. These complaints often result in immediate inspections and regulatory actions.

The Contractor will implement the following practices for effective sediment tracking control during construction:

- Stabilize all construction entrances and exits to prevent the off-site tracking of loose construction/landscape materials.
- Implement/install the tracking control BMPs listed below.

Tracking Control BMPs

The California Stormwater BMP Handbook - Construction contains fact sheets for tracking control BMPs. The table below indicates the tracking control BMPs that are required, because they are certain to be needed, and those that should be implemented as needed.

BMP#	BMP Name	Required	Implement as Needed
TC-1	Stabilized Construction Entrance/Exit	X	
TC-2	Stabilized Construction Roadway		X
TC-3	Entrance/Outlet Tire Wash	X	

Appendix H includes copies of the fact sheets of all the BMPs selected for this project.
Temporary Tracking Control BMP as shown in the above table will be implemented per the WPCDs.

SC-7 Street Sweeping

To the extent feasible, parking will be on stabilized surfaces. To the extent feasible, work will be conducted from paved surfaces. Prior to being driven from a disturbed area to a paved surface, wheels will be checked and sediment will be knocked from the tires. Powerbrooms will be used to collect any sediment that is tracked onto the roadway.

TC-1 Temporary Construction Exit

A construction exit will be provided as shown on plans.

TC-2 Stabilized Construction Roadway

No extended construction roadways are proposed.

TC-3 Temporary Entrance/Outlet Tire Wash

Limited access to disturbed soils is proposed. No tire wash facilities are warranted based on construction scheduling and size of disturbed areas. Sediment will knocked from tire as warranted by site conditions.

3.2.4 Wind Erosion Control

Wind erosion control consists of applying water or other dust palliatives to prevent or minimize dust nuisance.

Other BMPs that control wind erosion are EC-1 through EC-8, and EC-14 through EC-16. Be advised that some of the dust palliatives/chemical dust suppression agents may have potential water quality impacts

The Contractor will implement the following practices for effective wind erosion control during construction:

- Good housekeeping to prevent wind erosion of materials on site.
- Implement/install the wind erosion control BMP listed below.

Wind Erosion Control BMP

The California Stormwater BMP Handbook - Construction contains a fact sheet for wind erosion control BMPs. As indicated in the table below, the wind erosion control BMPs are required.

BMP#	BMP Name	Required	Implement as Needed
WE-1	Wind Erosion Control [1]	X	
1) BMP fact sheet updated in 2009			

Appendix H includes copies of the fact sheets of all the BMPs selected for this project.

Wind Erosion Control (WE-1) will be implemented as needed.

WE-1 Wind Erosion Control

Wind erosion control will consist of wetting soil to compact in weight of soil. All soil will be off-hauled to Contractor’s Yard. No overnight stockpile will be proposed. Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. 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 uppressants include: mulch and fiber based dust palliatives (e.g. paper mulch with gypsum binder), salts and brines (e.g. calcium chloride, magnesium chloride), nonpetroleum 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, montimorillonite) and electrochemical products (e.g. enzymes, ionic products).

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 shall be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment shall be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit shall be available at all times to apply water or dust palliative to the project.
- If reclaimed 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 shall not be conveyed in tanks or drain pipes that will be used to convey potable water and there shall be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances shall be marked, "NON-POTABLE WATER - DO NOT DRINK."
- 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 shall not create any adverse effects on stormwater, plant life, or groundwater and shall meet all applicable regulatory requirements.

3.3 Non-Storm Water and Materials Management

3.3.1 Non-Storm Water Management

The discharge of materials other than storm water and authorized non-storm water discharges is prohibited by NPDES regulations as well as other local codes and ordinances. It is recognized that certain authorized non-storm water discharges may be necessary for the completion of construction projects. Non-storm water management BMPs are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source or eliminating off-site discharge. These practices involve day-to-day operations of the construction site and are usually under the control of the contractor. These BMPs are also referred to as "good housekeeping practices", which involve keeping a clean, orderly construction site. This project will incorporate "good housekeeping practices".

The Contractor will implement the following practices for effective non-storm water management source control during construction:

- All stockpiled materials that are not actively being used shall be covered and surrounded by a berm at all times during the project. Stockpiled materials include soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.
- All chemicals shall be sheltered and stored in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).
- Construction materials not designated for outdoor use shall be stored in a manner that minimizes exposure to rain.
- Contractor shall implement BMPs to prevent the off-site tracking of loose construction/landscape materials.
- Contractor shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.
- Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.
- Place all equipment or vehicles which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.
- Clean leaks immediately and disposing of leaked materials properly.
- Wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.
- Implement/install the non-storm water management source control BMPs listed below.

Non-Storm Water Management BMPs

The California Stormwater BMP Handbook - Construction contains fact sheets for non-storm water management source control BMPs applicable to a wide range of project types and potential construction activities. The table below indicates the non-storm water management source control BMPs that are required, because they are certain to be needed, and those that should be implemented as needed.

BMP#	BMP Name	Required	Implement as Needed
NS-1	Water Conservation Practices	X	
NS-2	Dewatering Operations [1]		X
NS-3	Paving and Grinding Operations [1]		X
NS-6	Illicit Connection/Discharge	X	
NS-7	Potable Water/Irrigation		X
NS-8	Vehicle and Equipment Cleaning		X
NS-9	Vehicle and Equipment Fueling	X	
NS-10	Vehicle and Equipment Maintenance	X	

NS-12	Concrete Curing [1]		X
NS-13	Concrete Finishing [1]		X
1) BMP fact sheet updated in 2009			

Appendix H includes copies of the fact sheets of all the BMPs selected for this project.

The Non-Stormwater Pollution Control BMPs as shown in the above table will be implemented as needed.

NS-1 Water Conservation Practices

Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants offsite. These practices can reduce or eliminate non-stormwater discharges. The following practices will be implemented:

- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Washing of vehicles and equipment on the construction site is discouraged.
- Avoid using water to clean construction areas. If water must be used for cleaning or surface preparation, surface shall be swept and vacuumed first to remove dirt. This will minimize amount of water required.
- Direct construction water runoff to areas where it can soak into the ground or be collected and reused.
- Authorized non-stormwater discharges to the storm drain system, channels, or receiving waters are acceptable with the implementation of appropriate BMPs.
- Lock water tank valves to prevent unauthorized use.

NS-2 Dewatering Operations

The need for dewatering flows shall be minimized by berming to direct flow away from openings and covering trenches and bore holes. Dewatering flows shall be disposed of by dispersal for infiltration. Scheduling will be used to avoid open trenches during rainfall periods. If there is an exposed trench when rain is forecast that cannot be filled, berms will be constructed to divert surface flow away from the opening and covers will be placed over the opening. Any water that reaches the low point will be allowed to evaporate or percolate.

In the event that covering and berming is not successful, refer to the Field Guide to Construction Site Dewatering, October 2001 available on the Caltrans website and refer to the Basin Plan for guidance on dewatering.

It may be possible to discharge to the sewer or storm drain system with permit. A permit is required if the option is required.

Before sending dewatering flows to the storm drain or sewer system, Contractor shall submit a dewatering and discharge work plan under Section 5-1.02, "Plans and Working Drawings," of the

Standard Specifications and "Water Pollution Control" of these special provisions. The dewatering and discharge work plan must include:

1. Title sheet and table of contents
2. Description of dewatering and discharge activities detailing locations, quantity of water, equipment, and discharge point – Include description of filtering device (Baker Tank or sediment sack and list Turbidity and pH limits (Typically <50 NTU and pH 6.5 to 8.5)
3. Estimated schedule for dewatering and discharge start and end dates of intermittent and continuous activities
4. Discharge alternatives, such as dust control or percolation
5. Visual monitoring procedures with inspection log
6. Copy of written approval to discharge into a sanitary sewer system or storm drain system at least 5 business days before starting discharge activities

NS-3 Paving, Sawcutting and Grinding Operations

Prevent or reduce the discharge of pollutants from paving operations, using measures to prevent run-on and runoff pollution, properly disposing of wastes, and training employees and subcontractors. 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 shall be taken when managing these materials to prevent them from coming into contact with stormwater flows.

General

- Project will avoid paving during the wet season. Project is scheduled for completion October 31. Paving and grinding activities will be rescheduled if rain is forecasted.
- Employees and sub-contractors will be trained in pollution prevention and reduction.
- Disposal of PCC (Portland cement concrete) and AC (asphalt concrete) waste shall 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 shall 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 shall 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 shall be recycled or disposed of properly.

  - Do not allow saw-cut slurry to enter storm drains or watercourses. Residue from grinding operations shall be picked up by a vacuum attachment to the grinding machine, or by sweeping, shall not be allowed to flow across the pavement, and shall 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 shall 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 shall 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 shall 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) shall be used during application of seal coat, tack coat, slurry seal, and fog seal.
- Seal coat, tack coat, slurry seal, or fog seal shall not be applied if rainfall is predicted to occur during the application or curing period.

Paving Equipment

- 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 shall not contain soap and shall be non-foaming and non-toxic.
- Paving equipment parked onsite shall 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 shall follow NS-8, Vehicle and Equipment Cleaning.

Thermoplastic Striping

- Thermoplastic striper and pre-heater equipment shutoff valves shall be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the stormwater drainage system, or watercourses.
- Pre-heaters shall be filled carefully to prevent splashing or spilling of hot thermoplastic.
- Leave six inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move.
- 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 shall 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.
- Use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.

Inspection and Maintenance

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

NS-6 Illegal Connection and Illegal Discharge Detection Reporting

Planning

- There are no identified pre-existing areas of contamination.
- Inspect site before beginning the job for evidence of illicit connections, illegal dumping or discharges. Document any pre-existing conditions and notify the owner.
- 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 shall 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

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

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.

NS-7 Potable Water / Irrigation

- 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 shall 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.
- 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.

NS-8 Vehicle and Equipment Cleaning

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:

- 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 shall 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 shall 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 run-on and 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 shall be considered
- Use positive shutoff valve to minimize water usage
- Facility wash racks shall 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

NS-9 Vehicle and Equipment Fueling

- 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.
- Absorbent spill cleanup materials and spill kits shall be available in fueling areas and on fueling trucks. Other options to washing equipment onsite include contracting with either an offsite or mobile commercial be disposed of properly after use.
- Drip pans or absorbent pads shall 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 shall 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 shall be identified in the SWPPP.
- Dedicated fueling areas shall be protected from stormwater run-on and runoff, and shall 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 run-on, runoff, and to contain spills.
- Nozzles used in vehicle and equipment fueling shall be equipped with an automatic shutoff to control drips. Fueling operations shall not be left unattended.
- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management District (AQMD).
- Federal, state, and local requirements shall be observed for any stationary above ground storage tanks.

NS-10 Vehicle and Equipment Maintenance

- 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 shall be protected from stormwater run-on and runoff, and shall be located at least 50 ft from downstream drainage facilities and watercourses.
- Drip pans or absorbent pads shall 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 shall 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.
- 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.

NS-12 Concrete Curing

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 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.

NS-13 Material and Equipment Used Over Water

No material or equipment use is proposed over water as a part of this project.

NS-14 Concrete Finishing

- 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.

3.3.2 Waste Management & Materials Pollution Control

Waste management and materials pollution control BMPs, like non-storm water management BMPs, are source control BMPs that prevent pollution by limiting or reducing potential pollutants at their source before they come in contact with storm water. These BMPs also involve day-to-day operations of the construction site which are under the control of the contractor, and are additional "good housekeeping practices" which involve keeping a clean, orderly construction site.

The Contractor will implement the following practices for effective waste management and materials pollution control during construction:

- Not dispose of rinse/wash waters to ground.
- Not allow sanitation facilities to leak. (Regular maintenance and inspection shall occur to assure that facilities do not leak.)
- Cover waste disposal containers at the end of each day and during rain events.
- Not allow discharge from waste containers.
- Protect stockpiled waste materials from wind and rain at all times (except during active use).
- Review the Spill Prevention and Control BMP WM-4. Contractor shall update the spill response procedure as necessary to be current with site conditions. Contractor shall have the necessary materials on site (spill response kit) and in a designated location for use. Spills and leaks shall be cleaned up immediately and disposed of properly. Appropriate spill response personnel shall be assigned and trained.
- Make concrete (and other) washouts water tight or arrange to have contractor/vendor to perform off-site. Contractor shall ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas. Washouts shall be sized appropriately by the QSP.
- Cover stockpiled materials such as mulch and top soils when they are not actively being used.
- Shelter fertilizer containers and other landscape materials when they are not actively being used.
- Implement/install the non-storm water management source control BMPs listed below.

Waste Management & Materials Pollution Control BMPs

The California Stormwater BMP Handbook - Construction contains fact sheets for waste management & materials pollution control BMPs applicable to a wide range of project types and potential construction activities. The table below indicates the waste management & materials pollution control BMPs that are required, because they are certain to be needed, and those that should be implemented as needed.

BMP#	BMP Name	Required	Implement as Needed
WM-1	Material Delivery and Storage [1]	X	
WM-2	Material Use [1]	X	
WM-3	Stockpile Management [1]	X	
WM-4	Spill Prevention and Control	X	

WM-5	Solid Waste Management	X	
WM-6	Hazardous Waste Management	X	
WM-7	Contaminated Soil Management		X
WM-8	Concrete Waste Management [1]	X	
WM-9	Sanitary/ Septic Waste Management [1]	X	
WM-10	Liquid Waste Management [1]		X
1) BMP fact sheet updated in 2009			

Materials will be delivered to the Contractor's Yard. The Contractor's Yard is located under Route 92 and is protected from direct rainfall. Materials will be stored in sheds with no direct water contact.

Portable sanitary facilities will be provided at the Contractor's Yard and will be located at job locations as necessary, though a single facility may be used where there are several nearby job locations.

Where feasible, concrete will be delivered using concrete trucks that have built in water recycling systems. There is little concrete wash associated with these vehicles. Temporary Concrete Washout (Portable) will be implemented per the WPCDs for any required on-site wash. All other Temporary Waste Management and Materials Pollution Control BMPs as shown in Table 500.4.2 will be implemented as needed.

Debris boxes will be covered at the end of each day and while it is raining.

WM-1 Material Delivery and Storage

The following steps shall 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 shall 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 shall be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) shall be available on-site for all materials stored that have the potential to effect water quality.
- Construction site areas shall be designated for material delivery and storage.
- Material delivery and storage areas shall 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 the 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 shall be kept. Hazardous materials storage onsite shall be minimized.
- Hazardous materials shall 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 shall 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 shall be stored in approved containers and drums and shall not be overfilled. Containers and drums shall be placed in temporary containment facilities for storage.
- A temporary containment facility shall 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 shall be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility shall be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills shall be collected and placed into drums. These liquids shall be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids shall be sent to an approved disposal site.
- Sufficient separation shall be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, shall not be stored in the same temporary containment facility.
- Materials shall be covered prior to, and during rain events.
- Materials shall be stored in their original containers and the original product labels shall be maintained in place in a legible condition. Damaged or otherwise illegible labels shall be replaced immediately.
- Bagged and boxed materials shall be stored on pallets and shall not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials shall be covered during non-working days and prior to and during rain events.
- Stockpiles shall be protected in accordance with WM-3, Stockpile Management.
- Materials shall be stored indoors within existing structures or completely enclosed storage sheds when available.

- Proper storage instructions shall be posted at all times in an open and conspicuous location.
- An ample supply of appropriate spill clean up material shall be kept near storage areas.
- Also see WM-6, Hazardous Waste Management, for storing of hazardous wastes.
- Lime used for lime treatment shall be covered at the end of every day and shall remain covered during rain events.
- Lime shall be stored in a manner that protects the stockpile from flowing runoff.
- Lime shall not be applied if rain is forecast within 48 hours of application.

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.

WM-2 Material Use

The following steps shall be taken to minimize risk:

- Minimize use of hazardous materials onsite.
- Follow manufacturer instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- Train personnel who use pesticides. The California Department of Pesticide Regulation and county agricultural commissioners license pesticide dealers, certify pesticide applicators, and conduct onsite inspections.
- Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Unless on steep slopes, till fertilizers into the soil rather than hydraulic application. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried offsite by runoff. Do not apply these chemicals before predicted rainfall.
- Train employees and subcontractors in proper material use.
- Supply Material Safety Data Sheets (MSDS) for all materials.
- Dispose of latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, with other construction debris.

- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain, or watercourse. Dispose of any paint thinners, residue, and sludge(s) that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practicable, and rinse to a drain leading to a sanitary sewer where permitted, or contain for proper disposal off site. For oil-based paints, clean brushes to the extent practicable, and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials onsite when practical.
- Document the location, time, chemicals applied, and applicator’s name and qualifications.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.
- Discontinue use of erodible landscape material within 2 days prior to a forecasted rain event and materials shall be covered and/or bermed.
- Provide containment for material use areas such as masons’ areas or paint mixing/preparation areas to prevent materials/pollutants from entering stormwater.

WM-3 Stockpile Management

No stockpiling of materials is proposed at the construction locations. Materials will be taken from Contractors Yard at the start of the day and waste materials will be hauled to Contractor Yard at the end of the day. If storage occurs in the project Contractor Yard, storage will be under the existing freeway and will not be subject to direct rainfall. Dust control measures will be implemented on any stockpiled materials.

WM-3 Stockpile Management

No stockpiling of materials is proposed. Materials will be hauled to contractor’s yard.

WM-4 Spill Prevention and Control

See Contractors spill prevention plan. Employees will be trained to identify the type of spill (Minor, Semi-Significant or Significant/Hazardous),and respond accordingly Spills will not be cleaned up using water. The spills will be cleaned up using materials specified for the type of spill. The used clean up material and the recovered materials no longer suitable for the intended purpose will be disposed off site as per the applicable regulations. Regular meetings will be held to discuss these procedures as continuing education for new employees.

Spill Prevention and Control

Keep material or waste storage areas clean, well organized, and equipped with enough cleanup supplies for the material being stored.

Implement spill and leak prevention procedures for chemicals and hazardous substances stored on the job site. Whenever you spill or leak chemicals or hazardous substances at the job site, you are responsible for all associated cleanup costs and related liability.

Report minor, semi-significant, and significant or hazardous spills to the WPC manager. The WPC manager must notify the Engineer immediately.

As soon as it is safe, contain and clean up spills of petroleum materials and sanitary and septic waste substances listed under 40 CFR, Parts 110, 117, and 302.

Minor Spills

Minor spills consist of quantities of oil, gasoline, paint, or other materials that are small enough to be controlled by a 1st responder upon discovery of the spill.

Clean up a minor spill using the following procedures:

1. Contain the spread of the spill
2. Recover the spilled material using absorption
3. Clean the contaminated area
4. Dispose of the contaminated material and absorbents promptly and properly under "Waste Management" of these special provisions

Semi-Significant Spills

Semi-significant spills consist of spills that can be controlled by a 1st responder with help from other personnel.

Clean up a semi-significant spill immediately using the following procedures:

1. Contain the spread of the spill.
2. On paved or impervious surfaces, encircle and recover the spilled material with absorbent materials. Do not allow the spill to spread widely.
3. If the spill occurs on soil, contain the spill by constructing an earthen dike and dig up the contaminated soil for disposal.
4. If the spill occurs during precipitation, cover the spill with 10-mil plastic sheeting or other material to prevent contamination of runoff.
5. Dispose of the contaminated material promptly and properly under "Waste Management" of these special provisions.

Significant or Hazardous Spills

Significant or hazardous spills consist of spills that cannot be controlled by job site personnel.

Immediately notify qualified personnel of a significant or hazardous spill. Take the following steps:

1. Do not attempt to clean up the spill until qualified personnel have arrived
2. Notify the Engineer and follow up with a report
3. Obtain the immediate services of a spill contractor or hazardous material team

4. Notify local emergency response teams by dialing 911 and county officials by using the emergency phone numbers retained at the job site
5. Notify the California Emergency Management Agency State Warning Center at (916) 845-8911
6. Notify the National Response Center at (800) 424-8802 regarding spills of Federal reportable quantities under 40 CFR 110, 119, and 302
7. Notify other agencies as appropriate, including:

    7.1. Fire Department
    7.2. Public Works Department
    7.3. Coast Guard
    7.4. Highway Patrol
    7.5. City Police or County Sheriff's Department
    7.6. Department of Toxic Substances
    7.7. California Division of Oil and Gas
    7.8. Cal/OSHA
    7.9. Regional Water Resources Control Board

Prevent a spill from entering stormwater runoff before and during cleanup activities. Do not bury or wash the spill with water.

WM-5 Solid Waste Management

The following steps shall 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.
- 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 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.

Regular meetings will be held to discuss these procedures as continuing education for new employees.

Collection, Storage, and Disposal

- Littering on the project site is prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines is a priority.
- Trash receptacles shall 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 shall 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 shall not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number shall be provided to contain the solid waste generated by the project.
- Full dumpsters shall be removed from the project site and the contents shall be disposed of by the trash hauling contractor.
- Construction debris and waste shall be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public shall be stored or stacked in an orderly manner.
- Stormwater run-on shall 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 shall be located at least 50 ft from drainage facilities and watercourses and shall not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters shall 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.

WM-6 Hazardous Waste Management

Hazardous Waste Management will be implemented as per the contract specifications for any requirements pertaining to handling of contaminated material. Any waste generated will be stored in watertight containers and stored in a location approved by the Engineer until it is disposed of by a licensed hazardous waste transporter.

WM-7 Contaminated Soil Management

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. 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.

ADL contaminated soil has been identified on the site. If suspected or known contaminated soils are excavated, the soils shall be stockpiled on plastic and covered. Contractor shall coordinate with Caltrans for testing.

WM-8 Concrete Waste Management

Concrete waste will be handled in accordance with contract documents. Collect and dispose of Portland concrete, AC, or HMA waste at locations where sawcutting, coring, grinding, grooving or hydro-concrete demolition of Portland cement concrete, AC or HMA create a residue or slurry. Concrete waste will be collected and disposed as appropriate portable washout bins. If any spilled material is observed, the spilled material shall be removed and placed into the concrete washout bin. WM-4 Spill Prevention and Control BMPs shall be implemented in case of any spill.

WM-9 Sanitary/Septic Waste Management

Sanitary or septic wastes shall be treated or disposed of in accordance with state and local requirements. The sanitary facilities shall be located at least 50 feet away from storm drains. The weekly QSP inspection shall include a review of sanitary facilities and disposal shall be monitored.

WM-10 Liquid Waste Management

The following steps shall help keep a clean site and reduce stormwater pollution:

- Select designated liquid waste collection areas onsite.
- Inspect containers for leaks and repair any container 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 containers to keep rain out.
- Plan for enough containers and pickup schedule for anticipated liquid waste.
- Make sure that liquid waste, including 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 liquid waste containers on the construction site. Leave container cleaning to the liquid waste collecting contractor.
- Arrange for regular liquid waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that liquid waste is collected, removed, and disposed of only at authorized disposal areas.

Regular meetings will be held to discuss these procedures as continuing education for new employees.

Containing Liquid Wastes

- Drilling residue and drilling fluids shall not be allowed to enter storm drains and watercourses and shall be disposed of outside the highway right-of-way in conformance with the provisions in Standard Specifications Section 7-1.13.
- If an appropriate location is available, as determined by the Resident Engineer (RE), drilling residue and drilling fluids that are exempt under California Code of Regulations (CCR) Title 23 §2511(g) may be dried by infiltration and evaporation in a containment facility constructed in conformance with the provisions concerning the Temporary Concrete Washout Facilities detailed in WM-08 Concrete Waste Management.
- Liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud, shall be contained and not allowed to flow into drainage channels or receiving waters prior to treatment.
- Contain liquid wastes in a controlled area, such as a holding pit, sediment basin, roll-off bin, or portable tank.
- Containment devices must be structurally sound and leak free.
- Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated.
- Take precautions to avoid spills or accidental releases of contained liquid wastes. Apply the education measures and spill response procedures outlined in WM-4 Spill Prevention and Control.
- Do not locate containment areas or devices where accidental release of the contained liquid can threaten health or safety, or discharge to water bodies, channels, or storm drains.

Capturing Liquid Wastes

- Capture all liquid wastes running off a surface, which has the potential to affect the storm drainage system, such as wash water and rinse water from cleaning walls or pavement.
- Do not allow liquid wastes to flow or discharge uncontrolled. Use temporary dikes or berms to intercept flows and direct them to a containment area or device for capture.
- If the liquid waste is sediment laden, use a sediment trap (see SC-3 Sediment Trap) for capturing and treating the liquid waste stream, or capture in a containment device and allow sediment to settle.

Disposing of Liquid Wastes

- Typical method is to dewater the contained liquid waste, using procedures such as described in NS-2 Dewatering Operations, and SC-2 Sediment/Desilting Basin; and dispose of resulting solids per WM-5 Solid Waste Management, or per Standard Specifications Section 7-1.13, "Disposal of Material Outside the Highway Right of Way", for off-site disposal.

- Method of disposal for some liquid wastes may be prescribed in Water Quality Reports, NPDES permits, Environmental Impact Reports, 401 Water Quality Certifications or 404 permits, local agency discharge permits, etc., and may be defined elsewhere in the special provisions.
- Liquid wastes, such as from dredged material, may require testing and certification whether it is hazardous or not before a disposal method can be determined.
- For disposal of hazardous waste, see WM-6 Hazardous Waste Management.
- If necessary, further treat liquid wastes prior to disposal. Treatment may include, though is not limited to, sedimentation, filtration, and chemical neutralization.
- Spot check employees and subcontractors at least monthly throughout the job to ensure appropriate practices are being employed.
- Remove deposited solids in containment areas and capturing devices as needed, and at the completion of the task. Dispose of any solids as described in WM-5 Solid Waste Management.
- Inspect containment areas and capturing devices frequently for damage, and repair as needed.

Appendix H includes copies of the fact sheets of all the BMPs selected for this project.

3.4 Post-Construction Storm Water Management Measures

The post-construction storm water management measures are to be developed.

Section 4 BMP Inspection, Maintenance, and Repair

4.1 Construction Site Monitoring Program

Contractor shall ensure that all inspection, maintenance repair and sampling activities at the project location are performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP shall complete inspections of all BMPs as required to ensure proper functioning of the BMPs at all times during construction. The QSP may delegate any or all of these activities to an employee trained to do the task(s) appropriately, but shall ensure adequate deployment. The QSP is to implement the Construction Site Monitoring Program (CSMP) in accordance with the requirements found in Appendix A. The CSMP is included in this SWPPP in Appendix N, and incorporates a description of the BMP inspection locations, inspection procedures, and inspection follow-up and tracking procedures, including BMP maintenance and repair, sampling and analysis (if needed), SWPPP amendments (if needed).

Contractor shall purchase a turbidity meter and a pH meter. The QSP shall be trained in the use of both meters.

Section 5 Training

The Contractor shall designate a Qualified SWPPP Practitioner (QSP). The QSP must receive training and possess one of the certifications and or registrations specified in Table 9 of the 2009 Construction General Permit established by the SWRCB.

The QSP is required to document all training activities (formal and informal), and retain a record of training activities in SWPPP Appendix K. Training documentation must also be submitted in the Annual Report.

The Contractor's Qualified SWPPP Practitioner is TBD

Other Contractor personnel attending tailgate training will document attendance using the form in Attachment I. Informal training will include tailgate site briefings to be conducted bi-weekly, and will address the following topics:

- Erosion Control BMPs
- Sediment Control BMPs
- Non-Storm Water BMPs
- Waste Management and Materials Pollution Control BMPs
- Emergency Procedures specific to the construction site storm water management

This SWPPP was prepared by BKF Engineers, under the direction of Mr. Ed Boscacci, a registered Professional Engineer in the State of California and a Qualified SWPPP Developer. Mr. Boscacci has over 10 years of experience in the preparation of SWPPPs, and has the following previous experience:

- Has prepared over 25 project-specific SWPPPs
- Over 30 years of experience in storm drain design, hydrology, and hydraulics
- SWPPP Preparation training sponsored by San Francisco Bay Estuary

Section 6 Responsible Parties and Operators

6.1 Responsible Parties

A list of authorized representatives, along with project site personnel who are responsible for SWPPP activities, including the QSD and QSP, has been provided in Appendix L. This list includes the names of the individuals granted authority to sign permit-related documents.

6.2 Contractor List

The QSP is required to notify all contractors and subcontractors of the requirement for storm water management measures during the project. A list of contractors and subcontractors shall be maintained by the QSP and included in Appendix M. If subcontractors change during the project, the list will be updated accordingly. A sample “Subcontractor Notification Letter” and log is included in Appendix M.

List of Appendices

APPENDIX A

CONSTRUCTION GENERAL PERMIT

(Sections Applicable to Risk Level 1 Projects)

(Not Included in Version of SWPPP Posted on SMARTS.)

APPENDIX B

SUBMITTED PERMIT REGISTRATION DOCUMENTS

The following documents are to be filed electronically via the SMARTS system and included in this appendix per Attachment B, Section J of the General Permit. Paper copies of duplicate documents are not included in Appendix B.

1. Notice of Intent (NOI).
2. Site Map – See site map legend for specific documents to be included.
3. SWPPP – SWPPP consists of this entire document.
4. Risk Assessment – Documentation of risk assessment calculations.
5. Post Construction Water Balance Calculator – NOT APPLICABLE TO THIS LOCATION.
6. ATS Design Document and Certification – NOT APPLICABLE TO THIS PROJECT.

Site Maps

For:
2600 Mission Bell Drive, California 94806
APN: 416-140-021

WDID No.: TBD

The following list of referenced plans incorporate the information listed under Attachment B, Section J.2 of the General Permit.

a. **Vicinity Map** – See attached vicinity map.
b. **Site Layout** – See Inc. 3 Rough Grading and Utility Plan, Sheet C3.00.
c. **Site Boundaries** - Inc. 3 Rough Grading, Sheet C3.00.
d. **Drainage Areas** – See attached Site Drainage Exhibit.
e. **Discharge Locations** – Site discharges to the San Francisco Bay through the City's existing storm drain system.
f. **Sampling Locations** – N/A
g. **Disturbed Areas** – Entire site is disturbed.
h. **Active Disturbed Areas** – Entire site is disturbed.
i. **Runoff BMP Locations** – See attached Erosion Control Plans.
j. **Erosion Control BMPs** – See attached Erosion Control Plans.
k. **Sediment Control BMPs** – See attached Erosion Control Plans.
l. **ATS Location** – N/A
m. **Sensitive Habitats** – N/A.
n. **Post-Construction BMPs** – See attached Erosion Control Plans. BMP implemented as part of construction will remain and be maintained as necessary, see erosion control plans.
o. **Construction Activities Locations** – TBD. This will be shown/up-dated on contractor markup of Appendix S.

VICINITY MAP

Sediment Risk Factor Worksheet

Entry

A) R Factor

Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.

http://water.epa.gov/polwaste/npdes/stormwater/Rainfall-Erosivity-Factor-Calculator.cfm

R Factor Value 22.05

B) K Factor (weighted average, by area, for all site soils)

The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.

Site-specific K factor guidance

K Factor Value 0.24

C) LS Factor (weighted average, by area, for all slopes)

The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.

LS Table

LS Factor Value 0.69

Watershed Erosion Estimate (=RxKxLS) in tons/acre 3.65148

Site Sediment Risk Factor

Low Sediment Risk: < 15 tons/acre
Medium Sediment Risk: >=15 and <75 tons/acre
High Sediment Risk: >= 75 tons/acre

Low

Receiving Water (RW) Risk Factor Worksheet	**Entry**	**Score**
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment** (For help with impaired waterbodies please visit the link below) or has a **USEPA approved TMDL implementation plan for sediment**?: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml **OR** A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan) http://www.waterboards.ca.gov/waterboards_map.shtml	**no**	**Low**

Region 1 Basin Plan

Region 2 Basin Plan

Region 3 Basin Plan

Region 4 Basin Plan

Region 5 Basin Plan

Region 6 Basin Plan

Region 7 Basin Plan

Region 8 Basin Plan

Region 9 Basin Plan

Combined Risk Level Matrix

<table>
<tr><td></td><td></td><td colspan="3">Sediment Risk</td></tr>
<tr><td></td><td></td><td>Low</td><td>Medium</td><td>High</td></tr>
<tr><td rowspan="2">Receiving Water Risk</td><td>Low</td><td>Level 1</td><td colspan="2">Level 2</td></tr>
<tr><td>High</td><td colspan="2">Level 2</td><td>Level 3</td></tr>
</table>

Project Sediment Risk: **Low**

Project RW Risk: **Low**

Project Combined Risk: **Level 1**

APPENDIX C
SWPPP AMENDMENTS AND AMENDMENT LOG

APPENDIX C

SWPPP AMENDMENTS AND AMENDMENT LOG

SWPPP Amendment No. (Insert here)

Project Name: **Contra Costa College New Science Building**

Town Permits: ***Grading Permit No: TBD***

BKF Project Number: ***20175092***

Qualified SWPPP Developer (QSD) Certification of the Storm Water Pollution Prevention Plan Amendment

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

QSD's Signature

November 12, 2021
Date

Dayne Johnson, Project Manager
QSD's name and title

(925) 940-2200
Telephone Number

Discharger (Owner or Legally Responsible Person - LRP) Approval of the Storm Water Pollution Prevention Plan Amendment

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Discharger (or LRP)'s Signature

Date

Ines Zildzic , Authorized Representative
Discharger's name and title

Telephone Number

Amendment Log

Project Name: **Contra Costa College New Science Building**

Town Permits: ***Grading Permit No: TBD***

BKF Project Number: *20175092*

Amendment No.	Date	Brief Description of Amendment	Prepared By

APPENDIX D

NAL/NEL EXCEEDANCE SITE EVALUATIONS

(NOT INCLUDED - NOT APPLICABLE TO RISK LEVEL 1)

APPENDIX E

SUBMITTED CHANGES TO PRDS (DUE TO CHANGE IN OWNERSHIP OR ACREAGE)

APPENDIX F

CONSTRUCTION SCHEDULE

APPENDIX G

CONSTRUCTION ACTIVITIES, MATERIALS USED AND ASSOCIATED POLLUTANTS

SWPPP Construction Site Pollutant Checklist

CATEGORY - ADHESIVES **Page of .**

Examples:	Adhesives, glues, Resins and epoxy synthetics, Caulks, sealers, putty, sealing agents, Coal tars (naphtha, pitch)	**Pollutants:**	Phenolics, formaldehydes Phenolics, formaldehydes Asbestos, phenolics, formaldehydes Benzene, phenols, naphthalene

Product Name, Physical Form (L, P or S)*	Storage Location	Method of Control and Protection	Quantity

*Physical Form – "L" = Liquid, "P" = Powder, "S" = Solid

Note: VOC = Volatile organic compounds, BOD = Biological oxygen demand due to the use of oxygen by decomposing materials.

References: USEPA. 1973. Processes, Procedures, and Methods to Control Pollution Resulting From Construction Activity. Office of Air and Water Programs, EPA 430/9-73-007. October, 1973. Meech, Mark L. and Margaret Lattin Bazany. 1991. Construction Creates Own Set of Hazardous Wastes, Hazmat World August, 1991. Gosselin, R.E. Ph.D, R.P. Smith Ph.D., and H.C. Hodge Ph.D. 1984. Clinical Toxicology of Commercial Products, Fifth Ed. Williams and Wilkins, Baltimore/London.

CATEGORY - CLEANERS

Page of .

Examples:	Polishes, (metal, ceramic, tile)	**Pollutants:**	Metals
	Etching agents,		Metals
	Cleaners, ammonia, lye, caustic sodas		Acidity/alkalinity
	Bleaching agents		Acidity/alkalinity
	Chromate salts		Chromium

Product Name, Physical Form (L, P or S)*	Storage Location	Method of Control and Protection	Quantity

CATEGORY - PLUMBING

Page of .

Examples:	Solder (lead, tin), flux (zinc chloride) Pipe fitting (cut shavings) Galvanized metals (nails, fences) Electrical wiring	**Pollutants:**	Lead, copper, zinc, tin Copper Zinc Copper, lead

Product Name, Physical Form (L, P or S)*	**Storage Location**	**Method of Control and Protection**	**Quantity**

CATEGORY - PAINTING

Page of .

Examples:	Paint thinner, acetone, MEK, stripper Paints, lacquers, varnish, enamels Turpentine, gum spirit, solvents Sanding Paints	**Pollutants:**	VOCs Metals, Phenolics, mineral spirits VOCs Metals Metals

Product Name, Physical Form (L, P or S)*	Storage Location	Method of Control and Protection	Quantity

CATEGORY – WOODS **Page of .**

Examples:	Sawdust Particle board dusts Treated woods	**Pollutants:**	BOD Formaldehyde Copper, creosote

Product Name, Physical Form (L, P or S)*	**Storage Location**	**Method of Control and Protection**	**Quantity**

CATEGORY – MASONRY AND CONCRETE

Page of .

Examples:	Dusts (brick, cement) Colored chalks (pigments) Concrete curing compounds Glazing compounds Cleaning surfaces	**Pollutants:**	Acidity, sediments Metals See MSDS Asbestos Acidity

Product Name, Physical Form (L, P or S)*	**Storage Location**	**Method of Control and Protection**	**Quantity**

CATEGORY – FLOORS AND WALLS **Page of .**

Examples:	Flashing Drywall Tile cutting (ceramic dusts) Adhesives (see Adhesives category)	**Pollutants:**	Copper, aluminum Dusts Minerals

Product Name, Physical Form (L, P or S)*	**Storage Location**	**Method of Control and Protection**	**Quantity**

CATEGORY – REMODELING AND DEMOLITION

Page of .

Examples:	Insulation Coolant reservoirs Adhesives (See Adhesives category)	**Pollutants:**	Asbestos Freon

Product Name, Physical Form (L, P or S)*	**Storage Location**	**Method of Control and Protection**	**Quantity**

CATEGORY – AIR CONDITIONING AND HEATING

Page of .

Examples:	Insulating Coolant reservoirs Adhesives (See Adhesives category)	**Pollutants:**	Asbestos Freon

Product Name, Physical Form (L, P or S)*	**Storage Location**	**Method of Control and Protection**	**Quantity**

CATEGORY – YARD OPERATION AND MAINTENANCE

Page of .

Examples:	Vehicle and machinery maintenance Gasoline, oils, additives Marking paints (sprays) Grading, earth moving Portable toilets Fire hazard control (herbicides) Health and Safety Wash waters (herbicides, concrete, oils and greases)	**Pollutants:**	Oils and grease, coolants Benzene & derivatives, oils, grease Vinyl chloride, metals Erosion (sediments) BOD, disinfectants (spills) Sodium arsenite, dinitro compounds Rodenticides, insecticides (see above categories)

Product Name, Physical Form (L, P or S)*	**Storage Location**	**Method of Control and Protection**	**Quantity**

CATEGORY – LANDSCAPING AND EARTHMOVING			**Page of .**
Examples:	Planting, plant maintenance Excavation, tilling Masonry and concrete Solid wastes (trees, shrubs) Exposing natural lime /mineral deposits Soil additives Revegetation of graded areas	**Pollutants:**	Pesticides, herbicides, nutrients Erosion (sediments) (see above categories) BOD Acidity/alkalinity, metals Aluminum sulfate, sulfur Fertilizers

Product Name, Physical Form (L, P or S)*	**Storage Location**	**Method of Control and Protection**	**Quantity**

CATEGORY - MATERIALS STORAGE			**Page of .**
Examples:	Waste storage (used oils, solvents,etc) Hazardous waste containment Raw material piles	**Pollutants:**	Spills, leaks Spills, leaks Dusts, sediments

Product Name, Physical Form (L, P or S)*	**Storage Location**	**Method of Control and Protection**	**Quantity**

APPENDIX H

BMP CONSIDERATION CHECKLIST

AND

CASQA BMP HANDBOOK FACT SHEETS

(Not Included in Version of SWPPP Posted on SMARTS.)

BMP Consideration Checklist

CONSTRUCTION SITE BMPs
CONSIDERATION CHECKLIST

The BMPs listed here should be considered for every project. Those BMPs that are not included in the SWPPP must be checked as "Not Used" with a brief statement describing why it is not being used.

EROSION CONTROL BMPs

BMP No.	BMP	CONSIDERED FOR PROJECT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
EC-1	Scheduling	X	X		
EC-2	Preservation of Existing Vegetation	X	X		
EC-3	Hydraulic Mulch(1)			X	Not applicable to project.
EC-4	Hydroseeding(1)			X	Not applicable to project.
EC-5	Soil Binders(1)	X	X		
EC-6	Straw Mulch(1)	X	X		
EC-7	Geotextiles & Mats(1)			X	Not applicable to project.
EC-8	Wood Mulching	X	X		
EC-9	Earth Dikes & Drainage Swales	X	X		
EC-10	Velocity Dissipation Devices	X	X		
EC-11	Slope Drains			X	Not applicable to project.
EC-12	Streambank Stabilization			X	Not applicable to project.
EC-13	Reserved(2)			X	
EC-14	Compost Blankets(3)	X	X		
EC-15	Soil Preparation / Roughening(3)	X	X		
EC-16	Non-Vegetative Stabilization(3)	X	X		

(1) BMP fact sheet updated in 2009
(2) BMP fact sheet removed in 2009 (formerly PAM)
(3) New BMP fact sheet added in 2009

See Section 3.2.1 for BMPs that are required and those to be implemented as needed.

CONSTRUCTION SITE BMPs
CONSIDERATION CHECKLIST

The BMPs listed here should be considered for every project. Those BMPs that are not included in the SWPPP must be checked as "Not Used" with a brief statement describing why it is not being used.

SEDIMENT CONTROL BMPs

BMP No.	BMP	CONSIDERED FOR PROJECT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
SE-1	Silt Fence(1)	X	X		
SE-2	Sediment Basin(1)			X	Not applicable to project.
SE-3	Sediment Trap	X	X		
SE-4	Check Dam(1)			X	Not applicable to project.
SE-5	Fiber Rolls(1)	X	X		
SE-6	Gravel Bag Berm(1)	X	X		
SE-7	Street Sweeping and Vacuuming	X	X		
SE-8	Sandbag Barrier(1)	X	X		
SE-9	Straw Bale Barrier			X	SE-1, SE-5, SE-6 & SE-12 are more applicable as linear sediment barriers for this project.
SE-10	Storm Drain Inlet Protection(1)	X	X		
SE-11	Active Treatment Systems(1)			X	Not applicable to project.
SE-12	Temporary Silt Dike(2)	X	X		
SE-13	Compost Socks and Berms(2)	X	X		
SE-14	Biofilter Bags(2)	X	X		

(1) BMP fact sheet updated in 2009
(2) New BMP fact sheet added in 2009

WIND EROSION CONTROL BMPs

WE-1	Wind Erosion Control(1)	X	X		

(1) BMP fact sheet updated in 2009

See Sections 3.2.2 & 3.2.4 for BMPs that are required and those to be implemented as needed.

CONSTRUCTION SITE BMPs
CONSIDERATION CHECKLIST

The BMPs listed here should be considered for every project. Those BMPs that are not included in the SWPPP must be checked as "Not Used" with a brief statement describing why it is not being used.

TRACKING CONTROL BMPs

BMP No.	BMP	CONSIDERED FOR PROJECT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
TC-1	Stabilized Construction Entrance/Exit	X	X		
TC-2	Stabilized Construction Roadway	X	X		
TC-3	Entrance/Outlet Tire Wash	X	X		

NON-STORM WATER MANAGEMENT BMPs

NS-1	Water Conservation Practices	X	X		
NS-2	Dewatering Operations(1)	X	X		
NS-3	Paving and Grinding Operations(1)	X	X		
NS-4	Temporary Stream Crossing			X	Not applicable to project.
NS-5	Clear Water Diversion			X	Not applicable to project.
NS-6	Illicit Connection/ Discharge	X	X		
NS-7	Potable Water/Irrigation	X	X		
NS-8	Vehicle and Equipment Cleaning	X	X		
NS-9	Vehicle and Equipment Fueling	X	X		
NS-10	Vehicle and Equipment Maintenance	X	X		
NS-11	Pile Driving Operations			X	Not applicable to project.
NS-12	Concrete Curing(1)	X	X		
NS-13	Concrete Finishing(1)	X	X		
NS-14	Material and Equipment Use over Water			X	Not applicable to project.
NS-15	Demolition Adjacent to Water			X	Not applicable to project.
NS-16	Temporary Batch Plants(1)			X	Not applicable to project.

(1) BMP fact sheet updated in 2009

See Sections 3.2.3 & 3.3.1 for BMPs that are required and those to be implemented as needed.

CONSTRUCTION SITE BMPs
CONSIDERATION CHECKLIST

The BMPs listed here should be considered for every project. Those BMPs that are not included in the SWPPP must be checked as "Not Used" with a brief statement describing why it is not being used.

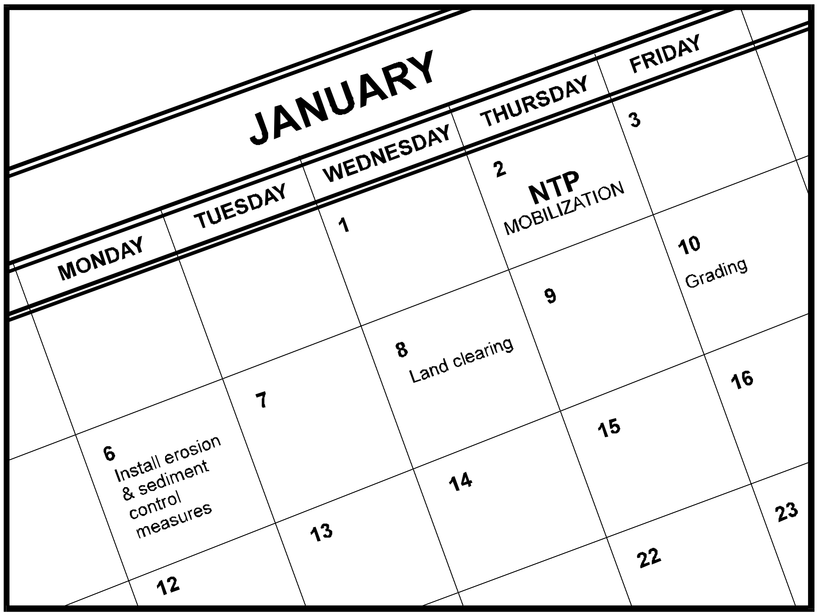
WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL BMPs

BMP No.	BMP	CONSIDERED FOR PROJECT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
WM-1	Material Delivery and Storage(1)	X	X		
WM-2	Material Use(1)	X	X		
WM-3	Stockpile Management(1)	X	X		
WM-4	Spill Prevention and Control	X	X		
WM-5	Solid Waste Management	X	X		
WM-6	Hazardous Waste Management	X	X		
WM-7	Contaminated Soil Management	X	X		
WM-8	Concrete Waste Management(1)	X	X		
WM-9	Sanitary/Septic Waste Management(1)	X	X		
WM-10	Liquid Waste Management(1)	X	X		

(1) BMP fact sheet updated in 2009

See Section 3.3.2 for BMPs that are required and those to be implemented as needed.

Scheduling EC-1



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	☑
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	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

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

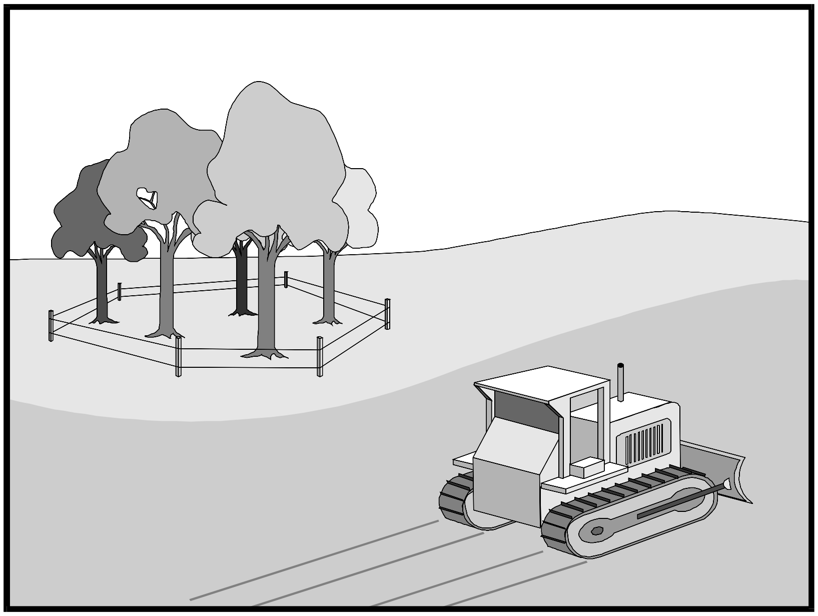
- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Amend the schedule when changes are warranted.
- Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

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	☑
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	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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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.

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.

  - 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

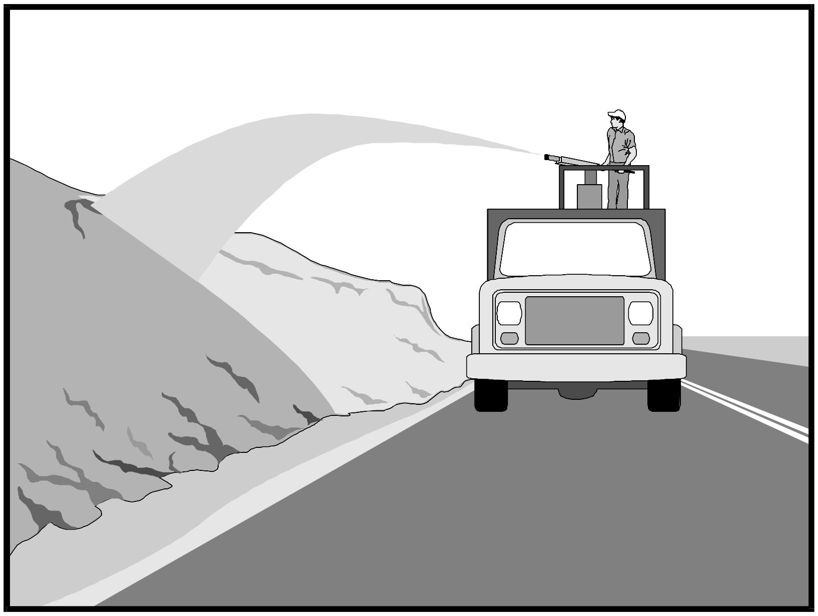
County of Sacramento Tree Preservation Ordinance, September 1981.

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.

Hydraulic Mulch EC-3



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	☑
SE	Sediment Control	
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	☑
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 course 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 is 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.

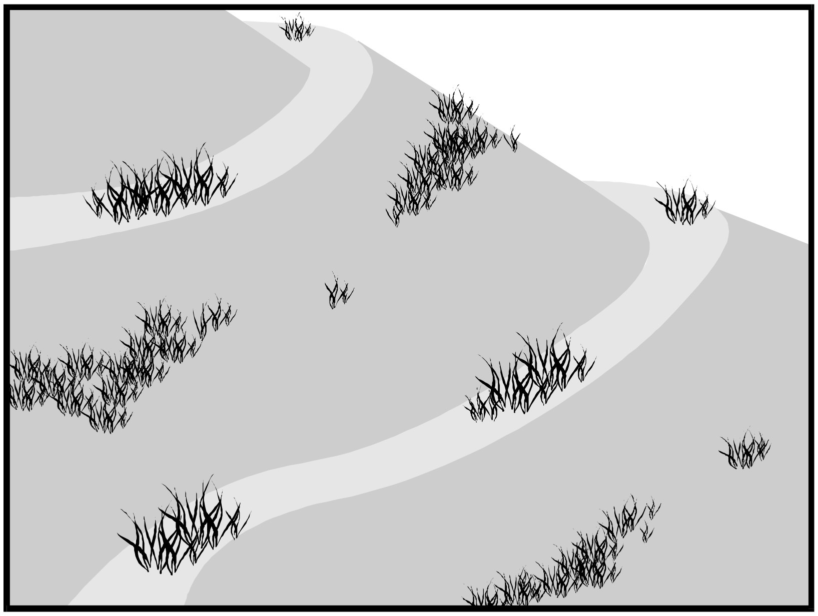
Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

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.

Hydroseeding EC-4



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	☑
SE	Sediment Control	
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	☑
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

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
- Site topography and exposure (sun/wind)
- Season and climate
- Vegetation types
- Maintenance requirements
- Sensitive adjacent areas
- Water availability
- 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.

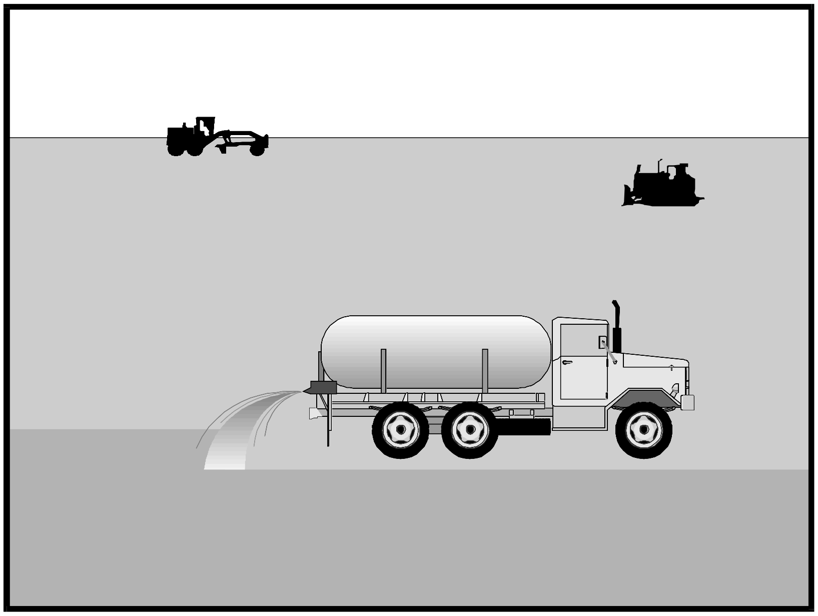
- Irrigation systems should be inspected for complete coverage and adjusted as needed to maintain complete coverage.

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.



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	

Legend:

☑ Primary Category

☒ Secondary Category

Targeted Constituents

Sediment	☑
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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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

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/yd^2 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/yd^2.

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.

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

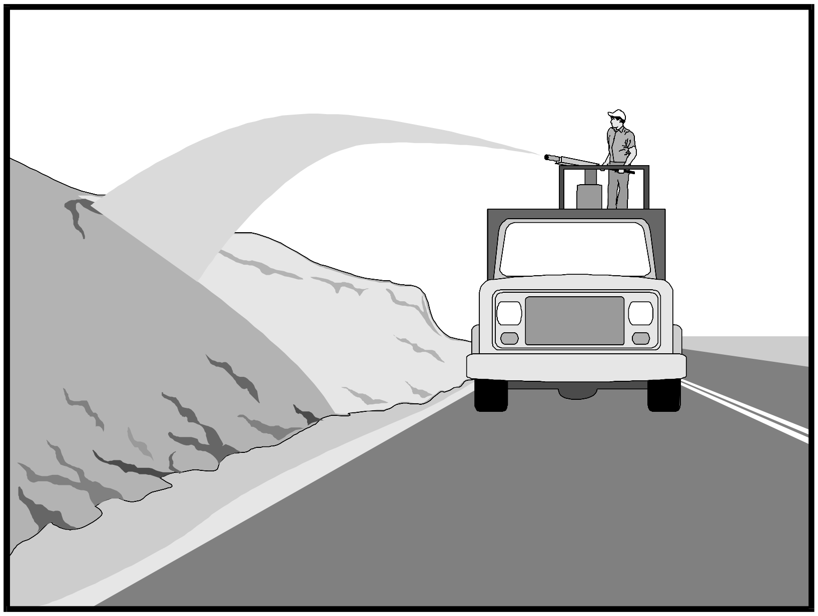
Sedimentation and Erosion Control, An Inventory of Current Practices Draft, US EPA, April 1990.

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.

Straw Mulch EC-6



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	

Legend:

☑ Primary Category

☒ Secondary Category

Targeted Constituents

Sediment	☑
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

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.

- 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 coulter, 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.

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

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.

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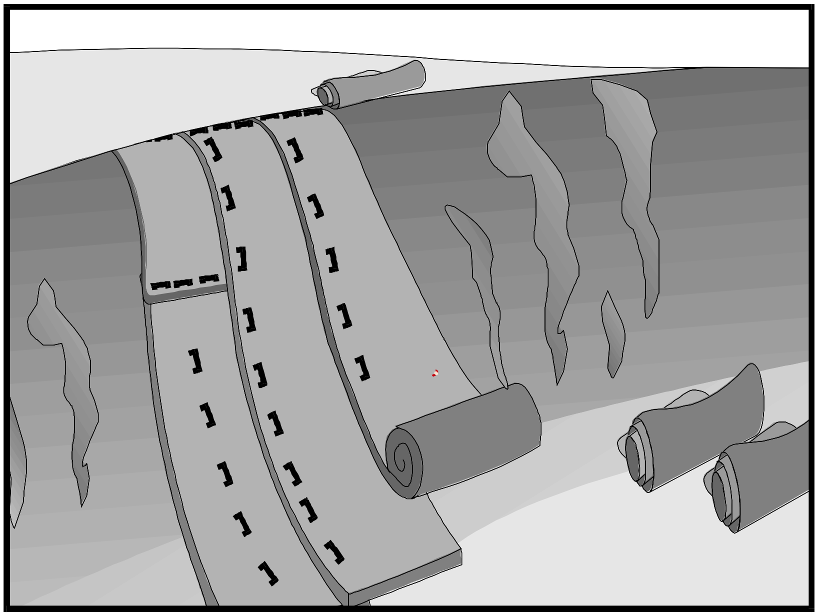
Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Geotextiles and Mats EC-7



Description and Purpose

Mattings, 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. Mattings 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	☑
SE	Sediment Control	
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	☑
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/yd^2, ±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/yd^2. 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/yd^2. 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/yd^2. 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 ¼ 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/yd^2. Moderate slopes, 2:1 (H:V) to 3:1 (H:V), require a minimum of 1 ½ staples/yd^2. 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 ½-3/4 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.

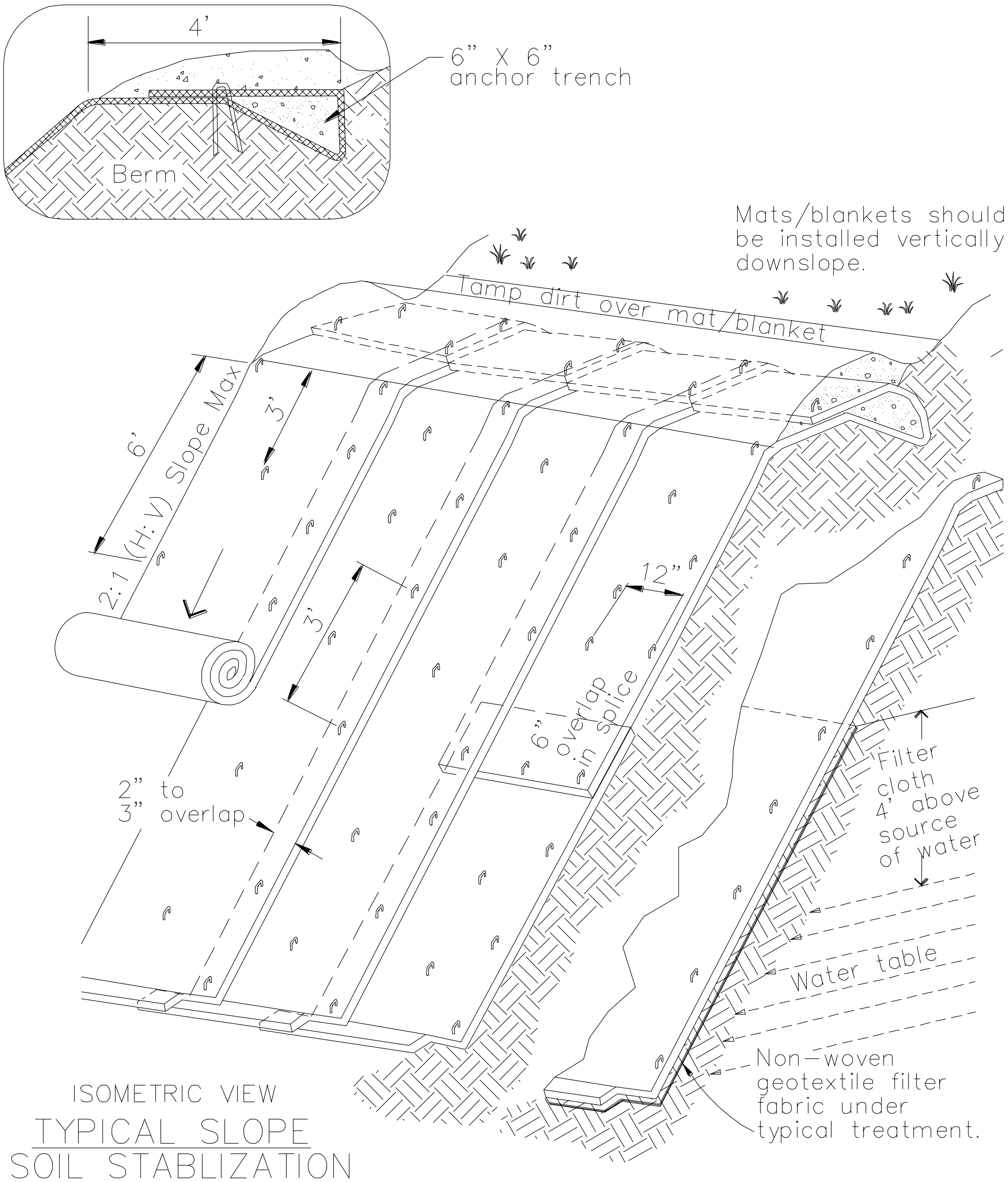
National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.

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.



ISOMETRIC VIEW

TYPICAL SLOPE SOIL STABLIZATION

NTS

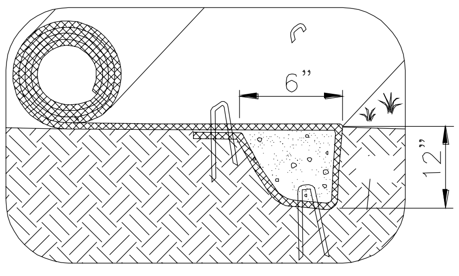
WET SLOPE LINING

NTS

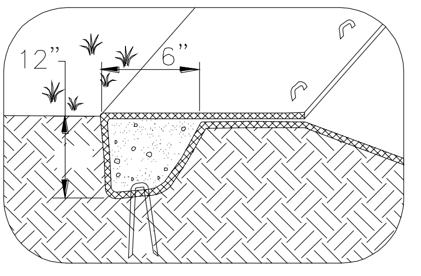
NOTES:

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
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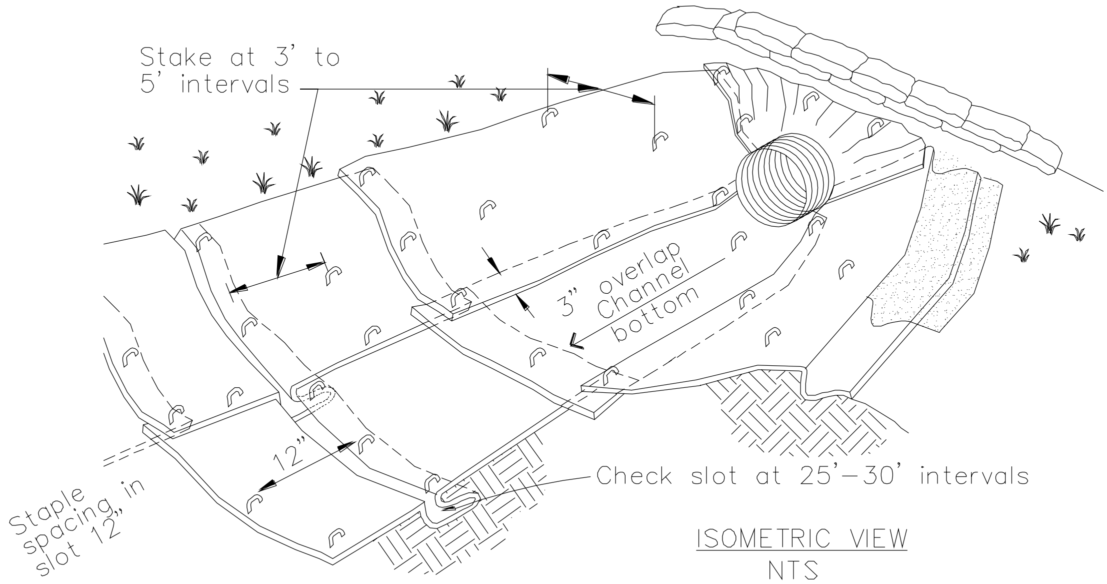
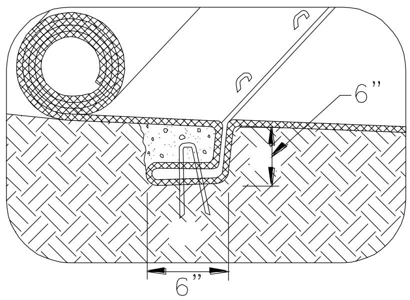
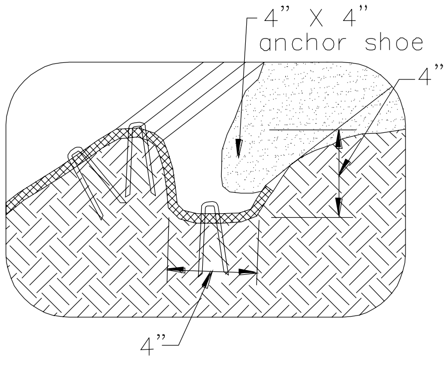


ISOMETRIC VIEW
NTS



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

Wood Mulching EC-8

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	☑
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	☑
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.

Compost Blanket EC-14

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	

Legend:

☑ Primary Category

☒ Secondary Category

Targeted Constituents

Sediment	☑
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

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Description and Purpose

A compost blanket is applied to slopes and earth disturbed areas to prevent erosion, and in some cases, increase infiltration and/or establish vegetation. The compost blanket can be applied by hand, conveyor system, compost spreader, or pneumatic delivery (blower) system. The blanket thickness is determined from the slope steepness and anticipated precipitation. A compost blanket protects the soil surface from raindrop erosion, particularly rills and gullies that may form under other methods of erosion control.

A compost blanket, if properly installed, can be very successful at vegetation establishment, weed suppression and erosion control. The compost blanket comes into direct contact with the underlying soil, reducing rill formation. Furthermore, compost provides organic matter and nutrients important for vegetation growth. The compost blanket provides soil structure that allows water to infiltrate the soil surface and retain moisture, which also promotes seed germination and vegetation growth, in addition to reducing runoff.

Compost is typically derived from combinations of feedstocks, biosolids, leaf and yard trimmings, manure, wood, or mixed solid waste. Many types of compost are products of municipal recycle or "Greenwaste" programs. Compost is organic and biodegradable and can be left onsite. There are many types of compost with a variety of properties with specific functions, and accordingly, compost selection is an important design consideration in the application of this type of erosion control.

Suitable Applications

A compost blanket is appropriate for slopes and earth disturbed areas requiring protection until permanent stabilization is established. A compost blanket can also used in combination with temporary and/or permanent seeding strategies to enhance plant establishment. Examples include:

- Rough-graded areas that will remain inactive for longer than 14 days
- Soil stockpiles
- Slopes with exposed soil between existing vegetation such as trees or shrubs
- Slopes planted with live, container-grown vegetation
- Disturbed areas where plants are slow to develop

A compost blanket is typically used on slopes of 2:1 (H:V) or gentler. However, a compost blanket can be effective when applied to slopes as steep as 1:1 (H:V) with appropriate design considerations including slope length, blanket thickness, adding components such as a tackifier, or using compost blankets in conjunction with other techniques, such as compost socks and berms or fiber rolls.

Compost can be pre-seeded prior to application to the soil (recommended by the EPA for construction site stormwater runoff control) or seeded after the blanket has been installed. The compost medium can also remove pollutants in stormwater including heavy metals; oil and grease; and hydrocarbons (USEPA, 1998).

Limitations

- Compost can potentially leach nutrients (dissolved phosphorus and nitrogen) into runoff and potentially impact water quality. Compost should not be used directly upstream from nutrient impaired waterbodies (Adams et. al, 2008).
- Compost may also contain other undesirable constituents that are detrimental to water quality. Carefully consider the qualifications and experience of any compost producer/supplier.
- A compost blanket applied by hand is more time intensive and potentially costly. Using a pneumatic blower truck is the recommended cost effective method of application.
- When blowers are used, the treatment areas should be within 300 ft of a road or surface capable of supporting trucks.
- Wind may limit application of compost and result in application to undesired locations.
- Compost blankets should not be applied in areas of concentrated flows.
- Steeper slopes may require additional blanket thickness and other stability measures such as using tackifiers or slope interruption devices (compost socks and berms, or fiber rolls). The same applies for sites with high precipitation totals or during the rainy season.

Implementation

- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

Compost Materials

- California Compost Regulations (Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7, Section 17868.3) define and require a quality of compost for application. Compost should comply with all physical and chemical requirements. Specific requirements are provided in Table 1 below, taken from Caltrans Standard Special Provision 10-1 (SSP 10-1), Erosion Control (Compost Blanket).

- The compost producer should be fully permitted as specified under the California Integrated Waste Management Board, Local Enforcement Agencies and any other State and Local Agencies that regulate Solid Waste Facilities. If exempt from State permitting requirements, the composting facility should certify that it follows guidelines and procedures for production of compost meeting the environmental health standards of Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7.

- The compost producer should be a participant in United States Composting Council's Seal of Testing Assurance program.

- Compost moisture should be considered for composition quality and application purposes. A range of 30-50% is typical. Compost that is too dry is hard to apply and compost that is too wet is more difficult (and more expensive) to transport. For arid or semi-arid areas, or for application during the dry season, use compost with greater moisture content than areas with wetter climates. For wetter or more humid climates or for application during the wet season, drier composts can be used as the compost will absorb moisture from the ambient air.

- Organic content of the compost is also important and should range from 30 to 65% depending on site conditions.

- Compost should be high-quality mature compost. Immature compost can potentially leach nutrients.

- Compost should not be derived from mixed municipal solid waste and should be free of visible contaminants.

- Compost should not contain paint, petroleum products, pesticides or any other chemical residues harmful to animal life or plant growth. Metal concentrations in compost should not exceed the maximum metal concentrations listed under Title 14, California Code of Regulations, Division 7, Chapter 3.1, Section 17868.2.

- Compost should not possess objectionable odors.

- Compost should be weed free.

Table 1. Physical/Chemical Requirements of Compost
Reference - Caltrans SSP-10 Erosion Control Blanket (Compost)

Property	Test Method	Requirement
pH	*TMECC 04.11-A Elastometric pH 1:5 Slurry Method pH Units	6.0–8.0
Soluble Salts	TMECC 04.10-A Electrical Conductivity 1:5 Slurry Method dS/m (mmhos/cm)	0-10.0
Moisture Content	TMECC 03.09-A Total Solids & Moisture at 70+/- 5 deg C % Wet Weight Basis	30-60
Organic Matter Content	TMECC 05.07-A Loss-On-Ignition Organic Matter Method (LOI) % Dry Weight Basis	30–65
Maturity	TMECC 05.05-A Germination and Vigor Seed Emergence Seedling Vigor % Relative to Positive Control	80 or Above 80 or Above
Stability	TMECC 05.08-B Carbon Dioxide Evolution Rate mg CO_2-C/g OM per day	8 or below
Particle Size	TMECC 02.02-B Sample Sieving for Aggregate Size Classification % Dry Weight Basis	100% Passing, 3 inch 90-100% Passing, 1 inch 65-100% Passing, 3/4 inch 0 - 75% Passing, 1/4 inch Maximum length 6 inches
Pathogen	TMECC 07.01-B Fecal Coliform Bacteria < 1000 MPN/gram dry wt.	Pass
Pathogen	TMECC 07.01-B Salmonella < 3 MPN/4 grams dry wt.	Pass
Physical Contaminants	TMECC 02.02-C Man Made Inert Removal and Classification: Plastic, Glass and Metal % > 4mm fraction	Combined Total: < 1.0
Physical Contaminants	TMECC 02.02-C Man Made Inert Removal and Classification: Sharps (Sewing needles, straight pins and hypodermic needles) % > 4mm fraction	None Detected

*TMECC refers to "Test Methods for the Examination of Composting and Compost," published by the United States Department of Agriculture and the United States Compost Council (USCC).

Installation

- Prior to compost application, prepare the slope by removing loose rocks, roots, stumps, and other debris greater than 2” in diameter. Prepare the slope area surface by scarifying or track walking/roughening if necessary.

- Select method to apply the compost blanket. A pneumatic blower is most cost effective and most adaptive in applying compost to steep, rough terrain, and hard to reach locations.

- A compost blanket thickness of 1” to 4” should be applied to slopes of 2:1 (H:V) or gentler, based on site-specific conditions. Increase blanket thickness with increased slope steepness and/or during installation during the rainy season (for example, 2” to 3” should be used for a

3:1 slope, while 1" to 2" can be used for a 4:1 slope). Erosion control using a compost blanket is not recommended for slopes greater than 1:1 (H:V).

- For steeper slopes, tackifiers should be utilized and/or other stabilization techniques employed. For example, compost socks or berms can be installed at intervals over the compost blanket (in a similar manner as Fiber Rolls, SE-5).
- Compost socks or berms (or equivalent linear sediment control BMP) should be placed at the top and/or bottom of the slope for additional erosion control performance.
- For optimum vegetation establishment, a blanket thickness of 1" to 2" is recommended. If vegetation establishment is not the primary function of the compost blanket, a thicker blanket may be recommended based on slope or rainfall conditions.
- Evenly distribute compost on the soil surface to the desired blanket thickness (1/2" to 4" as calculated prior based on site conditions and objectives). Even distribution is an important factor in preventing future rill and gully erosion.
- The compost blanket should extend 3 to 6 feet over the top of the shoulder of the slope. A compost sock or compost berm can be used at the top of the slope as an auxiliary technique to prevent runoff from flowing underneath the compost blanket.
- Use additional anchoring and erosion control BMPs in conjunction of the compost blanket as needed.

Costs

The cost associated with a compost blanket is similar to that of a straw mat and generally less expensive than a geotextile blanket (USEPA, 2009). Caltrans has provided a recent estimate for $5,000 to $8,000 per acre for application of an unseeded 1 inch compost blanket (Caltrans Compost Specifications, 2009). Recently obtained vendor costs indicate that proprietary blends of compost that are seeded and contain a nutrient rich "tackifier" can cost approximately $0.35 per square foot, or approximately $15,000 per acre for a 2 inch blanket. Application by hand is more time intensive and likely more costly.

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, another layer of compost should be reapplied as soon as possible. It may be necessary to install an additional type of stormwater BMP at the top of slope or as a slope interrupter to control flow, such as a fiber roll (SE-5) or compost sock (SE-11).
- Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.
- Limit or prohibit foot traffic to minimize damage to BMP or impede vegetation establishment.

References

An Analysis of Composting as an Environmental Remediation Technology, U.S. Environmental Protection Agency (USEPA), Solid Waste and Emergency Response (5305W), EPA530-R-8-008, 1998.

Characteristics of Compost: Moisture Holding and Water Quality Improvement, Center for Research in Water Resources, Kirchoff, C., Malina, J., and Barrett, M., 2003.

Compost Utilization for Erosion Control, The University of Georgia College of Agricultural and Environmental Sciences, pubs.caes.uga.edu/caespubs/pubcd/B1200.htm, Faucette, B. and Risse, M., 2009.

Demonstration Project Using Yard Debris Compost for Erosion Control, Final Report, presented to Metropolitan Service District, W&H Pacific, 1993.

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

Standard Special Provision 10-1, Erosion Control (Compost Blanket), California Department of Transportation (Caltrans). 2007 Update.

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Soil Preparation/Roughening EC-15

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	

Legend:

☑ Primary Category

☒ Secondary Category

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-5 Soil Binders

EC-7 Geotextiles and Mats

Description and Purpose

Soil Preparation/Roughening involves assessment and preparation of surface soils for BMP installation. This can include soil testing (for seed base, soil characteristics, or nutrients), as well as roughening surface soils by mechanical methods (including sheepsfoot rolling, track walking, scarifying, stair stepping, and imprinting) to prepare soil for additional BMPs, or to break up sheet flow. Soil Preparation can also involve tilling topsoil to prepare a seed bed and/or incorporation of soil amendments, to enhance vegetative establishment.

Suitable Applications

Soil preparation: Soil preparation is essential to proper vegetative establishment. In particular, soil preparation (i.e. tilling, raking, and amendment) is suitable for use in combination with any soil stabilization method, including RECPs or sod. Soil preparation should not be confused with roughening.

Roughening: Soil roughening is generally referred to as track walking (sometimes called imprinting) a slope, where treads from heavy equipment run parallel to the contours of the slope and act as mini terraces. Soil preparation is most effective when used in combination with erosion controls. Soil Roughening is suitable for use as a complementary process for controlling erosion on a site. Roughening is not intended to be used as a stand-alone BMP, and should be used with perimeter controls, additional erosion control measures, grade breaks, and vegetative establishment for maximum effectiveness. Roughening is intended to only affect surface soils and should not compromise slope stability or overall compaction. Suitable applications for soil roughening include:

- Along any disturbed slopes, including temporary stockpiles, sediment basins, or compacted soil diversion berms and swales.
- Roughening should be used in combination with hydraulically applied stabilization methods, compost blanket, or straw mulch; but should not be used in combination with RECPs or sod because roughening is intended to leave terraces on the slope.

Limitations

- Preparation and roughening must take place prior to installing other erosion controls (such as hydraulically applied stabilizers) or sediment controls (such as fiber rolls) on the faces of slopes.
- In such cases where slope preparation is minimal, erosion control/revegetation BMPs that do not require extensive soil preparation - such as hydraulic mulching and seeding applications - should be employed.
- Consideration should be given to the type of erosion control BMP that follows surface preparation, as some BMPs are not designed to be installed over various types of tillage/roughening, i.e., RECPs (erosion control blankets) should not be used with soil roughening due to a “bridging” effect, which suspends the blanket above the seed bed.
- Surface roughness has an effect on the amount of mulch material that needs to be applied, which shows up as a general increase in mulch material due to an increase in surface area (Topographic Index -see EC-3 Hydraulic Mulching).

Implementation

- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

General

A roughened surface can significantly reduce erosion. Based on tests done at the San Diego State Erosion Research Laboratory, various roughening techniques on slopes can result in a 12 - 76% reduction in the erosion rate versus smooth slopes.

Materials

Minimal materials are required unless amendments and/or seed are added to the soil. The majority of soil roughening/preparation can be done with equipment that is on hand at a normal construction site, such as bull dozers and compaction equipment.

Installation Guidelines

Soil Preparation

- Where appropriate or feasible, soil should be prepared to receive the seed by disking or otherwise scarifying the surface to eliminate crust, improve air and water infiltration and create a more favorable environment for germination and growth.
- Based upon soil testing conducted, apply additional soil amendments (e.g. fertilizers, additional seed) to the soil to help with germination. Follow EC-4, Hydroseeding, when selecting and applying seed and fertilizers.

Cut Slope Roughening:

- Stair-step grade or groove the cut slopes that are steeper than 3:1.
- Use stair-step grading on any erodible material soft enough to be ripped with a bulldozer. Slopes consisting of soft rock with some subsoil are particularly suited to stair-step grading.
- Make the vertical cut distance less than the horizontal distance, and slightly slope the horizontal position of the "step" in toward the vertical wall.
- Do not make individual vertical cuts more than 2 feet (0.6 m) high in soft materials or more than 3 feet (0.9 m) high in rocky materials.
- Groove the slope using machinery to create a series of ridges and depressions that run across the slope, on the contour.

Fill Slope Roughening:

- Place on fill slopes with a gradient steeper than 3:1 in lifts not to exceed 8 inches (0.2 m), and make sure each lift is properly compacted.
- Ensure that the face of the slope consists of loose, uncompacted fill 4-6 inches (0.1-0.2 m) deep.
- Use grooving or tracking to roughen the face of the slopes, if necessary.
- Do not blade or scrape the final slope face.

Roughening for Slopes to be Mowed:

- Slopes which require mowing activities should not be steeper than 3:1.
- Roughen these areas to shallow grooves by track walking, scarifying, sheepsfoot rolling, or imprinting.
- Make grooves close together (less than 10 inches), and not less than 1 inch deep, and perpendicular to the direction of runoff (i.e., parallel to the slope contours).
- Excessive roughness is undesirable where mowing is planned.

Roughening With Tracked Machinery:

- Limit roughening with tracked machinery to soils with a sandy textural component to avoid undue compaction of the soil surface.
- Operate tracked machinery up and down the slope to leave horizontal depressions in the soil. Do not back-blade during the final grading operation.
- Seed and mulch roughened areas as soon as possible to obtain optimum seed germination and growth.

Costs

Costs are based on the additional labor of tracking or preparation of the slope plus the cost of any required soil amendment materials.

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.

- Check the seeded slopes for signs of erosion such as rills and gullies. Fill these areas slightly above the original grade, then reseed and mulch as soon as possible.

- Inspect BMPs weekly during normal operations, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

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.

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	☑
SE	Sediment Control	☒
TR	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	☑
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/yd^2 in flat areas and \$11 - \$23/yd^2 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.

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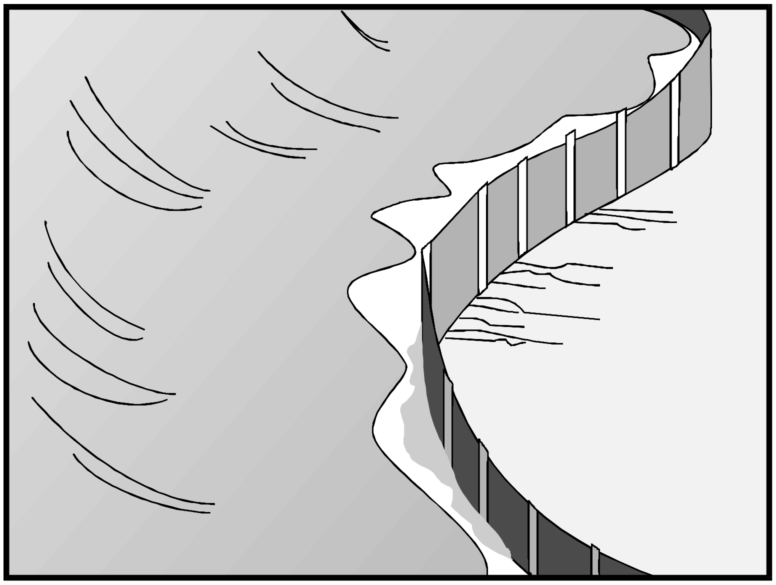
Silt Fence SE-1



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	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment (coarse sediment)	☑
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

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.

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 ft^2 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 1/3 the height of the barrier; in no case should the reach exceed 500 ft.
- Cross barriers should be a minimum of 1/3 and a maximum of ½ 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.

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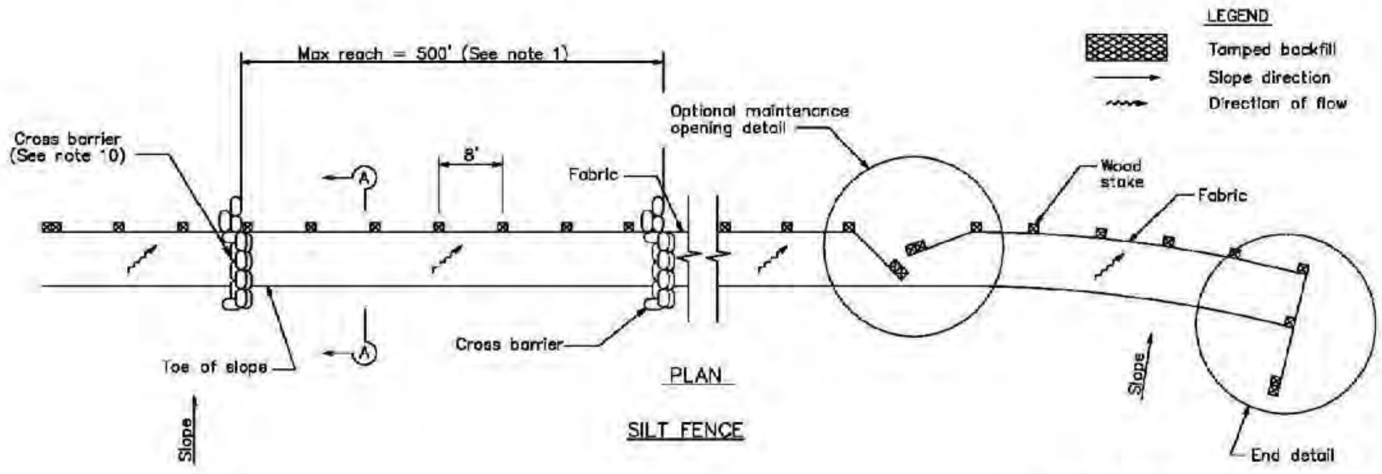
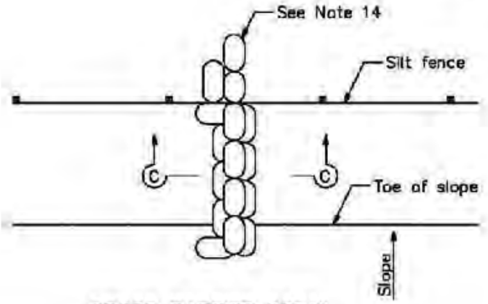


PLAN

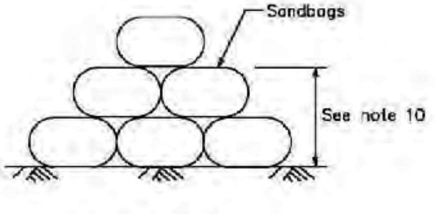
SILT FENCE

NOTES

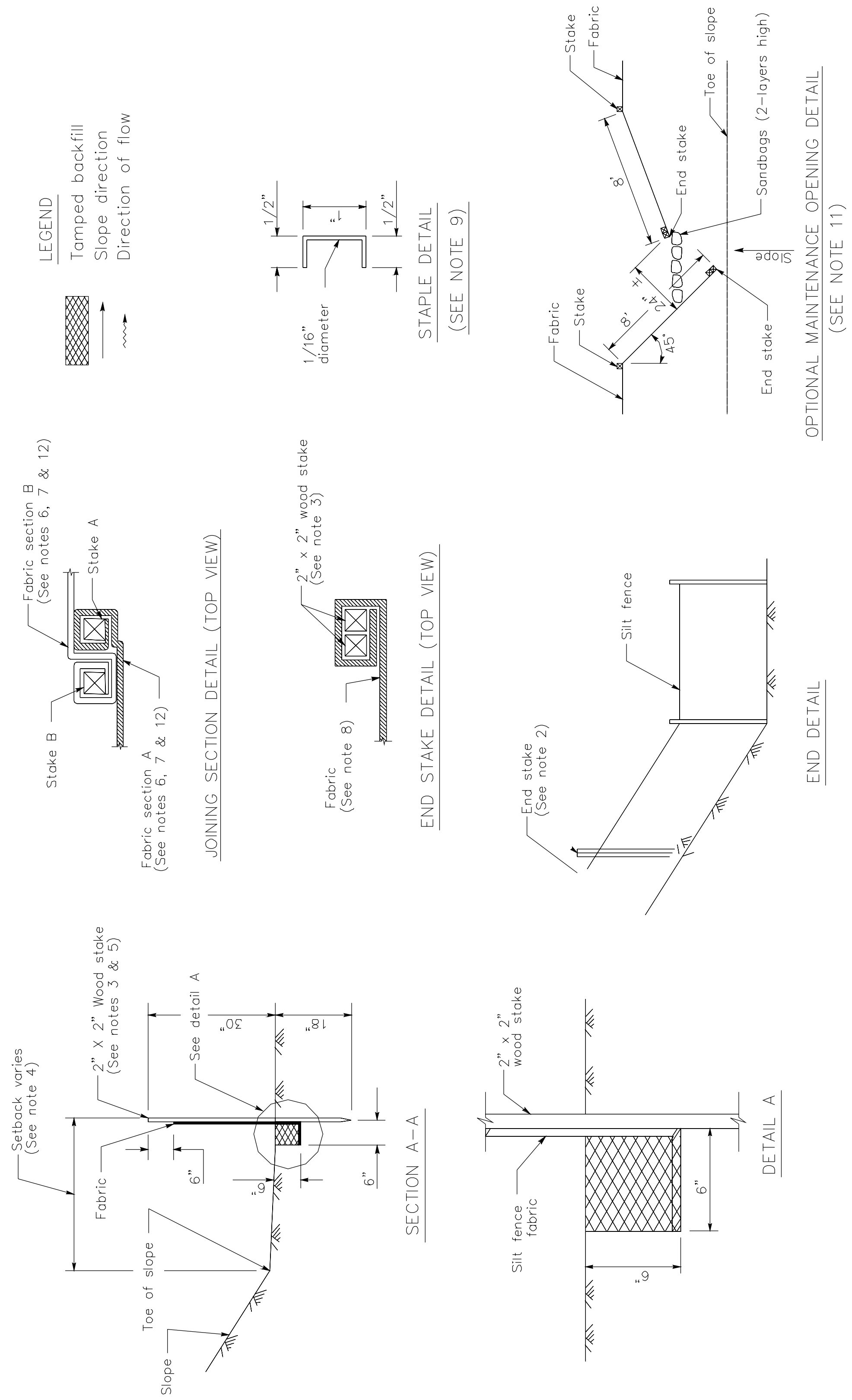
1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the linear barrier, in no case shall the reach length exceed 500'.
2. The last 8'–0" of fence shall be turned up slope.
3. Stake dimensions are nominal.
4. Dimension may vary to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



CROSS BARRIER DETAIL



SECTION C–C



STAPLE DETAIL (SEE NOTE 9)

OPTIONAL MAINTENANCE OPENING DETAIL (SEE NOTE 11)

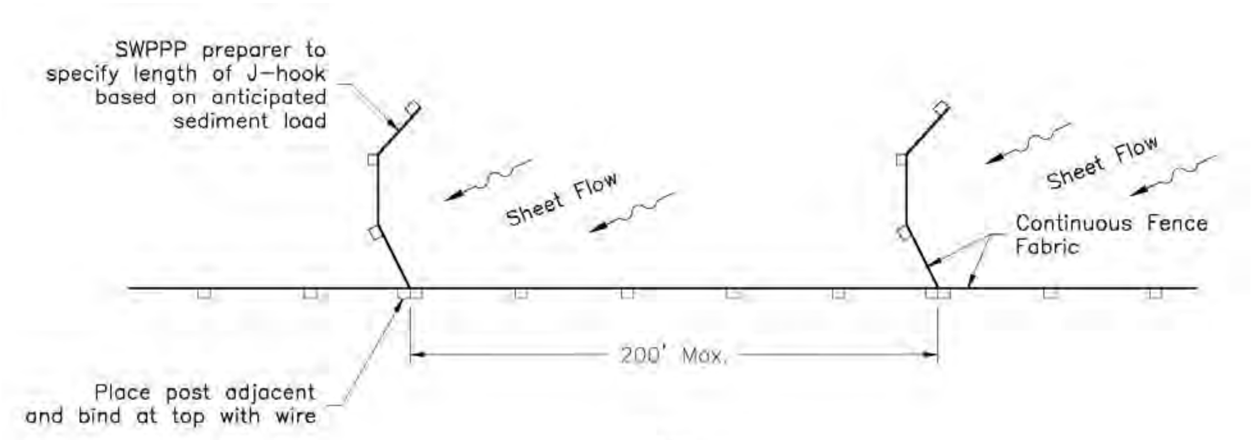
JOINING SECTION DETAIL (TOP VIEW)

END STAKE DETAIL (TOP VIEW)

END DETAIL

SECTION A-A

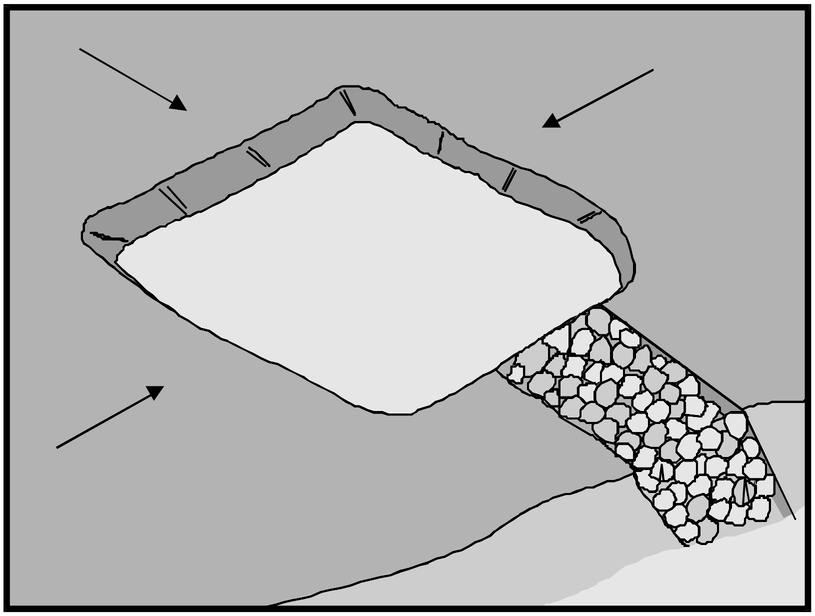
DETAIL A


SWPPP preparer to specify length of J-hook based on anticipated sediment load
Sheet Flow
Sheet Flow
Continuous Fence Fabric
200' Max.
Place post adjacent and bind at top with wire

Plan

J-HOOK

Sediment Trap SE-3



Description and Purpose

A sediment trap is a containment area where sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out or before the runoff is discharged by gravity flow. Sediment traps are formed by excavating or constructing an earthen embankment across a waterway or low drainage area.

Trap design guidance provided in this fact sheet is not intended to guarantee compliance with numeric discharge limits (numeric action levels or numeric effluent limits for turbidity). Compliance with discharge limits requires a thoughtful approach to comprehensive BMP planning, implementation, and maintenance. Therefore, optimally designed and maintained sediment traps should be used in conjunction with a comprehensive system of BMPs.

Suitable Applications

Sediment traps should be considered for use:

- At the perimeter of the site at locations where sediment-laden runoff is discharged offsite.
- At multiple locations within the project site where sediment control is needed.
- Around or upslope from storm drain inlet protection measures.
- Sediment traps may be used on construction projects where the drainage area is less than 5 acres. Traps would be

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	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-2 Sediment Basin (for larger areas)

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placed where sediment-laden stormwater may enter a storm drain or watercourse. SE-2, Sediment Basins, must be used for drainage areas greater than 5 acres.

- As a supplemental control, sediment traps provide additional protection for a water body or for reducing sediment before it enters a drainage system.

Limitations

- Requires large surface areas to permit infiltration and settling of sediment.
- Not appropriate for drainage areas greater than 5 acres.
- Only removes large and medium sized particles and requires upstream erosion control.
- Attractive and dangerous to children, requiring protective fencing.
- Conducive to vector production.
- Should not be located in live streams.

Implementation

Design

A sediment trap is a small temporary ponding area, usually with a gravel outlet, formed by excavation or by construction of an earthen embankment. Its purpose is to collect and store sediment from sites cleared or graded during construction. It is intended for use on small drainage areas with no unusual drainage features and projected for a quick build-out time. It should help in removing coarse sediment from runoff. The trap is a temporary measure with a design life of approximately six months to one year and is to be maintained until the site area is permanently protected against erosion by vegetation and/or structures.

Sediment traps should be used only for small drainage areas. If the contributing drainage area is greater than 5 acres, refer to SE-2, Sediment Basins, or subdivide the catchment area into smaller drainage basins.

Sediment usually must be removed from the trap after each rainfall event. The SWPPP should detail how this sediment is to be disposed, such as in fill areas onsite, or removal to an approved offsite dump. Sediment traps used as perimeter controls should be installed before any land disturbance takes place in the drainage area.

Sediment traps are usually small enough that a failure of the structure would not result in a loss of life, damage to home or buildings, or interruption in the use of public roads or utilities. However, sediment traps are attractive to children and can be dangerous. The following recommendations should be implemented to reduce risks:

- Install continuous fencing around the sediment trap or pond. Consult local ordinances regarding requirements for maintaining health and safety.
- Restrict basin side slopes to 3:1 or flatter.

Sediment trap size depends on the type of soil, size of the drainage area, and desired sediment removal efficiency (see SE-2, Sediment Basin). As a rule of thumb, the larger the basin volume the greater the sediment removal efficiency. Sizing criteria are typically established under the local grading ordinance or equivalent. The runoff volume from a 2-year storm is a common design criteria for a sediment trap. The sizing criteria below assume that this runoff volume is 0.042 acre-ft/acre (0.5 in. of runoff). While the climatic, topographic, and soil type extremes make it difficult to establish a statewide standard, the following criteria should trap moderate to high amounts of sediment in most areas of California:

- Locate sediment traps as near as practical to areas producing the sediment.
- Trap should be situated according to the following criteria: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where failure would not cause loss of life or property damage, and (3) to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area.
- Trap should be sized to accommodate a settling zone and sediment storage zone with recommended minimum volumes of 67 yd^3/acre and 33 yd^3/acre of contributing drainage area, respectively, based on 0.5 in. of runoff volume over a 24-hour period. In many cases, the size of an individual trap is limited by available space. Multiple traps or additional volume may be required to accommodate specific rainfall, soil, and site conditions.
- Traps with an impounding levee greater than 4.5 ft tall, measured from the lowest point to the impounding area to the highest point of the levee, and traps capable of impounding more than 35,000 ft^3, should be designed by a Registered Civil Engineer. The design should include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the trap outlet and bypass structures.
- The outlet pipe or open spillway must be designed to convey anticipated peak flows.
- Use rock or vegetation to protect the trap outlets against erosion.
- Fencing should be provided to prevent unauthorized entry.

Installation

Sediment traps can be constructed by excavating a depression in the ground or creating an impoundment with a small embankment. Sediment traps should be installed outside the area being graded and should be built prior to the start of the grading activities or removal of vegetation. To minimize the area disturbed by them, sediment traps should be installed in natural depressions or in small swales or drainage ways. The following steps must be followed during installation:

- The area under the embankment must be cleared, grubbed, and stripped of any vegetation and root mat. The pool area should be cleared.
- The fill material for the embankment must be free of roots or other woody vegetation as well as oversized stones, rocks, organic material, or other objectionable material. The embankment may be compacted by traversing with equipment while it is being constructed.
- All cut-and-fill slopes should be 3:1 or flatter.
- When a riser is used, all pipe joints must be watertight.

- When a riser is used, at least the top two-thirds of the riser should be perforated with 0.5 in. diameter holes spaced 8 in. vertically and 10 to 12 in. horizontally. See SE-2, Sediment Basin.
- When an earth or stone outlet is used, the outlet crest elevation should be at least 1 ft below the top of the embankment.
- When crushed stone outlet is used, the crushed stone used in the outlet should meet AASHTO M43, size No. 2 or 24, or its equivalent such as MSHA No. 2. Gravel meeting the above gradation may be used if crushed stone is not available.

Costs

Average annual cost per installation and maintenance (18 month useful life) is \$0.73 per ft^3 (\$1,300 per drainage acre). Maintenance costs are approximately 20% of installation costs.

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.
- Inspect outlet area for erosion and stabilize if required.
- Inspect trap banks for seepage and structural soundness, repair as needed.
- Inspect outlet structure and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.
- Inspect fencing for damage and repair as needed.
- Inspect the sediment trap for area of standing water during every visit. Corrective measures should be taken if the BMP does not dewater completely in 96 hours or less to prevent vector production.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the trap capacity. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed of at an appropriate location.
- Remove vegetation from the sediment trap when first detected to prevent pools of standing water and subsequent vector production.
- BMPs that require dewatering shall be continuously attended while dewatering takes place. Dewatering BMPs per NS-2 shall be implemented at all times during dewatering activities.

References

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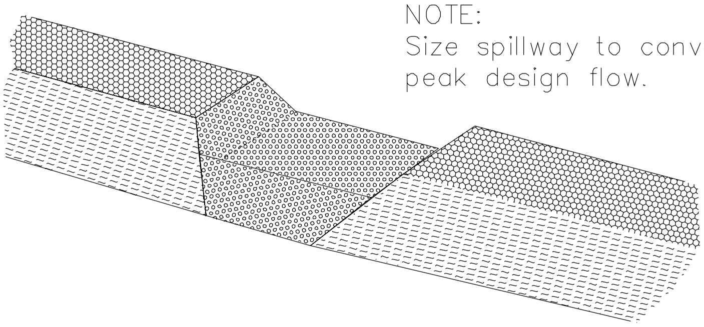
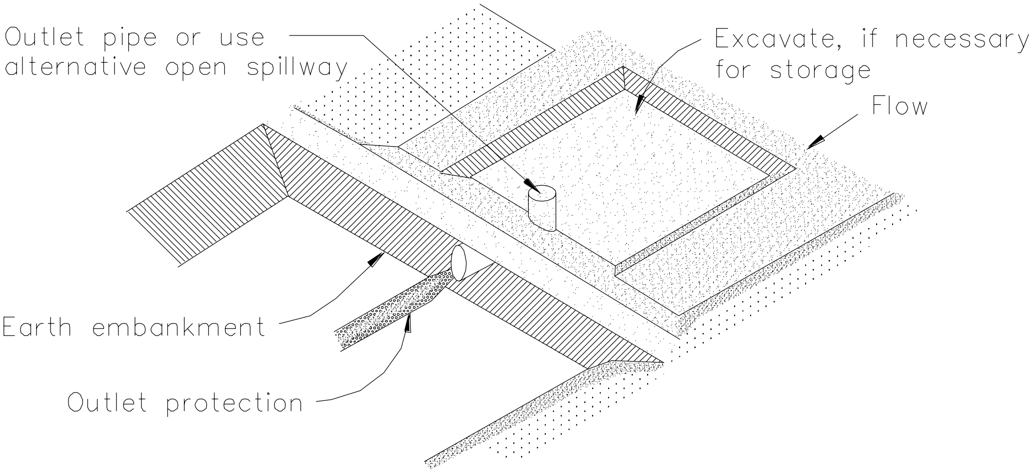
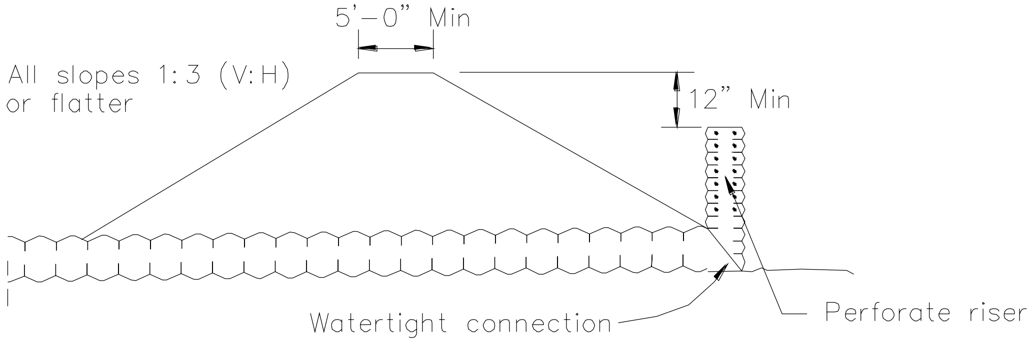


NOTE:
Size spillway to convey peak design flow.

TYPICAL OPEN SPILLWAY

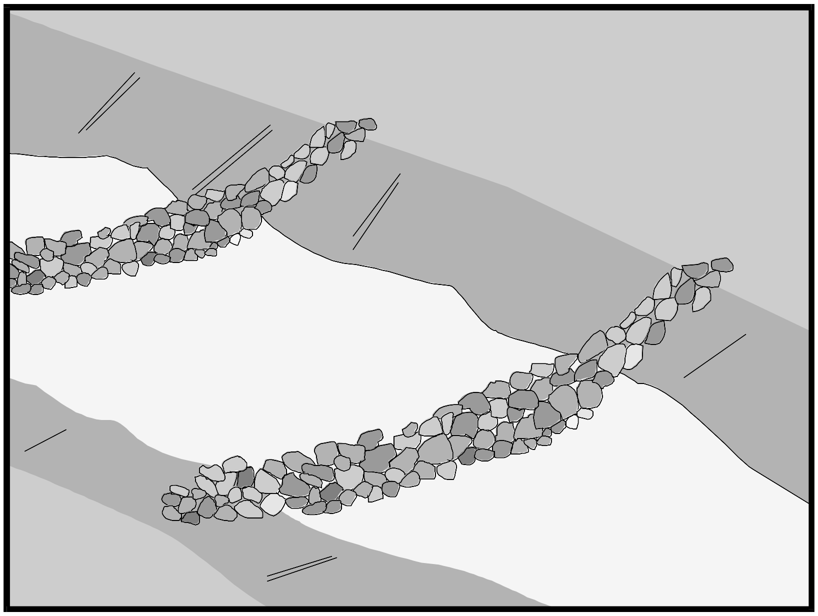




EMBANKMENT SECTION THRU RISER

TYPICAL SEDIMENT TRAP
NOT TO SCALE

Check Dams SE-4



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	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-12 Manufactured Linear Sediment Controls

SE-14 Biofilter Bags

Description and Purpose

A check dam is a small barrier constructed of rock, gravel bags, sandbags, fiber rolls, or other proprietary products, placed across a constructed swale or drainage ditch. Check dams reduce the effective slope of the channel, thereby reducing scour and channel erosion by reducing flow velocity and increasing residence time within the channel, allowing sediment to settle.

Suitable Applications

Check dams may be appropriate in the following situations:

- To promote sedimentation behind the dam.
- To prevent erosion by reducing the velocity of channel flow in small intermittent channels and temporary swales.
- In small open channels that drain 10 acres or less.
- In steep channels where stormwater runoff velocities exceed 5 ft/s.
- During the establishment of grass linings in drainage ditches or channels.
- In temporary ditches where the short length of service does not warrant establishment of erosion-resistant linings.
- To act as a grade control structure.

Limitations

- Not to be used in live streams or in channels with extended base flows.
- Not appropriate in channels that drain areas greater than 10 acres.
- Not appropriate in channels that are already grass-lined unless erosion potential or sediment-laden flow is expected, as installation may damage vegetation.
- Require extensive maintenance following high velocity flows.
- Promotes sediment trapping which can be re-suspended during subsequent storms or removal of the check dam.
- Do not construct check dams with straw bales or silt fence.
- Water suitable for mosquito production may stand behind check dams, particularly if subjected to daily non-stormwater discharges.

Implementation

General

Check dams reduce the effective slope and create small pools in swales and ditches that drain 10 acres or less. Using check dams to reduce channel slope reduces the velocity of stormwater flows, thus reducing erosion of the swale or ditch and promoting sedimentation. Thus, check dams are dual-purpose and serve an important role as erosion controls as well as as sediment controls. Note that use of 1-2 isolated check dams for sedimentation will likely result in little net removal of sediment because of the small detention time and probable scour during longer storms. Using a series of check dams will generally increase their effectiveness. A sediment trap (SE-3) may be placed immediately upstream of the check dam to increase sediment removal efficiency.

Design and Layout

Check dams work by decreasing the effective slope in ditches and swales. An important consequence of the reduced slope is a reduction in capacity of the ditch or swale. This reduction in capacity should be considered when using this BMP, as reduced capacity can result in overtopping of the ditch or swale and resultant consequences. In some cases, such as a "permanent" ditch or swale being constructed early and used as a "temporary" conveyance for construction flows, the ditch or swale may have sufficient capacity such that the temporary reduction in capacity due to check dams is acceptable. When check dams reduce capacities beyond acceptable limits, either:

- Don't use check dams. Consider alternative BMPs, or.
- Increase the size of the ditch or swale to restore capacity.

Maximum slope and velocity reduction is achieved when the toe of the upstream dam is at the same elevation as the top of the downstream dam (see "Spacing Between Check Dams" detail at the end of this fact sheet). The center section of the dam should be lower than the edge sections (at least 6 inches), acting as a spillway, so that the check dam will direct flows to the center of the ditch or swale (see “Typical Rock Check Dam” detail at the end of this fact sheet). Bypass or side-cutting can occur if a sufficient spillway is not provided in the center of the dam.

Check dams are usually constructed of rock, gravel bags, sandbags, and fiber rolls. A number of products can also be used as check dams (e.g. HDPE check dams, temporary silt dikes (SE-12)), and some of these products can be removed and reused. Check dams can also be constructed of logs or lumber, and have the advantage of a longer lifespan when compared to gravel bags, sandbags, and fiber rolls. Check dams should not be constructed from straw bales or silt fences, since concentrated flows quickly wash out these materials.

Rock check dams are usually constructed of 8 to 12 in. rock. The rock is placed either by hand or mechanically, but never just dumped into the channel. The dam should completely span the ditch or swale to prevent washout. The rock used should be large enough to stay in place given the expected design flow through the channel. It is recommended that abutments be extended 18 in. into the channel bank. Rock can be graded such that smaller diameter rock (e.g. 2-4 in) is located on the upstream side of larger rock (holding the smaller rock in place); increasing residence time.

Log check dams are usually constructed of 4 to 6 in. diameter logs, installed vertically. The logs should be embedded into the soil at least 18 in. Logs can be bolted or wired to vertical support logs that have been driven or buried into the soil.

See fiber rolls, SE-5, for installation of fiber roll check dams.

Gravel bag and sand bag check dams are constructed by stacking bags across the ditch or swale, shaped as shown in the drawings at the end of this fact sheet (see “Gravel Bag Check Dam” detail at the end of this fact sheet).

Manufactured products, such as temporary silt dikes (SE-12), should be installed in accordance with the manufacturer’s instructions. Installation typically requires anchoring or trenching of products, as well as regular maintenance to remove accumulated sediment and debris.

If grass is planted to stabilize the ditch or swale, the check dam should be removed when the grass has matured (unless the slope of the swales is greater than 4%).

The following guidance should be followed for the design and layout of check dams:

- Install the first check dam approximately 16 ft from the outfall device and at regular intervals based on slope gradient and soil type.
- Check dams should be placed at a distance and height to allow small pools to form between each check dam.
- For multiple check dam installation, backwater from a downstream check dam should reach the toes of the upstream check dam.
- A sediment trap provided immediately upstream of the check dam will help capture sediment. Due to the potential for this sediment to be resuspended in subsequent storms, the sediment trap should be cleaned following each storm event.

- High flows (typically a 2-year storm or larger) should safely flow over the check dam without an increase in upstream flooding or damage to the check dam.

- Where grass is used to line ditches, check dams should be removed when grass has matured sufficiently to protect the ditch or swale.

Materials

- Rock used for check dams should typically be 8-12 in rock and be sufficiently sized to stay in place given expected design flows in the channel. Smaller diameter rock (e.g. 2 to 4 in) can be placed on the upstream side of larger rock to increase residence time.

- Gravel bags used for check dams should conform to the requirements of SE-6, Gravel Bag Berms.

- Sandbags used for check dams should conform to SE-8, Sandbag Barrier.

- Fiber rolls used for check dams should conform to SE-5, Fiber Rolls.

- Temporary silt dikes used for check dams should conform to SE-12, Temporary Silt Dikes.

Installation

- Rock should be placed individually by hand or by mechanical methods (no dumping of rock) to achieve complete ditch or swale coverage.

- Tightly abut bags and stack according to detail shown in the figure at the end of this section (pyramid approach). Gravel bags and sandbags should not be stacked any higher than 3 ft.

- Upper rows or gravel and sand bags shall overlap joints in lower rows.

- Fiber rolls should be trenched in, backfilled, and firmly staked in place.

- Install along a level contour.

- HDPE check dams, temporary silt dikes, and other manufactured products should be used and installed per manufacturer specifications.

Costs

Cost consists of labor costs if materials are readily available (such as gravel on-site). If material must be imported, costs will increase. For other material and installation costs, see SE-5, SE-6, SE-8, SE-12, and SE-14.

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.

- Replace missing rock, bags, rolls, etc. Replace bags or rolls that have degraded or have become damaged.

- If the check dam is used as a sediment capture device, 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.
- If the check dam is used as a grade control structure, sediment removal is not required as long as the system continues to control the grade.
- Inspect areas behind check dams for pools of standing water, especially if subjected to daily non-stormwater discharges.
- Remove accumulated sediment prior to permanent seeding or soil stabilization.
- Remove check dam and accumulated sediment when check dams are no longer needed.

References

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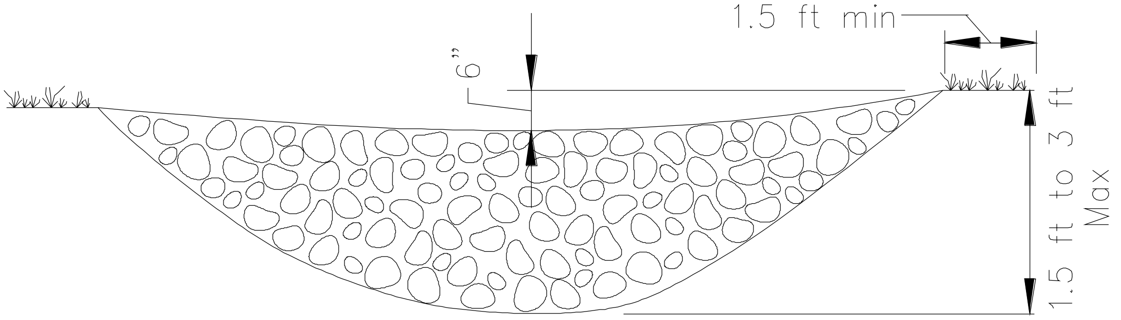
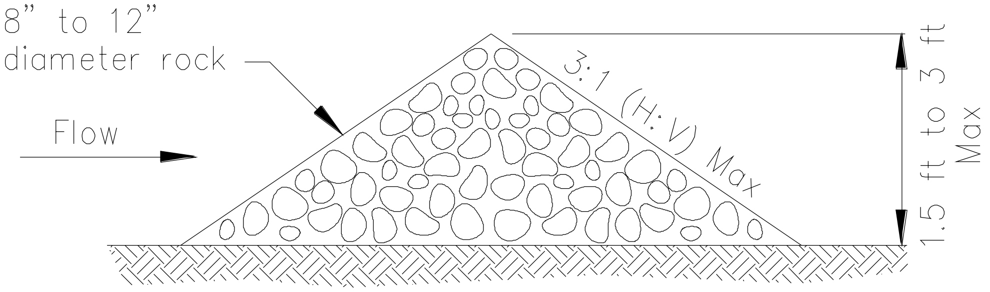
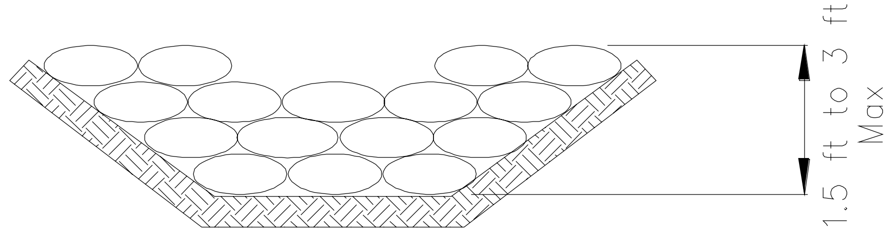


ELEVATION

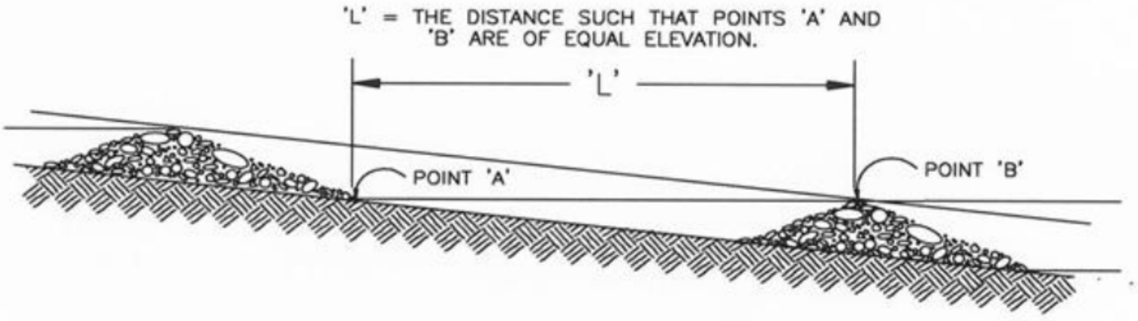


TYPICAL ROCK CHECK DAM SECTION

ROCK CHECK DAM
NOT TO SCALE

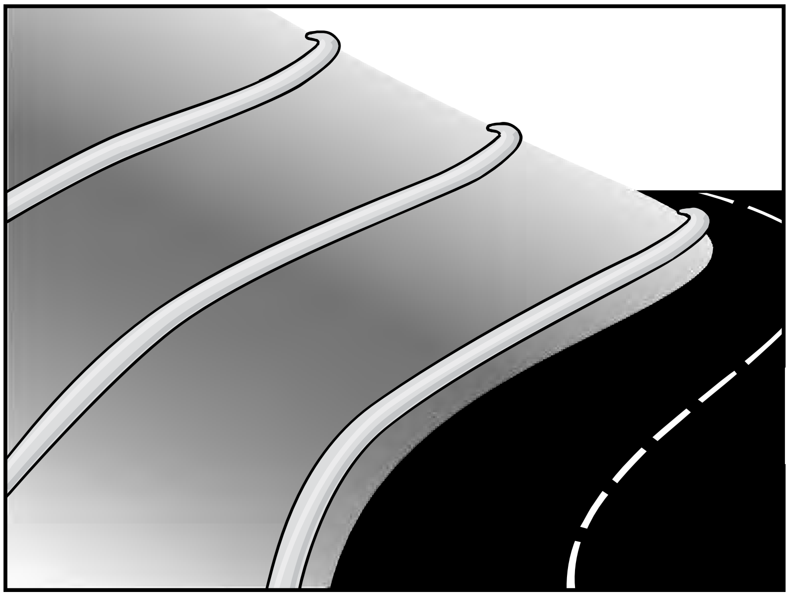


GRAVEL BAG CHECK DAM ELEVATION
NOT TO SCALE



SPACING BETWEEN CHECK DAMS

Fiber Rolls SE-5



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	☒
SE	Sediment Control	☑
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	☑
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

- 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 ¼ to 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 biodegradeable 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

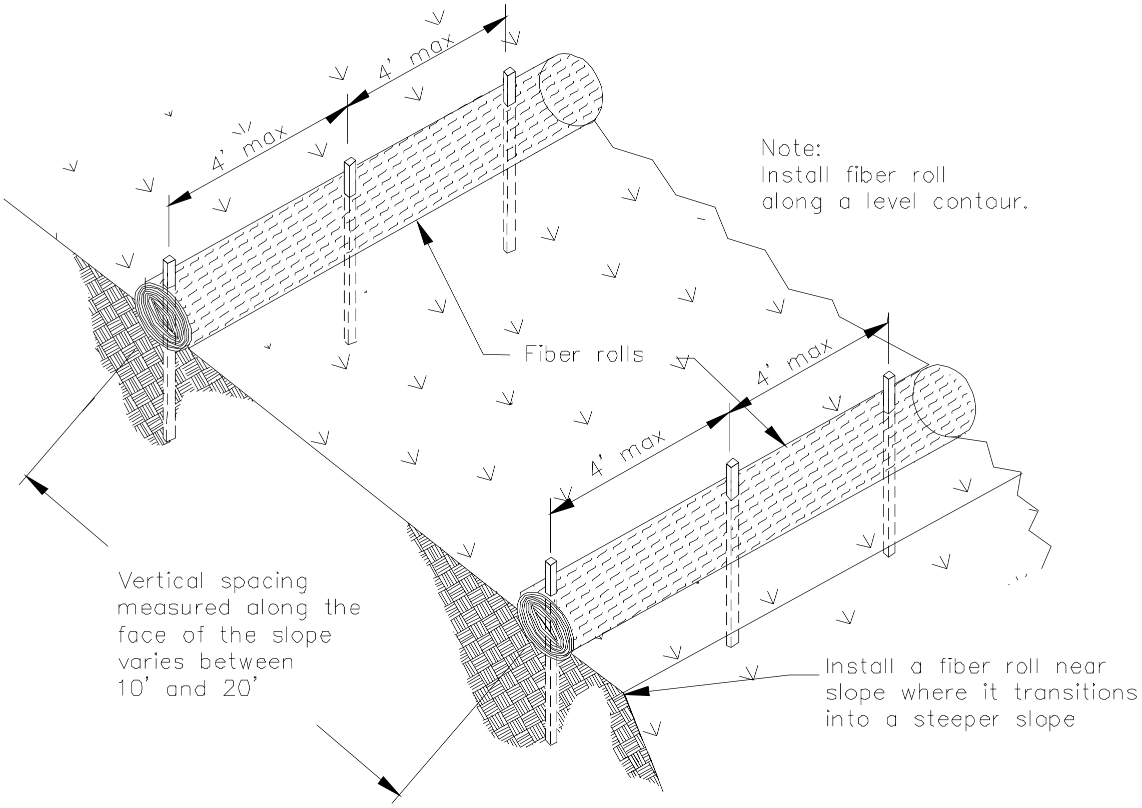
in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-third the designated sediment storage depth.

- 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

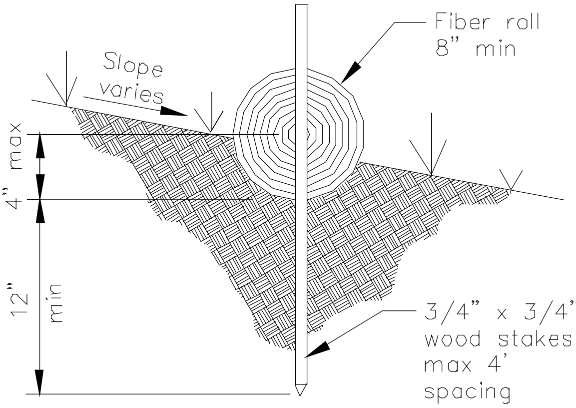
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

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



TYPICAL FIBER ROLL INSTALLATION

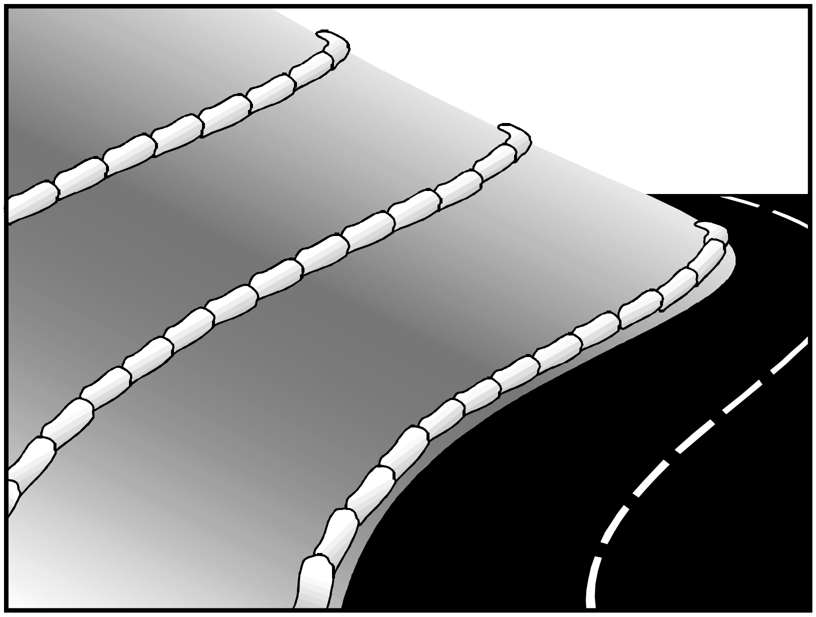
N.T.S.



ENTRENCHMENT DETAIL

N.T.S.

Gravel Bag Berm SE-6



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	☒
SE	Sediment Control	☑
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	☑
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

  - 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/yd^2, Mullen burst strength exceeding 300 lb/in^2 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.

Street Sweeping and Vacuuming SE-7

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	☒
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	☑
Nutrients	
Trash	☑
Metals	
Bacteria	
Oil and Grease	☑
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 yd^3 hopper) to $88/hour (9 yd^3 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.

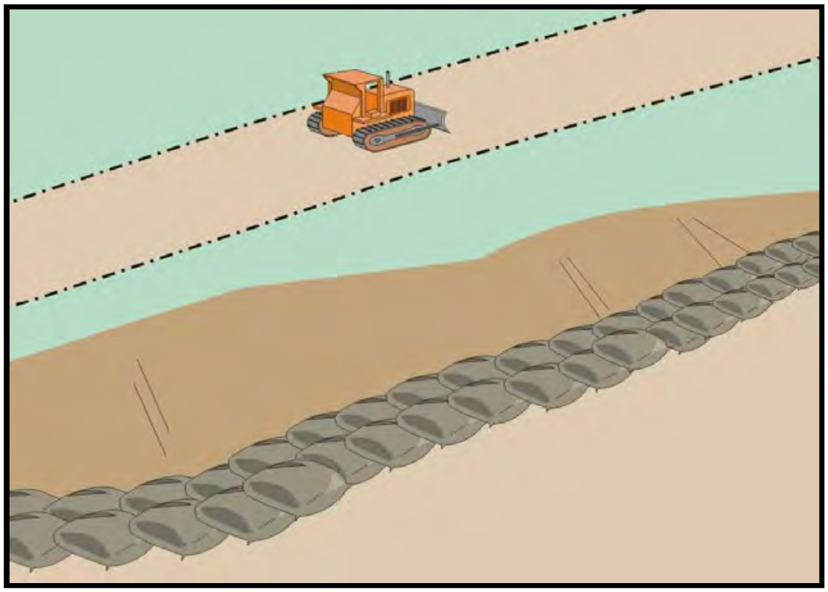
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

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.

Sandbag Barrier SE-8



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	

Legend:

☑ **Primary Category**

☒ **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	☑
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

- 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/yd^2, Mullen burst strength exceeding 300 lb/in^2 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 yd^3. 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.

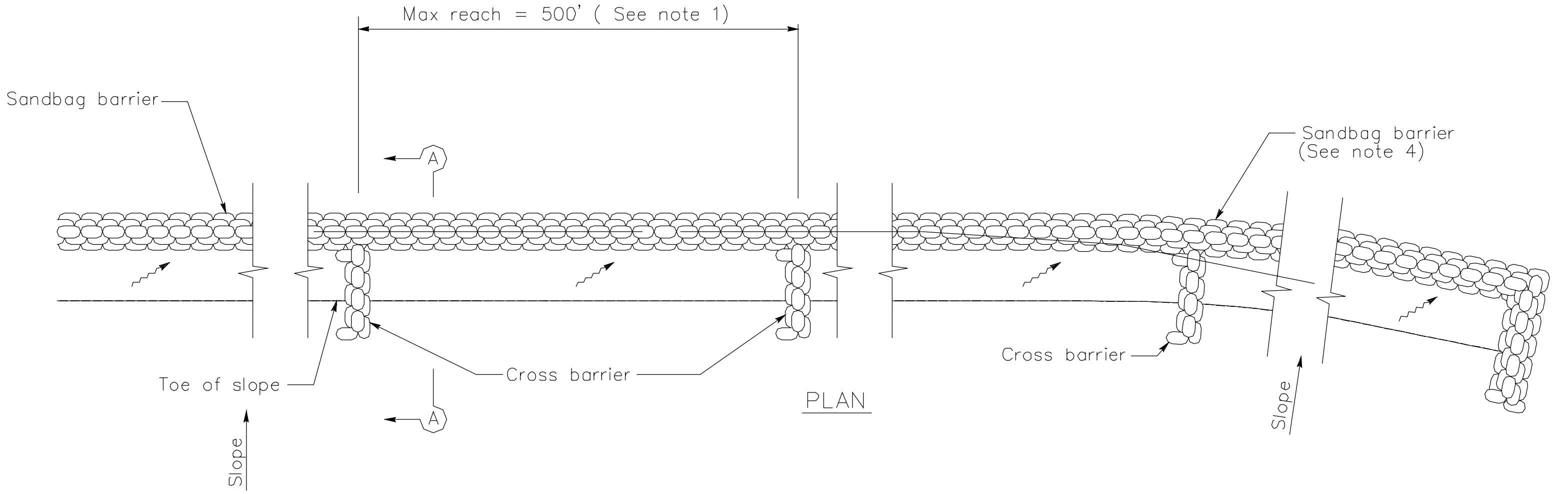
- Remove sandbags when no longer needed and recycle sand fill whenever possible and properly dispose of bag material. Remove sediment accumulation, and clean, re-grade, and stabilize the area.

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.

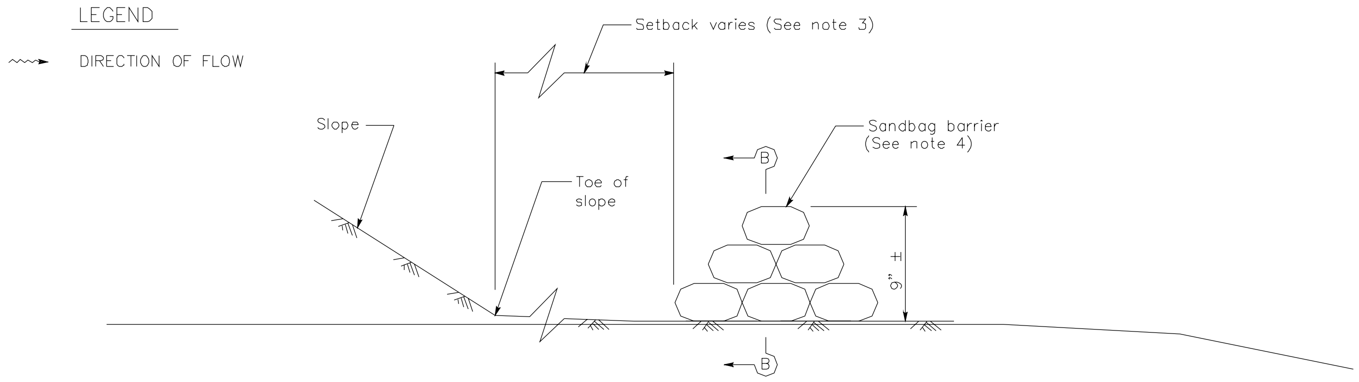
Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



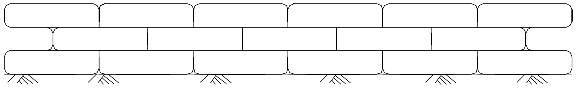
SANDBAG BARRIER

NOTES

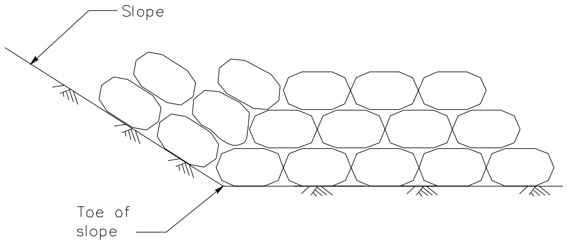
1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 500'.
2. Place sandbags tightly.
3. Dimension may vary to fit field condition.
4. Sandbag barrier shall be a minimum 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.



SECTION A–A



SECTION B–B



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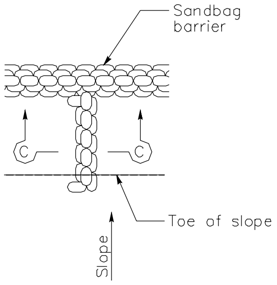
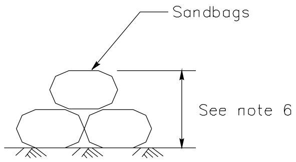
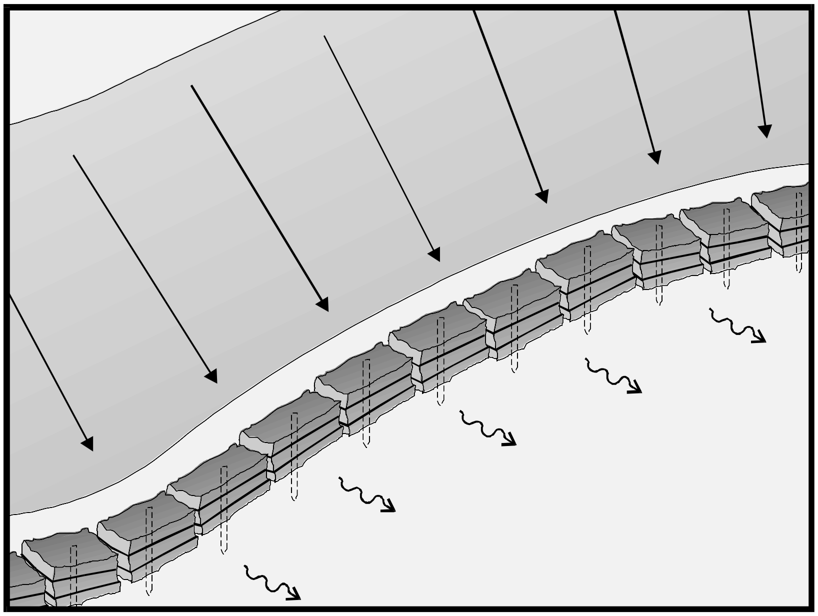


CROSS BARRIER DETAIL



SECTION C–C

Straw Bale Barrier SE-9



Description and Purpose

A straw bale barrier is a series of straw bales placed on a level contour to intercept sheet flows. Straw bale barriers pond sheet-flow runoff, allowing sediment to settle out.

Suitable Applications

Straw bale barriers 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 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	☒
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	☑
Nutrients	
Trash	
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-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 check dams across mildly sloped construction roads

Limitations

Straw bale barriers:

- Are not to be used for extended periods of time because they tend to rot and fall apart
- Are suitable only for sheet flow on slopes of 10 % or flatter
- Are not appropriate for large drainage areas, limit to one acre or less
- May require constant maintenance due to rotting
- Are not recommended for concentrated flow, inlet protection, channel flow, and live streams
- Cannot be made of bale bindings of jute or cotton
- Require labor-intensive installation and maintenance
- Cannot be used on paved surfaces
- Should not to be used for drain inlet protection
- Should not be used on lined ditches
- May introduce undesirable non-native plants to the area

Implementation

General

A straw bale barrier consists of a row of straw bales placed on a level contour. When appropriately placed, a straw bale barrier intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. Straw bale 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.

Straw bale barriers have not been as effective as expected due to improper use. These barriers have been placed in streams and drainage ways where runoff volumes and velocities have caused the barriers to wash out. In addition, failure to stake and entrench the straw bale has allowed undercutting and end flow. Use of straw bale barriers in accordance with this BMP should produce acceptable results.

Design and Layout

- Locate straw bale barriers on a level contour.
  - Slopes up to 10:1 (H:V): Straw bales should be placed at a maximum interval of 50 ft (a closer spacing is more effective), with the first row near the toe of slope.
  - Slopes greater than 10:1 (H:V): Not recommended.

- Turn the ends of the straw bale 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, consider moving the barrier away from the slope toe to facilitate cleaning. To prevent flow behind the barrier, sand bags can be placed perpendicular to the barrier to serve as cross barriers.

- Drainage area should not exceed 1 acre, or 0.25 acre per 100 ft of barrier.

- Maximum flow path to the barrier should be limited to 100 ft.

- Straw bale barriers should consist of two parallel rows.
    - Butt ends of bales tightly
    - Stagger butt joints between front and back row
    - Each row of bales must be trenched in and firmly staked

- Straw bale barriers are limited in height to one bale laid on its side.

- Anchor bales with either two wood stakes or four bars driven through the bale and into the soil. Drive the first stake towards the butt joint with the adjacent bale to force the bales together.

- See attached figure for installation details.

Materials

- ***Straw Bale Size:*** Each straw bale should be a minimum of 14 in. wide, 18 in. in height, 36 in. in length and should have a minimum mass of 50 lbs. The straw bale should be composed entirely of vegetative matter, except for the binding material.

- ***Bale Bindings:*** Bales should be bound by steel wire, nylon or polypropylene string placed horizontally. Jute and cotton binding should not be used. Baling wire should be a minimum diameter of 14 gauge. Nylon or polypropylene string should be approximately 12 gauge in diameter with a breaking strength of 80 lbs force.

- ***Stakes:*** Wood 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. Steel bar reinforcement should be equal to a #4 designation or greater. End protection should be provided for any exposed bar reinforcement.

Costs

Straw bales cost $5 - $7 each. Adequate labor should be budgeted for installation and maintenance.

Inspection and Maintenance

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.

- Straw bales degrade, especially when exposed to moisture. Rotting bales will need to be replaced on a regular basis.

- Replace or repair damaged bales as needed.

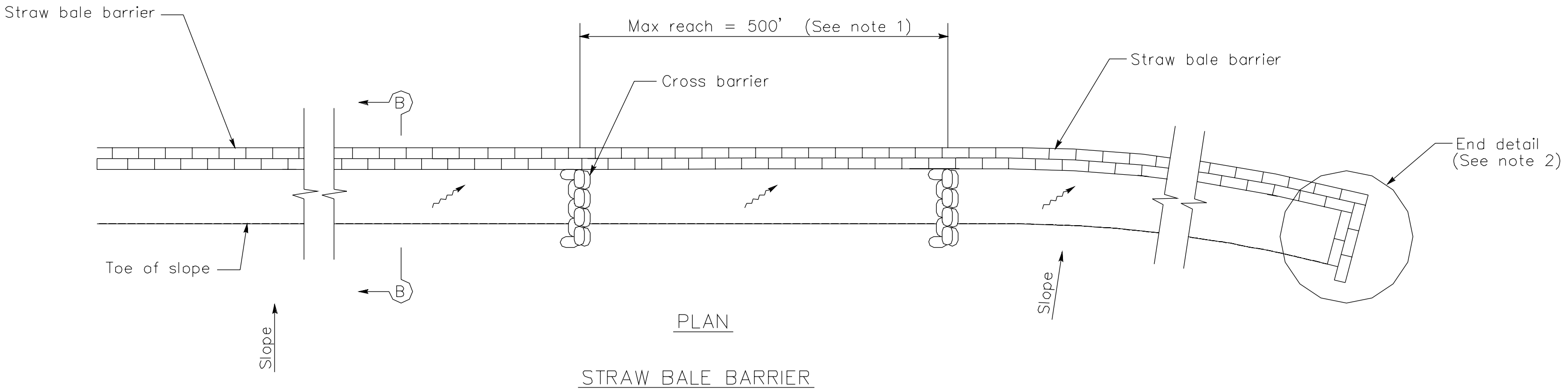
- Repair washouts or other damages as needed.

- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.

- Remove straw bales when no longer needed. Remove sediment accumulation, and clean, re-grade, and stabilize the area. Removed sediment should be incorporated in the project or disposed of.

References

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



PLAN

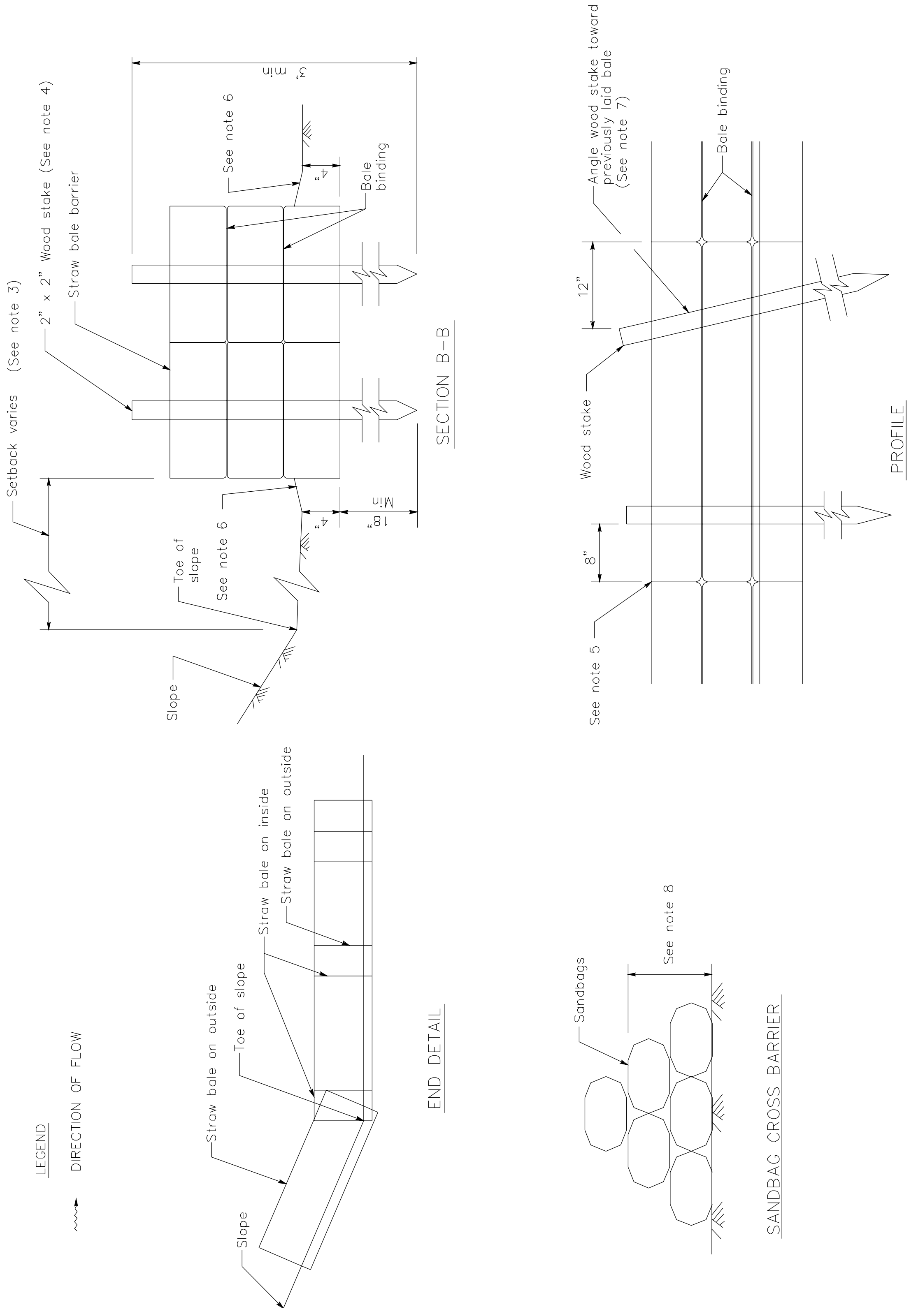
STRAW BALE BARRIER

NOTES

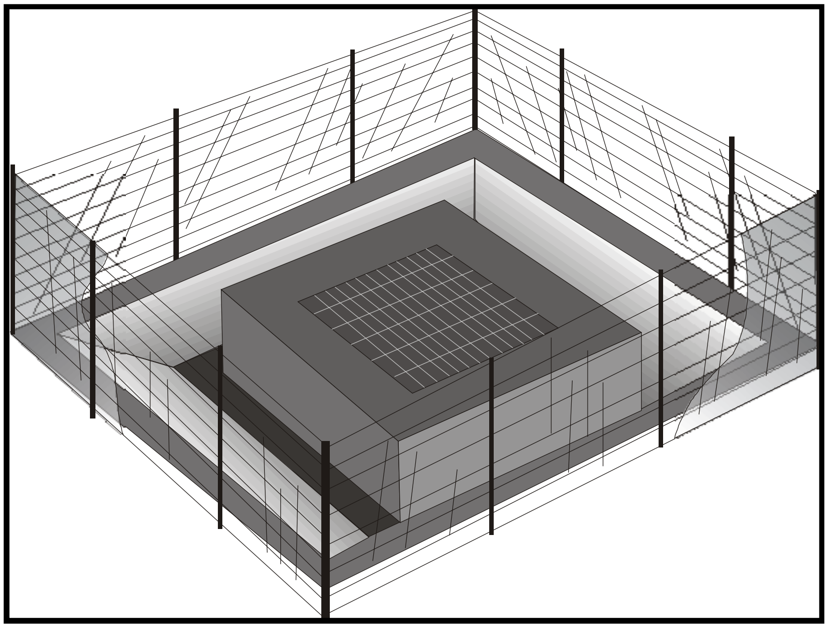
1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 500'.
2. The end of barrier shall be turned up slope.
3. Dimension may vary to fit field condition.
4. Stake dimensions are nominal.
5. Place straw bales tightly together.
6. Tamp embedment spoils against sides of installed bales.
7. Drive angled wood stake before vertical stake to ensure tight abutment to adjacent bale.
8. Sandbag cross barriers should be a min of 1/2 and a max of 2/3 the height of the linear barrier.
9. Sandbag rows and layers should be offset to eliminate gaps.

LEGEND

〰► DIRECTION OF FLOW


SECTION B-B
Setback varies (See note 3)
2" x 2" Wood stake (See note 4)
Straw bale barrier
See note 6
Bale binding
4"
3' min
18" Min
Toe of slope
Slope
PROFILE
Angle wood stake toward previously laid bale (See note 7)
Bale binding
12"
8"
Wood stake
See note 5
END DETAIL
Straw bale on inside
Straw bale on outside
Straw bale on outside
Toe of slope
Slope
SANDBAG CROSS BARRIER
Sandbags
See note 8
LEGEND
DIRECTION OF FLOW

Storm Drain Inlet Protection SE-10



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	☑
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	☑
Nutrients	
Trash	☒
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

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 yd^3/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.

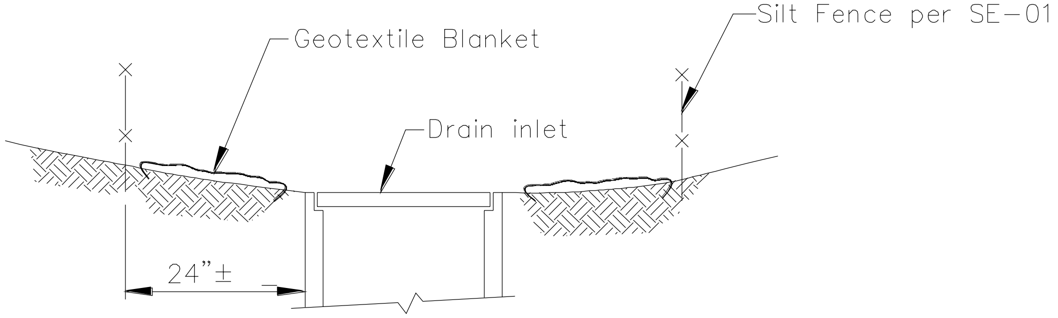
- Remove storm drain inlet protection once the drainage area is stabilized.
  - Clean and regrade area around the inlet and clean the inside of the storm drain inlet, as it should be free of sediment and debris at the time of final inspection.

References

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.

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



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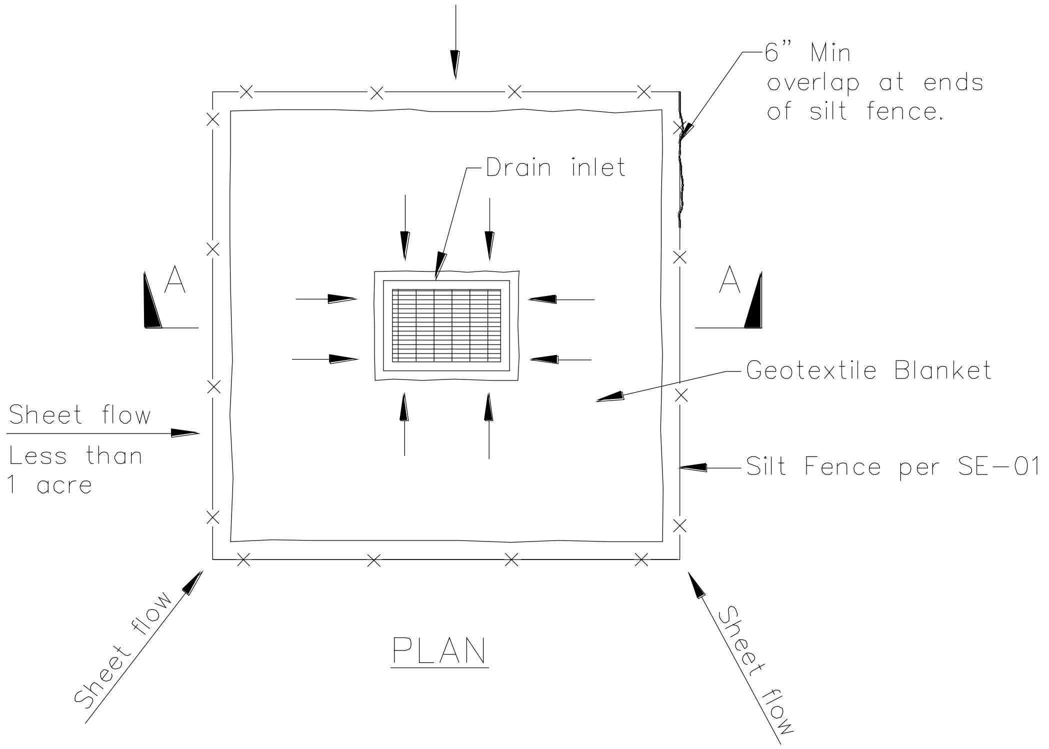


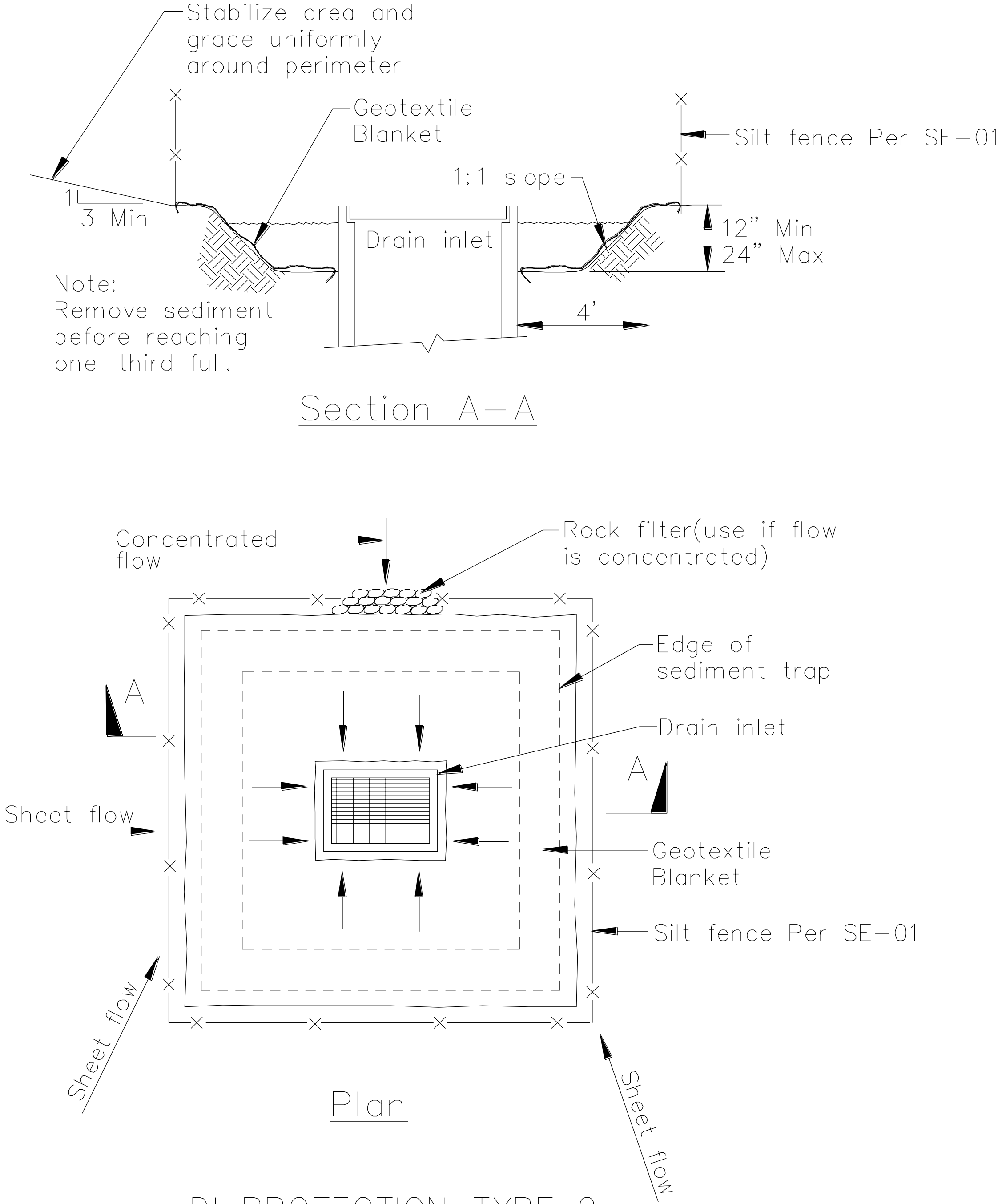
PLAN

DI PROTECTION TYPE 1

NOT TO SCALE

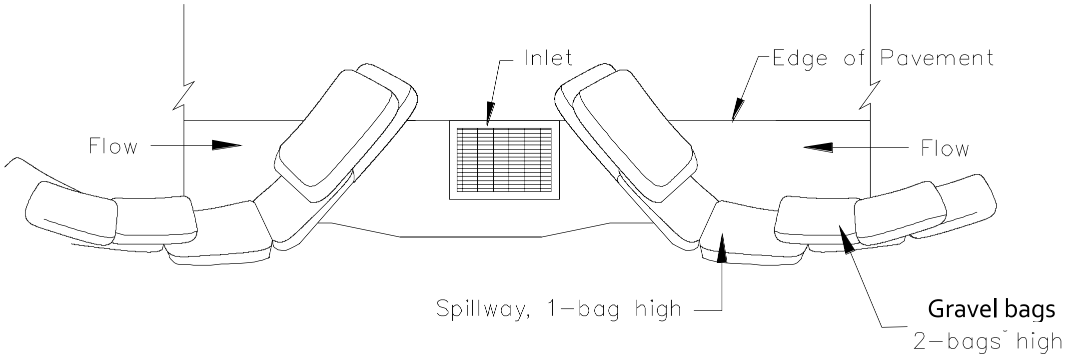
NOTES:

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.

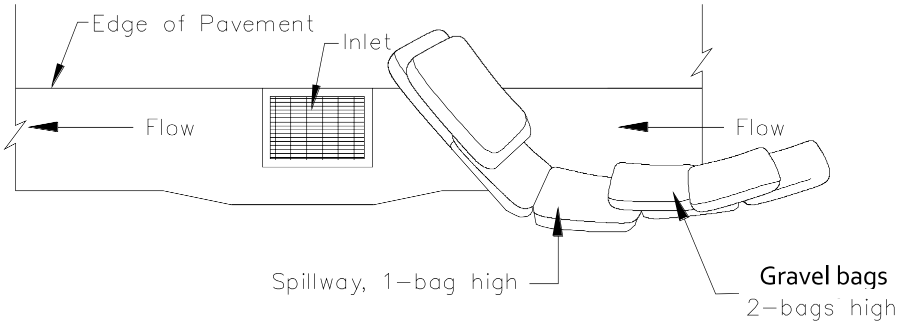


DI PROTECTION TYPE 2
NOT TO SCALE

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



TYPICAL PROTECTION FOR INLET ON SUMP

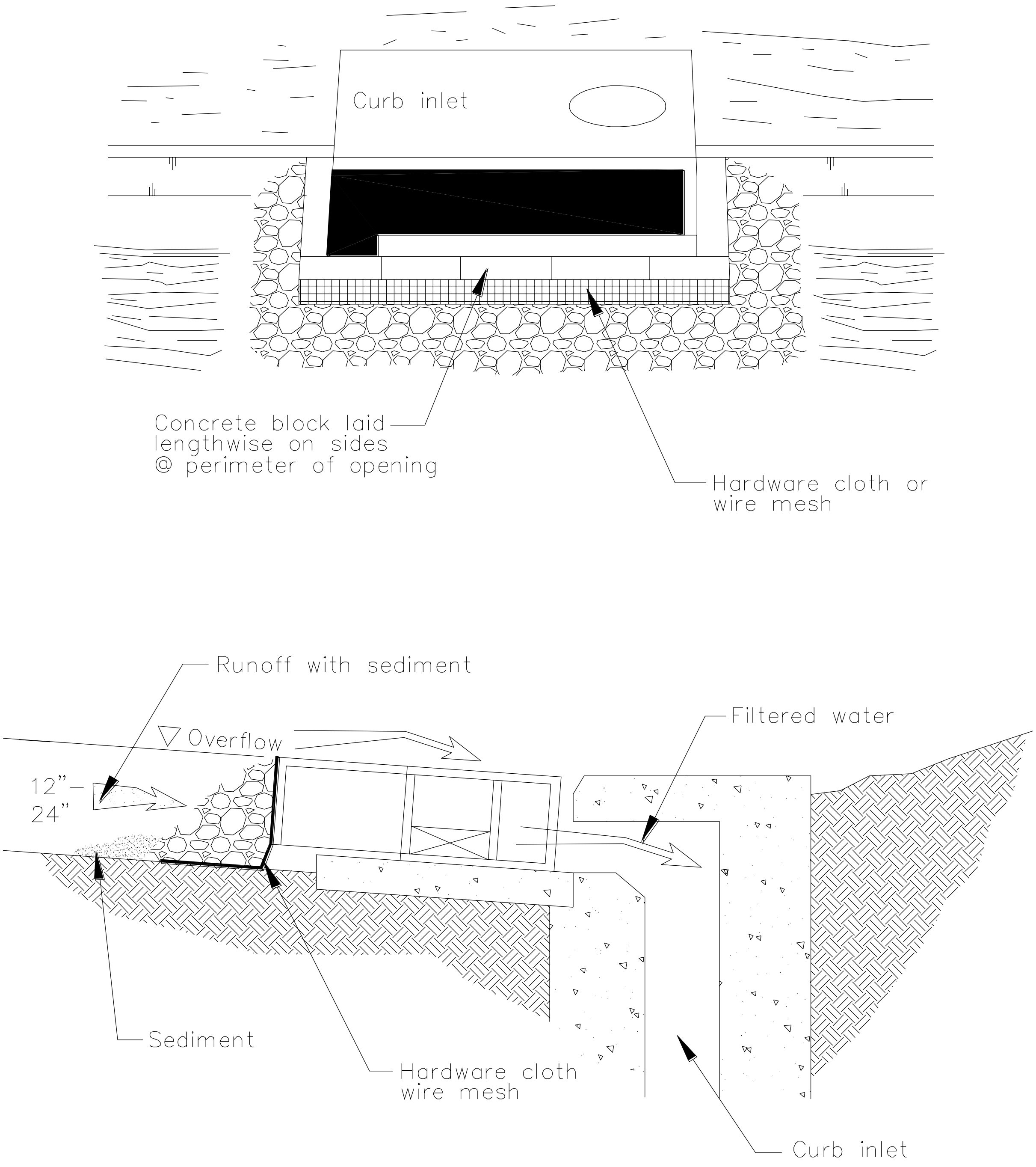


TYPICAL PROTECTION FOR INLET ON GRADE

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

Manufactured Linear Sediment Controls (MLSC) SE-12

Description and Purpose

Manufactured linear sediment controls (MLSC) are pre-manufactured devices that are typically specified and installed for drainage and sediment control on the perimeter of disturbed sites or stockpiles and as check dams within channels. Typically, MLSCs can be reused.

This fact sheet is intended to provide guidance on BMP selection and implementation of proprietary or vendor-supplied products, for sediment control. Products should be evaluated for project-specific implementation and used if determined to be appropriate by the SWPPP Preparer.

Suitable Applications

MLSCs are generally used in areas as a substitute for fiber rolls and silt fences in sediment control applications to slow down runoff water, divert drainage or contain fines and sediment. MLSCs are a linear control and application suitability varies based on the specific product type. They may be suitable:

- On paved surfaces for perimeter protection.
- As check structures in channels.
- Along the perimeter of disturbed sites in lieu of silt fence.

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	☑

Legend:

☑ Primary Category

☒ Secondary Category

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☒
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Roll

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

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- At operational storm drains as a form of inlet protection.

- Around temporary stockpiles or material/equipment storage areas.

- At the interface between graveled driveways and pavement.

- Along the toe of exposed and erodible slopes.

Limitations

- Limitations vary by product. Product manufacturer's printed product use instructions should be reviewed by the SWPPP Preparer to determine the project-specific applicability of MLSCs.

Implementation

General

When appropriately placed, MLSCs intercept and slow sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. The device is porous, which allows the ponded runoff to flow slowly through the device, releasing the runoff as sheet flows. Generally, MLSCs should be used in conjunction with temporary soil stabilization controls up-slope to provide an effective combination of erosion and sediment control.

Design and Layout

- MLSCs used on soil should be trenched or attached to the ground per manufacturer specifications in a manner that precludes runoff or ponded water from flowing around or under the device.

- MLSCs designed for use on asphalt or concrete may be attached using a variety of methods, including nailing the device to the pavement, or using a high strength adhesive.

- Follow manufacturer written specifications when installing MLSCs.

- Allow sufficient space up-slope from the silt dike to allow ponding, and to provide room for sediment storage.

- For installation near the toe of the slope, MLSCs should be set back 3 feet from the slope toe to facilitate cleaning. Where site conditions do not allow set back, the sediment control may be constructed on the toe of the slope. To prevent flows behind the barrier, sand or gravel bags can be placed perpendicular and between the sediment control and slope to serve as a barrier to parallel flow.

- Drainage area should not exceed 5 acres.

Materials

- Several manufactured products are available. The following search terms or combination of terms can be used with an internet search engine to find manufactured linear sediment controls:

- "silt barrier"
- "reusable silt fence"
- "silt fence alternative" or
- "perimeter sediment control"

Costs

Manufacturers should be contacted directly for current pricing.

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.
- Reshape or replace sections of damaged MLSCs 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 MLSCs when no longer needed. Remove sediment accumulation and clean, re-grade, and stabilize the area. Removed sediment should be incorporated in the project or disposed of properly.

References

City of Elko Construction Site Best Management Practices Handbook, December 2005.

Construction Site Best Management Practices Handbook, June 2008 Update, Truckee Meadows Regional Stormwater Quality Management Program, June 2008.

Complying with the Edwards Aquifer Rules Technical Guidance on Best Management Practices, Texas Commission on Environmental Quality, Revised July 2005, Addendum Sheet, January26, 2011.

Stormwater Management Manual for Western Washington Volume II, Construction Stormwater Pollution Prevention, Washington State Department of Ecology, February 2005.

Compost Socks and Berms SE-13

Description and Purpose

Compost socks and berms act as three-dimensional biodegradable filtering structures to intercept runoff where sheet flow occurs and are generally placed at the site perimeter or at intervals on sloped areas. Compost socks are generally a mesh sock containing compost and a compost berm is a dike of compost, trapezoidal in cross section. When employed to intercept sheet flow, both BMPs are placed perpendicular to the flow of runoff, allowing filtered runoff to pass through the compost and retaining sediment (and potentially other pollutants). A compost sock can be assembled on site by filling a mesh sock (e.g. with a pneumatic blower). The compost berm should be constructed using a backhoe or equivalent and/or a pneumatic delivery (blower) system and should be properly compacted. Compost socks and berms act as filters, reduce runoff velocities, and in some cases, aid in establishing vegetation.

Compost is organic, biodegradable, and renewable. Compost provides soil structure that allows water to infiltrate the compost medium which helps prevent rill erosion and the retained moisture promotes seed germination and vegetation growth, in addition to providing organic matter and nutrients important for fostering vegetation. Compost improves soil quality and productivity, as well as erosion and sediment control.

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	

Legend:

☑ Primary Category

☒ Secondary Category

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	☒
Bacteria	☒
Oil and Grease	☒
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Roll

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-14 Biofilter Bags

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The compost of the compost sock or berm can be selected that targets site specific objectives in capturing sediment and other pollutants, supporting vegetation, or additional erosion control.

Compost is typically derived from combinations of feedstocks, biosolids, leaf and yard trimmings, manure, wood, or mixed solid waste. Many types of compost are products of municipal recycle or "Greenwaste" programs. Compost is organic and biodegradable and can be left onsite. There are many types of compost with a variety of properties with specific functions, and accordingly compost selection is an important design consideration in the application of this type of erosion and sediment control.

Suitable Applications

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow (compost berms should only be used at the top of slopes or on slopes 4:1 (H:V) or flatter, all other slope applications should use compost socks)
- Along the perimeter of a project
- As check dams in unlined ditches (compost socks only)
- Down-slope of exposed soil areas
- At operational storm drains as a form of inlet protection (compost socks only)
- Around temporary stockpiles

Compost socks and berms do not require special trenching or BMP removal compared to other sediment control methods (e.g. silt fence or fiber rolls). Compost socks and berms can remain in place after earth disturbing activities are completed or the compost components can be spread over the site providing nutrients for plant growth and augmenting soil structure. BMPs that remain in place are particularly advantageous below embankments, especially adjacent streams, by limiting re-entry and the disturbance to sensitive areas.

Compost can be pre-seeded prior to application (recommended by the EPA for construction site stormwater runoff control and required for compost socks) or seeded after installation (for compost berms only). The compost medium can also remove pollutants in stormwater including heavy metals; oil and grease; and hydrocarbons.

Limitations

- Compost can potentially leach nutrients (dissolved phosphorus and nitrogen) into runoff and potentially impact water quality. Compost should not be used directly upstream from nutrient impaired waterbodies (Adams et. al, 2008).
- Compost may also contain other undesirable constituents that are detrimental to water quality. Compost should be obtained from a supplier certified by the California Integrated Waste Management Board or compost should otherwise meet the environmental health standards of Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7. Carefully consider the qualifications and experience of any compost producer/supplier.

- Application by hand is more time intensive and potentially costly. Using a pneumatic blower truck is the recommended cost effective method of assembly.
- Compost socks and berms should not be employed at the base of slopes greater than 2:1 (H:V). They can be employed with other erosion control methods for steeper slopes.
- Difficult to move once saturated.
- Compost berms should not be applied in areas of concentrated flows.
- Compost socks and berms are easy to fix; however, they are susceptible to damage by frequent traffic. Compost socks can be used around heavy machinery, but regular disturbance decreases sock performance.

Implementation

Compost Materials

- California Compost Regulations (Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7, Section 17868.3) define and require a quality of compost for application. Compost should comply with all physical and chemical requirements. Specific requirements are provided in Table 1, taken from Caltrans Standard Special Provision 10-1 (SSP 10-1), Erosion Control (Compost Blanket).
- The compost producer should be fully permitted as specified under the California Integrated Waste Management Board, Local Enforcement Agencies and any other State and Local Agencies that regulate Solid Waste Facilities. If exempt from State permitting requirements, the composting facility should certify that it follows guidelines and procedures for production of compost meeting the environmental health standards of Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7.
- The compost producer should be a participant in United States Composting Council's Seal of Testing Assurance program.
- Compost medium parameter specifications for compost socks and berms have been developed to assist in compost selection, such as those provided by the American Association of State Highway Transportation Officials (AASHTO).
- Particle size is important parameter for selecting compost. Well consolidated coarser grades of compost (e.g. small and large pieces) perform better for filtration objectives, while finer grades better support vegetation. Particle size of the compost should be selected based on site conditions, such as expected precipitation, and filtration goals and / or long term plant nutrients.
- Compost moisture should be considered for composition quality and application purposes. A range of 30-50% is typical. Compost that is too dry is hard to apply and compost that is too wet is more difficult (and more expensive) to transport. For arid or semi-arid areas, or for application during the dry season, use compost with greater moisture content than areas with wetter climates. For wetter or more humid climates or for application during the wet season, drier composts can be used as the compost will absorb moisture from the ambient air.

- If vegetation establishment is a desired function of the compost, a compost sample should be inspected by a qualified individual. Vegetation has different nutrient and moisture needs.
- Organic content of the compost is also important and should range from 30 to 65% depending on site conditions.
- Compost should not be derived from mixed municipal solid waste and should be reasonably free of visible contaminates.
- Compost should not contain paint, petroleum products, pesticides or any other chemical residues harmful to animal life or plant growth. Metal concentrations in compost should not exceed the maximum metal concentrations listed under Title 14, California Code of Regulations, Division 7, Chapter 3.1, Section 17868.2.
- Compost should not possess objectionable odors.
- Compost should be weed free.

Table 1. Physical/Chemical Requirements of Compost
Reference - Caltrans SSP-10 Erosion Control Blanket (Compost)

Property	Test Method	Requirement
pH	*TMECC 04.11-A Elastometric pH 1:5 Slurry Method pH Units	6.0–8.0
Soluble Salts	TMECC 04.10-A Electrical Conductivity 1:5 Slurry Method dS/m (mmhos/cm)	0-10.0
Moisture Content	TMECC 03.09-A Total Solids & Moisture at 70+/- 5 deg C % Wet Weight Basis	30-60
Organic Matter Content	TMECC 05.07-A Loss-On-Ignition Organic Matter Method (LOI) % Dry Weight Basis	30–65
Maturity	TMECC 05.05-A Germination and Vigor Seed Emergence Seedling Vigor % Relative to Positive Control	80 or Above 80 or Above
Stability	TMECC 05.08-B Carbon Dioxide Evolution Rate mg CO_2-C/g OM per day	8 or below
Particle Size	TMECC 02.02-B Sample Sieving for Aggregate Size Classification % Dry Weight Basis	100% Passing, 3 inch 90-100% Passing, 1 inch 65-100% Passing, 3/4 inch 0 - 75% Passing, 1/4 inch Maximum length 6 inches
Pathogen	TMECC 07.01-B Fecal Coliform Bacteria < 1000 MPN/gram dry wt.	Pass
Pathogen	TMECC 07.01-B Salmonella < 3 MPN/4 grams dry wt.	Pass
Physical Contaminants	TMECC 02.02-C Man Made Inert Removal and Classification: Plastic, Glass and Metal % > 4mm fraction	Combined Total: < 1.0
Physical Contaminants	TMECC 02.02-C Man Made Inert Removal and Classification: Sharps (Sewing needles, straight pins and hypodermic needles) % > 4mm fraction	None Detected

*TMECC refers to "Test Methods for the Examination of Composting and Compost," published by the United States Department of Agriculture and the United States Compost Council (USCC).

Installation

- Prior to application, prepare locations for socks and berms by removing brush and thick vegetation. The compost of the sock and/or berm should be allowed to come in full contact with the ground surface.

- Select method to apply the compost sock or berm. A pneumatic blower is most cost effective and most adaptive in applying compost to steep, rough terrain, and hard to reach locations.

- The compost of the berm should be distributed evenly to the surface, compacted, and shaped trapezoidal in cross section. Berm design is generally consists of a base two times the height. AASHTO specification MP 9-03 provides compost berm dimensions based on anticipated site precipitation (AASHTO, 2003 and USEPA, 2009). State agencies, such as Oregon Department of Environmental Quality (ODEQ) have developed berm dimension based on slope steepness and length (ODEQ, 2004).

- Compost socks can be assembled on site by filling mesh socks with the selected compost. Mesh socks can be tied at one end, filled, and then tied at the other end. The ends of socks can be interlocked until the desired length is achieved. The sock diameter is a function of slope steepness and length. Again, ASSHTO provides specifications for various parameters. Compost socks range from 8” to 18”, but are typically 12” to 18” in diameter.

- Compost socks are typically placed in contours perpendicular to sheet flow. They can also be placed in V formation on a slope. Compost socks need to be anchored, typically stakes, through the center of the sock. To prevent water flowing around them, the ends of compost socks should be placed upslope.

- Locate compost socks and berms on level contours spaced as follows:

  - Slope inclination of 4:1 (H:V) or flatter: Socks and/or berms should be placed at a maximum interval of 20 ft.

  - Slope inclination between 4:1 and 2:1 (H:V): Socks should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).

  - Slope inclination 2:1 (H:V) or greater: Socks should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).

- Place perimeter socks and berms using a j-hook installation. Use of vegetation will also provide additional anchoring.

- Compost socks and berms can be placed around the perimeter of an affected area, like a silt fence, if the area is flat or on a contour. Do not place these socks and berms where ponded water could become an issue.

- If used at the toe of slopes, the compost sock or berm should at a minimum of 5 to 10 feet away.

- Use additional anchoring and erosion control BMPs in conjunction of the compost socks and berms as needed.

- Consider using compost berms or socks as necessary at the top and/or bottom of the slope for additional erosion control performance.

- Compost socks and berms can also be effective over rocky and frozen ground if installed properly.

- It is recommended that the drainage areas of these compost BMPs do not exceed 0.25 acre per 100 feet placement interval and runoff does not exceed 1 cubic foot per second.

Costs

Recently obtained vendor costs indicated $3.50 per linear foot for compost berm application and $2.00 per linear foot for 8” socks and $2.50 per linear foot for 12”socks. Costs do not include final compost sock or berm functions at the end of construction activities, including spreading or removal, if required. ODEQ estimates that compost berms cost 30 percent less than silt fences to install.

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.

- Once damage is identified, mend or reapply the sock or berm as needed. Washed out areas should be replaced. If the sock or berm height is breached during a storm, an additional sock can be stacked to increase the sock height and similarly the berm dimensions can be increased, as applicable. An additional sock or berm may be installed upslope, as needed. It may be necessary to apply an additional type of stormwater BMP, such as a compost blanket.

- Sediment contained by the sock or berm should be removed prior reaching 1/3 of the exposed height of the BMP. The sediment can be stabilized with the compost sock or berm with vegetation at the end of construction activities.

- Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.

- Limit traffic to minimize damage to BMPs or impede vegetation establishment.

References

An analysis of Composting as an Environmental Remediation Technology, U.S. Environmental Protection Agency (USEPA), Solid Waste and Emergency Response (5305W), EPA530-R-8-008, 1998.

Characteristics of Compost: Moisture Holding and Water Quality Improvement, Center for Research in Water Resources, Kirchoff, C., Malina, J., and Barrett, M., 2003.

Compost Utilization for Erosion Control, The University of Georgia College of Agricultural and Environmental Sciences, pubs.caes.uga.edu/caespubs/pubcd/B1200.htm, Faucette, B. and Risse, M., 2001.

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

Standard Special Provision 10-1, Erosion Control (Compost Blanket), State of California Department of Transportation (Caltrans). 2007 Update.

Evaluation of Environmental Benefits and Impacts of Compost and Industry Standard Erosion and Sediment Controls Measures Used in Construction Activities, Dissertation, Institute of Ecology, University of Georgia, Faucette, B., 2004.

National Pollutant Discharge Elimination System (NPDES), Compost Blankets, U.S. Environmental Protection Agency (USEPA). http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=118, 2009.

Standard Specifications for Transportation Materials and Methods of Sampling and Testing, Designation MP-9, Compost for Erosion/Sediment Control (Filter Berms), Provisional, American Association of State Highway Transportation Officials (AASHTO), 2003.

Stormwater Best Management Practices (BMPs) Field Trials of Erosion Control Compost in Reclamation of Rock Quarry Operations, Nonpoint Source Protection Program CWA §319(h), Texas Commission on Environmental Quality, Adams, T., McFarland, A., Hauck, L., Barrett, M., and Eck, B., 2008.

Biofilter Bags SE-14

Description and Purpose

Biofilter bags, or bio-bags, are a multi-purpose sediment control BMP consisting of a plastic mesh bag filled with 100% recycled wood product waste. Biofilter bags come in a variety of sizes (30" x 18" and 30" x 9" being common) and generally have between 1-2 cubic yards of recycled wood waste (or wood chips). Biofilter bags work by detaining flow and allowing a slow rate of discharge through the wood media. This action removes suspended sediment through gravity settling of the detained water and filtration within the bag.

Suitable Applications

Biofilter bags are a short-term BMP that can be rapidly deployed, maintained, and replaced. Biofilter bags can be an effective short-term solution to place in developed rills to prevent further erosion until permanent measures can be established. Suitable short-term applications include:

- As a linear sediment control measure:
  - Below the toe of slopes and erodible slopes
  - Below other small cleared areas
  - Along the perimeter of a site (with low-expected flow)
  - Down slope of exposed soil areas
  - Around temporary stockpiles and spoil areas
  - Parallel to a roadway to keep sediment off paved areas

Categories

EC	Erosion Control	
SE	Sediment Control	☑
TR	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	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-4 Check Dams

SE-5 Fiber Roll

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-10 Storm Drain Inlet Protection

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  - Along streams and channels

- 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

- Inlet Protection (See SE-10)

- Supplement to silt fences or other sediment control devices

Limitations

- Short life-span (maximum usefulness of 2-3 months and should be replaced more frequently if needed); regular maintenance and replacement required to ensure effectiveness. Bags will rapidly fill with sediment and reduce permeability.

- Easily damaged by construction vehicles.

- If not properly staked, will fail on slope applications.

- If improperly installed can allow undercutting or side-cutting flow.

- Not effective where water velocities or volumes are high.

- Potentially buoyant and easily displaced if not properly installed.

Implementation

General

Biofilter bags are a relatively low cost temporary BMP that are easily deployed and have a simple installation that can be performed by hand. Without proper installation, however, biofilter bags can fail due to their light weight, potential displacement, and multiple joint locations. One of the benefits of utilizing biofilter bags is that the media (wood-product) can be recycled or used onsite when no longer needed (where acceptable).

Design and Layout – Linear control

- Locate biofilter bags on level contours.

  - Slopes between 20:1 and 4:1 (H:V): Biofilter bags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.

  - Slopes between 4:1 and 2:1 (H:V): Biofilter bags should be placed at a maximum interval of 15 ft, with the first row near the slope toe.

  - Slopes 2:1 (H:V) or steeper: Biofilter bags should be placed at a maximum interval of 10 ft., with the first row placed the slope toe.

- Turn the ends of the biofilter bag barriers up slope to prevent runoff from going around the berm.
- Allow sufficient space up slope from the biofilter bag berm to allow ponding, and to provide room for sediment storage.
- Stake biofilter bags into a 1 to 2 in. deep trench with a width equal to the bag.
  - Drive one stake at each end of the bag.
  - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.
- Biofilter bags should be overlapped (6 in.), not abutted.

Costs

Pre-filled biofilter bags cost approximately $2.50-$3.50 per bag, dependent upon size.

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.
- Biofilter bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.
- Reshape or replace biofilter bags as needed.
- Repair washouts or other damage as needed.
- Sediment that is retained by 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 biofilter bag berms when no longer needed. Remove sediment accumulation and clean, re-grade, and stabilize the area. Biofilter media may be used on-site, if allowed.

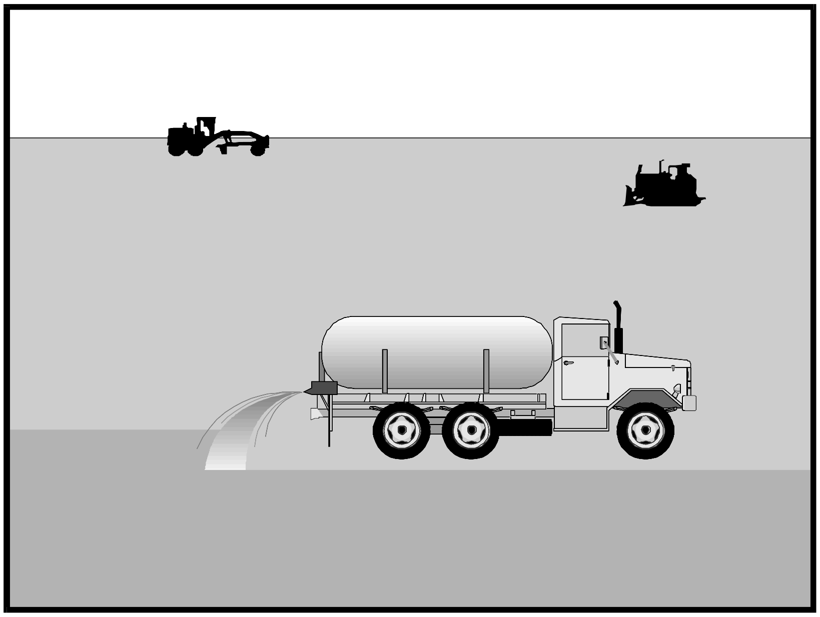
References

Catalog of Stormwater Best Management Practices for Idaho Cities and Counties. Volume 2, Section 7, BMP 34 – Biofilter Bags, Idaho Department of Environmental Quality, 2005.

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

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

Wind Erosion Control WE-1



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	

Legend:

☑ Primary Category

☒ Secondary Category

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-5 Soil Binders

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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:

- 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, montimorillonite) 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.

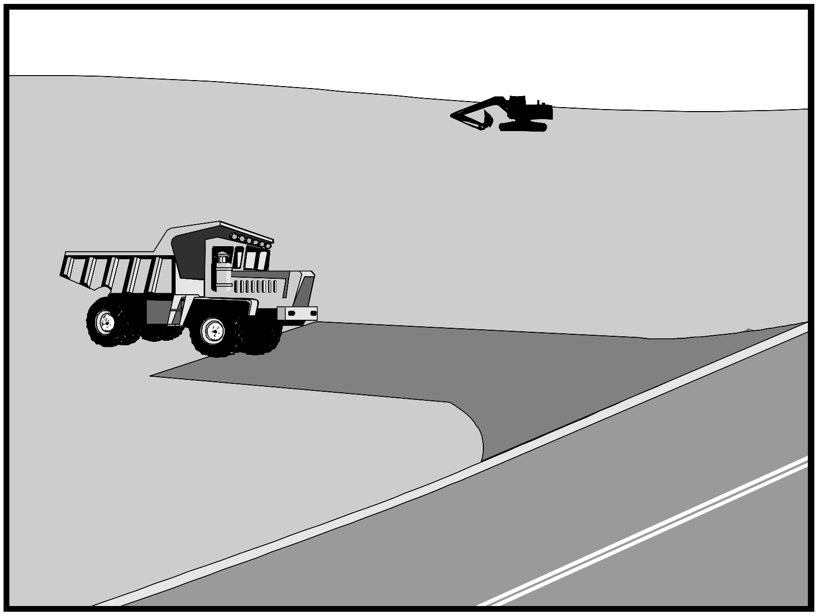
California Air Pollution Control Laws, California Air Resources Board, updated annually.

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.

Stabilized Construction Entrance/Exit TC-1



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	

Legend:

☑ Primary Objective

☒ Secondary Objective

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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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.

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.

- 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.

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.

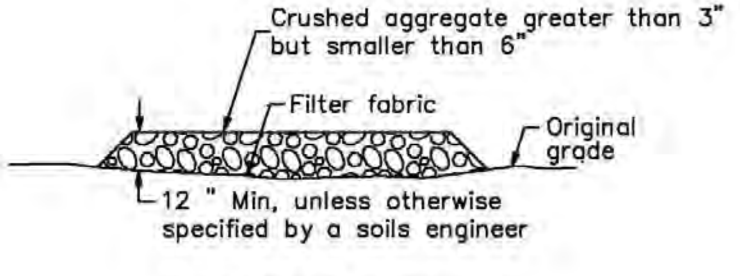
Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

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

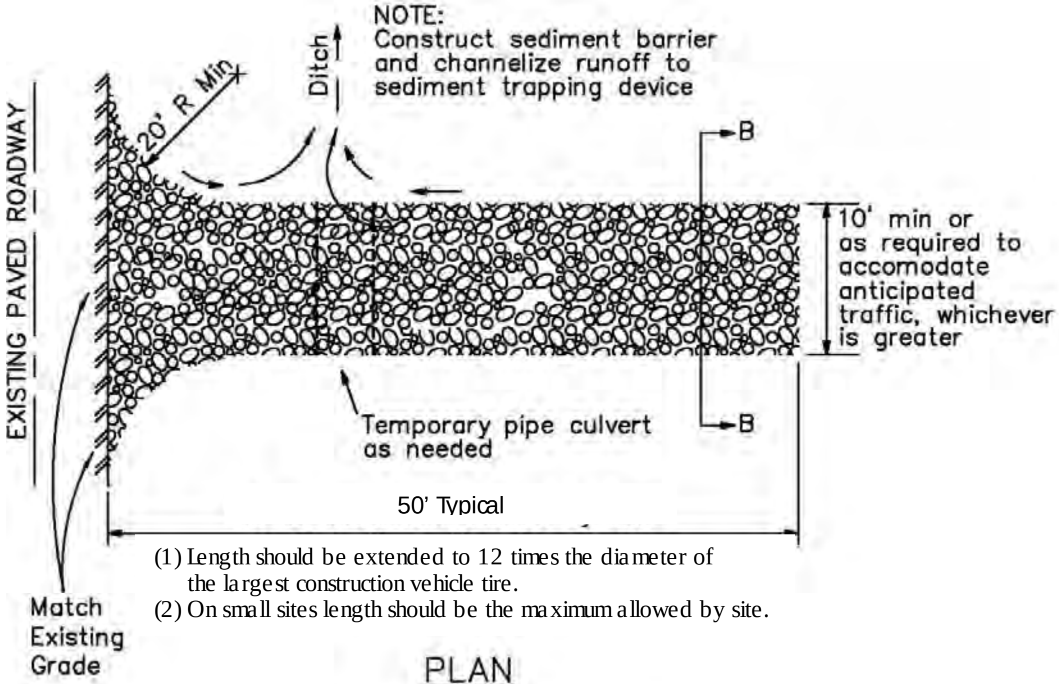
Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

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

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

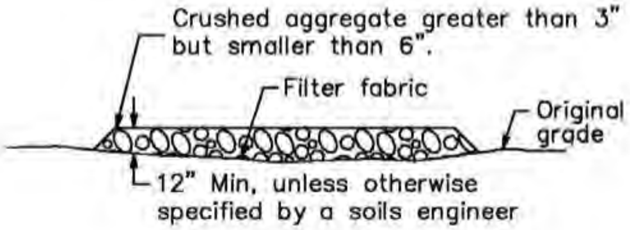


SECTION B–B
NTS

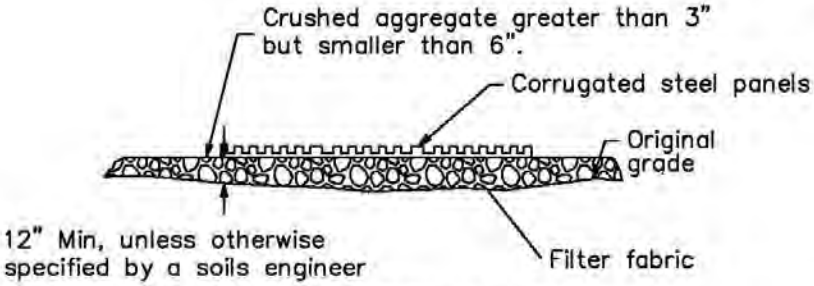


(1) Length should be extended to 12 times the diameter of the largest construction vehicle tire.
(2) On small sites length should be the maximum allowed by site.

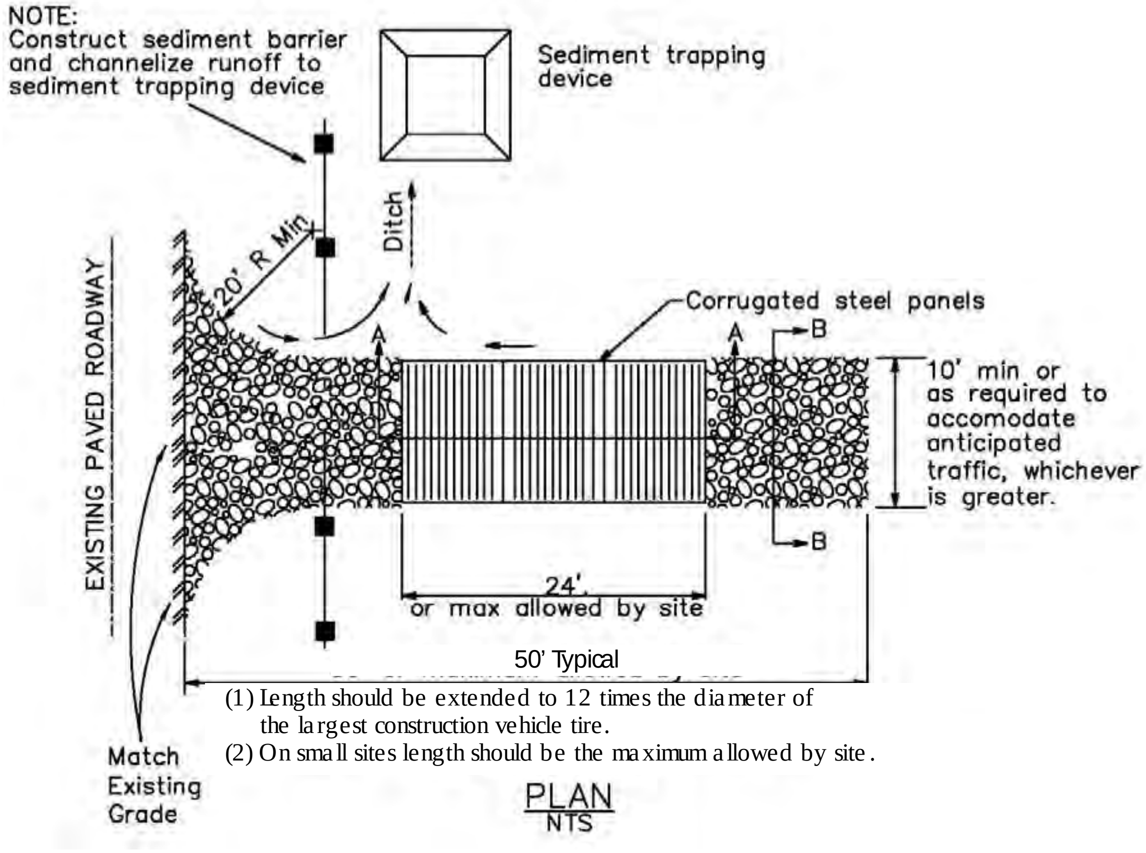
PLAN
NTS



SECTION B–B
NTS



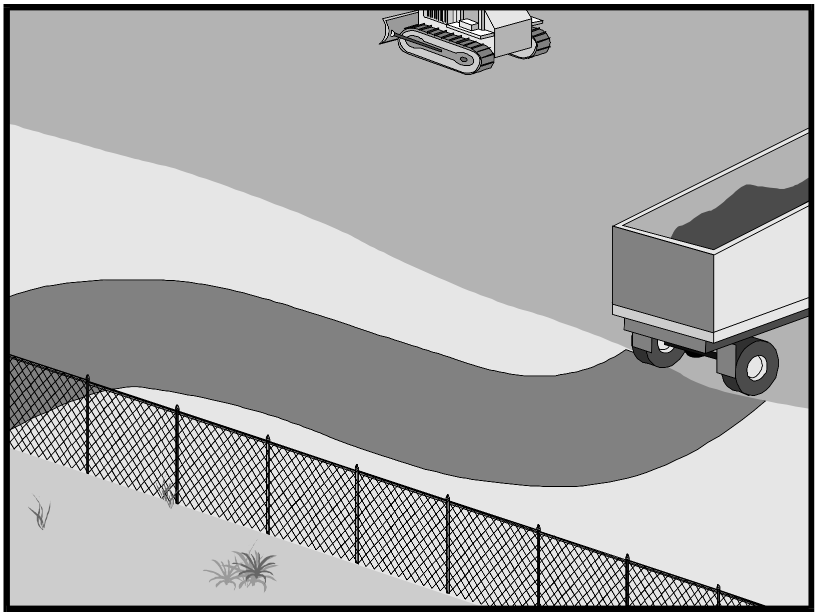
SECTION A–A
NOT TO SCALE



(1) Length should be extended to 12 times the diameter of the largest construction vehicle tire.
(2) On small sites length should be the maximum allowed by site.

PLAN
NTS

Stabilized Construction Roadway TC-2



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.

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	

Legend:

☑ Primary Objective

☒ Secondary Objective

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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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.

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

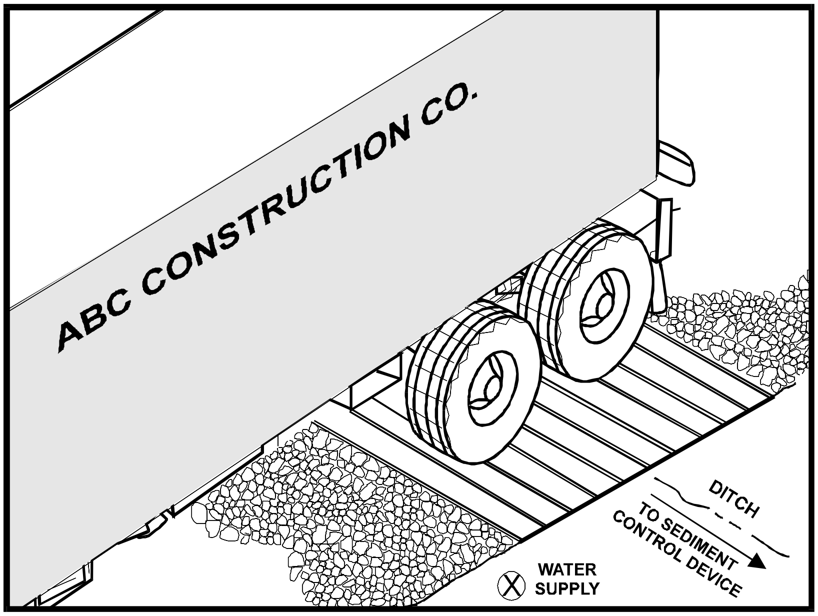
Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

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

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.

Entrance/Outlet Tire Wash TC-3



Description and Purpose

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

Suitable Applications

Tire washes may be used on construction sites where dirt and mud tracking onto public roads by construction vehicles may occur.

Limitations

- The tire wash requires a supply of wash water.
- A turnout or doublewide exit is required to avoid having entering vehicles drive through the wash area.
- Do not use where wet tire trucks leaving the site leave the road dangerously slick.

Implementation

- Incorporate with a stabilized construction entrance/exit. See TC-1, Stabilized Construction Entrance/Exit.
- Construct on level ground when possible, on a pad of coarse aggregate greater than 3 in. but smaller than 6 in. A geotextile fabric should be placed below the aggregate.
- Wash rack should be designed and constructed/manufactured for anticipated traffic loads.

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	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

TC-1 Stabilized Construction Entrance/Exit

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- Provide a drainage ditch that will convey the runoff from the wash area to a sediment trapping device. The drainage ditch should be of sufficient grade, width, and depth to carry the wash runoff.

- Use hoses with automatic shutoff nozzles to prevent hoses from being left on.

- Require that all employees, subcontractors, and others that leave the site with mud caked tires and undercarriages to use the wash facility.

- Implement SC-7, Street Sweeping and Vacuuming, as needed.

Costs

Costs are low for installation of wash rack.

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.

- Remove accumulated sediment in wash rack and/or sediment trap to maintain system performance.

- Inspect routinely for damage and repair as needed.

References

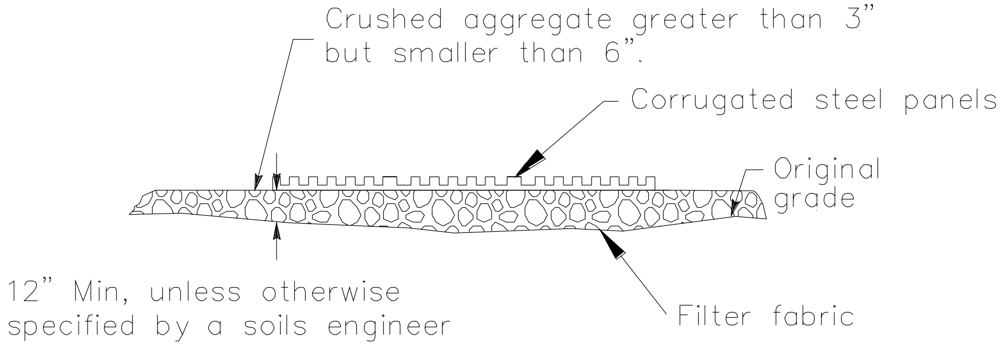
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

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

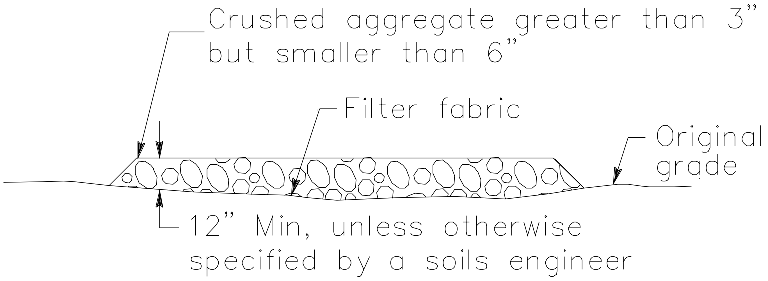
Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

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

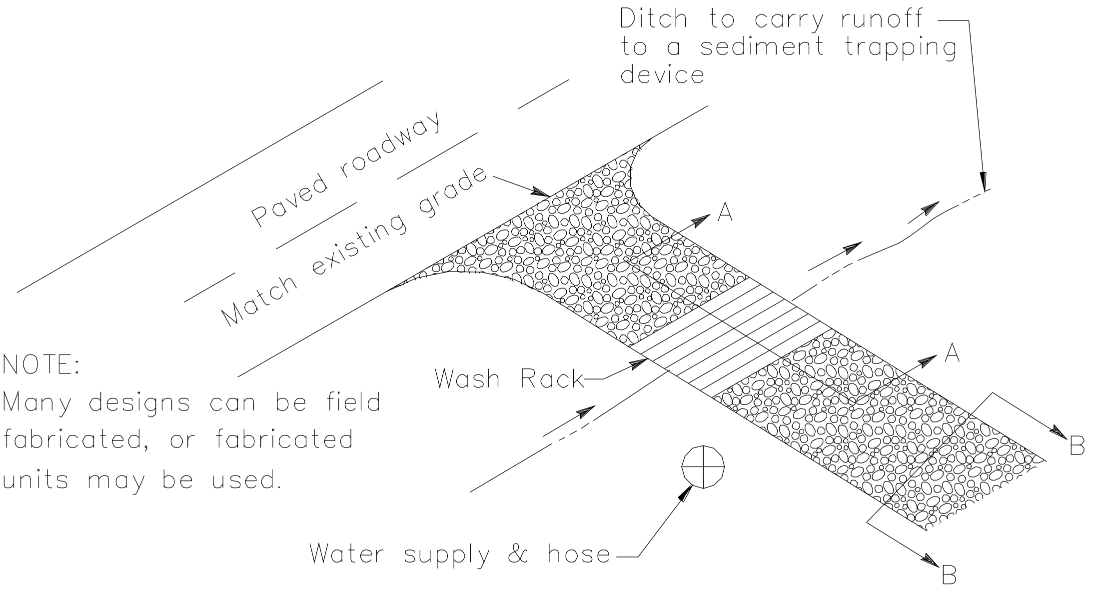
Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



SECTION A—A
NOT TO SCALE

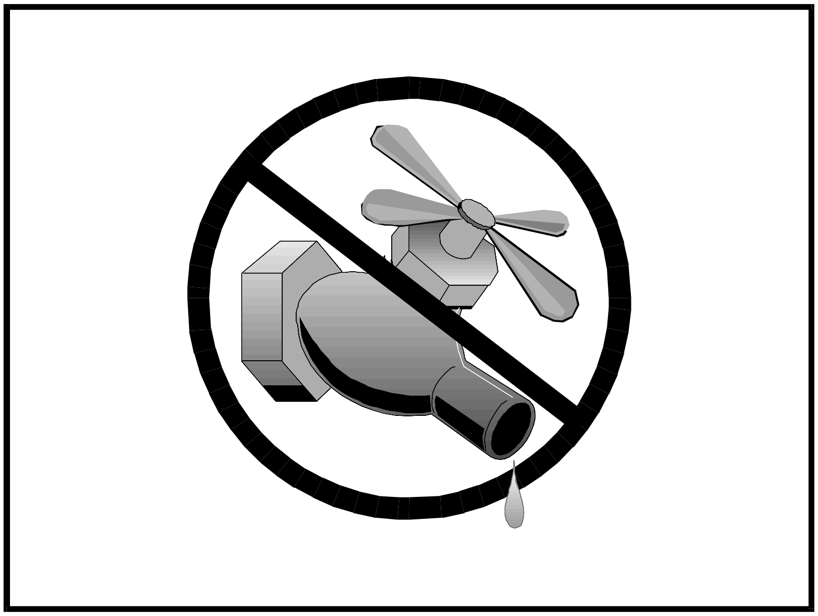


SECTION B—B
NTS



NOTE:
Many designs can be field fabricated, or fabricated units may be used.

TYPICAL TIRE WASH
NOT TO SCALE



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	

Legend:

☑ Primary Objective

☒ Secondary Objective

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Description and Purpose

Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants offsite. These practices can reduce or eliminate non-stormwater discharges.

Suitable Applications

Water conservation practices are suitable for all construction sites where water is used, including piped water, metered water, trucked water, and water from a reservoir.

Limitations

- None identified.

Implementation

- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Washing of vehicles and equipment on the construction site is discouraged.
- Avoid using water to clean construction areas. If water must be used for cleaning or surface preparation, surface should be swept and vacuumed first to remove dirt. This will minimize amount of water required.

- Direct construction water runoff to areas where it can soak into the ground or be collected and reused.
- Authorized non-stormwater discharges to the storm drain system, channels, or receiving waters are acceptable with the implementation of appropriate BMPs.
- Lock water tank valves to prevent unauthorized use.

Costs

The cost is small to none compared to the benefits of conserving water.

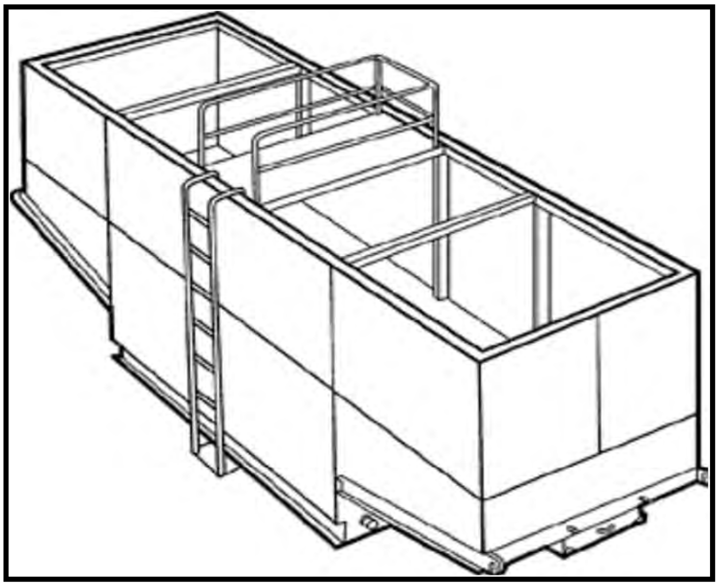
Inspection and Maintenance

- Inspect and verify that activity based BMPs are in place prior to the commencement of authorized non-stormwater discharges.
- 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 are occuring.
- Repair water equipment as needed to prevent unintended discharges.
  - Water trucks
  - Water reservoirs (water buffalos)
  - Irrigation systems
  - Hydrant connections

References

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

Dewatering Operations NS-2



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	

Legend:

☑ Primary Category

☒ Secondary Category

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

SE-5: Fiber Roll

SE-6: Gravel Bag Berm

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Description and Purpose

Dewatering operations are practices that manage the discharge of pollutants when non-stormwater and accumulated precipitation (stormwater) must be removed from a work location to proceed with construction work or to provide vector control.

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

Discharges from dewatering operations can contain high levels of fine sediment that, if not properly treated, could lead to exceedances of the General Permit requirements or Basin Plan standards.

The dewatering operations described in this fact sheet are not Active Treatment Systems (ATS) and do not include the use of chemical coagulations, chemical flocculation or electrocoagulation.

Suitable Applications

These practices are implemented for discharges of non-stormwater from construction sites. Non-stormwaters include, but are not limited to, groundwater, water from cofferdams, water diversions, and waters used during construction activities that must be removed from a work area to facilitate construction.

Practices identified in this section are also appropriate for implementation when managing the removal of accumulated precipitation (stormwater) from depressed areas at a construction site.

Stormwater mixed with non-stormwater should be managed as non-stormwater.

Limitations

- Dewatering operations will require, and should comply with applicable local and project-specific permits and regulations. In some areas, all dewatering activities, regardless of the discharge volume, require a dewatering permit.
- Site conditions will dictate design and use of dewatering operations.
- The controls discussed in this fact sheet primarily address sediment. Other secondary pollutant removal benefits are discussed where applicable.
- The controls detailed in this fact sheet only allow for minimal settling time for sediment particles. Use only when site conditions restrict the use of the other control methods.
- Avoid dewatering discharges where possible by using the water for dust control.

Implementation

- A Construction Site Monitoring Plan (CSMP) should be included in the project Stormwater Pollution Prevention Plan (SWPPP).
- Regional Water Quality Control Board (RWQCB) Regions may require notification and approval prior to any discharge of water from construction sites.
- The destination of discharge from dewatering activities will typically determine the type of permit required for the discharge. For example, when discharging to a water of the U.S., a dewatering permit may be required through the site's governing RWQCB. When discharging to a sanitary sewer or Municipal Separate Storm Sewer System (MS4), a permit may need to be obtained from the owner of the sanitary sewer or MS4 in addition to obtaining an RWQCB dewatering permit. Additional permits or permissions from other agencies may be required for dewatering cofferdams or diversions.
- Dewatering discharges should not cause erosion at the discharge point. Appropriate BMPs should be implemented to maintain compliance with all applicable permits.
- Maintain dewatering records in accordance with all local and project-specific permits and regulations.

Sediment Treatment

A variety of methods can be used to treat water during dewatering operations. Several devices are presented below and provide options to achieve sediment removal. The sediment particle size and permit or receiving water limitations on sediment or turbidity are key considerations for selecting sediment treatment option(s); in some cases, the use of multiple devices may be appropriate. Use of other enhanced treatment methods (i.e., introduction of chemicals or electric current to enhance flocculation and removal of sediment) must comply with: 1) for storm drain or surface water discharges, the requirements for Active Treatment Systems (see SE-11); or 2) for sanitary sewer discharges, the requirements of applicable sanitary sewer discharge permits.

Sediment Basin (see also SE-2)

Description:

- A sediment basin is a temporary basin with a controlled release structure that is formed by excavation or construction of an embankment to detain sediment-laden runoff and allow sediment to settle out before discharging. Sediment basins are generally larger than Sediment Traps (SE-3) and have a designed outlet structure.

Appropriate Applications:

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

Implementation:

- Excavation and construction of related facilities is required.
- Temporary sediment basins should be fenced if safety is a concern.
- Outlet protection is required to prevent erosion at the outfall location.

Maintenance:

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

Sediment Trap (See also SE-3)

Description:

- A sediment trap is a temporary basin formed by excavation and/or construction of an earthen embankment across a waterway or low drainage area to detain sediment-laden runoff and allow sediment to settle out before discharging. Sediment traps are generally smaller than Sediment Basins (SE-2) and do not have a designed outlet (but do have a spillway or overflow).

Appropriate Applications:

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

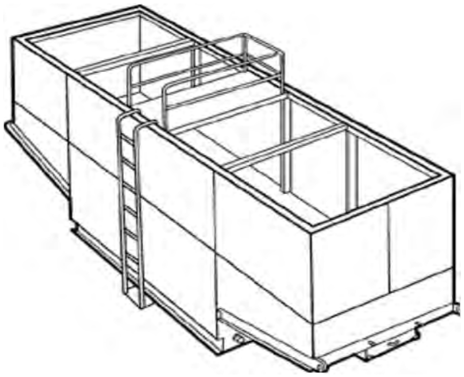
Implementation:

- Excavation and construction of related facilities is required.
- Trap inlets should be located to maximize the travel distance to the trap outlet.
- Use rock or vegetation to protect the trap outlets against erosion.

Maintenance:

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

Weir Tanks



Description:

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

Appropriate Applications:

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

Implementation:

- Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.

- Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors should be consulted to appropriately size tank.

- Treatment capacity (i.e., volume and number of tanks) should provide at a minimum the required volume for discrete particle settling for treatment design flows.

Maintenance:

- Periodic cleaning is required based on visual inspection or reduced flow.

- Oil and grease disposal should be conducted by a licensed waste disposal company.

Dewatering Tanks

Description:

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

Appropriate Applications:

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

Implementation:

- Tanks are delivered to the site by the vendor, who can provide assistance with set-up and operation.

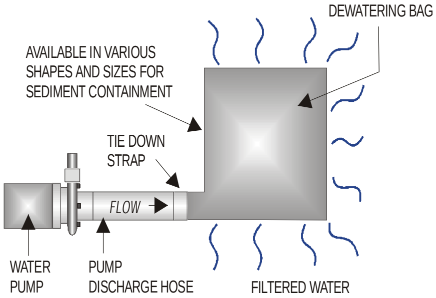
- Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors should be consulted to appropriately size tank.

Maintenance:

- Periodic cleaning is required based on visual inspection or reduced flow.

- Oil and grease disposal should be conducted by licensed waste disposal company.

Gravity Bag Filter



Description:

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

Appropriate Applications:

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

Implementation:

- Water is pumped into one side of the bag and seeps through the top, bottom, and sides of the bag.
- Place filter bag on pavement or a gravel bed or paved surface. Avoid placing a dewatering bag on unprotected bare soil. If placing the bag on bare soil is unavoidable, a secondary barrier should be used, such as a rock filter bed placed beneath and beyond the edges of the bag to, prevent erosion and capture sediments that escape the bag.
- Perimeter control around the downstream end of the bag should be implemented. Secondary sediment controls are important especially in the initial stages of discharge, which tend to allow fines to pass through the bag.

Maintenance:

- Inspection of the flow conditions, bag condition, bag capacity, and the secondary barrier (as applicable) is required.
- Replace the bag when it no longer filters sediment or passes water at a reasonable rate.
- Caution should be taken when removing and disposing of the bag, to prevent the release of captured sediment
- Properly dispose of the bag offsite. If sediment is removed from the bag prior to disposal (bags can potentially be reused depending upon their condition), dispose of sediment in accordance with the general maintenance procedures described at the end of this BMP Fact Sheet.

Sand Media Particulate Filter

Description:

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

Appropriate Applications:

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

Implementation:

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

Maintenance:

- The filters require regular service to monitor and maintain the level of the sand media. If subjected to high loading rates, filters can plug quickly.
- Venders generally provide data on maximum head loss through the filter. The filter should be monitored daily while in use, and cleaned when head loss reaches target levels.
- If cleaned by backwashing, the backwash water may need to be hauled away for disposal, or returned to the upper end of the treatment train for another pass through the series of dewatering BMPs.

Pressurized Bag Filter

Description:

- A pressurized bag filter is a unit composed of single filter bags made from polyester felt material. The water filters through the unit and is discharged through a header. Vendors provide bag filters in a variety of configurations. Some units include a combination of bag filters and cartridge filters for enhanced contaminant removal.

Appropriate Applications:

- Effective for the removal of sediment (sand and silt) and some metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Oil absorbent bags are available for hydrocarbon removal.

- Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

Implementation:

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

Maintenance:

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

Cartridge Filter

Description:

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

Appropriate Applications:

- Effective for the removal of sediment (sand, silt, and some clays) and metals, as well as the reduction of BOD, turbidity, and hydrocarbons. Hydrocarbons can effectively be removed with special resin cartridges.

- Filters can be used to provide secondary treatment to water treated via settling or basic filtration.

Implementation:

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

Maintenance:

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

Costs

- Sediment control costs vary considerably depending on the dewatering and sediment treatment system that is selected. Pressurized filters tend to be more expensive than gravity settling, but are often more effective. Simple tanks are generally rented on a long-term basis (one or more months) and can range from $360 per month for a 1,000 gallon tank to $2,660 per month for a 10,000 gallon tank. Mobilization and demobilization costs vary considerably.

Inspection and Maintenance

- Inspect and verify that dewatering BMPs are in place and functioning prior to the commencement of activities requiring dewatering.

- Inspect dewatering BMPs daily while dewatering activities are being conducted.

- Inspect all equipment before use. Monitor dewatering operations to ensure they do not cause offsite discharge or erosion.
- Sample dewatering discharges as required by the General Permit.
- Unit-specific maintenance requirements are included with the description of each unit.
- Sediment removed during the maintenance of a dewatering device may be either spread onsite and stabilized, or disposed of at a disposal site as approved by the owner.
- Sediment that is commingled with other pollutants should be disposed of in accordance with all applicable laws and regulations and as approved by the owner.

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.

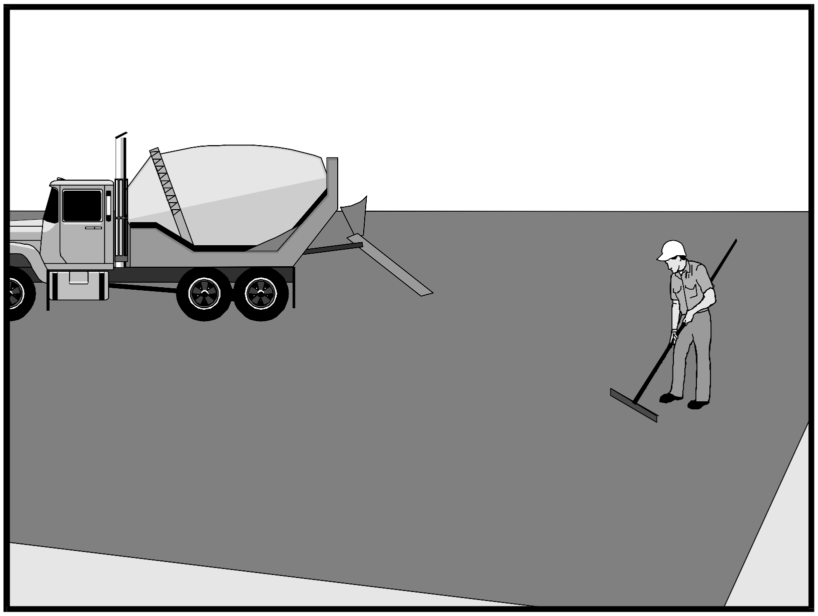
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003; Updated March 2004.

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

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

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

Paving and Grinding Operations NS-3



Description and Purpose

Prevent or reduce the discharge of pollutants from paving operations, using measures to prevent runon 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	☑
WM	Waste Management and Materials Pollution Control	☒

Legend:

☑ Primary Category

☒ Secondary Category

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

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CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

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 runon (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

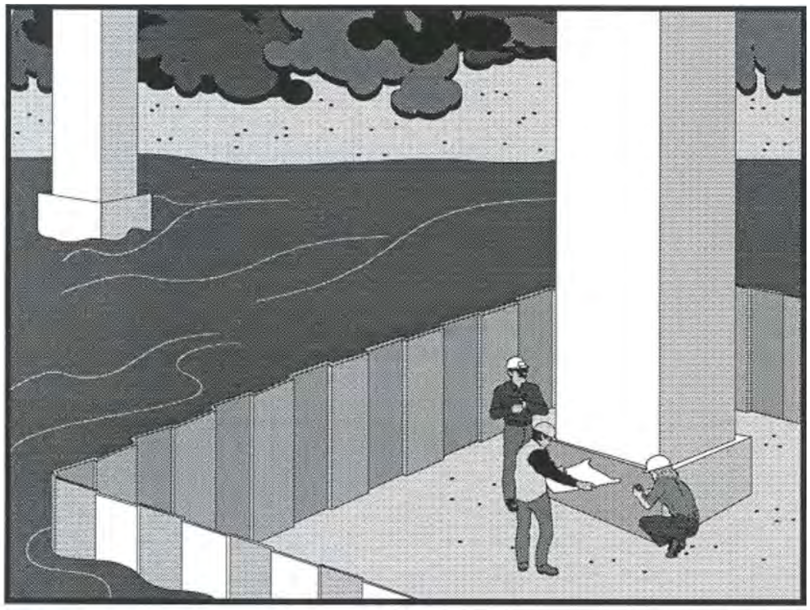
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

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.

Clear Water Diversion NS-5



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	

Legend:

☑ Primary Objective

☒ Secondary Objective

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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Description and Purpose

Clear water diversion consists of a system of structures and measures that intercept clear surface water runoff upstream of a project, transport it around the work area, and discharge it downstream with minimal water quality degradation from either the project construction operations or the construction of the diversion. Clear water diversions are used in a waterway to enclose a construction area and reduce sediment pollution from construction work occurring in or adjacent to water. Structures commonly used as part of this system include diversion ditches, berms, dikes, slope drains, rock, gravel bags, wood, aqua barriers, cofferdams, filter fabric or turbidity curtains, drainage and interceptor swales, pipes, or flumes.

Suitable Applications

A clear water diversion is typically implemented where appropriate permits (1601 Agreement) have been secured and work must be performed in a flowing stream or water body.

- Clear water diversions are appropriate for isolating construction activities occurring within or near a water body such as streambank stabilization, or culvert, bridge, pier or abutment installation. They may also be used in combination with other methods, such as clear water bypasses and/or pumps.
- Pumped diversions are suitable for intermittent and low flow streams.
- Excavation of a temporary bypass channel, or passing the flow through a heavy pipe (called a “flume”) with a trench

excavated under it, is appropriate for the diversion of streams less than 20 ft wide, with flow rates less than 100 cfs.

- Clear water diversions incorporating clean washed gravel may be appropriate for use in salmonid spawning streams.

Limitations

- Diversion and encroachment activities will usually disturb the waterway during installation and removal of diversion structures.
- Installation may require Regional Water Quality Control Board (RWQCB) 401 Certification, U.S. Army Corps of Engineers 404 permit and approval by California Department of Fish and Game. If numerical-based water quality standards are mentioned in any of these and other related permits, testing and sampling may be required.
- Diversion and encroachment activities may constrict the waterway, which can obstruct flood flows and cause flooding or washouts. Diversion structures should not be installed without identifying potential impacts to the stream channel.
- Diversion or isolation activities are not appropriate in channels where there is insufficient stream flow to support aquatic species in the area dewatered as a result of the diversion.
- Diversion or isolation activities are inappropriate in deep water unless designed or reviewed by an engineer registered in California.
- Diversion or isolation activities should not completely dam stream flow.
- Dewatering and removal may require additional sediment control or water treatment. See NS-2, Dewatering Operations.
- Not appropriate if installation, maintenance, and removal of the structures will disturb sensitive aquatic species of concern.

Implementation

General

- Implement guidelines presented in EC-12, Streambank Stabilization to minimize impacts to streambanks.
- Where working areas encroach on flowing streams, barriers adequate to prevent the flow of muddy water into streams should be constructed and maintained between working areas and streams. During construction of the barriers, muddying of streams should be held to a minimum.
- Diversion structures must be adequately designed to accommodate fluctuations in water depth or flow volume due to tides, storms, flash floods, etc.
- Heavy equipment driven in wet portions of a water body to accomplish work should be completely clean of petroleum residue, and water levels should be below the fuel tanks, gearboxes, and axles of the equipment unless lubricants and fuels are sealed such that inundation by water will not result in discharges of fuels, oils, greases, or hydraulic fluids.

- Excavation equipment buckets may reach out into the water for the purpose of removing or placing fill materials. Only the bucket of the crane/ excavator/backhoe may operate in a water body. The main body of the crane/excavator/backhoe should not enter the water body except as necessary to cross the stream to access the work site.

- Stationary equipment such as motors and pumps located within or adjacent to a water body, should be positioned over drip pans.

- When any artificial obstruction is being constructed, maintained, or placed in operation, sufficient water should, at all times, be allowed to pass downstream to maintain aquatic life.

- Equipment should not be parked below the high water mark unless allowed by a permit.

- Disturbance or removal of vegetation should not exceed the minimum necessary to complete operations. Precautions should be taken to avoid damage to vegetation by people or equipment. Disturbed vegetation should be replaced with the appropriate erosion control measures.

- Riparian vegetation approved for trimming as part of the project should be cut off no lower than ground level to promote rapid re-growth. Access roads and work areas built over riparian vegetation should be covered by a sufficient layer of clean river run cobble to prevent damage to the underlying soil and root structure. The cobble should be removed upon completion of project activities.

- Drip pans 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.

- Where possible, avoid or minimize diversion and encroachment impacts by scheduling construction during periods of low flow or when the stream is dry. Scheduling should also consider seasonal releases of water from dams, fish migration and spawning seasons, and water demands due to crop irrigation.

- Construct diversion structures with materials free of potential pollutants such as soil, silt, sand, clay, grease, or oil.

Temporary Diversions and Encroachments

- Construct diversion channels in accordance with EC-9, Earth Dikes and Drainage Swales.

- In high flow velocity areas, stabilize slopes of embankments and diversion ditches using an appropriate liner, in accordance with EC-7, Geotextiles and Mats, or use rock slope protection.

- Where appropriate, use natural streambed materials such as large cobbles and boulders for temporary embankment and slope protection, or other temporary soil stabilization methods.

- Provide for velocity dissipation at transitions in the diversion, such as the point where the stream is diverted to the channel and the point where the diverted stream is returned to its natural channel. See also EC-10, Velocity Dissipation Devices.

Temporary Dry Construction Areas

- When dewatering behind temporary structures to create a temporary dry construction area, such as cofferdams, pass pumped water through a sediment-settling device, such as a portable tank or settling basin, before returning water to the water body. See also NS-2, Dewatering Operations.
- Any substance used to assemble or maintain diversion structures, such as form oil, should be non-toxic and non-hazardous.
- Any material used to minimize seepage underneath diversion structures, such as grout, should be non-toxic, non-hazardous, and as close to a neutral pH as possible.

Comparison of Diversion and Isolation Techniques:

- Gravel bags are relatively inexpensive, but installation and removal can be labor intensive. It is also difficult to dewater the isolated area. Sandbags should not be used for this technique in rivers or streams, as sand should never be put into or adjacent to a stream, even if encapsulated in geotextile.
- Gravel Bag Berms (SE-6) used in conjunction with an impermeable membrane are cost effective, and can be dewatered relatively easily. If spawning gravel is used, the impermeable membrane can be removed from the stream, and the gravel can be spread out and left as salmonid spawning habitat if approved in the permit. Only clean, washed gravel should be used for both the gravel bag and gravel berm techniques.
- Cofferdams are relatively expensive, but frequently allow full dewatering. Also, many options now available are relatively easy to install.
- Sheet pile enclosures are a much more expensive solution, but do allow full dewatering. This technique is not well suited to small streams, but can be effective on large rivers or lakes, and where staging and heavy equipment access areas are available.
- K-rails are an isolation method that does not allow full dewatering, but can be used in small to large watercourses, and in fast-water situations.
- A relatively inexpensive isolation method is filter fabric isolation. This method involves placement of gravel bags or continuous berms to ‘key-in’ the fabric, and subsequently staking the fabric in place. This method should be used in relatively calm water, and can be used in smaller streams. Note that this is not a dewatering method, but rather a sediment isolation method.
- Turbidity curtains should be used where sediment discharge to a stream is unavoidable. They can also be used for in-stream construction, when dewatering an area is not required.
- When used in watercourses or streams, cofferdams must be used in accordance with permit requirements.
- Manufactured diversion structures should be installed following manufacturer’s specifications.

- Filter fabric and turbidity curtain isolation installation methods can be found in the specific technique descriptions that follow.

Filter Fabric Isolation Technique

Definition and Purpose

A filter fabric isolation structure is a temporary structure built into a waterway to enclose a construction area and reduce sediment pollution from construction work in or adjacent to water. This structure is composed of filter fabric, gravel bags, and steel t-posts.

Appropriate Applications

- Filter fabric may be used for construction activities such as streambank stabilization, or culvert, bridge, pier or abutment installation. It may also be used in combination with other methods, such as clean water bypasses and/or pumps.

- Filter fabric isolation is relatively inexpensive. This method involves placement of gravel bags or continuous berms to 'key-in' the fabric, and subsequently staking the fabric in place.

- If spawning gravel is used, all other components of the isolation can be removed from the stream, and the gravel may be spread out and left as salmonid spawning habitat if approved in the permit. Whether spawning gravel or other types of gravel are used, only clean washed gravel should be used as infill for the gravel bags or continuous berm.

- This method should be used in relatively calm water, and can be used in smaller streams. This is not a dewatering method, but rather a sediment isolation method.

- Water levels inside and outside the fabric curtain must be about the same, as differential heads will cause the curtain to collapse.

Limitations

- Do not use if the installation, maintenance and removal of the structures will disturb sensitive aquatic species of concern.

- Filter fabrics are not appropriate for projects where dewatering is necessary.

- Filter fabrics are not appropriate to completely dam stream flow.

Design and Installation

- For the filter fabric isolation method, a non-woven or heavy-duty fabric is recommended over standard silt fence. Using rolled geotextiles allows non-standard widths to be used.

- Anchor filter fabric with gravel bags filled with clean, washed gravel. Do not use sand. If a bag should split open, the gravel can be left in the stream, where it can provide aquatic habitat benefits. If a sandbag splits open in a watercourse, the sand could cause a decrease in water quality, and could bury sensitive aquatic habitat.

- Another anchor alternative is a continuous berm, made with the Continuous Berm Machine. This is a gravel-filled bag that can be made in very long segments. The length of the berms is usually limited to 18 ft for ease of handling (otherwise, it gets too heavy to move).

- Place the fabric on the bottom of the stream, and place either a bag of clean, washed gravel or a continuous berm over the bottom of the silt fence fabric, such that a bag-width of fabric lies on the stream bottom. The bag should be placed on what will be the outside of the isolation area.
- Pull the fabric up, and place a metal t-post immediately behind the fabric, on the inside of the isolation area; attach the silt fence to the post with three diagonal nylon ties.
- Continue placing fabric as described above until the entire work area has been isolated, staking the fabric at least every 6 ft.

Inspection and Maintenance

- Immediately repair any gaps, holes or scour.
- Remove and properly dispose of sediment buildup.
- Remove BMP upon completion of construction activity. Recycle or reuse if applicable.
- Revegetate areas disturbed by BMP removal if needed.

Turbidity Curtain Isolation Technique

Definition and Purpose

A turbidity curtain is a fabric barrier used to isolate the near shore work area. The barriers are intended to confine the suspended sediment. The curtain is a floating barrier, and thus does not prevent water from entering the isolated area; rather, it prevents suspended sediment from getting out.

Appropriate Applications

Turbidity curtains should be used where sediment discharge to a stream is unavoidable. They are used when construction activities adjoin quiescent waters, such as lakes, ponds, and slow flowing rivers. The curtains are designed to deflect and contain sediment within a limited area and provide sufficient retention time so that the sediment particles will fall out of suspension.

Limitations

- Turbidity curtains should not be used in flowing water; they are best suited for use in ponds, lakes, and very slow-moving rivers.
- Turbidity curtains should not be placed across the width of a channel.
- Removing sediment that has been deflected and settled out by the curtain may create a discharge problem through the resuspension of particles and by accidental dumping by the removal equipment.

Design and Installation

- Turbidity curtains should be oriented parallel to the direction of flow.
- The curtain should extend the entire depth of the watercourse in calm-water situations.
- In wave conditions, the curtain should extend to within 1 ft of the bottom of the watercourse, such that the curtain does not stir up sediment by hitting the bottom repeatedly. If it is

desirable for the curtain to reach the bottom in an active-water situation, a pervious filter fabric may be used for the bottom 1 ft.

- The top of the curtain should consist of flexible flotation buoys, and the bottom should be held down by a load line incorporated into the curtain fabric. The fabric should be a brightly colored impervious mesh.

- The curtain should be held in place by anchors placed at least every 100 ft.

- First, place the anchors, then tow the fabric out in a furled condition, and connect to the anchors. The anchors should be connected to the flotation devices, and not to the bottom of the curtain. Once in place, cut the furling lines, and allow the bottom of the curtain to sink.

- Consideration must be given to the probable outcome of the removal procedure. It must be determined if it will create more of a sediment problem through re-suspension of the particles or by accidental dumping of material during removal. It is recommended that the soil particles trapped by the turbidity curtain only be removed if there has been a significant change in the original contours of the affected area in the watercourse.

- Particles should always be allowed to settle for a minimum of 6 to 12 hours prior to their removal or prior to removal of the turbidity curtain.

Maintenance and Inspection:

- The curtain should be inspected for holes or other problems, and any repairs needed should be made promptly.

- Allow sediment to settle for 6 to 12 hours prior to removal of sediment or curtain. This means that after removing sediment, wait an additional 6 to 12 hours before removing the curtain.

- To remove, install furling lines along the curtain, detach from anchors, and tow out of the water.

K-rail River Isolation

Definition and Purpose

This temporary sediment control or stream isolation method uses K-rails to form the sediment deposition area, or to isolate the in-stream or near-bank construction area.

Barriers are placed end-to-end in a pre-designed configuration and gravel-filled bags are used at the toe of the barrier and at their abutting ends to seal and prevent movement of sediment beneath or through the barrier walls.

Appropriate Applications

The K-rail isolation can be used in streams with higher water velocities than many other isolation techniques.

- This technique is also useful at the toe of embankments, and cut or fill slopes.

Limitations

- The K-rail method should not be used to dewater a project site, as the barrier is not watertight.

Design and Installation

- To create a floor for the K-rail, move large rocks and obstructions. Place washed gravel and gravel-filled bags to create a level surface for K-rails to sit. Washed gravel should always be used.

- Place the bottom two K-rails adjacent to each other, and parallel to the direction of flow; fill the center portion with gravel bags. Then place the third K-rail on top of the bottom two. There should be sufficient gravel bags between the bottom K-rails such that the top rail is supported by the gravel. Place plastic sheeting around the K-rails, and secure at the bottom with gravel bags.

- Further support can be added by pinning and cabling the K-rails together. Also, large riprap and boulders can be used to support either side of the K-rail, especially where there is strong current.

Inspection and Maintenance:

- The barrier should be inspected and any leaks, holes, or other problems should be addressed immediately.

- Sediment should be allowed to settle for at least 6 to 12 hours prior to removal of sediment, and for 6 to 12 hours prior to removal of the barrier.

Stream Diversions

The selection of which stream diversion technique to use will depend upon the type of work involved, physical characteristics of the site, and the volume of water flowing through the project.

Advantages of a Pumped Diversion

- Downstream sediment transport can be nearly eliminated.

- Dewatering of the work area is possible.

- Pipes can be moved around to allow construction operations.

- The dams can serve as temporary access to the site.

- Increased flows can be managed by adding more pumping capacity.

Disadvantages of a Pumped Diversion

- Flow volume is limited by pump capacity.

- A pumped diversion requires 24 hour monitoring of pumps.

- Sudden rain could overtop dams.

- Erosion at the outlet.

- Minor in-stream disturbance is required to install and remove dams.

Advantages of Excavated Channels and Flumes

- Excavated channels isolate work from water flow and allow dewatering.
- Excavated channels can handle larger flows than pumps.

Disadvantages of Excavated Channels and Flumes

- Bypass channel or flume must be sized to handle flows, including possible floods.
- Channels must be protected from erosion.
- Flow diversion and re-direction with small dams involves in-stream disturbance and mobilization of sediment.

Design and Installation

- Installation guidelines will vary based on existing site conditions and type of diversion used.
- Pump capacity must be sufficient for design flow.
- A standby pump is required in case a primary pump fails.
- Dam materials used to create dams upstream and downstream of diversion should be erosion resistant; materials such as steel plate, sheet pile, sandbags, continuous berms, inflatable water bladders, etc., would be acceptable.

When constructing a diversion channel, begin excavation of the channel at the proposed downstream end, and work upstream. Once the watercourse to be diverted is reached and the excavated channel is stable, breach the upstream end and allow water to flow down the new channel. Once flow has been established in the diversion channel, install the diversion weir in the main channel; this will force all water to be diverted from the main channel.

Inspection and Maintenance

- Pumped diversions require 24 hour monitoring of pumps.
- Inspect embankments and diversion channels for damage to the linings, accumulating debris, sediment buildup, and adequacy of the slope protection. Remove debris and repair linings and slope protection as required. Remove holes, gaps, or scour.
- Upon completion of work, the diversion or isolation structure should be removed and flow should be redirected through the new culvert or back into the original stream channel. Recycle or reuse if applicable.
- Revegetate areas disturbed by BMP removal if needed.

Costs

Costs of clear water diversion vary considerably and can be very high.

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.

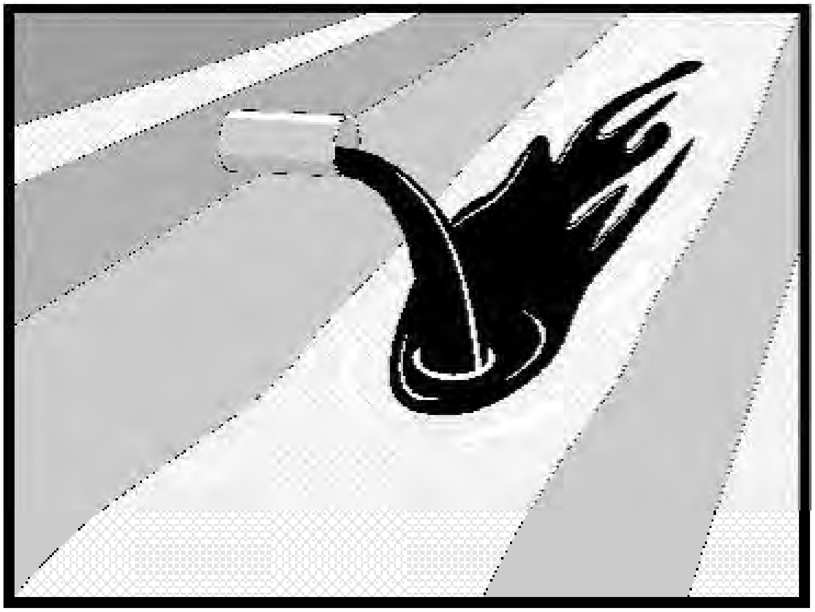
- Refer to BMP-specific inspection and maintenance requirements.

References

California Bank and Shore Rock Slope Protection Design – Practitioners Guide and Field Evaluations of Riprap Methods, Caltrans Study No. F90TL03, October, 2000.

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

Illicit Connection/Discharge NS-6



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	

Legend:

☑ Primary Objective

☒ Secondary Objective

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.

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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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.

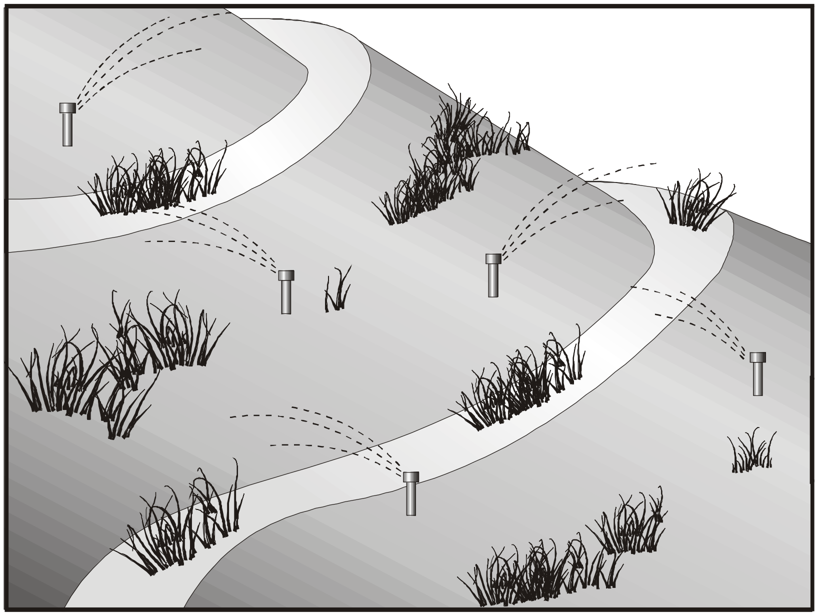
References

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.

Potable Water/Irrigation NS-7



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Sediment	☑
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Trash	
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Bacteria	
Oil and Grease	
Organics	☑

Potential Alternatives

None

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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.

- 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.

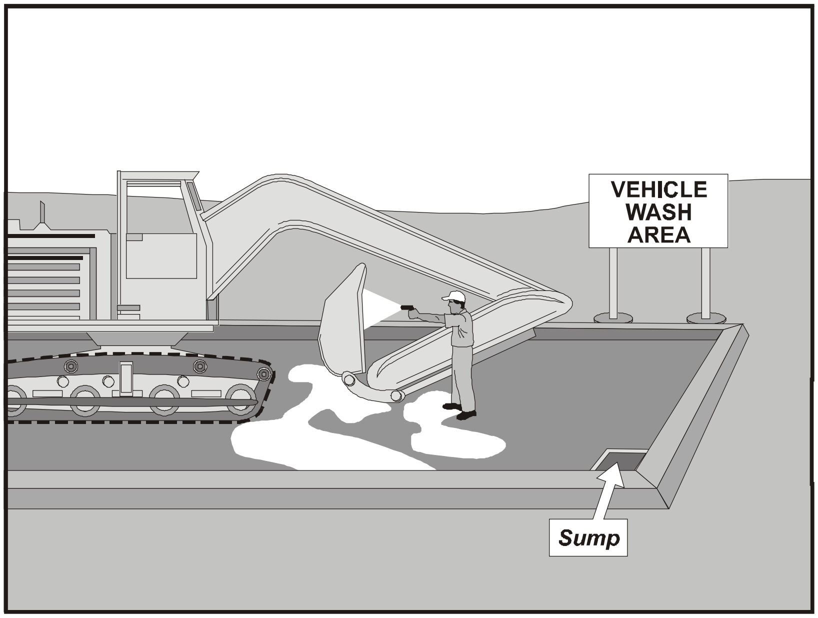
References

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.

Vehicle and Equipment Cleaning NS-8



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	

Legend:

☑ Primary Objective

☒ Secondary Objective

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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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:

- 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 runon and 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

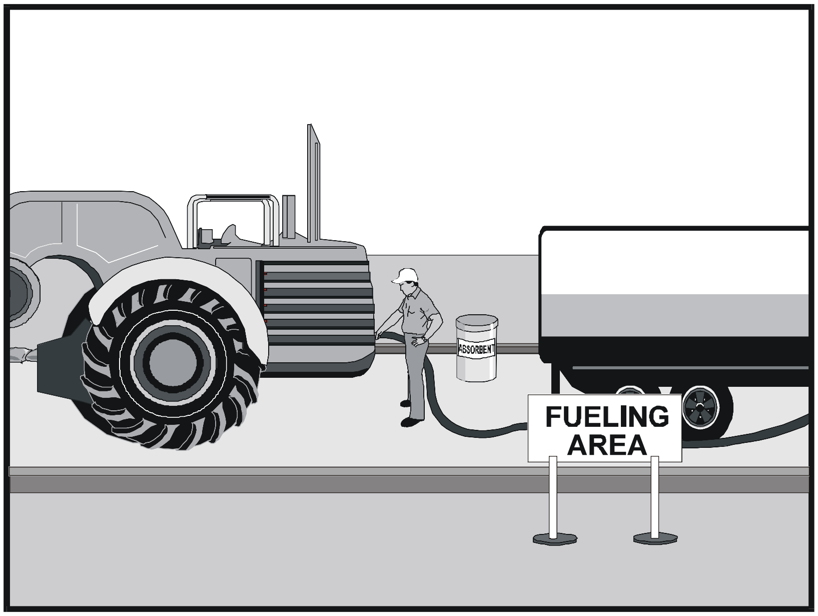
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at 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.

Vehicle and Equipment Fueling NS-9



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	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ Primary Objective

☒ Secondary Objective

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
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 runon and 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 runon, 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

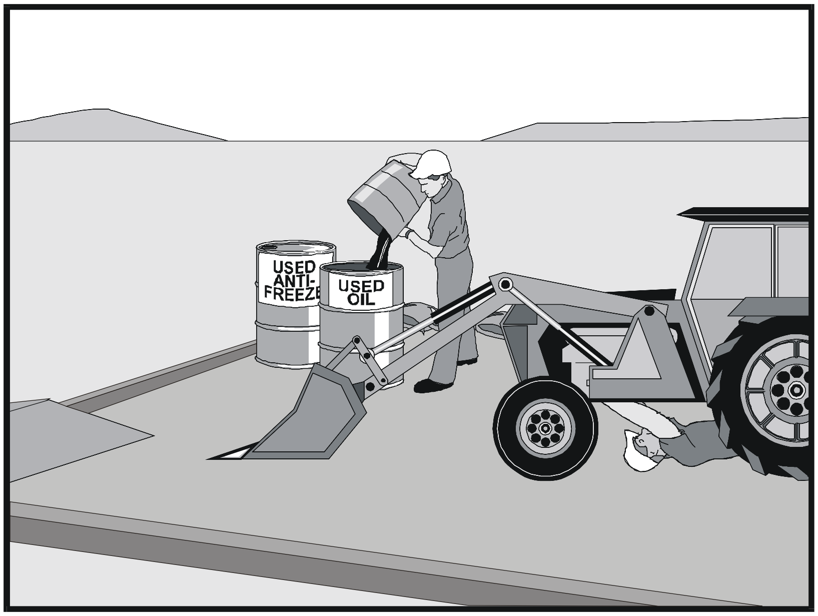
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

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

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	

Legend:

☑ Primary Objective

☒ Secondary Objective

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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CALIFORNIA STORMWATER QUALITY ASSOCIATION

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 runon 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.

- 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.

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.

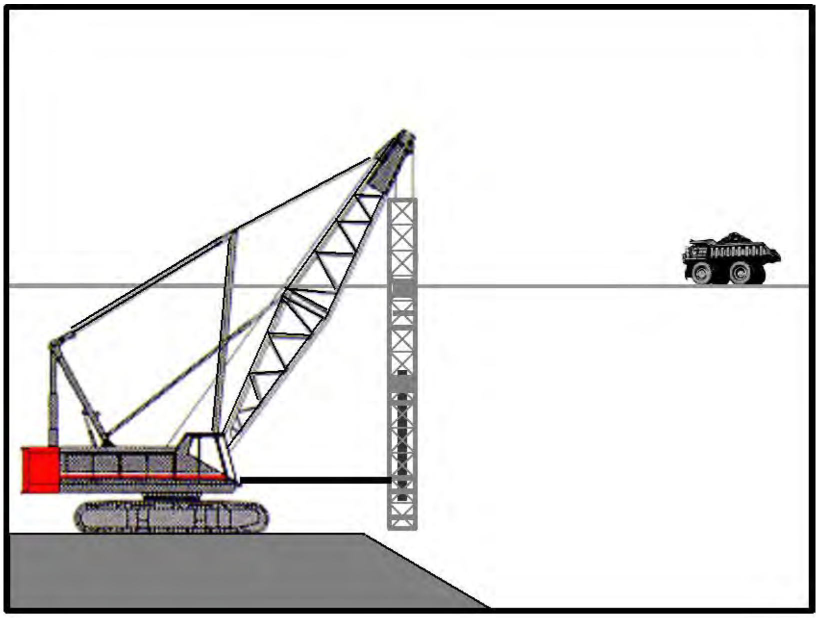
References

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.

Pile Driving Operations NS-11



Description and Purpose

The construction and retrofit of bridges and retaining walls often include driving piles for foundation support and shoring operations. Driven piles are typically constructed of precast concrete, steel, or timber. Driven sheet piles are also used for shoring and cofferdam construction. Proper control and use of equipment, materials, and waste products from pile driving operations will reduce or eliminate the discharge of potential pollutants to the storm drain system, watercourses, and waters of the United States.

Suitable Applications

These procedures apply to all construction sites near or adjacent to a watercourse or groundwater where permanent and temporary pile driving (impact and vibratory) takes place, including operations using pile shells as well as construction of cast-in-steel-shell and cast-in-drilled-hole piles.

Limitations

None identified.

Implementation

- Use drip pans or absorbent pads during vehicle and equipment operation, maintenance, cleaning, fueling, and storage. Refer to NS-8, Vehicle and Equipment Cleaning, NS-9, Vehicle and Equipment Fueling, and NS-10, Vehicle and Equipment Maintenance.

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	

Legend:

☑ Primary Objective

☒ Secondary Objective

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

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- Have spill kits and cleanup materials available at all locations of pile driving. Refer to WM-4, Spill Prevention and Control.

- Equipment that is stored or in use in streambeds, or on docks, barges, or other structures over water bodies should be kept leak free.

- Park equipment over plastic sheeting or equivalent where possible. Plastic is not a substitute for drip pans or absorbent pads. The storage or use of equipment in streambeds or other bodies of water must comply with all applicable permits.

- Implement other BMPs as applicable, such as NS-2, Dewatering Operations, WM-5, Solid Waste Management, WM-6, Hazardous Waste Management, and WM-10, Liquid Waste Management.

- When not in use, store pile-driving equipment away from concentrated flows of stormwater, drainage courses, and inlets. Protect hammers and other hydraulic attachments from runon and runoff by placing them on plywood and covering them with plastic or a comparable material prior to the onset of rain.

- Use less hazardous products, e.g., vegetable oil, when practicable.

Costs

All of the above measures can be low cost.

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.

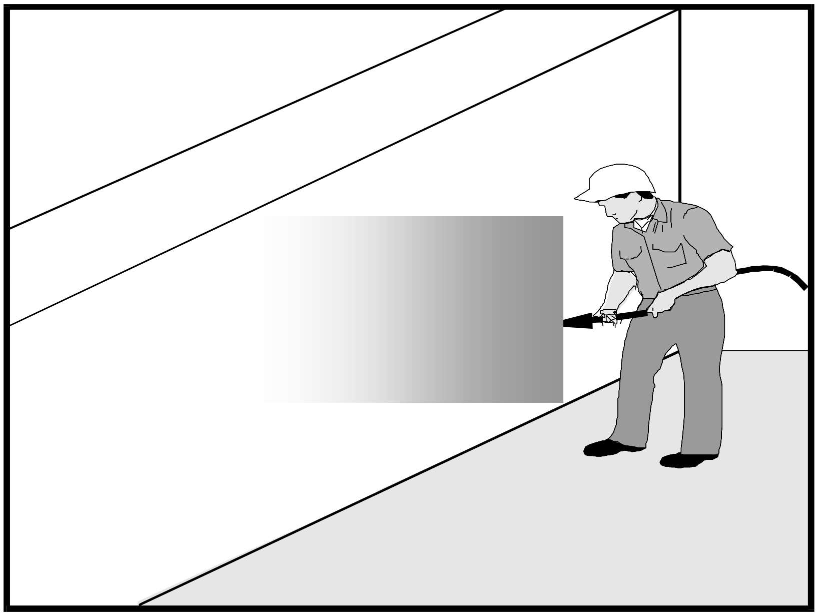
- Inspect equipment every day at startup and repair equipment as needed (i.e., worn or damaged hoses, fittings, and gaskets). Recheck equipment at shift changes or at the end of the day and scheduled repairs as needed.

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.

Concrete Curing NS-12



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	☑

Legend:

☑ Primary Category

☒ Secondary Category

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

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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.

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

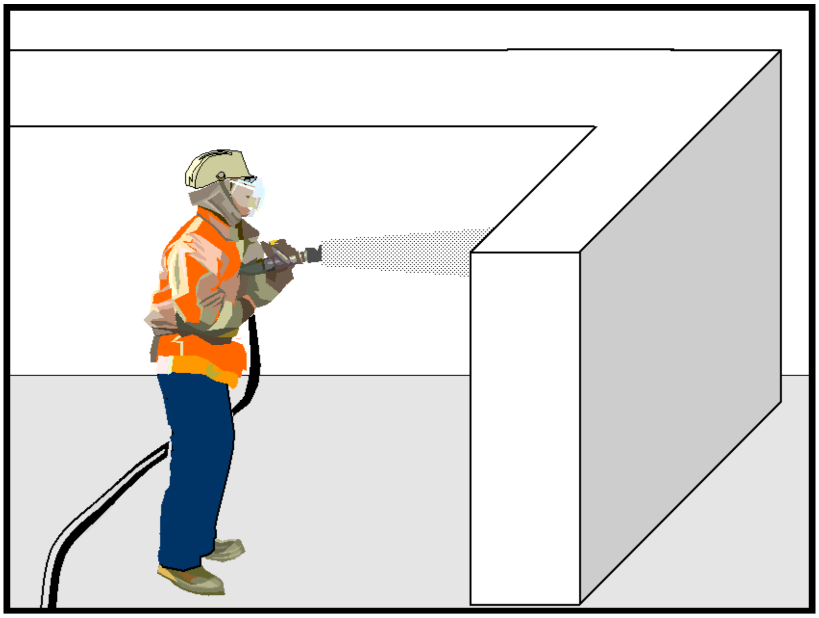
Blue Print for a Clean Bay-Construction-Related Industries: Best Management Practices for Stormwater Pollution Prevention; Santa Clara Valley Non Point Source Pollution Control Program, 1992.

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.

Concrete Finishing NS-13



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	☑
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ Primary Category

☒ Secondary Category

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	
Organics	☑

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.

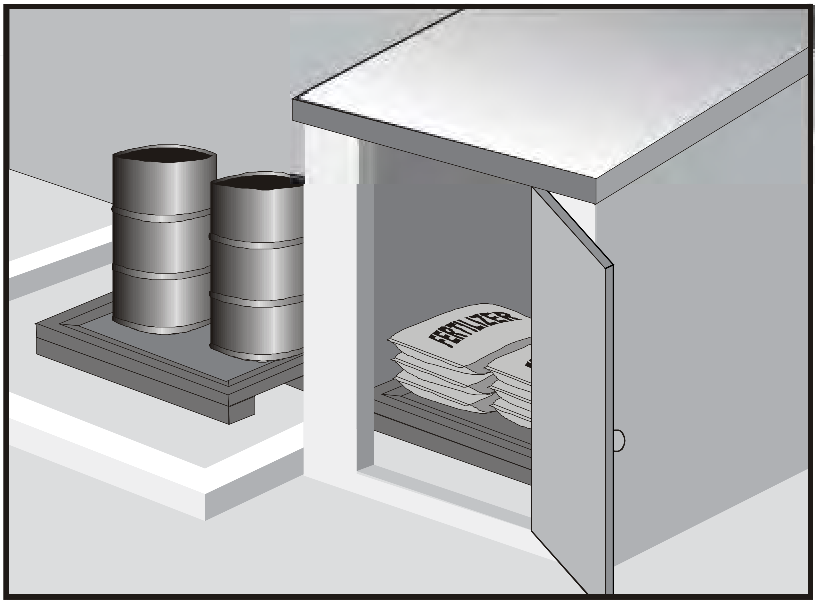
References

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.

Material Delivery and Storage WM-1



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	☑

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.

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

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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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

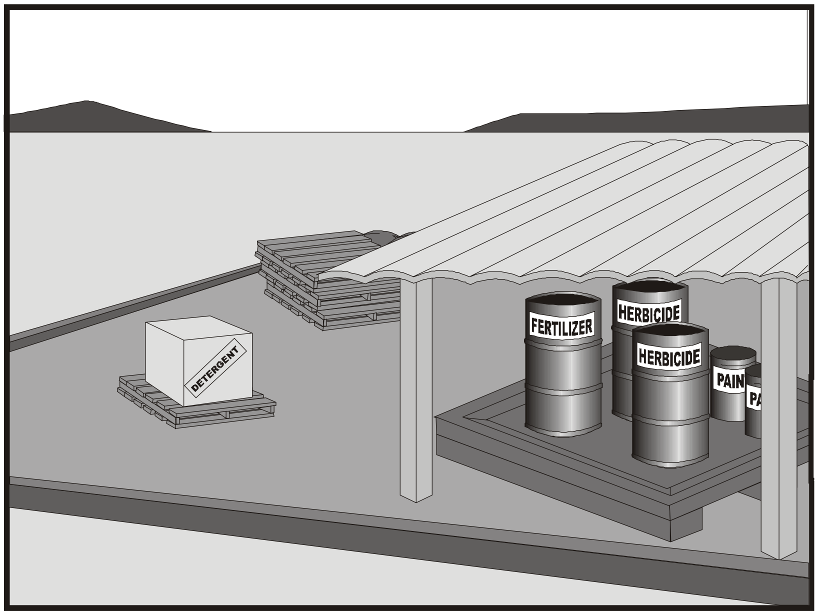
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

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.

Material Use WM-2



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	☑

Legend:

☑ Primary Category

☒ Secondary Category

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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Description and Purpose

Prevent or reduce the discharge of pollutants to the storm drain system or watercourses from material use by using alternative products, minimizing hazardous material use onsite, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for use at all construction projects. These procedures apply when the following materials are used or prepared onsite:

- Pesticides and herbicides
- Fertilizers
- Detergents
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete components
- Other hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Other materials that may be detrimental if released to the environment

Limitations

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

Implementation

The following steps should be taken to minimize risk:

- Minimize use of hazardous materials onsite.
- Follow manufacturer instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- Train personnel who use pesticides. The California Department of Pesticide Regulation and county agricultural commissioners license pesticide dealers, certify pesticide applicators, and conduct onsite inspections.
- The preferred method of termiticide application is soil injection near the existing or proposed structure foundation/slab; however, if not feasible, soil drench application of termiticides should follow EPA label guidelines and the following recommendations (most of which are applicable to most pesticide applications):
  - Do not treat soil that is water-saturated or frozen.
  - Application shall not commence within 24-hours of a predicted precipitation event with a 40% or greater probability. Weather tracking must be performed on a daily basis prior to termiticide application and during the period of termiticide application.
  - Do not allow treatment chemicals to runoff from the target area. Apply proper quantity to prevent excess runoff. Provide containment for and divert stormwater from application areas using berms or diversion ditches during application.
  - Dry season: Do not apply within 10 feet of storm drains. Do not apply within 25 feet of aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds).
  - Wet season: Do not apply within 50 feet of storm drains or aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds) unless a vegetative buffer is present (if so, refer to dry season requirements).
  - Do not make on-grade applications when sustained wind speeds are above 10 mph (at application site) at nozzle end height.
  - Cover treatment site prior to a rain event in order to prevent run-off of the pesticide into non-target areas. The treated area should be limited to a size that can be backfilled and/or covered by the end of the work shift. Backfilling or covering of the treated area shall be done by the end of the same work shift in which the application is made.
  - The applicator must either cover the soil him/herself or provide written notification of the above requirement to the contractor on site and to the person commissioning the

application (if different than the contractor). If notice is provided to the contractor or the person commissioning the application, then they are responsible under the Federal Insecticide Fungicide, and Rodenticide Act (FIFRA) to ensure that: 1) if the concrete slab cannot be poured over the treated soil within 24 hours of application, the treated soil is covered with a waterproof covering (such as polyethylene sheeting), and 2) the treated soil is covered if precipitation is predicted to occur before the concrete slab is scheduled to be poured.

- Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Unless on steep slopes, till fertilizers into the soil rather than hydraulic application. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried offsite by runoff. Do not apply these chemicals before predicted rainfall.
- Train employees and subcontractors in proper material use.
- Supply Material Safety Data Sheets (MSDS) for all materials.
- Dispose of latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, with other construction debris.
- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain, or watercourse. Dispose of any paint thinners, residue, and sludge(s) that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practicable, and rinse to a drain leading to a sanitary sewer where permitted, or contain for proper disposal off site. For oil-based paints, clean brushes to the extent practicable, and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials onsite when practical.
- Document the location, time, chemicals applied, and applicator’s name and qualifications.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.
- Discontinue use of erodible landscape material within 2 days prior to a forecasted rain event and materials should be covered and/or bermed.

- Provide containment for material use areas such as masons' areas or paint mixing/preparation areas to prevent materials/pollutants from entering stormwater.

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.
- 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.
- Ensure employees and subcontractors throughout the job are using appropriate practices.

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.

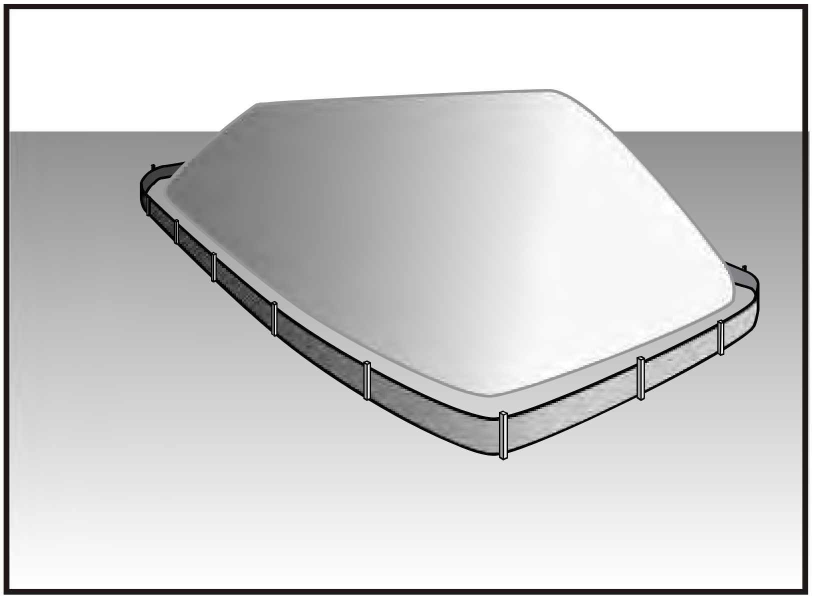
Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Comments on Risk Assessments Risk Reduction Options for Cypermethrin: Docket No. OPP–2005–0293; California Stormwater Quality Association (CASQA) letter to USEPA, 2006.Environmental Hazard and General Labeling for Pyrethroid Non-Agricultural Outdoor Products, EPA-HQ-OPP-2008-0331-0021; USEPA, 2008.

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.

Stockpile Management WM-3



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	☒
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	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

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 runon 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

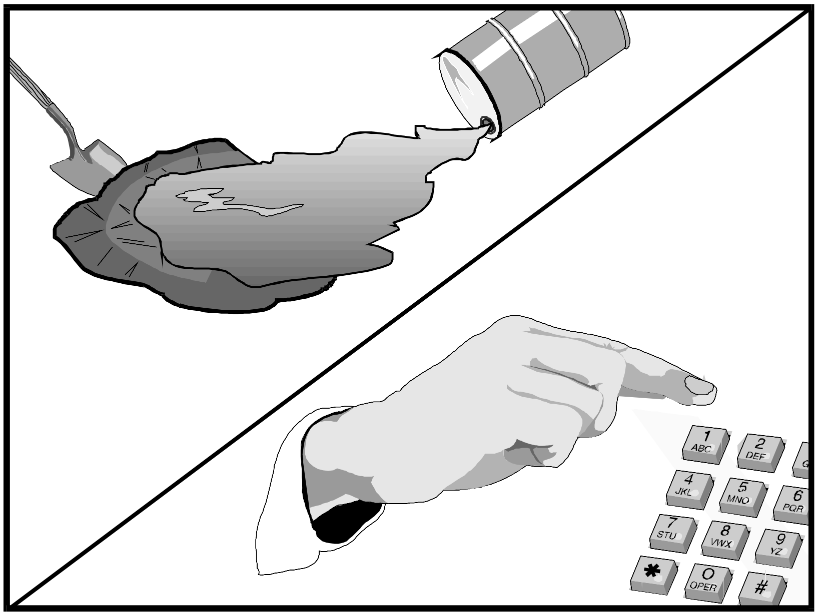
For cost information associated with stockpile protection refer to the individual erosion or sediment control BMP fact sheet considered for implementation (For example, refer to SE-1 Silt Fence for installation of silt fence around the perimeter of a stockpile.)

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	☑

Legend:

☑ Primary Objective

☒ Secondary Objective

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

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 runon 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 runon 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 runon 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.

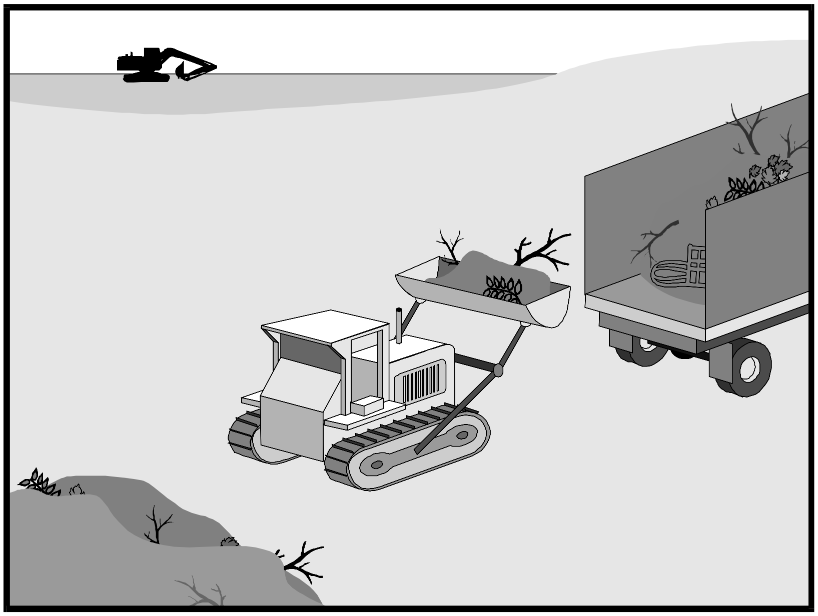
References

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.

Solid Waste Management WM-5



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	
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	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

- 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 runon 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.

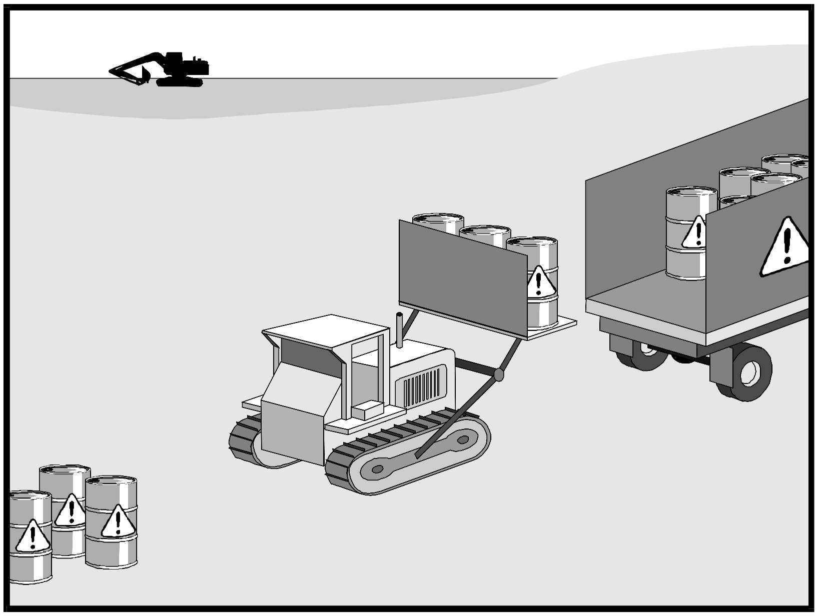
References

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.

Hazardous Waste Management WM-6



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	☑

Legend:

☑ Primary Objective

☒ Secondary Objective

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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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

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

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.

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.

Contaminated Soil Management WM-7

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	☑

Legend:

☑ Primary Objective

☒ Secondary Objective

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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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 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.

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.

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.

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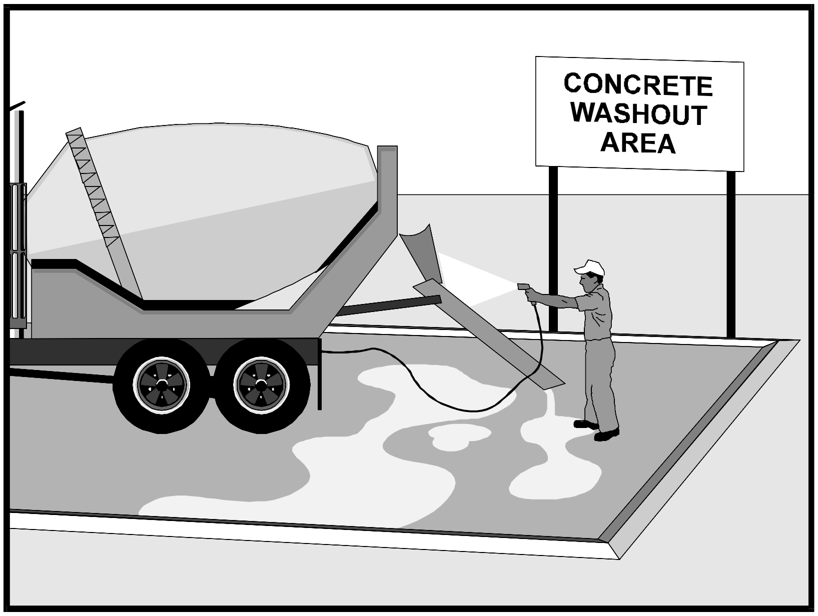
Concrete Waste Management WM-8



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	☑

Legend:

☑ Primary Category

☒ Secondary Category

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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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.

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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-0ff 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.

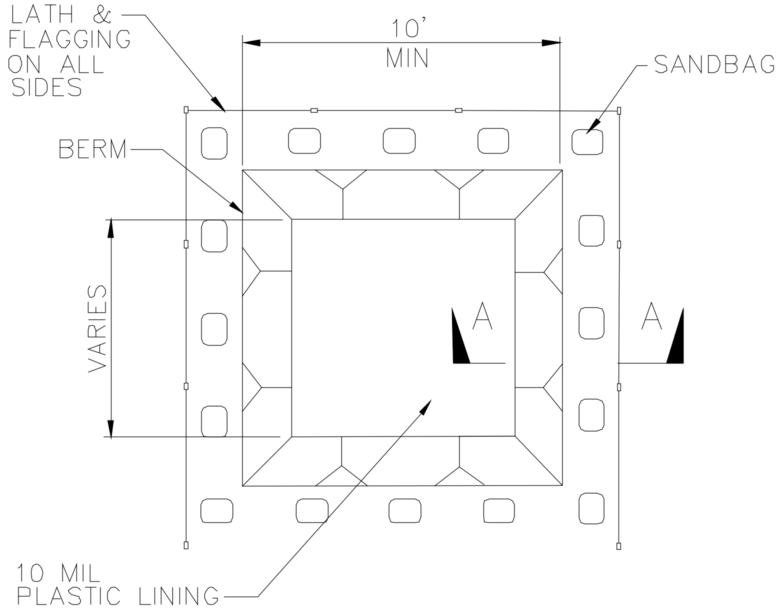
- Inspect washout facilities for damage (e.g. torn liner, evidence of leaks, signage, etc.). Repair all identified damage.

References

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, Updated March 2003.

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



PLAN
NOT TO SCALE
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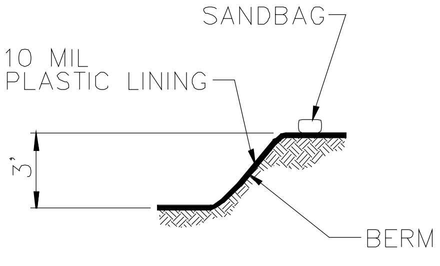
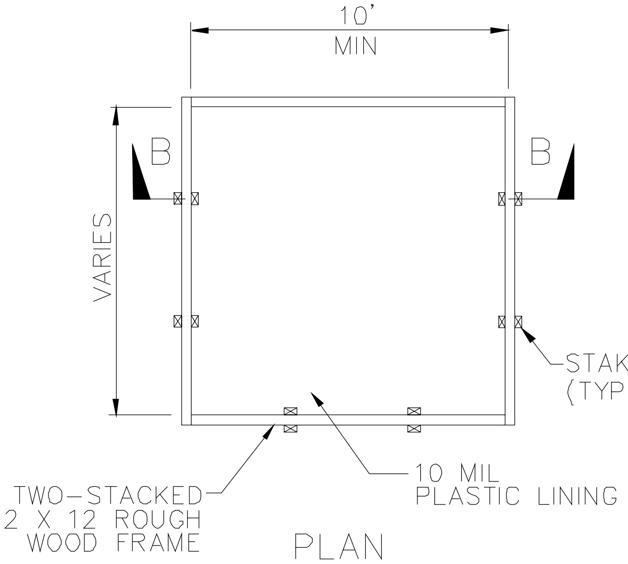
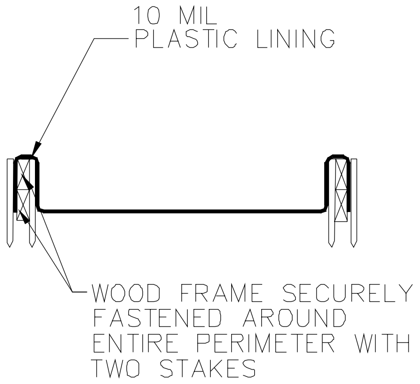


SECTION A–A
NOT TO SCALE



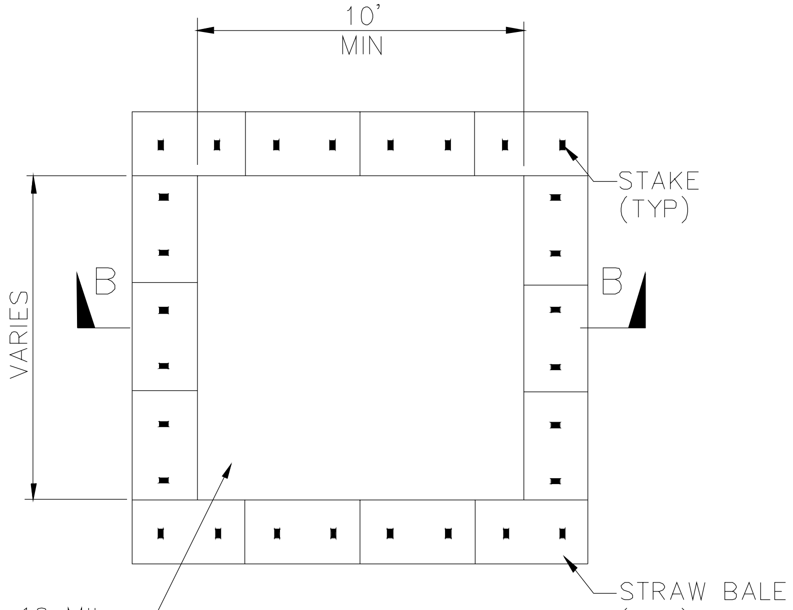
PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"



SECTION B–B
NOT TO SCALE

NOTES

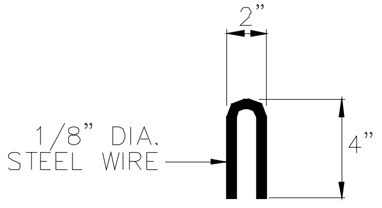
1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.



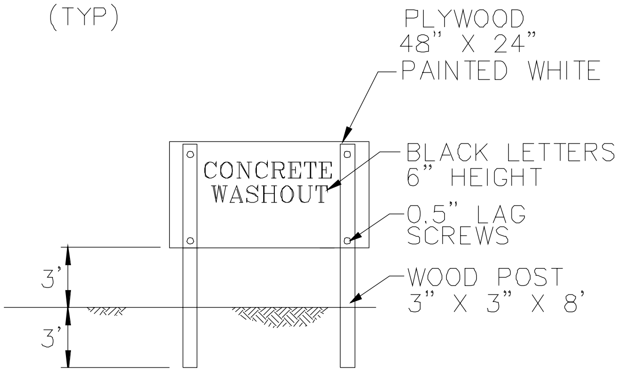
PLAN

NOT TO SCALE

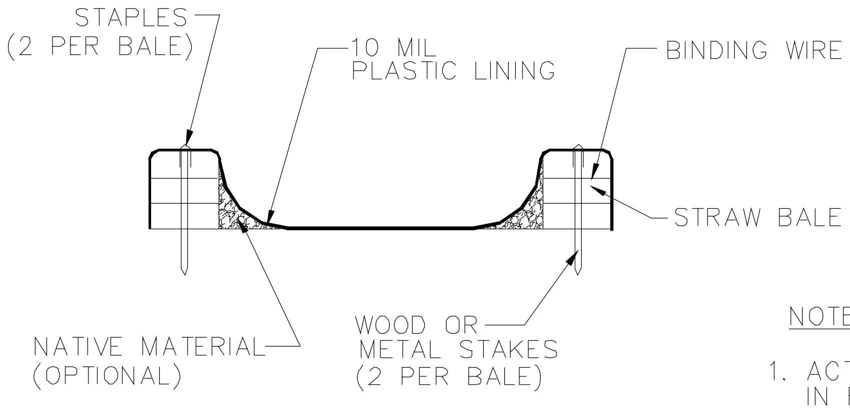
TYPE "ABOVE GRADE" WITH STRAW BALES



STAPLE DETAIL



CONCRETE WASHOUT SIGN DETAIL (OR EQUIVALENT)



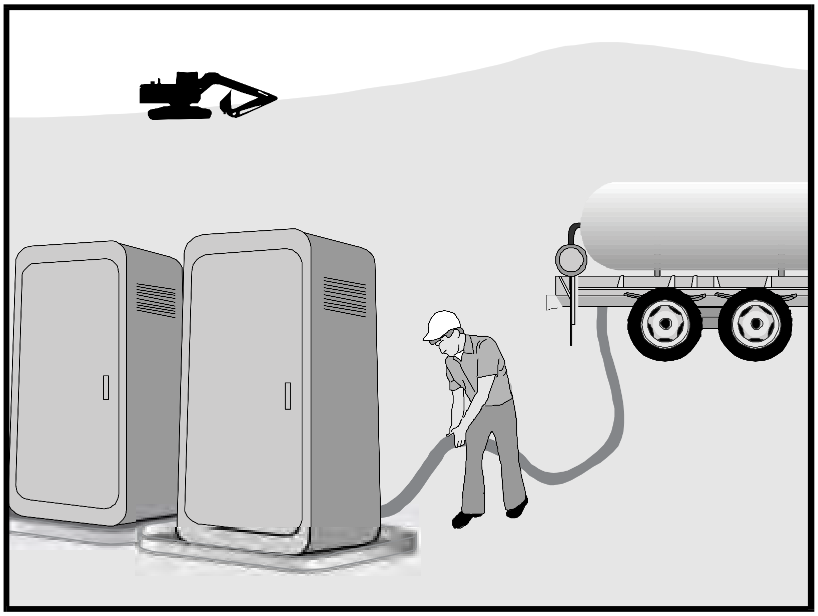
SECTION B-B

NOT TO SCALE

NOTES

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

Sanitary/Septic Waste Management WM-9



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	☑

Legend:

☑ Primary Category

☒ Secondary Category

Targeted Constituents	
Sediment	
Nutrients	☑
Trash	☑
Metals	
Bacteria	☑
Oil and Grease	
Organics	☑

Potential Alternatives

None

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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.

- 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.

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.

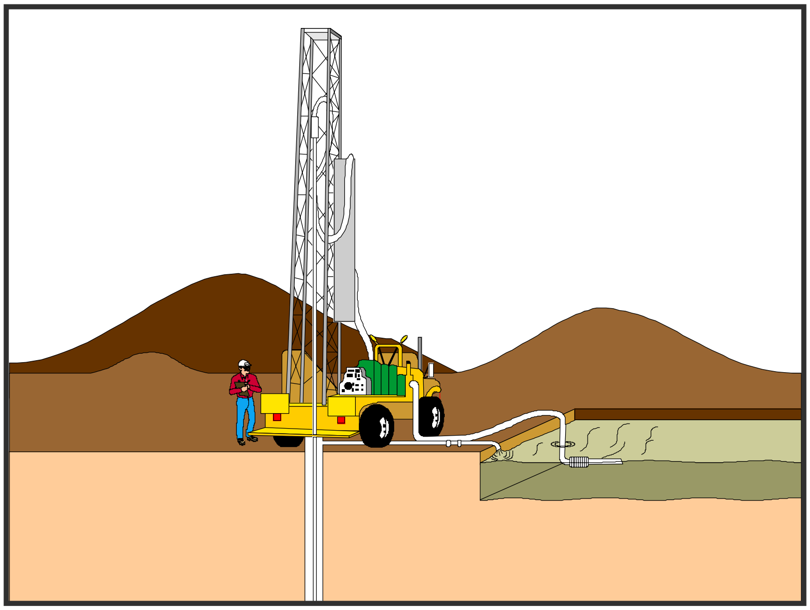
- If spills or leaks from sanitary or septic facilities occur that are not contained and discharge from the site, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

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.

Liquid Waste Management WM-10



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	☑

Legend:

☑ Primary Objective

☒ Secondary Objective

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

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Description and Purpose

Liquid waste management includes procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

Suitable Applications

Liquid waste management is applicable to construction projects that generate any of the following non-hazardous by-products, residuals, or wastes:

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

Limitations

- Disposal of some liquid wastes may be subject to specific laws and regulations or to requirements of other permits secured for the construction project (e.g., NPDES permits, Army Corps permits, Coastal Commission permits, etc.).
- Liquid waste management does not apply to dewatering operations (NS-2 Dewatering Operations), solid waste management (WM-5, Solid Waste Management), hazardous wastes (WM-6, Hazardous Waste Management), or

concrete slurry residue (WM-8, Concrete Waste Management).

- Typical permitted non-stormwater discharges can include: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; uncontaminated pumped ground water; discharges from potable water sources; foundation drains; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; flows from riparian habitats and wetlands; and discharges or flows from emergency fire fighting activities.

Implementation

General Practices

- Instruct employees and subcontractors how to safely differentiate between non-hazardous liquid waste and potential or known hazardous liquid waste.
- Instruct employees, subcontractors, and suppliers that it is unacceptable for any liquid waste to enter any storm drainage device, waterway, or receiving water.
- Educate employees and subcontractors on liquid waste generating activities and liquid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Verify which non-stormwater discharges are permitted by the statewide NPDES permit; different regions might have different requirements not outlined in this permit.
- Apply NS-8, Vehicle and Equipment Cleaning for managing wash water and rinse water from vehicle and equipment cleaning operations.

Containing Liquid Wastes

- Drilling residue and drilling fluids should not be allowed to enter storm drains and watercourses and should be disposed of.
- If an appropriate location is available, drilling residue and drilling fluids that are exempt under Title 23, CCR § 2511(g) may be dried by infiltration and evaporation in a containment facility constructed in conformance with the provisions concerning the Temporary Concrete Washout Facilities detailed in WM-8, Concrete Waste Management.
- Liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud, should be contained and not allowed to flow into drainage channels or receiving waters prior to treatment.
- Liquid wastes should be contained in a controlled area such as a holding pit, sediment basin, roll-off bin, or portable tank.
- Containment devices must be structurally sound and leak free.
- Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated.

- Precautions should be taken to avoid spills or accidental releases of contained liquid wastes. Apply the education measures and spill response procedures outlined in WM-4, Spill Prevention and Control.

- Containment areas or devices should not be located where accidental release of the contained liquid can threaten health or safety or discharge to water bodies, channels, or storm drains.

Capturing Liquid Wastes

- Capture all liquid wastes that have the potential to affect the storm drainage system (such as wash water and rinse water from cleaning walls or pavement), before they run off a surface.

- Do not allow liquid wastes to flow or discharge uncontrolled. Use temporary dikes or berms to intercept flows and direct them to a containment area or device for capture.

- Use a sediment trap (SE-3, Sediment Trap) for capturing and treating sediment laden liquid waste or capture in a containment device and allow sediment to settle.

Disposing of Liquid Wastes

- A typical method to handle liquid waste is to dewater the contained liquid waste, using procedures such as described in NS-2, Dewatering Operations, and SE-2, Sediment Basin, and dispose of resulting solids per WM-5, Solid Waste Management.

- Methods of disposal for some liquid wastes may be prescribed in Water Quality Reports, NPDES permits, Environmental Impact Reports, 401 or 404 permits, and local agency discharge permits, etc. Review the SWPPP to see if disposal methods are identified.

- Liquid wastes, such as from dredged material, may require testing and certification whether it is hazardous or not before a disposal method can be determined.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management.

- If necessary, further treat liquid wastes prior to disposal. Treatment may include, though is not limited to, sedimentation, filtration, and chemical neutralization.

Costs

Prevention costs for liquid waste management are minimal. Costs increase if cleanup or fines are involved.

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 weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

- Remove deposited solids in containment areas and capturing devices as needed and at the completion of the task. Dispose of any solids as described in WM-5, Solid Waste Management.

- Inspect containment areas and capturing devices and repair as needed.

References

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

APPENDIX I

SAMPLE CONSTRUCTION SITE INSPECTION REPORT FORM

APPENDIX J

SITE SPECIFIC RAIN EVENT ACTION PLAN

(FORMS AND COMPLETED PLANS)

(NOT INCLUDED - NOT APPLICABLE TO RISK LEVEL 1)

APPENDIX K

TRAINING REPORTING FORM

Trained Contractor Personnel Log

Storm Water Management Training Log

Project Name: ______________________________

Project Number/Location: ______________________________

Storm Water Management Topic: (check as appropriate)

☐ SWPPP Implementation

☐ BMP Inspection and Maintenance

☐ Record Keeping

☐ Erosion Control

☐ Wind Erosion Control

☐ Non-storm water management

☐ Storm Water Sampling

☐ Sediment Control

☐ Tracking Control

☐ Waste Management and Materials Pollution Control

Specific Training Objective: ______________________________

Location: ____________________ Date: ____________________

Instructor: ____________________ Telephone: ____________________

Course Length (hours): ______________

Attendee Roster (attach additional forms if necessary)

Name	Company	Phone

Name	**Company**	**Phone**

COMMENTS:

APPENDIX L

RESPONSIBLE PARTIES

Property Owners / Dischargers:
Contra Costa Community College District

Legally Responsible Person:
Ines Zildzic

Qualified SWPPP Practitioner
TBD

Qualified SWPPP Developer
Dayne Johnson
BKF Engineers
1646 N. California Blvd, Suite 400
Walnut Creek, California 94596

APPENDIX M

CONTRACTORS AND SUBCONTRACTORS

CONTRACTOR/SUBCONTRACTOR LIST

(All contractors, subcontractors, and individuals who will be directed by the QSP.)

Project Name: Contra Costa College New Science Building

Project Number/Location: 20175092 / San Pablo, CA

COMPANY NAME	CONTACT NAME	ADDRESS	PHONE NUMBER	EMERGENCY CONTACT #	SPECIFIC AREAS OF RESPONSIBILITY

USE ADDITIONAL PAGES AS NECESSARY

APPENDIX N

CONSTRUCTION SITE MONITORING PROGRAM

APPENDIX N
CONSTRUCTION SITE MONITORING PROGRAM

1. BMP INSPECTIONS

1.1 Inspection Requirements - General

The QSP shall complete inspections of all BMPs as required to ensure proper functioning of the BMPs at all times during construction.

At a minimum, inspections shall be conducted as follows:

- Within 2 business days (48 hours) prior to a forecast storm that is anticipated to be a Qualifying Storm / Rain Event, which is any event that produces 0.5 inches or more precipitation, with a 48 hour or greater period between rain events.
- Within 2 business days (48 hours) after each Qualifying Storm / Rain Event or any rain event that causes run-off from the site.
- Daily during extended rain events.
- For all BMPs - Weekly during the entire construction period.
- For selected additional BMPs, as identified by the QSP - Daily during the entire construction period.
- Inspections during non-business hours are not required.
- If a random visual observation results in action being taken, then the visual observation shall be considered an inspection and documented accordingly.
- In addition to the inspections listed above, a quarterly inspection for non-storm water discharge shall be performed.

For each inspection required, the QSP shall complete an inspection checklist. Sample inspection forms are provided in Appendix I. At a minimum, inspection checklists shall include the following:

- Inspection date and time, and date the inspection report was written.
- Weather information, including presence or absence of precipitation, estimate of beginning of Qualifying Storm / Rain Event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.
- Site information, including stage of construction, activities completed, and approximate area of the site exposed.
- A description of any BMPs evaluated, including location of each BMP, and any deficiencies noted.
- If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.
- Report the presence of any observed pollutant characteristics (floating or suspended material, discoloration, turbidity, etc.), noticeable odors, or any visible surface sheen, for any discharges.

- Any corrective actions required, including any necessary changes to the SWPPP and the implementation dates of the associated SWPPP changes.
- Documentation that the required corrective actions were taken.
- Photographs taken during the inspection, if any.
- Inspector's name, title, and signature.

The QSP shall identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. QSP shall submit all completed inspection checklists electronically via SMARTS as part of the Annual Report. Additional daily inspections performed at the discretion of the QSP do not need to be submitted unless the inspection results in sampling and analysis or a corrective action. Contractor shall ensure that all completed inspection checklists remain on-site with the SWPPP.

1.2 Inspection Requirements Prior to a Qualifying Storm / Rain Event

- Inspect all storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the Contractor/QSP shall implement appropriate corrective actions.
- Inspect any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.
- Inspect all BMPs to identify whether they have been properly implemented in accordance with the SWPPP. If needed, the Contractor/QSP shall implement appropriate corrective actions.
- For the inspections described in the first two bullet points above, QSP shall observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.
- If there are signs of spills, leaks or malfunctions, or evidence of non-storm water discharge QSP shall sample for pH and turbidity.
- If visual monitoring indicates evidence of non-visible pollutant discharge, QSP shall sample for, and analyze samples for, all non-visible pollutant parameters as described in Section 1.8 "Non-Visible Pollutant Monitoring Requirements" below.

1.3 Inspection Requirements After a Qualifying Storm / Rain Event

- Conduct post rain event inspections to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs required and revise the SWPPP accordingly.
- Complete the inspections listed under Section 1.2 "Inspection Requirements Prior to a Qualifying Storm / Rain Event" above.
- Inspect the discharge of stored or contained storm water that is derived from and discharged subsequent to a Qualifying Storm / Rain Event at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.
- Record the time, date and rain gauge reading of all qualifying storm / rain events.

1.4 Inspection Requirements During an Extended Rain Event

- Complete the inspections listed under Section 1.2 "Inspection Requirements Prior to a Qualifying Storm / Rain Event" and Section 1.3 "Inspection Requirements After a Qualifying Storm / Rain Event" above. Inspections should be performed at least once each 24 hour period during an extended rain event.

1.5 Inspection Requirements During/After a Breach

During or immediately after a breach in perimeter controls, inlet protection, or sediment traps/basins, or any other unauthorized storm water discharges, Contractor/QSP shall do the following:

- Direct non-sampling/testing personnel to repair the breach immediately after sampling to minimize unauthorized storm water discharges.
- Direct trained/qualified personnel to sample for turbidity and pH.
- Direct trained/qualified personnel to sample for other pollutants if warranted by visual observations. QSP shall refer to the Construction Site Pollutant Checklists in Appendix G for possible pollutants associated with materials exposed to storm water.
- Prepare a sampling report with the following information:
  1. Location(s) of sampling.
  2. The date and approximate time of sampling.
  3. The individual(s) who performed the sampling.
  4. Identifying numbers for samples.
  5. Field analysis performed, or laboratory analysis to be performed, on samples.
- Contractor shall keep all sampling reports and field or analytical data in the SWPPP document.
- QSP shall submit all sampling reports and all field or laboratory analytical data electronically via SMARTS as part of the Annual Report. The Regional Board will respond with any further action required by the QSP and/or the Contractor.

1.6 Visual Observation Exemptions

The QSP shall conduct inspections per the requirements described above, but is not required to conduct visual observation (inspections) under the following conditions:

- During dangerous weather conditions such as flooding and electrical storms.
- Outside of scheduled site business hours.

If no required inspections are collected due to these exceptions, Contractor/QSP shall include an explanation in the SWPPP and in the Annual Report documenting why the visual observations (inspections) were not conducted.

1.7 Non-Storm Water Discharge Monitoring Requirements

a. Visual Monitoring Requirements:

   i. QSP shall inspect each drainage area for the presence of (or indications of prior) non-storm water discharges and their sources.

   ii. QSP shall conduct one non-storm water inspection quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Inspections are only required during daylight hours (sunrise to sunset).

   iii. QSP shall ensure that each inspection documents the presence or evidence of any non-storm water discharge, pollutant characteristics and source.

b. Sampling Requirements:

   i. If there are signs of spills, leaks or malfunctions, or evidence of non-storm water discharge QSP shall sample for pH and turbidity.

   ii. If visual monitoring indicates evidence of non-visible pollutant discharge in non-storm water discharges, QSP shall sample for, and analyze samples for, all non-visible pollutant parameters as described in Section 1.8 "Non-Visible Pollutant Monitoring Requirements" below.

c. QSP shall submit all sampling reports and all field or laboratory analytical data electronically via SMARTS as part of the Annual Report. The Regional Board will respond with any further action required by the QSP and/or the Contractor.

1.8 Non-Visible Pollutant Monitoring Requirements

a. Contractor/QSP shall notify owner of release within 8 hours and provide details of incident and course of actions to be taken. QSP shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.

b. QSP shall ensure that water samples are large enough to characterize the site conditions.

c. QSP shall collect samples at all discharge locations that can be safely accessed.

d. QSP shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

e. If the breach, malfunction, leakage, or spill occurs when it is not raining, the QSP shall implement appropriate clean-up procedures. Then during the next rain event that occurs during business hours and generates runoff, the QSP shall collect samples during the first two hours of discharge.

f. QSP shall analyze samples for all non-visible pollutant parameters (if applicable). Parameters indicating the presence of pollutants identified in the pollutant source assessment are required. Contractor/QSD shall modify this document to address these additional parameters in accordance with any updated SWPPP pollutant source assessment.

g. QSP shall collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.

h. QSP shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis. For laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field discharge samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed.

i. QSP shall prepare a sampling report to document the specifics of each sample taken. At a minimum, the sampling report shall contain the following:

   i. Location(s) of sampling.

   ii. The date and approximate time of sampling.

   iii. The individual(s) who performed the sampling.

   iv. Identifying numbers for samples.

   v. Field analysis performed, or laboratory analysis to be performed, on samples.

j. Contractor shall keep all field or laboratory analytical data in the SWPPP document. At a minimum, the data records shall contain the following:

    i. Complete copies of all field or laboratory analyses.

    ii. The date and approximate time of analyses.

    iii. The individual(s) who performed the analyses.

    iv. The method detection limits and reporting units, and the analytical techniques or methods used.

    v. Quality assurance / quality control records and results.

k. QSP shall submit all sampling reports and all field or laboratory analytical data electronically via SMARTS as part of the Annual Report. The Regional Board will respond with any further action required by the QSP and/or the Contractor.

2. BMP MAINTENANCE AND REPAIR

BMPs shall be maintained regularly based on permit-required inspections and observations made during the course of normal construction activities.

The QSP shall implement corrective actions as soon as practical, but begin within 72 hours from the time deficiencies are identified during inspections. The QSP shall complete follow-up inspections and document that the required corrective actions were taken. If warranted by the problem encountered and corrective action required, SWPPP amendments shall be prepared by the QSP and approved by the QSD.

3. RECORDS

Contractor shall retain records of all storm water monitoring information and copies of all reports (including Annual Reports) for a period of at least three years. Contractor shall provide all records to owner upon completion of construction. Contractor shall retain all records on-site, in Appendix O, while construction is ongoing. At a minimum, these records sampling report shall include the following:

- All inspection checklists.
- Rain gauge readings from site inspections.
- Exemption/Exception Records – See Section 1.6.
- All sampling reports.
- A summary of all analytical results from the last three years, as well as all field /or analytical data.
- The records of any corrective actions (BMP Maintenance and Repair) and follow-up activities that resulted from analytical results or inspections.

4. REFERENCES

The QSP's attention is directed to Appendix D, "Field Monitoring and Analysis Guidance" of the November 2009 California Stormwater BMP Handbook, Construction (www.casqa.org) for sampling procedures, including sampling safety.

APPENDIX O

CONSTRUCTION RECORDS

APPENDIX P

AGENCY APPROVALS AND MISCELLANEOUS DOCUMENTS

APPENDIX Q

TEST METHODS, DETECTION LIMITS, REPORTING UNITS, APPLICABLE NALS AND NELS

(NOT INCLUDED - NOT APPLICABLE TO RISK LEVEL 1)

APPENDIX R
EROSION CONTROL PLAN

GRAPHIC SCALE: 3" = 1'-0"

GRAPHIC SCALE: 1 1/2" = 1'-0"

GRAPHIC SCALE: 1" = 1'-0"

GRAPHIC SCALE: 3/4" = 1'-0"

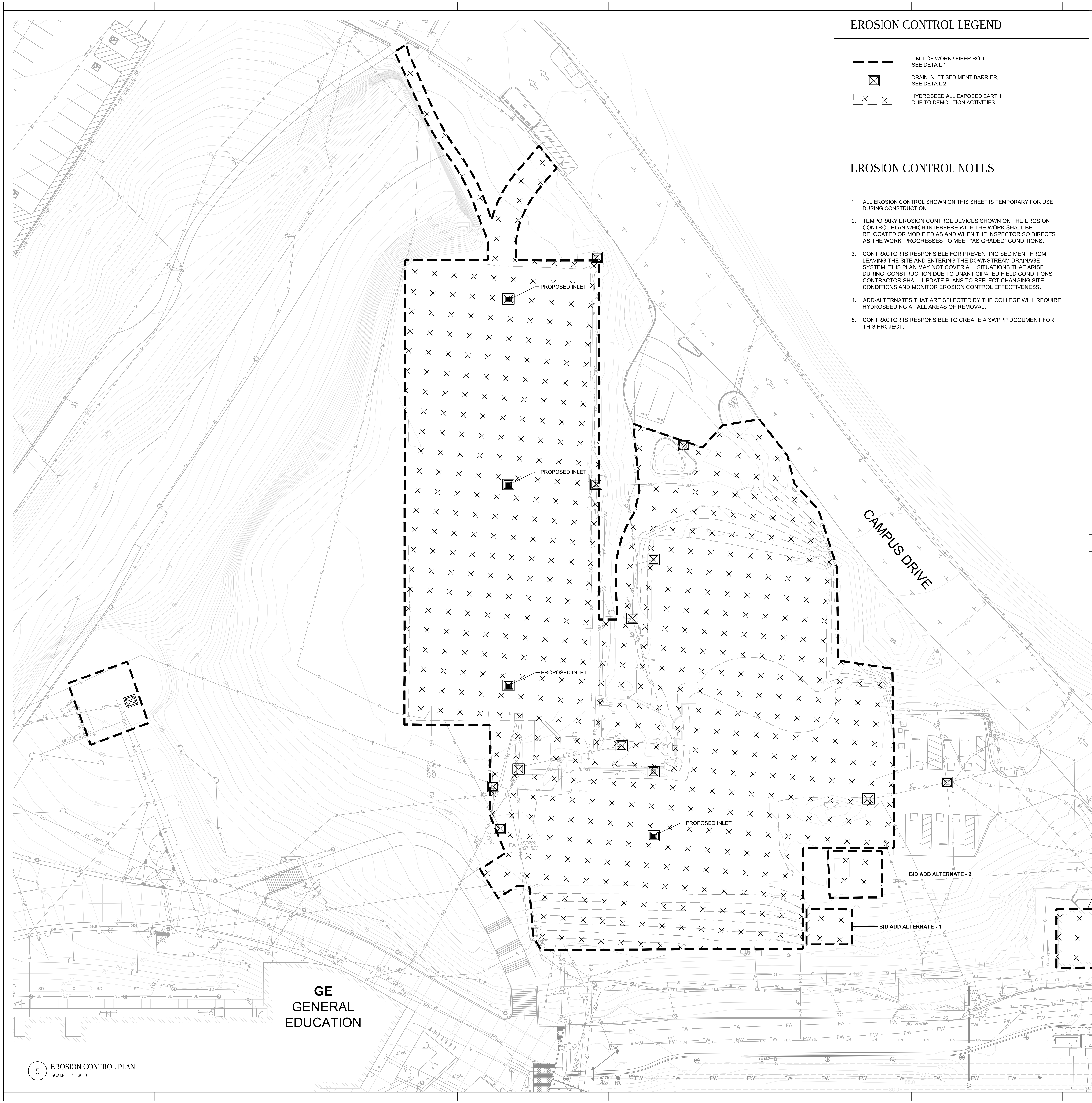
GRAPHIC SCALE: 1/2" = 1'-0"

GRAPHIC SCALE: 1/16" = 1'-0"

GRAPHIC SCALE: 1/8" = 1'-0"

GRAPHIC SCALE: 1/4" = 1'-0"

Plot Date: 11/2/2021 6:58:07 PM



5 EROSION CONTROL PLAN

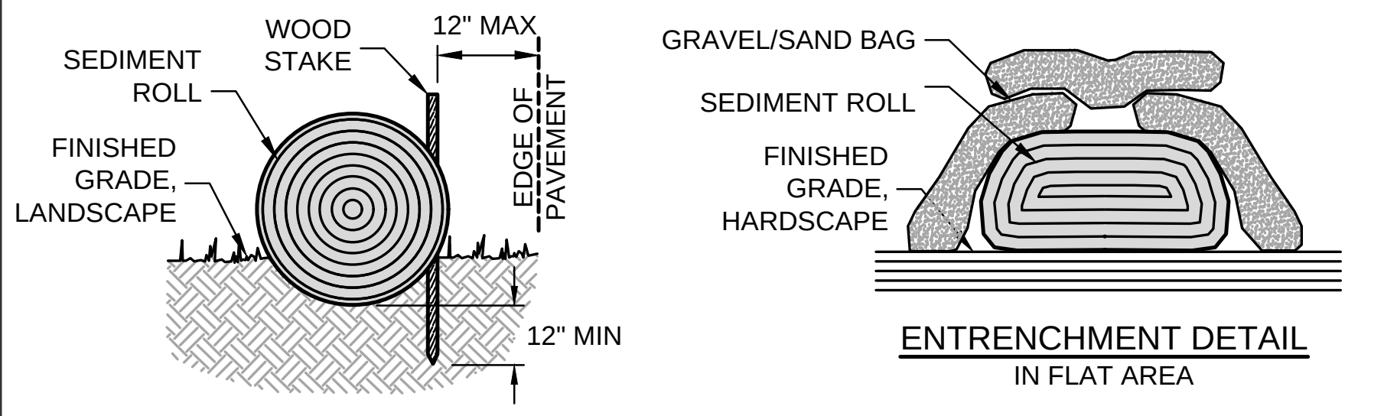
SCALE: 1" = 20'-0"

EROSION CONTROL LEGEND

▬ ▬ ▬	LIMIT OF WORK / FIBER ROLL, SEE DETAIL 1
☒	DRAIN INLET SEDIMENT BARRIER, SEE DETAIL 2
[× ×]	HYDROSEED ALL EXPOSED EARTH DUE TO DEMOLITION ACTIVITIES

EROSION CONTROL NOTES

1. ALL EROSION CONTROL SHOWN ON THIS SHEET IS TEMPORARY FOR USE DURING CONSTRUCTION
2. TEMPORARY EROSION CONTROL DEVICES SHOWN ON THE EROSION CONTROL PLAN WHICH INTERFERE WITH THE WORK SHALL BE RELOCATED OR MODIFIED AS AND WHEN THE INSPECTOR SO DIRECTS AS THE WORK PROGRESSES TO MEET "AS GRADED" CONDITIONS.
3. CONTRACTOR IS RESPONSIBLE FOR PREVENTING SEDIMENT FROM LEAVING THE SITE AND ENTERING THE DOWNSTREAM DRAINAGE SYSTEM. THIS PLAN MAY NOT COVER ALL SITUATIONS THAT ARISE DURING CONSTRUCTION DUE TO UNANTICIPATED FIELD CONDITIONS. CONTRACTOR SHALL UPDATE PLANS TO REFLECT CHANGING SITE CONDITIONS AND MONITOR EROSION CONTROL EFFECTIVENESS.
4. ADD-ALTERNATES THAT ARE SELECTED BY THE COLLEGE WILL REQUIRE HYDROSEEDING AT ALL AREAS OF REMOVAL.
5. CONTRACTOR IS RESPONSIBLE TO CREATE A SWPPP DOCUMENT FOR THIS PROJECT.



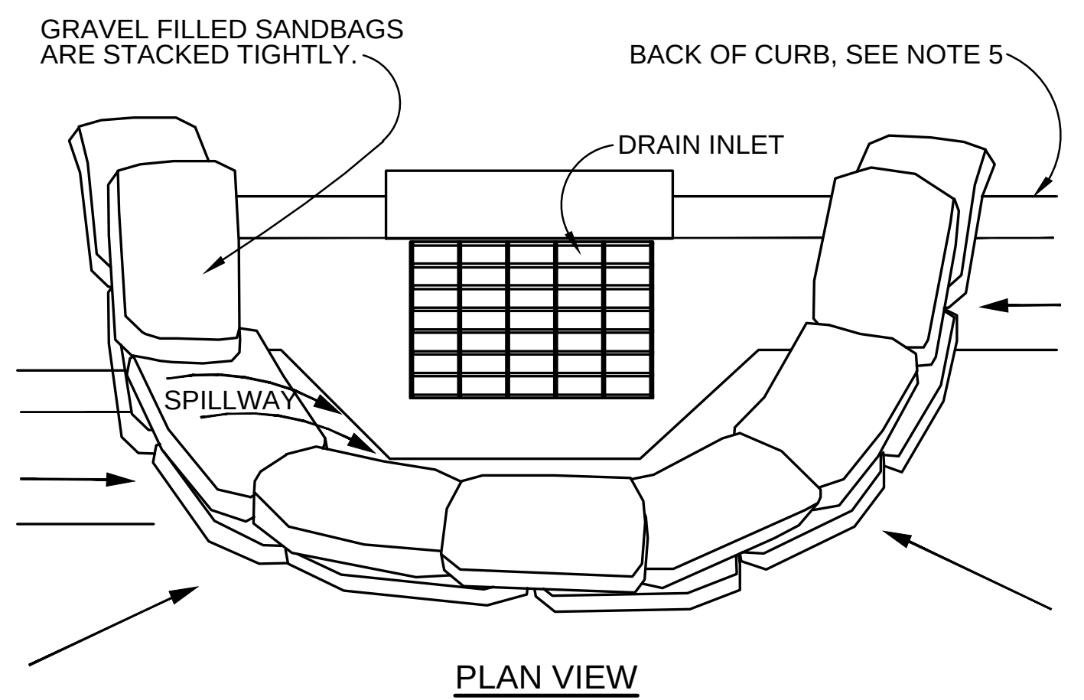
ENTRENCHMENT DETAIL
IN FLAT AREA

NOTES:

1. FIBER ROLLS ARE TUBES MADE FROM POROUS BIODEGRADABLE FIBER STUFFED IN A PHOTO-DEGRADABLE OPEN WEAVE NETTING. THEY ARE APPROXIMATELY 8" DIAMETER.
2. FIBER ROLLS SHALL BE SECURED IN PLACE EITHER BY GRAVEL BAGS ON HARDSCAPE OR BY STAKING THE ROLL IN A TRENCH, 2"-4" DEEP, DUG ON CONTOUR IN LANDSCAPE. RUNOFF MUST NOT BE ALLOWED TO RUN UNDER OR AROUND ROLL. ROLLS SHOULD BE ABUTTED SECURELY TO PROVIDE A TIGHT JOINT, NOT OVERLAPPED.
3. TURN ENDS OF FIBER ROLLS UPSLOPE.
4. SILT BUILD-UP AT THE UPSLOPE SIDE OF FIBER ROLLS SHALL BE REMOVED WHEN THE DEPRESSION BECOMES 50% FULL.
5. ANY PLACE WHERE WATER HAS ERODED UNDER THE FIBER ROLL SHALL BE IMMEDIATELY FILLED AS NECESSARY TO PREVENT RECURRENCE.

4 FIBER ROLL

NOT TO SCALE



PLAN VIEW

NOTES:

1. PLACE CURB TYPE SEDIMENT BARRIERS ON GENTLY SLOPING STREET SEGMENTS, WHERE WATER CAN POND AND ALLOW SEDIMENT TO SEPARATE FROM RUNOFF.
2. SANDBAGS OF EITHER BURLAP OR WOVEN 'GEOTEXTILE' FABRIC, ARE FILLED WITH GRAVEL LAYERED AND PACKED TIGHTLY.
3. LEAVE A ONE SANDBAG GAP IN THE TOP ROW TO PROVIDE A SPILLWAY FOR OVERFLOW.
4. INSPECT BARRIERS AND REMOVE SEDIMENT IMMEDIATELY BEFORE AND AFTER EACH STORM EVENT. SEDIMENT AND GRAVEL MUST BE REMOVED FROM THE TRAVELED WAY IMMEDIATELY.
5. FOR INLETS NOT AGAINST A CURB, PLACE GRAVEL FILLED SANDBAGS FULLY SURROUNDING THE INLET, IN SIMILAR PATTERN, LEAVING A SPILLWAY EVERY THIRD BAG.

4 DRAIN INLET SEDIMENT BARRIER

NOT TO SCALE

AGENCY APPROVALS

CONTRA
COSTA
COLLEGE

Inc. 3, Demo and Abatement of
Physical Science and Biological
Science Building and other
Structures

SMITHGROUP

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BKF Engineers
CIVIL ENGINEER
1646 N. California Blvd. #400
Walnut Creek, CA 94596
(925) 940-2200

ISSUED FOR	REV	DATE
ISSUED FOR BID		*05 NOV 2021*
100% CONSTRUCTION DOCUMENTS		*08 OCT 2021*
ISSUED FOR DISTRICT REVIEW		*29 MAR 2018*

SEALS AND SIGNATURES

DAINE B. JOHNSON
C 061408
CIVIL

DATE SIGNED: 11/12/2021

SHEET TITLE

PROPOSED EROSION
CONTROL PLAN

10418.000

PROJECT NUMBER

INC-3 C5.00

SHEET NUMBER

APPENDIX S

CONTRACTOR ACTIVITIES LOCATION MAP