PUBLIC UTILITIES COMMISSION
505 VAN NESS AVENUE

July 5, 2022

Advice Letters 6186-E, AL 6186-E-A, AL 6168-E-B

Erik Jacobson
Director, Regulatory Relations
Pacific Gas and Electric Company
77 Beale Street, Mail Code B10C
P.O. Box 770000
San Francisco, CA 94177

SUBJECT: Submits Notice of Construction, Pursuant to General Order 131-D, for the Construction of Ignacio-Alto-Sausalito #1 and #2 60 kV Power Line, SCADA Switch Program in the City of Mill Valley, County of Marin.

Dear Mr. Jacobson:

Advice Letters 6186-E, AL 6186-E-A, AL 6168-E-B are effective as of June 23, 2022, per Resolution E-5207 ordering paragraphs.

Sincerely,

Pete Skala
Interim Deputy Executive Director for Energy & Climate Policy, CPUC
Interim Director, Energy Division, CPUC
Director of Electric Supply, Planning and Costs, Energy Division, CPUC

Pacific Gas and Electric Company

Sidney Bob Dietz II
Director
Regulatory Relations

Pacific Gas and Electric Company
77 Beale St., Mail Code B13U
P.O. Box 770000
San Francisco, CA 94177

Fax: 415-973-3582

March 9, 2022

Advice 6186-E-B
(Pacific Gas and Electric Company ID U 39 E)

Public Utilities Commission of the State of California

Subject: **Second Supplemental: Submits Notice of Construction, Pursuant to General Order 131-D, for the Construction of the Ignacio-Alto-Sausalito #1 and #2 60 kV Power Lines, SCADA Switch Program, in the City of Mill Valley, County of Marin**

Pacific Gas and Electric Company (PG&E) hereby provides supplemental information to Advice Letter 6186-E-A to make documents available addressing concerns raised by protests filed in this proceeding. The project description in Advice Letter 6186-E, which provided notice of construction pursuant to General Order (G.O.) 131-D, was revised to in Advice Letter 6186-E-A to reflect PG&E's redesign of the project in response to community concerns.

Purpose

This advice letter provides supplemental information to Advice Letter 6186-E-A.

Background

Pursuant to California Public Utilities Commission (CPUC) GO 131-D, PG&E submitted Advice Letter 6186-E on May 4, 2021, concerning its request to replace a tower and 2 switches on the Ignacio-Alto-Sausalito #1 and #2 60 kV Power Lines with 3 steel poles and 4 switches. The project is located on a hill in Mill Valley, California, and is part of PG&E's efforts to address wildfire protection and minimize customer outages. As indicated in the advice letter, the project is exempt from permitting requirements under the Commission's GO 131-D, Section III. B.1, subsection (g) for work in an existing "public utility easement."

Between May 17 and May 24, 2021, a number of concerns were raised in protests to the project submitted by Jeremiah Revitch, Gail Katz, Michael Green, Janet Oelklaus, Katherine Hale, Cherie Whitmore, Gregory, Jessica and Patrick Mullin, Regina and Rich Garcia, Peter Riaboff, Dave and Peggy Chenoweth, Mark and Julianna Hayes, Danielle and Erik Lundgren, and Carlos and Emily Montalvan (Protestants).

On May 24, 2021, due to the concerns raised in the protests, PG&E asked the CPUC to suspend the advice letter while PG&E explored other design and construction options for revising the project to minimize impacts. The CPUC suspended the advice letter on May 25, 2021. PG&E submitted replies to the protests on June 2, 2021 and again on November 1, 2021 to provide updates to Protestants and the community.

On November 4, 2021, PG&E submitted AL 6186-E-A to provide an updated project design, reducing the number of replacement structures from 3 to 2 and the size of the construction footprint. Carlos and Emily Montalvan, and Gail Katz and Rodolfo Broullon (Additional Protestants) filed two protests to this supplemental advice letter on November 23, 2021. PG&E replied to those protests on December 7, 2021.

Supplemental Information

In its December 7, 2021 reply, PG&E indicated that plans and drawings that are part of the grading permit application submitted to the City of Mill Valley would be made available to Property Owners. Those documents are attached and include the following:

1. Detailed Grading Plan
2. Pole Foundation Plan
3. Geotechnical Report
4. Erosion and Sediment Control Plan

Due to the surface area of the project site and the mobile generation site at Alto Substation, a Stormwater Pollution Prevention Plan (SWPPP) will be prepared for this project. It will be based on the City's approved grading plan, including the documents attached.

Protests

PG&E asks that the Commission, pursuant to GO 96-B, reopen the protest and comment period.

Anyone wishing to protest this submittal may do so by letter sent electronically via E-mail, no later than March 29, 2022, which is 20 days after the date of this submittal. Protests must be submitted to:

CPUC Energy Division
ED Tariff Unit
E-mail: EDTariffUnit@cpuc.ca.gov

The protest shall also be electronically sent to PG&E via E-mail at the address shown below on the same date it is electronically delivered to the Commission:

Sidney Bob Dietz II
Director, Regulatory Relations
c/o Megan Lawson
E-mail: PGETariffs@pge.com

Any person (including individuals, groups, or organizations) may protest or respond to an advice letter (General Order 96-B, Section 7.4). The protest shall contain the following information: specification of the advice letter protested; grounds for the protest; supporting factual information or legal argument; name and e-mail address of the protestant; and statement that the protest was sent to the utility no later than the day on which the protest was submitted to the reviewing Industry Division (General Order 96-B, Section 3.11).

Effective Date – Request for Expedited Relief

PG&E has been advised that this advice letter will require approval by resolution of the Commission. PG&E respectfully requests that this process be expedited to the extent feasible to enable the community to benefit as soon as possible from greater wildfire protection as well as fewer and shorter power outages triggered by wildfire concerns.

Notice

In accordance with General Order 96-B, Section IV, a copy of this advice letter is being sent electronically to parties shown on the attached list and the parties on the service list for Parties Listed in G.O. 131-D, Paragraphs B.1 and B.2. Address changes to the General Order 96-B service list should be directed to PG&E at email address PGETariffs@pge.com. For changes to any other service list, please contact the Commission's Process Office at (415) 703-2021 or at Process_Office@cpuc.ca.gov. Send all electronic approvals to PGETariffs@pge.com. Advice letter submittals can also be accessed electronically at: http://www.pge.com/tariffs/.

/S/

Sidney Bob Dietz II
Director, Regulatory Relations

Attachments:

1. Detailed Grading Plan
2. Pole Foundation Plan
3. Geotechnical Report
4. Erosion and Sediment Control Plan

cc: Parties Listed in G.O. 131-D, Paragraphs B.1 and B.2

ADVICE LETTER SUMMARY

ENERGY UTILITY

MUST BE COMPLETED BY UTILITY (Attach additional pages as needed)

Company name/CPUC Utility No.: Pacific Gas and Electric Company (ID U39 E)

Utility type:
- [x] ELC
- [ ] GAS
- [ ] WATER
- [ ] PLC
- [ ] HEAT

Contact Person: Kimberly Loo
Phone #: (415)973-4587
E-mail: PGETariffs@pge.com
E-mail Disposition Notice to: KELM@pge.com

EXPLANATION OF UTILITY TYPE

ELC = Electric GAS = Gas WATER = Water
PLC = Pipeline HEAT = Heat

(Date Submitted / Received Stamp by CPUC)

Advice Letter (AL) #: 6186-E-B

Tier Designation: 2

Subject of AL: Second Supplemental: Submits Notice of Construction, Pursuant to General Order 131-D, for the Construction of Ignacio-Alto-Sausalito #1 and #2 60 kV Power Line, SCADA Switch Program in the City of Mill Valley, County of Marin

Keywords (choose from CPUC listing): Compliance, G.O. 131-D

AL Type: [ ] Monthly [ ] Quarterly [ ] Annual [x] One-Time [ ] Other:

If AL submitted in compliance with a Commission order, indicate relevant Decision/Resolution #:

Does AL replace a withdrawn or rejected AL? If so, identify the prior AL: No

Summarize differences between the AL and the prior withdrawn or rejected AL:

Confidential treatment requested? [ ] Yes [x] No

If yes, specification of confidential information:
Confidential information will be made available to appropriate parties who execute a nondisclosure agreement. Name and contact information to request nondisclosure agreement/ access to confidential information:

Resolution required? [x] Yes [ ] No

Requested effective date:

No. of tariff sheets: 0

Estimated system annual revenue effect (%): N/A

Estimated system average rate effect (%): N/A

When rates are affected by AL, include attachment in AL showing average rate effects on customer classes (residential, small commercial, large C/I, agricultural, lighting).

Tariff schedules affected: N/A

Service affected and changes proposed[1]: N/A

Pending advice letters that revise the same tariff sheets: N/A

[1]Discuss in AL if more space is needed.

Clear Form

Protests and correspondence regarding this AL are to be sent via email and are due no later than 20 days after the date of this submittal, unless otherwise authorized by the Commission, and shall be sent to:

California Public Utilities Commission
Energy Division Tariff Unit Email:
EDTariffUnit@cpuc.ca.gov

Contact Name: Sidney Bob Dietz II, c/o Megan Lawson
Title: Director, Regulatory Relations
Utility/Entity Name: Pacific Gas and Electric Company

Telephone (xxx) xxx-xxxx:
Facsimile (xxx) xxx-xxxx:
Email: PGETariffs@pge.com

Contact Name:
Title:
Utility/Entity Name:

Telephone (xxx) xxx-xxxx:
Facsimile (xxx) xxx-xxxx:
Email:

CPUC
Energy Division Tariff Unit
505 Van Ness Avenue
San Francisco, CA 94102

Clear Form

Attachment 1

Detailed Grading Plan

IGNACIO-ALTO-SAUSALITO
SW 67 AND 69
SCADA TOWER

MILL VALLEY, CALIFORNIA

APN: 030-211-48
SITE LAT./LONG.: 37°53'54"N; 122°31'14"W

TOPOGRAPHY SOURCE

BASE CONTOUR DATA PROVIDED BY PG&E AS A DXF FILE ON JUNE 11, 2021.

HORIZONTAL - NAD 83, CALIFORNIA, ZONE III, US FEET
VERTICAL - NAVD 88, US FEET

ASSESSORS PARCEL NUMBERS

APN: 030-211-48

EXISTING PROPERTY LINE INFORMATION WAS OBTAINED BY THE MARIN COUNTY GIS DATABASE. PROPERTY LINES SHOWN WITHIN THIS PLAN SET ARE SUBJECT TO VERIFICATION IN THE FIELD.

TOTAL AREA OF DISTURBANCE

SITE - 4.522 ACRES

GRADING QUANTITIES

EARTHWORK

GRADED AREA ____________ 0.59 [ACRES]
CUT QUANTITIES ___________ 1,635 [CYD]
FILL QUANTITIES___________ 1,290 [CYD]
NET_____________________ 345 [CYD] CUT

QUANTITIES PROVIDED ABOVE ARE FOR CITY PERMITTING PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THEIR OWN QUANTITIES FOR BID PURPOSES. THE ENGINEER OF RECORD DOES NOT CERTIFY TO THE QUANTITIES ABOVE. CALCULATED QUANTITIES ARE FROM EXISTING GRADE TO COMPLETED FINISHED GRADE.

PROJECT DESCRIPTION

THE FOLLOWING PROJECT IS PART OF THE PACIFIC GAS & ELECTRIC COMPANY'S (PG&E) PROPOSED UPGRADES TO EXISTING ELECTRICAL TRANSMISSION LINES. THIS PROJECT INCLUDES IMPROVEMENTS TO AN EXISTING ACCESS ROAD AND THE CONSTRUCTION OF TWO WORK PADS WITH CONNECTING ACCESS ROAD TO FACILITATE TOWER REPLACEMENT AND EQUIPMENT INSTALLATION.

VICINITY MAP
SCALE: 1" = 5000'

LOCATION MAP
SCALE: 1" = 500'

USA NORTH 811
Call 811 Before You Dig

PLAN REPRODUCTION WARNING

THE PLANS HAVE BEEN CREATED ON ANSI D (22"x34") SHEETS. FOR REDUCTIONS, REFER TO GRAPHIC SCALE.

THE PLANS HAVE BEEN CREATED FOR FULL COLOR PLOTTING. ANY SET OF THE PLANS THAT IS NOT PLOTTED IN FULL COLOR SHALL NOT BE CONSIDERED ADEQUATE FOR CONSTRUCTION PURPOSES.

WARNING: INFORMATION MAY BE LOST IN COPYING AND/OR GRAY SCALE PLOTTING.

PROJECT OWNER

PACIFIC GAS & ELECTRIC COMPANY
YASMIN HASSEN, P.E. 925-378-0352
6111 BOLLINGER CANYON RD
SAN RAMON, CA 94583

PG&E Pacific Gas and Electric Company®

SHEET INDEX

KLEINFELDER
Bright People. Right Solutions.

REGISTERED PROFESSIONAL ENGINEER
JASON ADAM BROWN
C 86395
EXP. 3/31/2023
CIVIL
STATE OF CALIFORNIA

REVISIONS

REV	DESCRIPTION	DSN / DWN	CHK / APP	DATE

SCALE VERIFICATION

THIS BAR IS 1 INCH IN LENGTH ON ORIGINAL DRAWING

0 1"

IF IT'S NOT 1 INCH ON THIS SHEET ADJUST YOUR SCALES ACCORDINGLY

ORIGINAL DRAWING SIZE IS 24 x 36

COVER

IGNACIO-ALTO-SAUSILITO
SCADA TOWER
SW 67 AND 69

Pacific Gas and Electric Company®
PACIFIC GAS & ELECTRIC COMPNAY
6121 BOLLINGER CANYON ROAD
SAN RAMON, CA 94583

100% SUBMISSION

PROJECT NO.	20220871.001A
ISSUE DATE	12/15/2021
CURRENT REVISION	A
DESIGNED BY	M. TREMBLAY
DRAWN BY	M. TREMBLAY
CHECKED BY	A.BISACKY
APPROVED BY	J.BROWN

SHEET 1

CAD FILE: C:\pwworking\kleinfelderpw01\kleinfelder_mtremblay\d0207934\01_190539_Cover_15-70.dwg LAYOUT: 24x36Horiz PLOTTED: 12/15/2021 3:33 PM BY: matt tremblay

GENERAL NOTES

1. TOPOGRAPHIC SURVEY INFORMATION AS A DXF FILE WAS PROVIDED PG&E ON JUNE 11, 2021.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SURVEY MONUMENTS AND/OR VERTICAL CONTROL BENCHMARKS WHICH ARE DISTURBED OR DESTROYED BY CONSTRUCTION. A LAND SURVEYOR MUST FIELD LOCATE, REFERENCE, AND/OR PRESERVE ALL HISTORICAL OR CONTROLLING MONUMENTS PRIOR TO ANY EARTH DISTURBANCE. IF DESTROYED, A LAND SURVEYOR SHALL REPLACE SUCH MONUMENTS WITH APPROPRIATE MONUMENTS. A CORNER RECORD OR RECORD OF SURVEY, AS APPROPRIATE, SHALL BE FILED AS REQUIRED BY THE PROFESSIONAL LAND SURVEYORS ACT, SECTION 8771 OF THE BUSINESS AND PROFESSIONS CODE OF THE STATE OF CALIFORNIA. IF ANY VERTICAL CONTROL IS TO BE DISTURBED OR DESTROYED, MARIN COUNTY FIELD SURVEY SECTION MUST BE NOTIFIED, IN WRITING, AT LEAST 3 DAYS PRIOR TO THE CONSTRUCTION. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE COST OF REPLACING ANY VERTICAL CONTROL BENCHMARKS DESTROYED BY THE CONSTRUCTION.
3. IMPORTANT NOTICE: SECTION 4216 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A "PERMIT TO EXCAVATE" WILL BE VALID. FOR YOUR DIG ALERT I.D. NUMBER, CALL UNDERGROUND SERVICE ALERT AT 811 OR TOLL FREE 1-800-422-4133, TWO DAYS BEFORE YOU DIG.
4. PRIOR TO ANY DISTURBANCE TO THE SITE, EXCLUDING UTILITY MARK-OUTS AND SURVEYING, THE CONTRACTOR MUST MAKE ARRANGEMENTS FOR A PRE-CONSTRUCTION MEETING WITH THE OWNER'S PROJECT REPRESENTATIVE.
5. DEVIATIONS FROM THESE SIGNED PLANS WILL NOT BE ALLOWED UNLESS A CONSTRUCTION CHANGE IS APPROVED BY THE ENGINEER OF RECORD OR THE CHANGE IS REQUIRED BY A COUNTY INSPECTOR.
6. CONTRACTOR IS RESPONSIBLE FOR LOCATING AND PROTECTING ALL UNDERGROUND UTILITIES WITHIN THE CONSTRUCTION AREA.
7. CONTRACTOR IS RESPONSIBLE FOR ALL LOSSES AND REPAIRS OCCASIONED BY DAMAGE TO UNDERGROUND FACILITIES/UTILITIES RESULTING FROM THEIR WORK.
8. CONTRACTOR MUST BE RESPONSIBLE FOR INGRESS/EGRESS TRAFFIC CONTROL WHICH SHALL BE MAINTAINED AS TO AVOID A NEGATIVE IMPACT TO THE SURROUNDING RESIDENTIAL AREA.

RESTORATION NOTES

1. FURNISH AND INSTALL SMALL-ROCK PROTECTION ON SLOPES 3:1 OR GREATER THAT MEETS THE GRADATION REQUIREMENTS OF CALTRANS STANDARD SPECIFICATION 72-4 ROCK GRADING FOR 7-INCH THICK LAYER.
2. ALL SLOPES LESS THAN 3:1 WILL BE COATED WITH A HEAVY DUTY, SEEDED HYDROMULCH THAT WILL PROVIDE A CRUST ON THE EXISTING SOIL FOR UP TO ONE YEAR AFTER RESTORATION.
3. THE SEED MIX FOR THE HYDROMULCH MUST BE CERTIFIED WEED FREE.
4. THE SEED MIX IS EXPECTED TO CONTAIN NATIVE, PERENNIAL GRASSES, NATIVE ANNUAL GRASSES, NON-NATIVE, NON-INVASIVE ANNUAL GRASSES, AND LEGUMES. NATIVE WILDFLOWERS MAY BE INCLUDED. A STERILE WHEATGRASS, SUCH AS REGREEN STERILE WHEATGRASS (ELYMUS X TRITICUMI) MAY BE APPLIED ON STEEPER SLOPES THAT REQUIRE QUICKER COVER AND STABILIZATION.
5. SEED MIXES MUST BE SUBMITTED TO PG&E'S PROJECT MANAGER AND BIOLOGIST FOR REVIEW AND JURISDICTIONAL AGENCY APPROVAL PRIOR TO PURCHASE AND APPLICATION.
6. ALL SMALL-ROCK SLOPE PROTECTION MATERIAL MUST REMAIN AFTER COMPLETION OF WORK. RE-SEED ALL DISTURBED AREAS THAT ARE NOT COVERED WITH ROCK SLOPE PROTECTION. ALL EARTHWORK/GRADING IS TO REMAIN IN PLACE.

GEOTECHNICAL NOTES

1. THE CONTRACTOR MUST STRIP THE TOP 2 TO 3 INCHES OF TOP SOIL AND ROOTS. ORGANIC MATERIAL AND ROCKS GREATER THAN 6-INCHES IN ANY DIMENSION MUST NOT BE USED IN ENGINEERED FILL.
2. MAXIMUM PERMISSIBLE CUT SLOPES WITHIN BEDROCK, MUST NOT EXCEED A SLOPE OF 1.5H:1V OR AS SHOWN ON PLANS AND DETAILS. THE SOIL NEAR THE TOP OF THE PROPOSE CUT SLOPES SHOULD BE ROUNDED TO NO STEEPER THAN 3H:1V. MAXIMUM PERMISSIBLE REINFORCED FILL SLOPES, MUST NOT EXCEED A SLOPE OF 1.5H:1V OR AS SHOWN ON PLANS AND DETAILS.
3. FILL PLACEMENT MUST BE DONE IN 8-INCH MAXIMUM LOOSE LIFTS AND COMPACTED TO AT LEAST 95% MAXIMUM DENSITY AT MOISTURE CONTENT AT OR ABOVE 2% OF OPTIMUM PER ASTM D 1557.
4. CONTRACTOR MUST BE RESPONSIBLE FOR OBTAINING COMPACTION CURVES ON NATIVE SUBGRADE AND ANY IMPORT MATERIALS.
5. ALL AREAS TO BE GRADED MUST SCARIFIED TO A DEPTH OF AT LEAST 8-INCHES, UNIFORMLY MOISTURE CONDITIONED TO 2% ABOVE THE OPTIMUM MOISTURE CONTENT, THEN RECOMPACTED TO 95% RELATIVE COMPACTION PER ASTM D 1557. THE SUBGRADE MUST NOT BE ALLOWED TO DRY OUT PRIOR TO PLACEMENT OF NEW ENGINEERED FILL OR GEOFABRIC AND ROCK. ADDITIONALLY ALL COLLUVIUM SHOULD BE REMOVED IN ITS ENTIRE DEPTH AT LEAST 1-FOOT INTO FIRM SOIL OR BEDROCK PRIOR TO FILL AND GEOGRID PLACEMENT. KLEINFELDER MUST OBSERVE ALL COLLUVIUM EXCAVATIONS PRIOR TO PLACEMENT OF ENGINEERED FILL.
6. THE GEOTECHNICAL ENGINEER MUST PROVIDE CONSTRUCTION OBSERVATION AND TESTING DURING ALL EARTHWORK AND CONSTRUCTION ACTIVITIES. THIS WILL ALLOW THE GEOTECHNICAL ENGINEER TO EVALUATE ACTUAL CONDITIONS ENCOUNTERED DURING CONSTRUCTION AND TO EXPEDITE ANY SUPPLEMENTAL RECOMMENDATIONS IF WARRANTED BY THE EXPOSED CONDITIONS. ALL EARTHWORK MUST BE PERFORMED AS SHOWN AND/OR NOTED ON THESE PLANS OR AS SUPPLEMENTED BY THE GEOTECHINICAL ENGINEER DURING CONSTRUCTION.
7. IMPORT ENGINEERED FILL MUST MEET THE FOLLOWING REQUIREMENTS.

FILL REQUIREMENT		TEST PROCEDURES	
Gradation		ASTM	Caltrans
Sieve Size	Percent Passing		
3 inch	100	D6913	202
3/4 inch	70-100	D6913	202
No. 200	10-30	D6913	202
Plasticity			
Liquid Limit	Plasticity Limit		
<30	<12	D4318	204

8. ON-SITE SOIL AND/OR BEDROCK EXCAVATED FOR REUSE AS ACCESS ROAD AND CRANE PAD ENGINEERED FILL SHALL BE SAMPLED AND TESTED BY KLEINFELDER PRIOR TO APPROVAL. THE REMOLDED SHEAR STRENGTH OF THE FILL MUST HAVE A MINIMUM INTERNAL ANGLE OF FRICTION OF 33 DEGREES.

EROSION & SEDIMENT CONTROL NOTES

1. PRIOR TO THE START OF CLEARING, GRUBBING, OR EARTHMOVING ACTIVITIES, THE CONTRACTOR MUST INSTALL ALL PERIMETER CONTROLS AND THE CONSTRUCTION ENTRANCE PER THE PLANS.
2. THE CONTRACTOR MUST PROVIDE APPROPRIATE MEANS TO DIRECT NATURAL DRAINAGE AROUND WORK AREAS, AND TO PREVENT OFF-SITE RUN-ON THROUGH THE CONSTRUCTION AREA.
3. THE CONTRACTOR MUST STORE ADEQUATE SEDIMENT CONTROL MATERIALS ONSITE TO CONTROL DISCHARGES AT THE DOWNGRADE PERIMETER AND OPERATIONAL INLETS IN THE EVENT OF A PREDICTED STORM.
4. EQUIPMENT AND WORKERS MUST BE AVAILABLE FOR EMERGENCY WORK AT ALL TIMES. ALL NECESSARY MATERIALS SHALL BE STOCKPILED ONSITE AT CONVENIENT LOCATIONS TO FACILITATE THE RAPID INSTALLATION/CONSTRUCTION OF TEMPORARY EROSION CONTROL MEASURES WHEN RAIN IS IMMINENT.
5. CLEARING AND GRUBBING MUST BE DONE ONLY IN AREAS WHERE EARTHWORK WILL BE PERFORMED AND ONLY IN AREAS WHERE CONSTRUCTION IS PLANNED TO COMMENCE WITHIN 14 DAYS AFTER THE CLEARING AND GRUBBING.
6. DISTURBED AREAS OF THE SITE WHERE CONSTRUCTION ACTIVITY HAS CEASED FOR MORE THAN 14 DAYS MUST BE TEMPORARILY STABILIZED.
7. CONTRACTOR SHALL INSTALL ADDITIONAL EROSION CONTROL MEASURES AS NEEDED OR AS REQUESTED BY A CITY OFFICIAL, THE OWNER'S ENGINEER, AND/OR REGULATORY AGENCY.
8. THE CONTRACTOR SHALL RESTORE ALL EROSION CONTROL DEVICES TO WORKING ORDER TO THE SATISFACTION OF THE CITY ENGINEER AFTER EACH RUN-OFF PRODUCING RAINFALL.
9. THE CONTRACTOR SHALL INSTALL ADDITIONAL EROSION CONTROL MEASURES AS MAY BE REQUIRED BY THE CITY ENGINEER DUE TO UNCOMPLETED GRADING OPERATIONS OR UNFORESEEN CIRCUMSTANCES WHICH MAY ARISE.
10. ALL EROSION CONTROL MEASURES PROVIDED PER THE APPROVED SWPPP AND/OR EROSION CONTROL PLAN SHALL BE INCORPORATED HEREON.
11. GRADED AREAS AROUND THE PROJECT PERIMETER MUST DRAIN AWAY FROM THE FACE OF SLOPE AT THE CONCLUSION OF EACH WORKING DAY.
12. ALL REMOVABLE PROTECTIVE DEVICES SHOWN SHALL BE IN PLACE AT THE END OF EACH WORKING DAY WHEN THE FIVE (5) DAY RAIN PROBABILITY EXCEEDS FORTY PERCENT (40%). SILT AND OTHER DEBRIS SHALL BE REMOVED AFTER EACH RAINFALL.

CONTRACTOR SUBMITTALS

1. THE CONTRACTOR MUST PREPARE AND PROVIDE SUBMITTALS FOR THE FOLLOWING ITEMS TO CONFIRM CONFORMANCE WITH THESE PLANS. SUBMITTALS MUST BE PREPARED PRIOR TO THE PURCHASE OF MATERIALS. PROVIDE 2 COPIES OF EACH SUBMITTAL TO PG&E'S PROJECT MANAGER AND 2 COPIES OF EACH SUBMITTAL TO THE ENGINEER OF RECORD FOR REVIEW.
2. THE CONTRACTOR IS RESPONSIBLE FOR NOTING ANY AND ALL DEVIATIONS FROM THE MATERIALS SPECIFIED ON THESE PLANS. FAILURE TO DO SO, REGARDLESS OF ACCEPTANCE OF THE SUBMITTAL BY PG&E OR THE ENGINEER OF RECORD, DOES NOT RELIEVE THE CONTRACTOR FROM COMPLYING WITH THESE PLANS. PG&E AND THE ENGINEER OF RECORD WILL NOT BE RESPONSIBLE FOR ANY DELAY IN SCHEDULE, COST OF RETURNING, RESTOCKING OR REPURCHASING OTHER MATERIALS THAT CONFORM TO THE REQUIREMENTS OF THESE PLANS.
3. REQUIRED SUBMITTALS (PRE-CONSTRUCTION)
   - -GEOFABRIC
   - -CRANE SETUP AND LOADING PLAN
   - -CALTRANS ROCK SLOPE PROTECTION
   - -EROSION CONTROL BLANKET AND STAKES
   - -SITE RESTORATION SEED MIX
   - -FIBER ROLL AND EROSION CONTROL MATS
   - -SILT FENCE
4. REQUIRED SUBMITTALS (DURING CONSTRUCTION)
   - -COMPACTION CURVES FOR SUBGRADE AND IMPORT MATERIAL

WORK TO BE DONE

THE IMPROVEMENTS CONSIST OF THE FOLLOWING WORK TO BE DONE ACCORDING TO THESE PLANS AND THE SPECIFICATIONS LISTED BELOW:

STANDARD SPECIFICATIONS:

DESCRIPTION

1. CALIFORNIA DEPARTMENT OF TRANSPORTATION U.S. CUSTOMARY STANDARD SPECIFICATIONS, LATEST EDITION

LEGEND

- EXISTING TRANSMISSION LINE
- EXISTING TRANSMISSION TOWER
- PROPOSED PAD AND SITE ACCESS DRIVE EDGE
- PROPOSED ROCK SLOPE PROTECTION
- PROPOSED ROAD CENTERLINE
- 360 EXISTING MAJOR 10 FT CONTOUR
- EXISTING MINOR 2 FT CONTOUR
- 360 PROPOSED MAJOR 10 FT CONTOUR
- PROPOSED MINOR 2 FT CONTOUR
- LOD PROPOSED LIMIT OF DISTURBANCE
- PROPOSED LIMIT OF GRADING
- PROPOSED CONSTRUCTION ENTRANCE
- TEST PIT LOCATION (30-IN WIDE X 12-FT LONG X 5-FT DEEP)
- PROPOSED TRENCH DRAIN
- PROPOSED FIBER ROLL
- APPROXIMATE LIMIT OF EXISTING SLIDE

KLEINFELDER
Bright People. Right Solutions.

REGISTERED PROFESSIONAL ENGINEER
JASON ADAM BROWN
C 86395
EXP. 3/31/2023
CIVIL
STATE OF CALIFORNIA

REVISIONS

REV	DESCRIPTION	DSN / DWN	CHK / APP	DATE

SCALE VERIFICATION

THIS BAR IS 1 INCH IN LENGTH ON ORIGINAL DRAWING

0 1"

IF IT'S NOT 1 INCH ON THIS SHEET ADJUST YOUR SCALES ACCORDINGLY

ORIGINAL DRAWING SIZE IS 24 x 36

NOTES AND LEGEND

IGNACIO-ALTO-SAUSILITO
SCADA TOWER
SW 67 AND 69

Pacific Gas and Electric Company®

PACIFIC GAS & ELECTRIC COMPNAY
6121 BOLLINGER CANYON ROAD
SAN RAMON, CA 94583

100% SUBMISSION

PROJECT NO.	20220871.001A
ISSUE DATE	12/15/2021
CURRENT REVISION	A
DESIGNED BY	M. TREMBLAY
DRAWN BY	M. TREMBLAY
CHECKED BY	A.BISACKY
APPROVED BY	J.BROWN

2

SHEET 2 of 9

CAD FILE: C:\pwworking\kleinfelderpw01\kleinfelder_mtremblay\d0207934\02_190539_Notes_Legend.dwg LAYOUT: 2 NOTES AND LEGEND PLOTTED: 12/15/2021 3:34 PM BY: matt tremblay

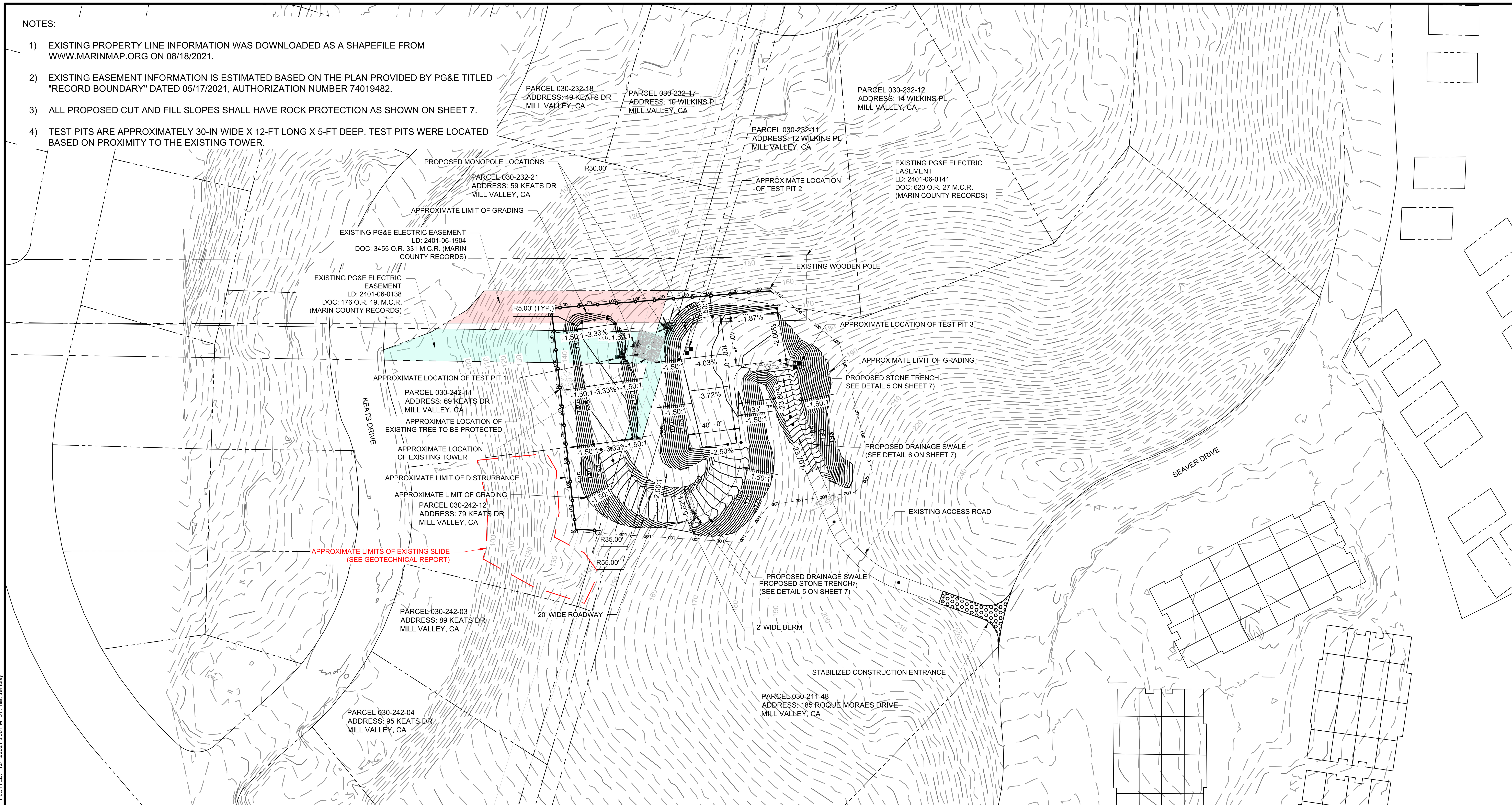
NOTES:

1) EXISTING PROPERTY LINE INFORMATION WAS DOWNLOADED AS A SHAPEFILE FROM WWW.MARINMAP.ORG ON 08/18/2021.

2) EXISTING EASEMENT INFORMATION IS ESTIMATED BASED ON THE PLAN PROVIDED BY PG&E TITLED "RECORD BOUNDARY" DATED 05/17/2021, AUTHORIZATION NUMBER 74019482.

3) ALL PROPOSED CUT AND FILL SLOPES SHALL HAVE ROCK PROTECTION AS SHOWN ON SHEET 7.

4) TEST PITS ARE APPROXIMATELY 30-IN WIDE X 12-FT LONG X 5-FT DEEP. TEST PITS WERE LOCATED BASED ON PROXIMITY TO THE EXISTING TOWER.



KLEINFELDER
Bright People. Right Solutions.

REGISTERED PROFESSIONAL ENGINEER
JASON ADAM BROWN
C 86395
EXP. 3/31/2023
CIVIL
STATE OF CALIFORNIA

REVISIONS

REV	DESCRIPTION	DSN / DWN	CHK / APP	DATE

SCALE VERIFICATION

THIS BAR IS 1 INCH IN LENGTH ON ORIGINAL DRAWING

0 1"

IF IT'S NOT 1 INCH ON THIS SHEET ADJUST YOUR SCALES ACCORDINGLY

0 40 80

SCALE: 1" = 40' SCALE IN FEET

ORIGINAL DRAWING SIZE IS 24 x 36

SITE PLAN

IGNACIO-ALTO-SAUSILITO
SCADA TOWER
SW 67 AND 69

Pacific Gas and Electric Company®

PACIFIC GAS & ELECTRIC COMPNAY
6121 BOLLINGER CANYON ROAD
SAN RAMON, CA 94583

100% SUBMISSION

PROJECT NO.	20220871.001A
ISSUE DATE	12/15/2021
CURRENT REVISION	A
DESIGNED BY	M. TREMBLAY
DRAWN BY	M. TREMBLAY
CHECKED BY	A.BISACKY
APPROVED BY	J.BROWN

SHEET 3 of 9

3

CAD FILE: C:\pwworking\kleinfelder_mtremblay\d0207934\04_20220871_Proposed Conditions_Plan.dwg LAYOUT: Layout Plan PLOTTED: 12/15/2021 3:38 PM BY: matt tremblay

NOTES:

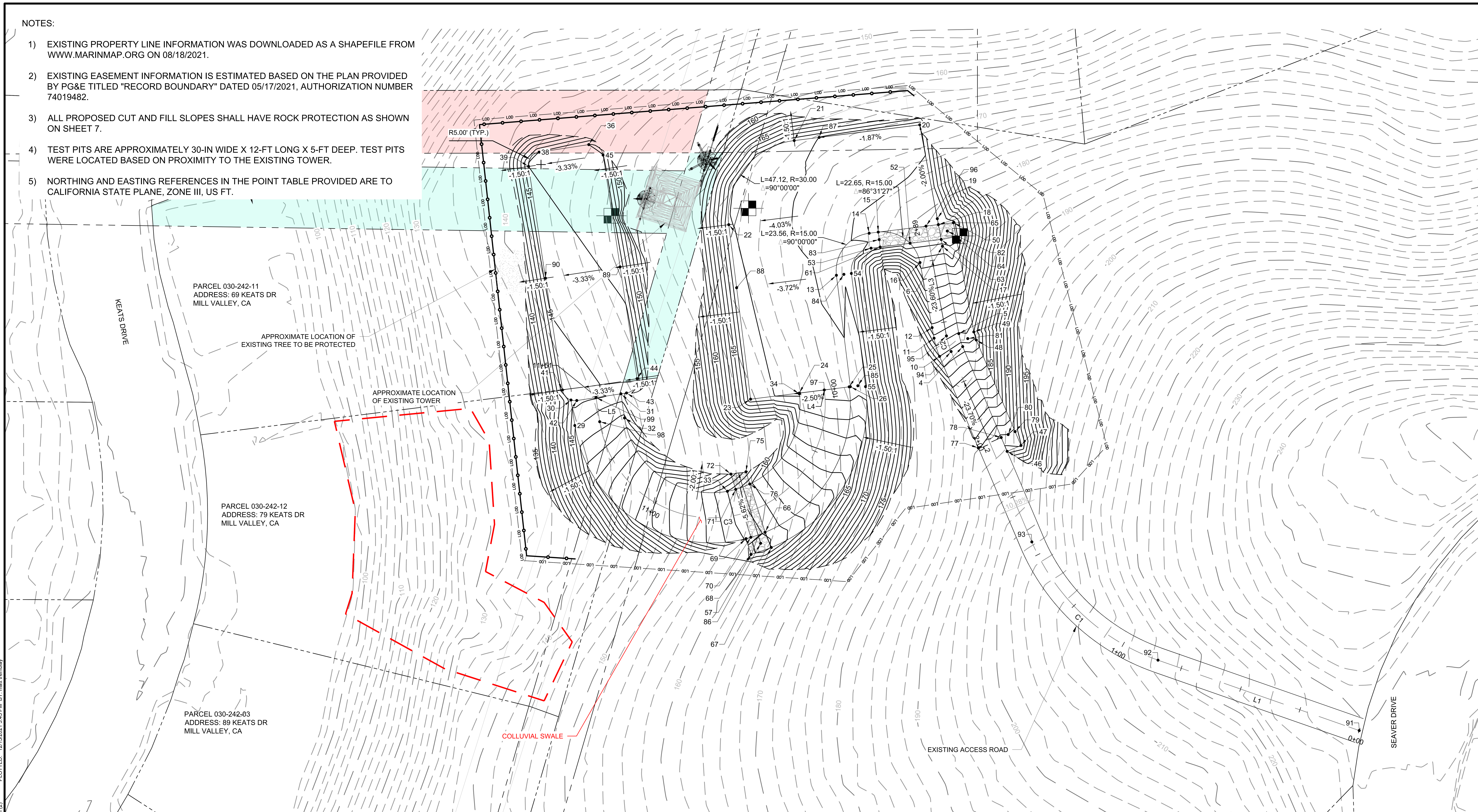
1) EXISTING PROPERTY LINE INFORMATION WAS DOWNLOADED AS A SHAPEFILE FROM WWW.MARINMAP.ORG ON 08/18/2021.

2) EXISTING EASEMENT INFORMATION IS ESTIMATED BASED ON THE PLAN PROVIDED BY PG&E TITLED "RECORD BOUNDARY" DATED 05/17/2021, AUTHORIZATION NUMBER 74019482.

3) ALL PROPOSED CUT AND FILL SLOPES SHALL HAVE ROCK PROTECTION AS SHOWN ON SHEET 7.

4) TEST PITS ARE APPROXIMATELY 30-IN WIDE X 12-FT LONG X 5-FT DEEP. TEST PITS WERE LOCATED BASED ON PROXIMITY TO THE EXISTING TOWER.

5) NORTHING AND EASTING REFERENCES IN THE POINT TABLE PROVIDED ARE TO CALIFORNIA STATE PLANE, ZONE III, US FT.



ACCESS TO UPPER WORK PAD CONSTRUCTION BASELINE DATA								
NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
L1	0+00.00	2155724.150	5978881.416		N70°42'23"W 84.79'	0+84.79	2155752.165	5978801.391
C1	0+84.79	2155752.165	5978801.391	R=85.00' Δ=47°44'56" L=70.84' T=37.62'		1+55.62	2155799.237	5978751.208
L2	1+55.62	2155799.237	5978751.208		N22°57'27"W 82.30'	2+37.92	2155875.015	5978719.108
C2	2+37.92	2155875.015	5978719.108	R=30.00' Δ=12°24'56" L=6.50' T=3.26'		2+44.42	2155881.228	5978717.238
L3	2+44.42	2155881.228	5978717.238		N10°32'32"W 44.45'	2+88.87	2155924.925	5978709.106

ACCESS TO LOWER WORK PAD CONSTRUCTION BASELINE DATA								
NUMBER	STARTING STATION	NORTHING	EASTING	CURVE DATA	LINE DATA	ENDING STATION	NORTHING	EASTING
L4	10+00.00	2155859.715	5978668.654		S7°07'30"E 0.28'	10+00.28	2155859.435	5978668.689
C3	10+00.28	2155859.435	5978668.689	R=45.11' Δ=178°14'58" L=140.34' T=2952.58'		11+40.63	2155847.079	5978579.327
L5	11+40.63	2155847.079	5978579.327		N8°37'24"W 10.24'	11+50.87	2155857.207	5978577.791

Point Table

Point #	Northing	Easting	Elevation	Raw Description
4	2155876.9657	5978723.7119	181.451	Edge of Existing Access Road
5	2155882.1430	5978722.1537	180.095	Edge of Existing Access Road
6	2155916.9086	5978715.6839	171.253	Edge of Existing Access Road
10	2155873.0652	5978714.5040	180.993	Edge of Existing Access Road
11	2155880.3134	5978712.3225	179.331	Edge of Existing Access Road
12	2155884.5300	5978711.5378	178.372	Edge of Existing Access Road
13	2155905.3554	5978673.4836	169.312	Edge of Upper Pad
14	2155922.1000	5978686.5073	170.341	Edge of Upper Pad
15	2155922.5522	5978690.1242	170.500	Edge of Upper Pad
16	2155910.4275	5978706.7287	172.478	Edge of Upper Pad
17	2155916.9346	5978715.6579	171.248	Edge of Upper Pad
18	2155925.5426	5978714.0479	170.561	Edge of Upper Pad
19	2155927.9014	5978713.6067	170.513	Edge of Upper Pad
20	2155965.2395	5978706.6231	169.753	Edge of Upper Pad
21	2155958.9992	5978656.7003	168.750	Edge of Upper Pad
22	2155925.5098	5978630.6530	167.926	Edge of Upper Pad
23	2155856.0503	5978639.3355	167.754	Edge of Upper Pad
24	2155858.4748	5978658.7313	168.243	Edge of Upper Pad
25	2155860.9555	5978678.5769	168.743	Edge of Upper Pad
26	2155861.0117	5978679.0266	168.754	Edge of Upper Pad

Point Table

Point #	Northing	Easting	Elevation	Raw Description
29	2155845.5694	5978569.4417	145.865	Edge of Road Between Pads
30	2155855.7079	5978567.9042	144.640	Edge of Road Between Pads
31	2155858.1729	5978587.7590	145.152	Edge of Road Between Pads
32	2155848.5681	5978589.2156	147.249	Edge of Road Between Pads
33	2155819.3728	5978630.1037	157.985	Edge of Road Between Pads
34	2155858.1844	5978658.7676	168.187	Edge of Road Between Pads
36	2155957.3813	5978574.9996	147.000	Edge of Lower Pad
38	2155954.3826	5978555.2257	146.000	Edge of Lower Pad
39	2155948.6894	5978551.0319	146.000	Edge of Lower Pad
41	2155859.7068	5978564.5262	144.500	Edge of Lower Pad
42	2155855.5130	5978570.2194	144.699	Edge of Lower Pad
43	2155858.5118	5978589.9933	145.500	Edge of Lower Pad
44	2155864.2049	5978594.1871	145.500	Edge of Lower Pad
45	2155953.1875	5978580.6927	147.000	Edge of Lower Pad
46	2155835.2739	5978741.3720	192.505	Edge of Upper Swale
47	2155837.6136	5978746.8970	191.888	Edge of Upper Swale
48	2155879.6081	5978729.1088	181.213	Edge of Upper Swale
49	2155882.8025	5978728.1458	181.034	Edge of Upper Swale
50	2155926.2882	5978720.0124	170.561	Edge of Upper Swale
52	2155918.0869	5978702.7758	170.530	Edge of Lower Swale

Point Table

Point #	Northing	Easting	Elevation	Raw Description
53	2155916.1464	5978687.2515	170.257	Edge of Lower Swale
54	2155906.0996	5978679.4373	169.312	Edge of Lower Swale
55	2155861.0523	5978685.0682	168.666	Edge of Lower Swale
57	2155794.2434	5978639.5055	159.000	Edge of Lower Swale
61	2155916.5985	5978690.8684	170.500	Edge of Upper Stone Trench
63	2155919.6341	5978715.1530	170.561	Edge of Upper Stone Trench
64	2155920.6993	5978721.0578	170.561	Edge of Upper Stone Trench
65	2155926.2882	5978720.0124	170.561	Edge of Upper Stone Trench
66	2155803.0674	5978645.1096	159.169	Edge of Lower Stone Trench
67	2155797.0061	5978647.5826	159.094	Edge of Lower Stone Trench
68	2155794.2434	5978639.5055	159.000	Edge of Lower Stone Trench
69	2155800.5222	5978637.5240	158.106	Edge of Lower Stone Trench
70	2155801.0637	5978639.4503	158.373	Edge of Lower Stone Trench
71	2155820.1462	5978633.4279	158.630	Edge of Lower Stone Trench
72	2155826.2290	5978631.5083	155.393	Edge of Lower Stone Trench
75	2155827.1485	5978637.5098	157.403	Edge of Lower Stone Trench
76	2155822.2773	5978639.0471	159.793	Edge of Lower Stone Trench
77	2155836.6452	5978729.9316	189.807	Edge of Existing Access Road
78	2155840.7986	5978739.0324	191.271	Edge of Existing Access Road
79	2155843.1386	5978744.5573	191.271	Edge of Upper Swale

Point Table

Point #	Northing	Easting	Elevation	Raw Description
80	2155841.9687	5978741.7948	191.021	Upper Swale CL
81	2155880.1595	5978725.7197	180.539	Upper Swale CL
82	2155922.9611	5978717.5827	170.311	Upper Swale CL
83	2155919.5753	5978690.4963	170.250	Lower Swale CL
84	2155905.7275	5978676.4604	169.062	Lower Swale CL
85	2155861.3838	5978682.0034	168.504	Lower Swale CL
86	2155798.6726	5978643.3508	157.985	Lower Swale CL
87	2155960.2395	5978666.6231	169.000	Edge of Upper Pad
88	2155900.3975	5978633.7921	167.864	Edge of Upper Pad
89	2155908.6962	5978587.4399	146.250	Edge of Lower Pad
90	2155904.1981	5978557.7791	145.250	Edge of Lower Pad
91	2155724.1503	5978881.4160	229.595	Roadway Centerline
92	2155752.1646	5978801.3908	216.455	Roadway Centerline
93	2155799.2366	5978751.2081	201.629	Roadway Centerline
94	2155875.0155	5978719.1080	181.227	Roadway Centerline
95	2155881.2282	5978717.2381	179.687	Roadway Centerline
96	2155924.9249	5978709.1062	170.548	Roadway Centerline
97	2155859.7152	5978668.6541	168.493	Roadway Centerline
98	2155847.0789	5978579.3271	146.555	Roadway Centerline
99	2155856.6735	5978577.8721	144.897	Roadway Centerline

KLEINFELDER
Bright People. Right Solutions.

REGISTERED PROFESSIONAL ENGINEER JASON ADAM BROWN C 86395 EXP. 3/31/2023 CIVIL STATE OF CALIFORNIA

REVISIONS				
REV	DESCRIPTION	DSN / DWN	CHK / APP	DATE

SCALE VERIFICATION

THIS BAR IS 1 INCH IN LENGTH ON ORIGINAL DRAWING

0 1"

IF IT'S NOT 1 INCH ON THIS SHEET ADJUST YOUR SCALES ACCORDINGLY

0 20 40

SCALE: 1" = 20' SCALE IN FEET

ORIGINAL DRAWING SIZE IS 24 x 36

LAYOUT PLAN

IGNACIO-ALTO-SAUSILITO
SCADA TOWER
SW 67 AND 69

Pacific Gas and Electric Company®

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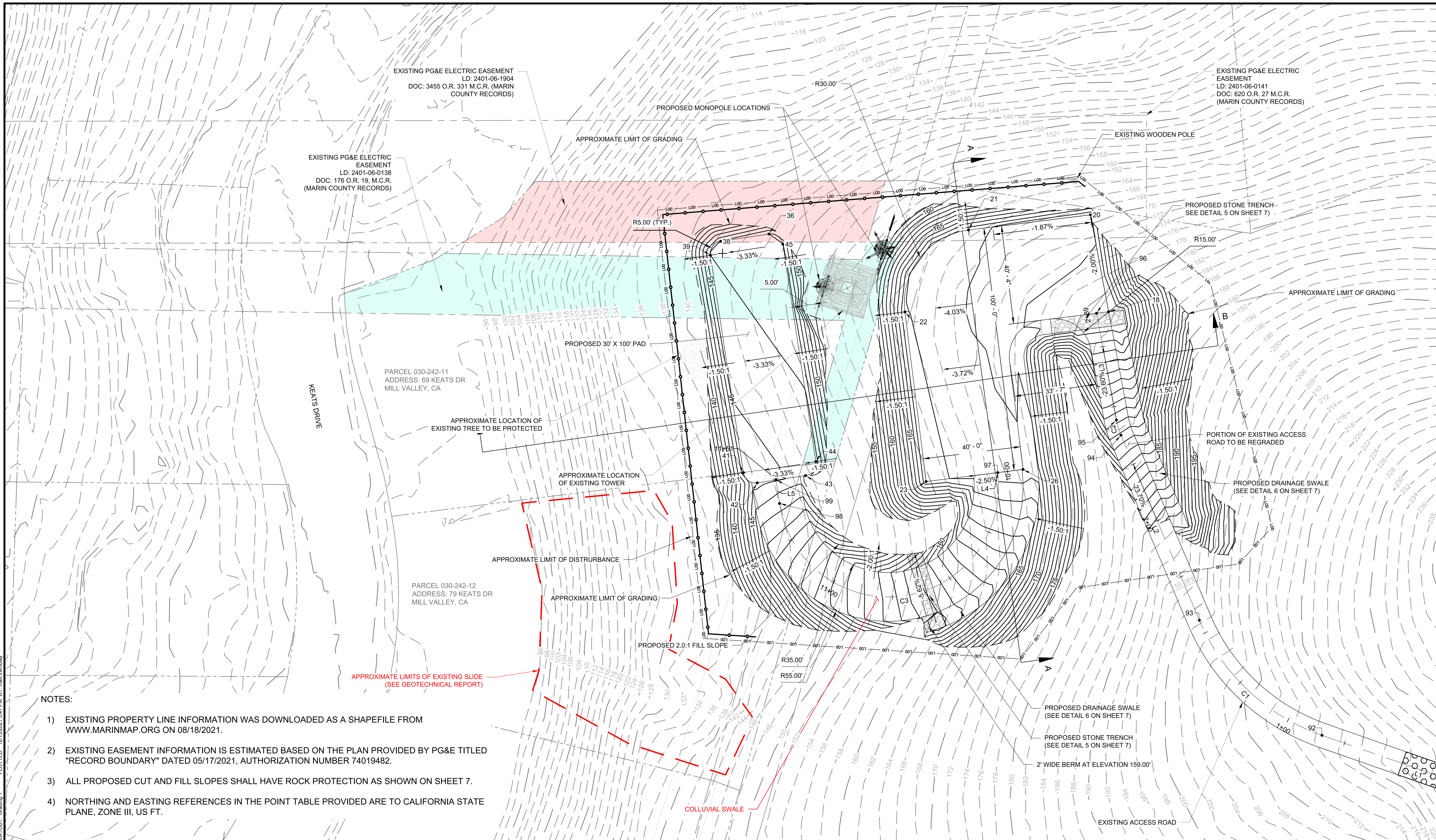
DRAWN BY	M. TREMBLAY
CHECKED BY	A.BISACKY
APPROVED BY	J.BROWN

4

SHEET 4 of 9

CAD FILE: C:\pwworking\kleinfelderpw01\kleinfelder_mtremblay\d0207934\04_20220871_Proposed Conditions_Plan.dwg LAYOUT: Layout Plan (2) PLOTTED: 12/15/2021 3:43 PM BY: matt tremblay



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Point Table

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20	2155965.2395	5978706.6231	169.753	Edge of Upper Pad
21	2155958.9992	5978656.7003	168.750	Edge of Upper Pad
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42	2155855.5130	5978570.2194	144.699	Edge of Lower Pad

Point Table

Point #	Northing	Easting	Elevation	Raw Description
43	2155858.5118	5978589.9933	145.500	Edge of Lower Pad
44	2155864.2049	5978594.1871	145.500	Edge of Lower Pad
45	2155953.1875	5978580.6927	147.000	Edge of Lower Pad
92	2155752.1646	5978801.3908	216.455	Roadway Centerline
93	2155799.2366	5978751.2081	201.629	Roadway Centerline
94	2155875.0155	5978719.1080	181.227	Roadway Centerline
95	2155881.2282	5978717.2381	179.687	Roadway Centerline
96	2155924.9249	5978709.1062	170.548	Roadway Centerline
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98	2155847.0789	5978579.3271	146.555	Roadway Centerline
99	2155856.6735	5978577.8721	144.897	Roadway Centerline

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JASON ADAM BROWN
C 86395
EXP. 3/31/2023
CIVIL
STATE OF CALIFORNIA

REVISIONS

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GRADING PLAN

IGNACIO-ALTO-SAUSILITO
SCADA TOWER
SW 67 AND 69

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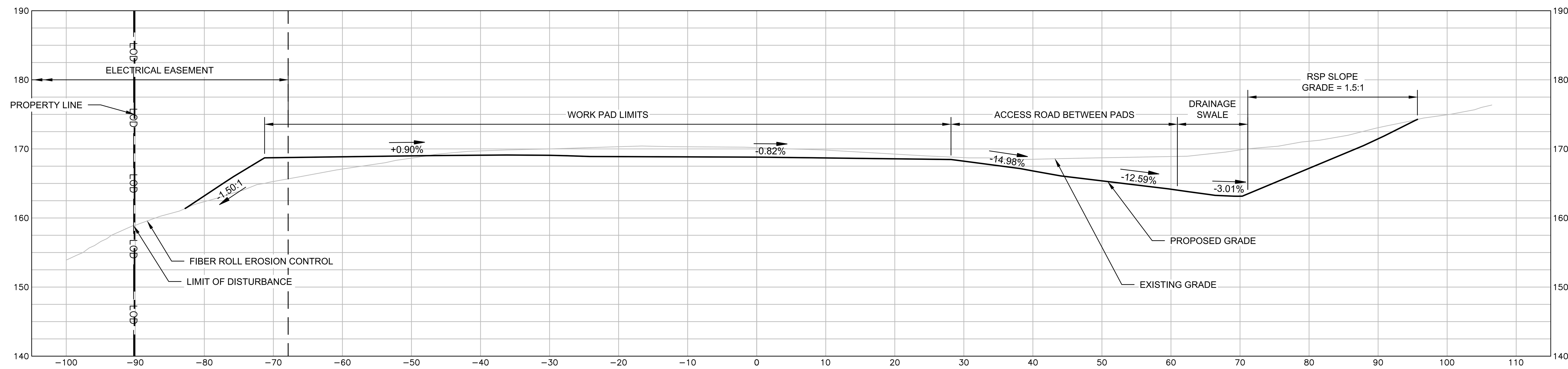
5

SHEET 5 of 9

CAD FILE: C:\pwworking\kleinfelder\pw01\kleinfelder_mtremblay\d0207934\04_20220871_Proposed Conditions_Plan.dwg LAYOUT: Grading 1 PLOTTED: 12/15/2021 3:47 PM BY: matt tremblay

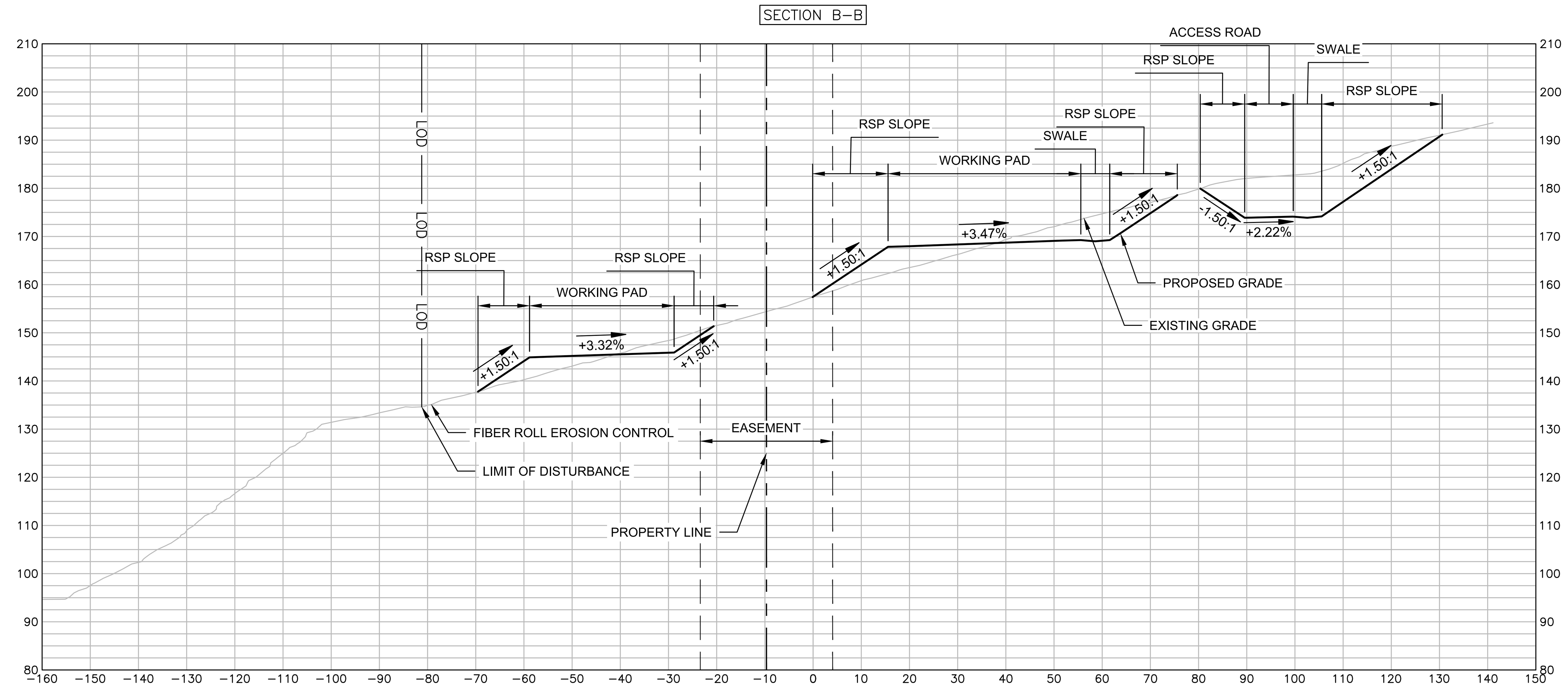
SECTION A–A



HORIZONTAL SCALE: 1" = 10'

VERTICAL SCALE: 1" = 10'

SECTION B–B



HORIZONTAL SCALE: 1" = 20'

VERTICAL SCALE: 1" = 20'

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C 86395
EXP. 3/31/2023
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SECTION VIEWS

IGNACIO-ALTO-SAUSILITO
SCADA TOWER
SW 67 AND 69

PG&E Pacific Gas and Electric Company®

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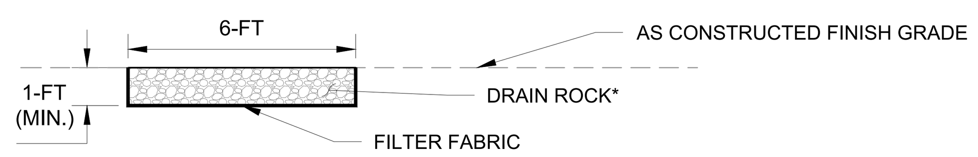
6

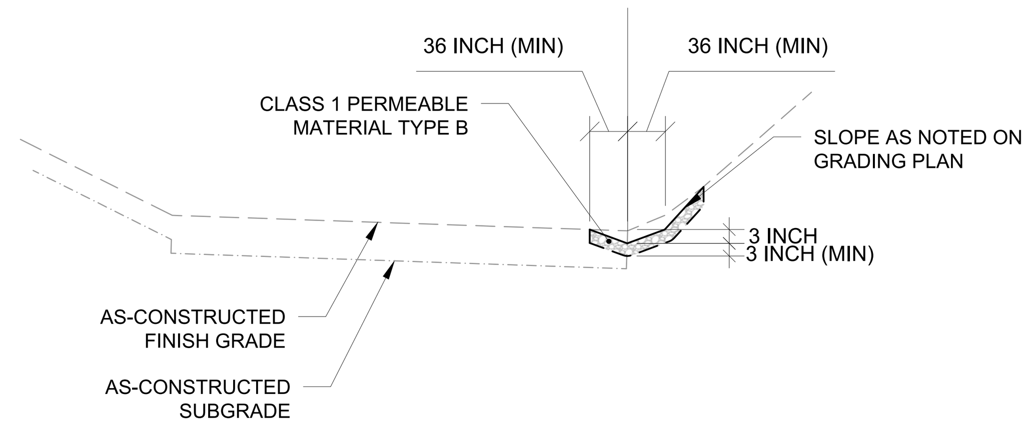
SHEET 6 of 9

CAD FILE: C:\pwworking\kleinfelderpw01\kleinfelder_mtremblay\d0207934\04_20220871_ Proposed Conditions_Plan.dwg LAYOUT: Sections PLOTTED: 12/15/2021 3:48 PM BY: matt tremblay



* DRAIN ROCK SHOULD BE CLEAN, FREE DRAINING AND MEET THE REQUIREMENTS FOR CLASS 1 TYPE B, PERMEABLE MATERIAL SECTION 68 OF THE STATE OF CALIFORNIA "CALTRANS" STANDARD SPECIFICATIONS, OR 0.75" DIA. CRUSHED ROCK WITH FILTER FABRIC, SUCH AS MIRAFI 140N, BETWEEN THE SOIL AND ROCK.

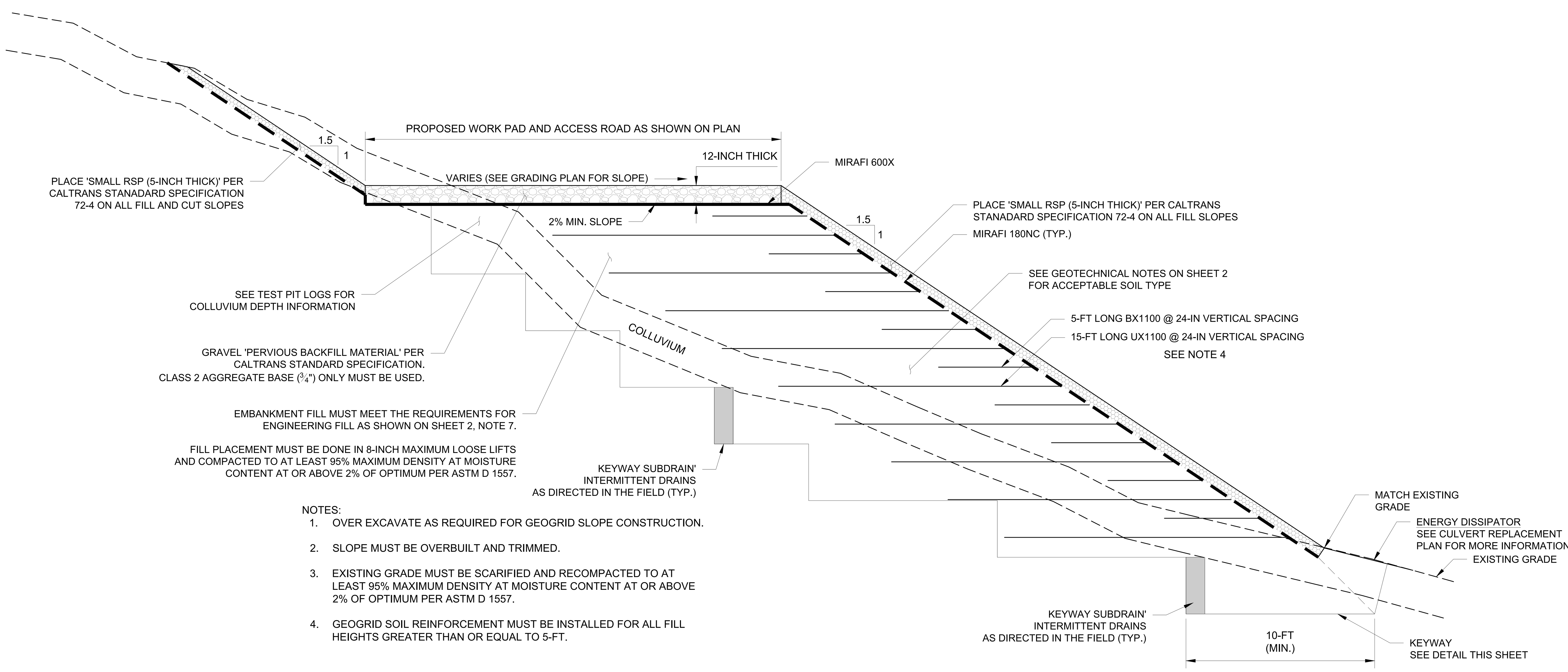
1/5 TRENCH DRAIN
SCALE: N.T.S



2/5 DRAINAGE SWALE DETAIL
SCALE: N.T.S

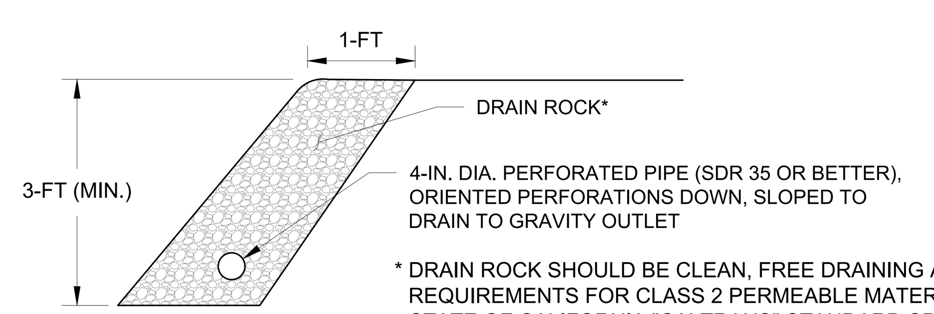
CLASS 1 PERMEABLE MATERIAL GRADATION REQUIREMENTS

SIEVE SIZE	PERCENTAGE PASSING	
	TYPE A	TYPE B
2"	-	100
1-1/2"	-	95-100
3/4"	100	50-100
1/2"	95-100	-
3/8"	70-100	15-55
NO. 4	0-55	0-25
NO. 8	0-10	0-5
NO. 200	0-3	0-3



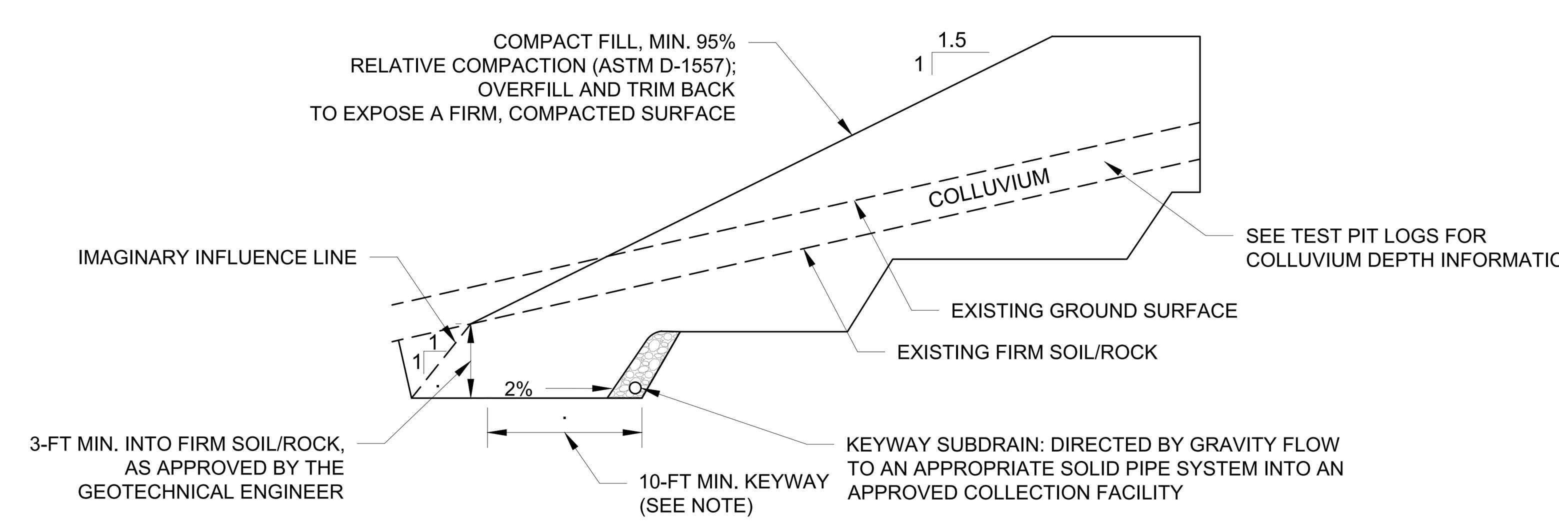
NOTES:
1. OVER EXCAVATE AS REQUIRED FOR GEOGRID SLOPE CONSTRUCTION.
2. SLOPE MUST BE OVERBUILT AND TRIMMED.
3. EXISTING GRADE MUST BE SCARIFIED AND RECOMPACTED TO AT LEAST 95% MAXIMUM DENSITY AT MOISTURE CONTENT AT OR ABOVE 2% OF OPTIMUM PER ASTM D 1557.
4. GEOGRID SOIL REINFORCEMENT MUST BE INSTALLED FOR ALL FILL HEIGHTS GREATER THAN OR EQUAL TO 5-FT.

3/5 TYPICAL SECTION - EMBANKMENT
SCALE: N.T.S



* DRAIN ROCK SHOULD BE CLEAN, FREE DRAINING AND MEET THE REQUIREMENTS FOR CLASS 2 PERMEABLE MATERIAL SECTION 68 OF THE STATE OF CALIFORNIA "CALTRANS" STANDARD SPECIFICATIONS, OR 0.75" DIA. CRUSHED ROCK ENCAPSULATED IN FILTER FABRIC, SUCH AS MIRAFI 140N.

4/5 KEYWAY SUBDRAIN
SCALE: N.T.S



NOTE:
KEYWAY EXCAVATION SHOULD BE OBSERVED BY THE GEOTECHNICAL ENGINEER OR GEOLOGIST. EXCAVATE SERIES OF BENCHES INTO FIRM SOIL/ROCK, BELOW COLLUVIUM AS INDICATED.

5/5 TYPICAL FILL SECTION - KEYWAY
SCALE: N.T.S

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REVISIONS

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CONSTRUCTION DETAILS

IGNACIO-ALTO-SAUSILITO
SCADA TOWER
SW 67 AND 69

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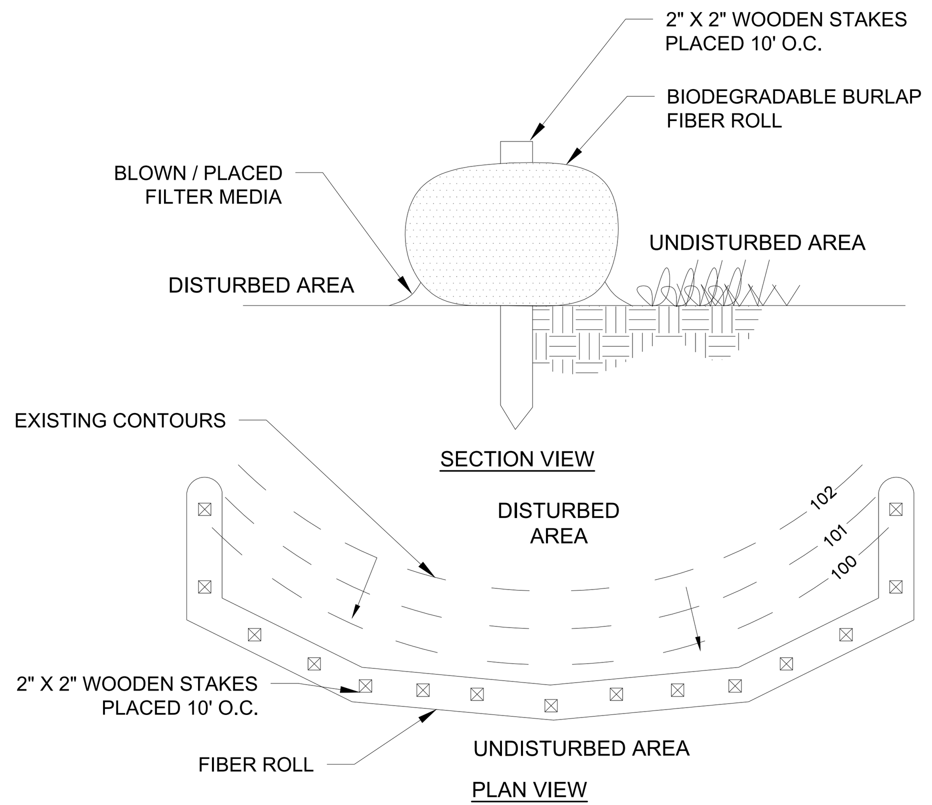
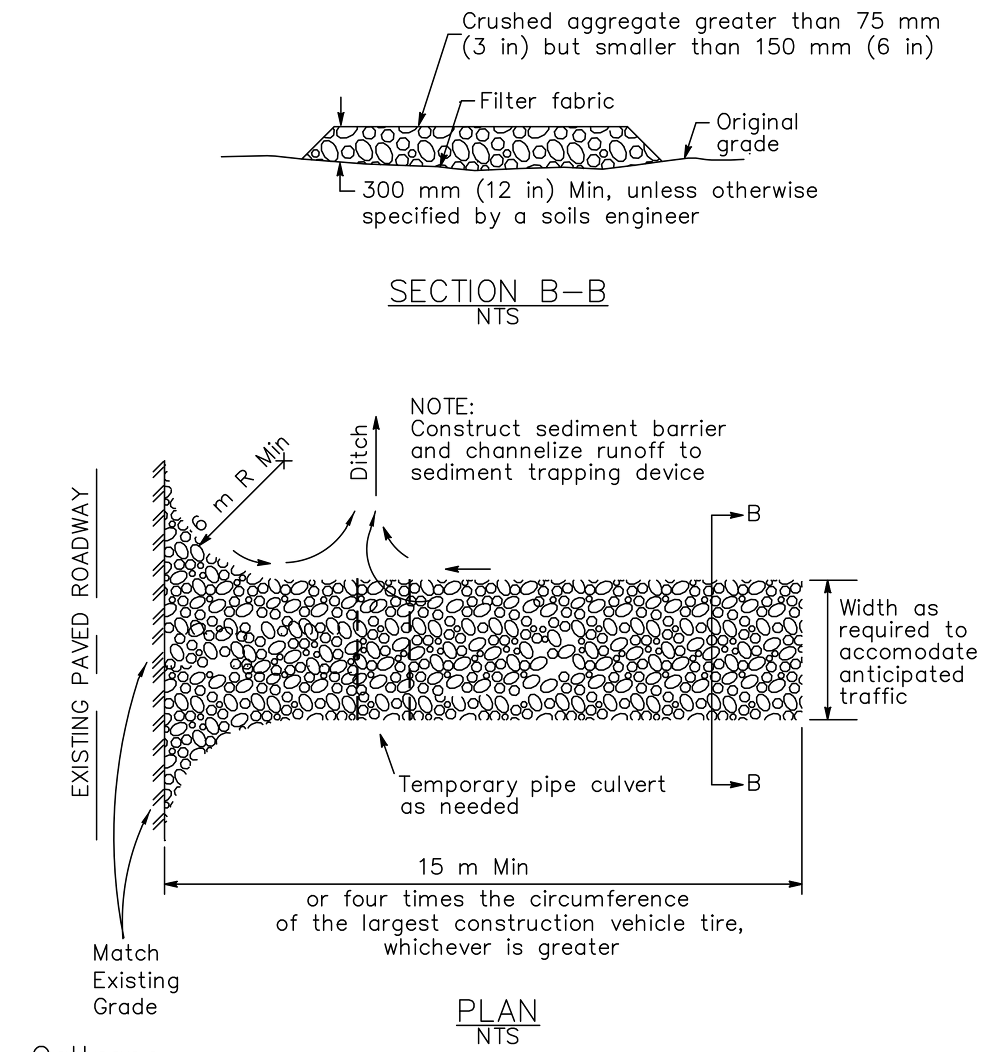


NOTES

1. FIBER ROLL SHALL BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE SOCK SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN ROLL ALIGNMENT. STAKES MAY BE INSTALLED IMMEDIATELY DOWNSLOPE OF THE ROLL IF SO SPECIFIED BY THE MANUFACTURER.
2. PLACE FIBER ROLL 10-FEET APART ON SLOPES STEEPER THAN 2:1.
3. TRAFFIC SHALL NOT BE PERMITTED TO TRAVEL OVER FIBER ROLL.
4. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES HALF THE ABOVEGROUND HEIGHT OF THE ROLL AND DISPOSED IN THE MANNER DESCRIBED ELSEWHERE IN THE PLAN.
5. DAMAGED SOCKS SHALL BE REPAIRED ACCORDING TO MANUFACTURER'S SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION.
6. BIODEGRADABLE FIBER ROLLS SHALL BE REPLACED AFTER 6 MONTHS.
7. UPON STABILIZATION OF THE AREA TRIBUTARY TO THE ROLL, STAKES SHALL BE REMOVED. THE ROLL MAY BE LEFT IN PLACE AND VEGETATED OR REMOVED. IN THE LATER CASE, THE MESH SHALL BE CUT OPEN AND THE MULCH SPREAD AS A SOIL SUPPLEMENT.

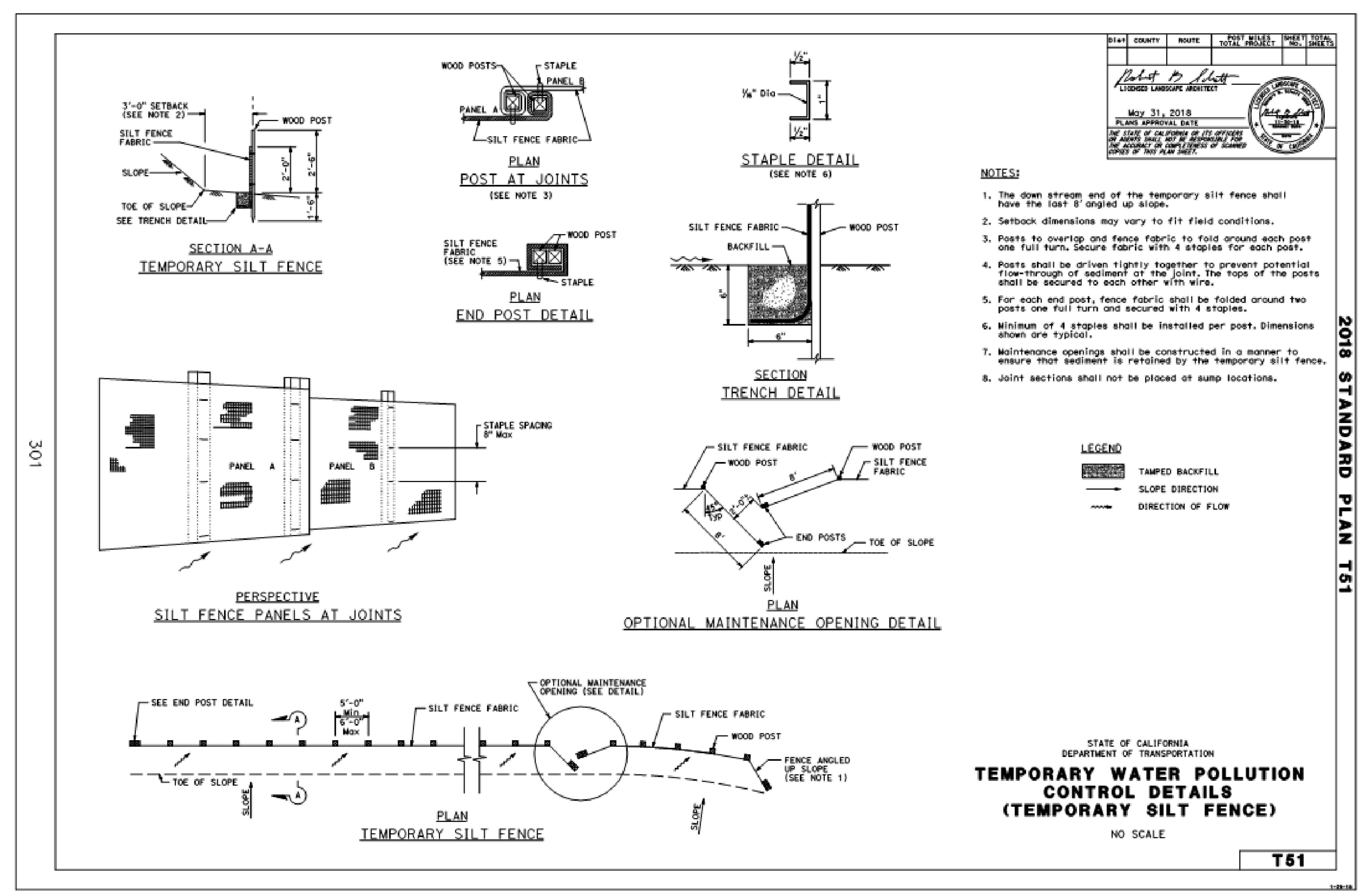
1/6 FIBER ROLL
SCALE: N.T.S



Caltrans
Stabilized Construction Entrance/Exit TC–1

2/6 CONSTRUCTION ENTRANCE
SCALE: N.T.S

3/6 ROLLED EROSION CONTROL PRODUCT
SCALE: N.T.S



4/6 TEMPORARY SILT FENCE
SCALE: N.T.S

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STATE OF CALIFORNIA

REVISIONS

REV	DESCRIPTION	DSN / DWN	CHK / APP	DATE

SCALE VERIFICATION

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EROSION & SEDIMENTATION CONTROL DETAILS

IGNACIO-ALTO-SAUSILITO
SCADA TOWER
SW 67 AND 69

Pacific Gas and Electric Company®

PACIFIC GAS & ELECTRIC COMPNAY
6121 BOLLINGER CANYON ROAD
SAN RAMON, CA 94583

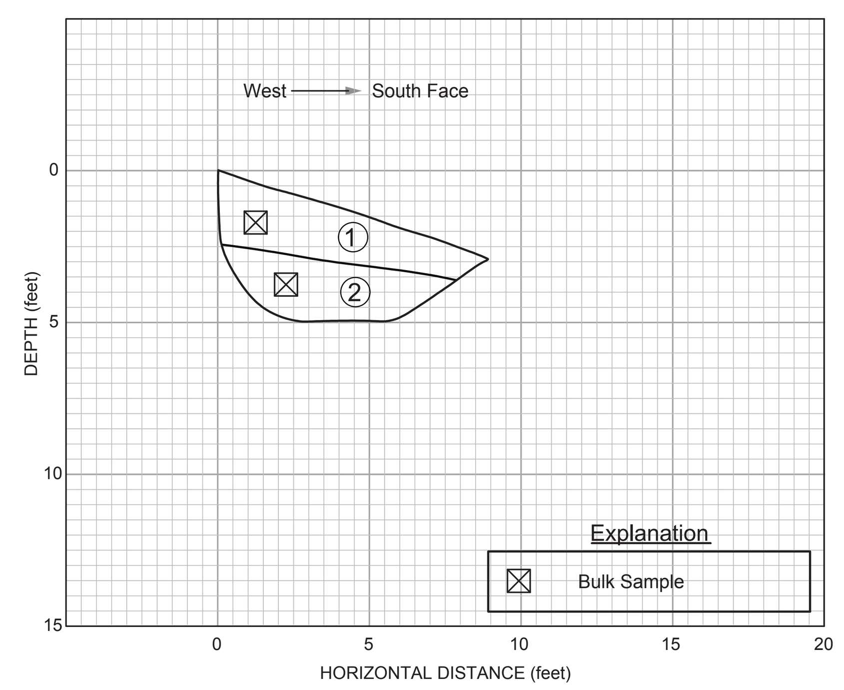
100% SUBMISSION

PROJECT NO.	20220871.001A
ISSUE DATE	12/15/2021
CURRENT REVISION	A
DESIGNED BY	M. TREMBLAY
DRAWN BY	M. TREMBLAY
CHECKED BY	A.BISACKY
APPROVED BY	J.BROWN

SHEET 8

8 of 9

CAD FILE: C:\pwworking\kleinfelder\pw01\kleinfelder_mtremblay\d0207934\10_221720_Details.dwg LAYOUT: 7 PLOTTED: 12/15/2021 3:48 PM BY: matt tremblay



Unit Descriptions

1	SILT WITH SAND (ML) - light grayish brown, dry, stiff, fine grained sand, highly porous, rootlets to full depth, upper 1’ disturbed/reworked (surface soil/colluvium)
2	SILTY SANDSTONE - brown, yellow brown, orange brown, highly weathered, weak to extremely weak (R0-R1), intensely fractured with minor silt infill, fine grained sand (Franciscan Complex)

Logged By: J. Richmond
Date: 8/10/21
Elevation: n/a
Equipment: John Deere 85G Excavator

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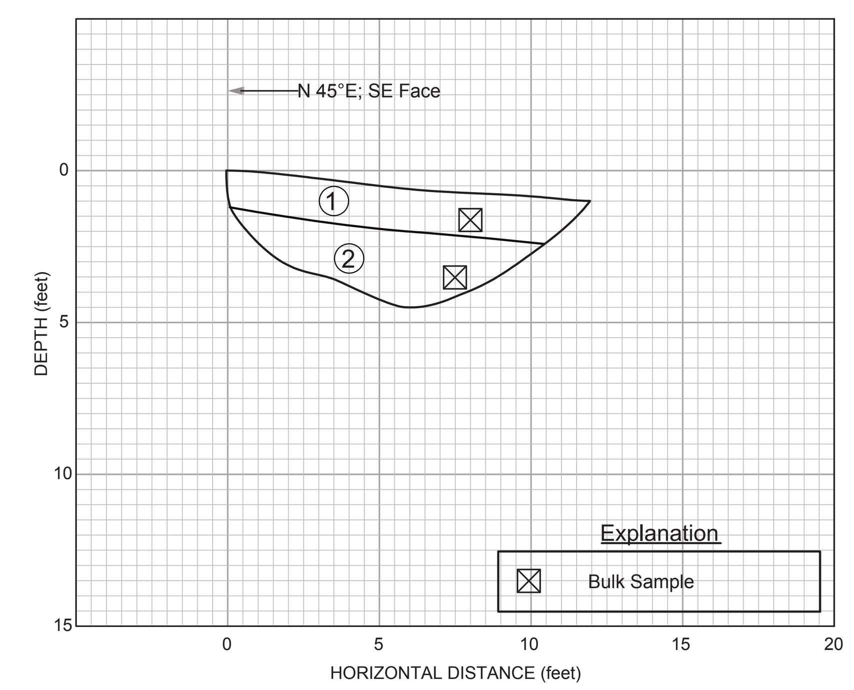
PROJECT NO. 20220871	LOG OF TEST PIT TP-1	FIGURE	
DRAWN AUG 2021			
DRAWN BY DJS	PG&E IGNACIO ALTO-SAUSALITO SW 67&69 SCADA TOWER MILL VALLEY, CALIFORNIA	A-4	
CHECKED BY JCR			
FILE NAME TP-1.ai			



Unit Descriptions

1	SILT/LEAN CLAY WITH SAND (ML/CL) - light grayish brown, dry, stiff, fine grained sand, highly porous, rootlets throughout (surface soil/colluvium)
2	SILTY SANDSTONE - yellow brown, brown, light orange brown, highly weathered, extremely weak to weak (R0-R1), moderately to intensely fractured with minor silt infill (Franciscan Complex)

Logged By: J. Richmond
Date: 8/10/21
Elevation: n/a
Equipment: John Deere 85G Excavator

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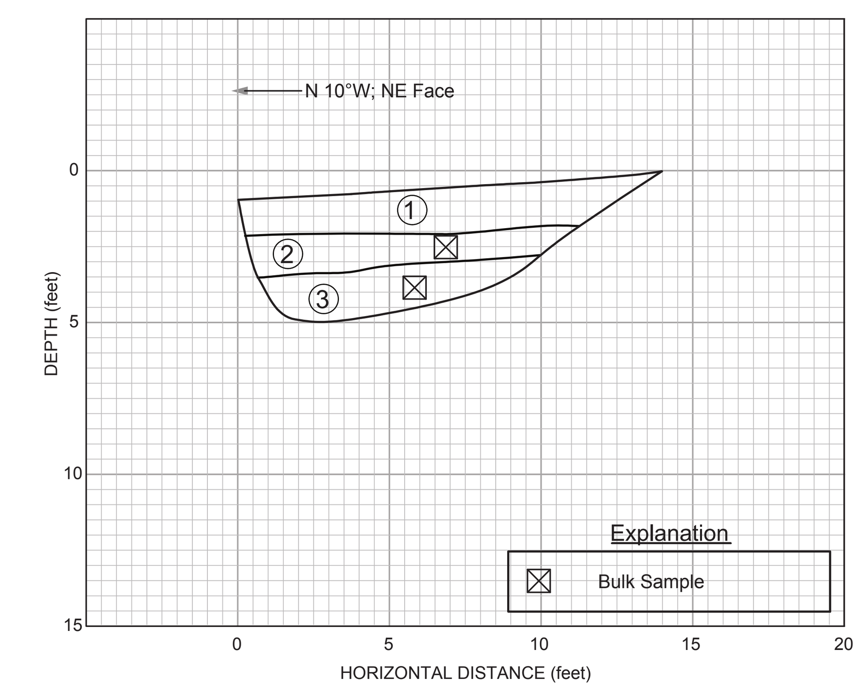
PROJECT NO. 20220871	LOG OF TEST PIT TP-2	FIGURE
DRAWN AUG 2021		
DRAWN BY DJS	PG&E IGNACIO ALTO-SAUSALITO SW 67&69 SCADA TOWER MILL VALLEY, CALIFORNIA	A-5
CHECKED BY JCR		
FILE NAME TP-2.ai		



Unit Descriptions

1	SILT WITH SAND (ML) - light grayish brown, dry, stiff, fine grained sand, highly porous, rootlets to full depth, trace subangular gravel to 1” (surface soil/colluvium)
2	CLAYEY GRAVEL (GC) - gray, reddish brown, dry to moist, medium dense, subangular gravel to 1” (shale fragments), moderately plastic (colluvium/residual soil)
3	SHALE - dark gray, reddish brown, light brown, highly weathered to decomposed, extremely weak to weak (R0-R1), intensely fractured with minor local clay infill, locally laminated (Franciscan Complex)

Logged By: J. Richmond
Date: 8/10/21
Elevation: n/a
Equipment: John Deere 85G Excavator

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PROJECT NO. 20220871	LOG OF TEST PIT TP-3	FIGURE
DRAWN AUG 2021		
DRAWN BY DJS	PG&E IGNACIO ALTO-SAUSALITO SW 67&69 SCADA TOWER MILL VALLEY, CALIFORNIA	A-6
CHECKED BY JCR		
FILE NAME TP-3.ai		

KLEINFELDER
Bright People. Right Solutions.

REGISTERED PROFESSIONAL ENGINEER
JASON ADAM BROWN
C 86395
EXP. 3/31/2023
CIVIL
STATE OF CALIFORNIA

REVISIONS

REV	DESCRIPTION	DSN / DWN	CHK / APP	DATE

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ORIGINAL DRAWING SIZE IS 24 x 36

TEST PIT SECTIONS

IGNACIO-ALTO-SAUSILITO
SCADA TOWER
SW 67 AND 69

PG&E Pacific Gas and Electric Company®

PACIFIC GAS & ELECTRIC COMPNAY
6121 BOLLINGER CANYON ROAD
SAN RAMON, CA 94583

100% SUBMISSION

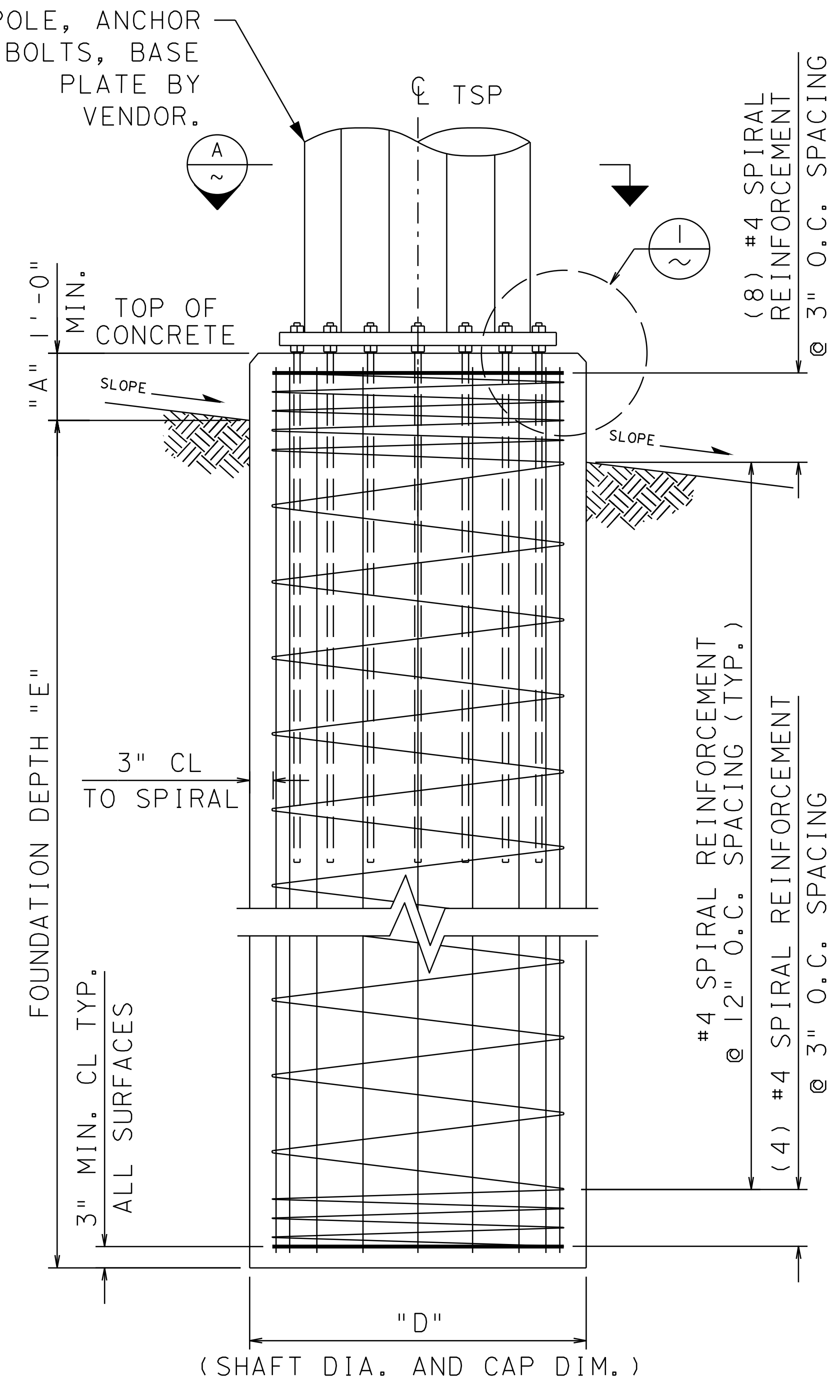
PROJECT NO.	20220871.001A	9
ISSUE DATE	12/15/2021	
CURRENT REVISION	A	
DESIGNED BY	M. TREMBLAY	
DRAWN BY	M. TREMBLAY	
CHECKED BY	A.BISACKY	
APPROVED BY	J.BROWN	SHEET 9 of 9

Advice 6186-E-B
March 9, 2022

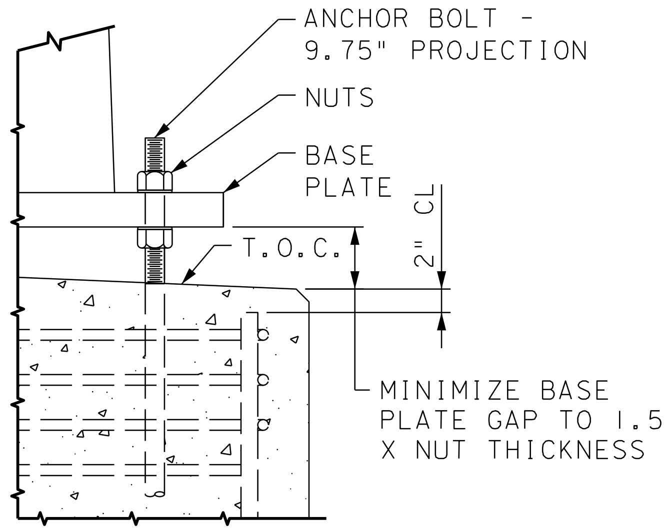
Attachment 2

Pole Foundation Plan

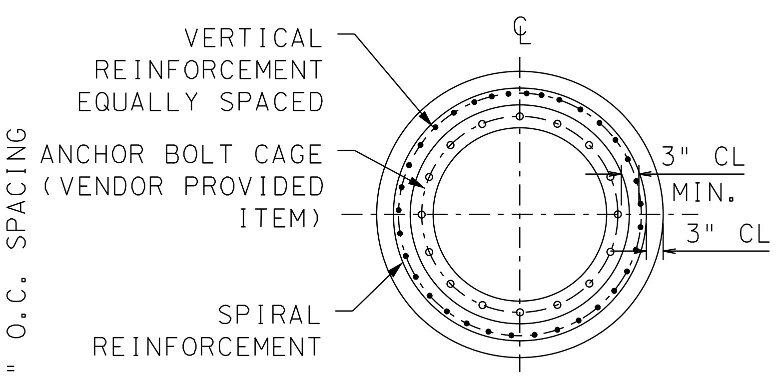
113801



ELEVATION
NTS



DETAIL 1



SECTION A-A
SEE FOUNDATION SCHEDULE
NTS

AUGERED FOOTING DATA

POLE NO.	POLE HEIGHT (FT)	POLE CLASS	TYPE	DIMENSIONS "A"	DIMENSIONS "D"	DIMENSIONS "E"	VERT. REINF.	TIES
012/084A	100'-0"	LOAD TREE	TSP	1'-0"	7'-0"	29'-0"	(34) #11	#4 @ 12"
012/084B	90'-0"	LOAD TREE	TSP	1'-0"	7'-0"	30'-0"	(34) #11	#4 @ 12"

GENERAL NOTES:

1. ALL CONCRETE WORK SHALL BE IN ACCORDANCE WITH THE CURRENT VERSION OF THE ACI 318 AND 336-3R-144. CONCRETE MIX SHALL BE REVIEWED BY CIVIL ENGINEER OF RECORD.
2. CONCRETE STRENGTH SHALL BE 3000 PSI@ 28 DAYS.
3. REINFORCING STEEL SHALL CONFORM TO ASTM A615 GR.60.
4. EXPOSED CONCRETE EDGES SHALL BE CHAMFERED 3/4".
5. GROUNDING OF POLES OUTSIDE SUBSTATION SHALL BE DONE ACCORDING TO PG&E DWG. NO.012566.
6. REBAR SPIRALS SHALL BE USED FOR REBAR TIES IN DRILLED PIER FOUNDATIONS. REBAR SPIRALS PITCH MUST BE THE SAME AS OR TIGHTER THAN REQUIRED TIE SPACING. REBAR SPIRALS SHALL BE LAPPED ONE FULL TURN AT START AND FINISH OF THE PIER ALONG WITH ANY SPLICE LOCATION.
7. ALL FOUNDATIONS SHALL BE PLACED IN UNDISTURBED SOIL AND THE BOTTOM OF ALL EXCAVATIONS SHALL BE CLEANED OF ALL LOOSE MATERIAL.
8. ALL BOLT CAGES SHALL BE INSTALLED PLUMB AND UNIFORMLY LEVEL TO WITHIN 1/4" IN ALL DIRECTIONS ACROSS BOLT CIRCLE.
9. CONCRETE SHALL BE PLACED SUCH THAT IT DOES NOT STRIKE THE SIDES OF THE EXCAVATION OR REBAR.
10. THE TOP SURFACE OF THE FOUNDATION SHALL BE TROWEL FINISHED AND SLOPED TO SHED WATER.
11. FOR OTHER FOUNDATION NOTES, SEE CDS 056014, LATEST REVISION.
12. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALIGNMENT OF THE ANCHOR BOLT CAGE PRIOR TO THE CONCRETE POURING. IF THERE IS ANY UNCERTAINTY, CONTACT THE ENGINEER.
13. STRAIGHT SIDED STEEL CASING MAY BE USED IF NEEDED. HOWEVER, CASING SHALL BE REMOVED DURING CONCRETE PLACEMENT.

DESIGN NOTES:

1. A GEOTECHNICAL SOILS INVESTIGATION HAS BEEN PERFORMED BY KLEINFELDER VIA PROVIDED ATTACHMENT #PLE21L120588. THE CONTRACTOR SHALL BE REQUIRED TO DETERMINE IF SOIL CONDITIONS ARE WITHIN THE ASSUMPTIONS MADE IN THIS SPECIFICATION.
2. FOUNDATIONS WERE DESIGNED USING L-PILE ANALYSIS WITH A MAXIMUM TOTAL PILE-HEAD ROTATION OF 1 DEGREE AND DEFLECTION OF 2% OF PIER DIAMETER UNDER MAXIMUM DESIGN LOADS. THE SOIL TYPE CONSIDERED IS SOFT CLAY (MATLOCK), WITH A MINIMUM COHESION OF 1000 PSF. SOIL EFFECTIVE UNIT WEIGHT WAS ASSUMED TO BE 110 PCF.
3. FOUNDATIONS LOCATED ADJACENT TO OR ON SLOPES STEEPER THAN 5H:1V SHALL BE DESIGNED TO CONSIDER EFFECTS OF THE SLOPING GROUND ON FOUNDATION PERFORMANCE.
4. THE FOUNDATION INCLUDED WITHIN THIS DRAWING HAS BEEN DESIGNED ASSUMING THE WATER TABLE IS BELOW THE FOUNDATION DEPTH. IF THE WATER TABLE IS ENCOUNTERED, CONTACT THE ENGINEER.

REFERENCE DRAWINGS:

REFERENCE DRAWINGS	DWG NO.
STRUCTURE DATA SHEET	22426, 239497
PLAN AND PROFILE	3103380
GENERAL ARRANGEMENT	3103441
TSP SHOP DRAWING	6057321
TSP REQ, LOCATION, & POLE ORIENTATION	095417

REV	DATE	DESCRIPTION	JOB NO	DSG/DWN	CHKD	SUPV	APVD
02	12/15/21	SCADA PSPS BUNDLE C-26C SW 67, 69, 77, & 79 - ISSUED FOR 60% REVIEW	74019482	DAS/DFG	DAS/DCT	DAS/BTR	

ORDER: 74019482

DSG	DAS/M. KECH
DWN	DAS/D. GRANATO
CHKD	DAS/D. TIEMANN
SUPV	DAS/B. RUSSELL
APVD	
APVD	
DATE	11/04/2021

CIVIL

IGNACIO-ALTO-SAUSALITO #1
IGNACIO-ALTO-SAUSALITO #2
60 kV TRANSMISSION LINES
DRILLED PIER FOUNDATION DETAILS

DEPARTMENT OF ENGINEERING
PACIFIC GAS AND ELECTRIC COMPANY
SAN FRANCISCO, CALIFORNIA

MICROFILM
BILL OF MATL
DWG LIST
SUPSDS
SUPSD BY
SHEET NO 1 OF 1 SHEETS

113801 REV 02

Attachment 3

Geotechnical Report

January 8, 2021
Project No.: 20203166.001A

Mr. Ryan Lehman, PE
Dashiell Corporation
11501 Burnet Rd., Suite 200, Building 906
Austin, Texas 78758
ryan.lehman@dashiell.com

SUBJECT: Geotechnical Design Recommendations

PROJECT: PG&E SCADA PSPS Program
PG&E SCADA Switch Installation Program
Delivery Bundle C-26C
Marin County, California

Dear Mr. Lehman:

As requested, Kleinfelder has evaluated the geologic conditions at two proposed System Control and Data Acquisition (SCADA) switch pole sites located in Marin County, California as part of the Public Safety Power Shutdown (PSPS) Project for PG&E's SCADA Switch Installation Program. Our work was performed to provide geotechnical recommendations for design and construction of pole foundations for Delivery Bundle C-26C.

We understand PG&E plans install two new steel monopoles supported on drilled pier foundations for the Ignacio-Alto-Sausalito alignment in the vicinity of Structure 012/084. This letter report provides geotechnical design recommendations for the proposed pole foundations based on an engineering desktop study of existing geological and geotechnical data in the vicinity of the planned pole sites. Provided in the following sections of this report are a description of the project, the scope of services provided, and our conclusions and recommendations.

It is Kleinfelder's professional opinion that the proposed pole sites are geotechnically suitable for construction of the proposed project using drilled pier foundations. Based on our desktop study, the primary geotechnical design and construction issues associated with the project are the potential for severe erosion or shallow landslides in the vicinity of the site. Removal of existing structures during construction should be observed to confirm the presence of severe erosion or landslide issues. Recommendations for design and construction of pole foundations are presented in this report and should be incorporated into project design and construction.

Kleinfelder appreciates the opportunity to provide geotechnical engineering services to Dashiell during the design phase of this project. If there are any questions concerning the information presented in this report, please contact this office at your convenience.

PROJECT UNDERSTANDING

Our understanding of the project is based on email and telephone conversations and previous experience with Dashiell for Phase I of the PG&E SCADA project and other PG&E SCADA

Upgrade projects, the Request for Quote (RFQ) received on May 14, 2020, and email correspondence with Dashiell through December 10, 2020. We understand PG&E plans to replace a number of manual switches and/or install new SCADA switches on DE steel poles or TSPs for PG&E's PSPS Project as part of the SCADA Program.

We understand that for Delivery Bundle C-26C, PG&E plans to replace the existing tower with a pair of monopole dead end structures founded on drilled piers. The proposed monopoles are to be constructed immediately south of Structure 012/084, within approximately 15 feet of the existing tower. The existing structure locations are shown on Figures 1 and 2.

SCOPE OF SERVICES

We have provided our services in general accordance with our proposal. Our scope of services included review of published geologic maps, available geotechnical data, Soil Survey Geographic Database (SSURGO) from the United States of Agriculture (USDA), and preparation of this letter that includes the following:

- A description of the proposed project including site plans showing the proposed pole location
- Geologic discussion including maps of the project areas
- A discussion of the anticipated site subsurface conditions
- A discussion of the applicability of PG&E standard foundation design criteria
- 2019 California Building Code (CBC) seismic design criteria
- Recommendations for direct embed pole construction, included recommended drilling methods and concrete placement guidelines
- Appendices containing relevant geotechnical data obtained

PREVIOUS STUDIES

Various websites and online databases were reviewed to determine where existing available data might be used to characterize the subsurface conditions at the planned new pole sites. Additionally, existing geologic and geotechnical information used in this study include the following:

- "Geotechnical Design Report for Soundwall Foundations, Soundwall/Ramp Widening Project at East Blithdale/Off-Ramp to it from 101SB, 04-MRN-101-KP9 9.2/9.7 (PM 5.71/6.03)," prepared by Caltrans, dated September 8, 2003.
- "Geologic Map and Map Database of Parts of Marin, San Francisco, Alameda, Contra Costa, and Sonoma Counties," California: U.S. Geological Survey, Miscellaneous Field Studies Map MF-2337, scale 1:75,000, by Blake, M.C., Graymer, R.W., Jones, D.L., and Soule, Adam, dated 2000.
- "Reconnaissance Landslide Map of Parts of Marin and Sonoma Counties, California, Consisting of Bolinas, Double Point, Drakes Bay, Inverness, Novato, Petaluma, Petaluma River, Point Reyes NE, San Geronimo, San Rafael, San Quentin, and Tomales 7½ Minute Quadrangles," California: U.S. Geological Survey, Open File Map, 75-281 (Sheet 11 of 12), by Carl M. Wentworth and Virgil A. Frizzell dated 1975.

KLEINFELDER 6801 Koll Center Parkway, Suite 150, Pleasanton, CA 94566 p | 925.484.1700 f | 925.484.5838

The locations of available previous explorations (borings) are shown on Figure 2 of this report. Logs of the borings from these previous explorations are included in Appendix A of this report.

Mapped soil unit and corrosivity information from the USDA SSURGO website are included in Appendices B and C, respectively.

AREA AND SITE GEOLOGY

The pole site is located within the Coast Range Geomorphic Province of Northern California. This province is generally characterized by northwest-trending mountain ranges and intervening valleys, which are a reflection of the dominant northwest structural trend of the bedrock in the region. The basement rock in the northern portion of this province consists predominantly of the Franciscan Complex, a subduction complex of diverse groups of igneous, sedimentary and metamorphic rocks of Cretaceous to Upper Jurassic age (65 to 160 million years old), and to the east, the Coast Range Ophiolite and Great Valley Complex, an Upper to Middle Jurassic age (approximately 145 to 175 million years old) volcanic ophiolite sequence with associated Lower Cretaceous to Upper Jurassic (approximately 100 to 160 million years old) sedimentary rocks. The Coast Range Ophiolite and Great Valley Complex were tectonically juxtaposed with the Franciscan Complex (most likely during subduction accretion of the Franciscan Complex), and these ancient fault boundaries are truncated by a modern right-lateral fault system that includes the San Andreas, Hayward-Rodgers Creek, Maacama-Garberville and Bartlett Springs faults. Located approximately 6.8 miles southwest of the site, the San Andreas fault defines the westernmost boundary of the local bedrock. In the site vicinity, the Great Valley Sequence and Franciscan Complex are unconformably overlain by Tertiary age (approximately 2.6 to 65 million years old) continental and marine sedimentary and volcanic rocks. These Tertiary age rocks are locally overlain by younger Quaternary (approximately 2.6 million years old to present day) volcanic bedrock, along with alluvial, colluvial and landslide deposits.

The geology of the pole site has been mapped by Blake et al. (2000), among others. The site is underlain by Cretaceous and Jurassic age (66 million years to 201 million years old) mélange (map symbol fsr), which is described as an argillite (mudstone) and lithic sandstone matrix with blocks and slabs of greenstone, chert, metamorphic rocks, serpentinite, and other rocks. The project site is included on landslide map prepared Wentworth and Frizzell (1975), which indicates that a relatively small landslide is located northeast of and adjacent to the existing Structure 012/084. A map compiled of geologic information based on Blake et al. (2000) and landslide information based on Wentworth and Frizzell (1975) is presented on Figure 3.

FAULTING AND SEISMICITY

The pole site is not located within an Earthquake Fault Zone, as defined by the California Geological Survey (CGS, 2020) in accordance with the Alquist-Priolo Earthquake Fault Zone Act of 1972. According to the CGS (2020), the most proximal zoned active fault to the pole site is the San Andreas fault, located approximately 6.8 miles to the southwest. Moderate to major earthquakes generated on the San Andreas, Hayward-Rodgers Creek, the San Gregorio, and other faults in the region can be expected to cause strong ground shaking at the pole sites.

The proximities of significant faults in the vicinity of the pole sites are listed in Table 1, below.

Table 1
Significant Faults and Closest Distances to Sites

Fault Names	Closest Distance to Site (miles)
San Andreas	6.8
Point Reyes	17.4
Hayward	11.2
San Gregorio	10.4
West Napa	23.7
Green Valley	26.1
Mount Diablo	26.3
Calaveras	28.5
Monte Vista-Shannon	35.1
Greenville	37.6
Great Valley 4	41.2
Hunting Creek-Berryessa	42.1
Maacama-Garberville	47.6

SITE DESCRIPTON

The pole site is located east of the existing PG&E Alto Substation about 250 feet southeast of Wilkins Place and Keats Drive intersection. The site is located about ¼ mile north of Richardson Bay and ¼ mile east Highway 101. The pole site located near the top of a steep hill within an undeveloped area behind a suburban neighborhood.

ANTICIPATED SUBSURFACE AND GROUNDWATER CONDITIONS

The following interpretations of soil and groundwater conditions at the sites are based on a desktop review of available information, as discussed above. Soil reports obtained from the Soil Survey Geographic Database (SSURGO) from the United States of Agriculture (USDA) for each site are attached in Appendix B. Corrosion of concrete report obtained from the USDA SSURGO website for each site are attached in Appendix C. Corrosion of steel information was not available for the site.
Based on soil reports from the Soil Survey Geographic Database (SSURGO) from the United States of Agriculture (USDA), the surficial soils at the sites are anticipated to consist of up to 3 feet of clay loam underlain by bedrock. The surficial soils at the site are expected to have low risk for corrosion of concrete (USDA).

Borings were drilled within ¾ miles of the structures (Caltrans, 2003) in the same geologic unit, approximately 40 to 100 feet lower in elevation than the subject pole site. At the surface elevation of these explorations, borings generally encountered about 17-½ to 30 feet of stiff to hard gravelly lean clay, with variable amounts of sand and gravel, underlain by claystone or sandstone to drilled depths up to about 32 feet. Groundwater was measured at about 14 and 20 feet in the lower-elevated Borings BH-2B and BH-3, respectively, at the time of drilling.

CONCLUSIONS AND RECOMMENDATIONS

From a geotechnical standpoint the proposed construction appears feasible provided the recommendations presented in this letter are incorporated into the project design and construction. The following sections discuss our conclusions and recommendations with respect to use of standard design criteria, California Building Code (CBC) design considerations, and foundation design and construction considerations.

Note that the conclusions and recommendations that follow are based on our desktop review and interpretation of available information. If soil or groundwater conditions exposed during construction vary from those presented in this report, Kleinfelder should be notified to evaluate whether our conclusions or recommendations should be modified.

2019 California Building Code Seismic Design Parameters

In developing seismic design criteria, the characteristics of the soils underlying the site are an important input to evaluate the site response. Site Class C is defined as a soil profile consisting of a very dense soil and soft rock with an average shear wave velocity between 1,200 ft/sec and 2,500 ft/sec, standard penetration test (SPT) blow counts (N-value) greater than 50 blows per foot, or undrained shear strength greater than 2,000 psf in the top 100 feet. Based on geologic mapping and nearby existing data, the soil and rock conditions at the Bridgeville-Cottonwood site meet these criteria and should be classified as Site Class C, Very Dense Soil and Soft Rock, per Table 20.3-1 of American Society of Civil Engineers (ASCE) 7-16 (2016) as referenced by the 2019 CBC.

Seismic design parameters were developed consistent with the requirements of the 2019 California Building Code (CBC). The seismic design requirements in the 2019 CBC are based on ASCE 7-16 and Supplement 1 of that standard.

Table 2
Ground Motion Parameters Based on 2019 CBC

Parameter	Values	ASCE 7-16 Reference
S_S	1.500g	Fig 22-1
S_1	0.600g	Fig 22-2
Site Class	C	Table 20.3-1
F_a	1.200	Table 11.4-1
F_v	1.400	Table 11.4-2
PGA	0.602g	Fig 22-9
S_{MS}	1.800g	Eq 11.4-1
S_{M1}	0.840g	Eq 11.4-2
S_{DS}	1.200g	Eq 11.4-3
S_{D1}	0.560g	Eq 11.4-4
F_{PGA}	1.200	Table 11.8-1
PGA_M	0.722g	Eq 11.8-1
C_{RS}	0.915	Fig 22-18A
C_{R1}	0.899	Fig 22-19A
T_L	12 seconds	-

Deep Foundations

We understand the planned new monopoles will be supported on a drilled pier foundation. General recommendations for design and construction of pole foundations are presented in the following sections of this report.

PG&E Deep Foundation Standard Design

PG&E has developed standard steel pole foundation designs for project sites that satisfy "normal soil conditions", which are defined has having:

- ASCE/SEI 7-16 Site Class A through D
- Groundwater table below the embedded tip of the deep foundation
- Minimum Canedo Q value of = 780 psf per foot of depth
- Clay soil with minimum undrained shear strength of 1,000 psf and moist unit weight of at least 110 pcf
- Sand soil with minimum angle of internal friction of 30 degrees and moist unit weight of at least 110 pcf

Based on our review of available geologic data and our site reconnaissance, it is our opinion that the subsurface conditions are anticipated to be generally consistent with PG&E "normal soil conditions" and that the PG&E Standard Designs are appropriate for design of the planned new pole foundations. We recommend the use of the clay soil model for analysis of pole foundation embedment depth.

Construction Considerations

Based on geologic mapping and nearby data, shallow bedrock is expected at the pole site. The underlying mudstone and sandstone unit, if encountered, should be drillable with rock augers and/or core barrels. Based on the site topography, groundwater is not anticipated to exist within typical pole foundation depths. Perched groundwater can occur seasonally above the bedrock contact. Removal of existing structures should be observed to confirm the presence of potential erosion and landslide issues. The planned new structure location changes to north of the existing Structure 012/084 instead of south, Kleinfelder should be consulted to reconsider erosion and landslide issues.

General Comments

Consistent with Chapter 17 of the 2019 CBC, drilled foundation excavations should be inspected and approved by the geotechnical engineer prior to installation of the monopoles. The depths of all foundation excavations should be checked immediately prior to concrete placement or backfill to verify excessive sloughing and/or caving has not reduced the required hole depth. This may be done with a weighted tape measure or similar measuring device.

If concrete is used for the backfill, the concrete used should be discharged vertically into the drilled holes to reduce aggregate segregation. Under no circumstances during foundation construction should concrete be allowed to free-fall against either the pole or the sides of the excavation. Sufficient space should be provided in the excavation to allow the insertion of a pump hose or tremie tube for concrete placement. The direct embed pole should be installed and the concrete pumped immediately after drilling is completed.

Concrete used for drilled foundation construction should have a slump ranging from 4 to 6 inches if placed in a dry shaft without temporary casing, and from 6 to 8 inches if temporary casing or slurry drilling methods are used. The concrete mix should be designed with appropriate admixtures and/or water/cement ratios to achieve these recommended slumps. Adding water to a conventional mix to achieve the recommended slump should not be allowed. For concrete mixes with slumps over 6 inches, vibration of the concrete during placement is generally not recommended as aggregate settlement may result in the lack of aggregate within the upper portion of the pile. Careful vibration of the concrete around anchor bolt assemblies is recommended.

Concrete should be placed into the hole using tremie methods. Tremie concrete placement should be performed in accordance with American Concrete Institute (ACI) 304R. The tremie pipe should be rigid and remain several feet below the surface of the in-place concrete at all times to maintain a seal between the water or slurry and the fresh concrete. The upper concrete seal layer will likely become contaminated with excess water and/or soil as the concrete is placed and should be removed to expose uncontaminated concrete during or immediately following completion of concrete placement. It has been our experience that the concrete seal layer may be on the order of 3 to 5 feet thick but will depend on the pile diameter, amount of water seepage, and construction workmanship.

If the contractor must mitigate shallow groundwater conditions during construction, use of slurry drilling methods may be needed to reduce the potential for caving in the foundation excavations where groundwater levels are above the bottom of the excavation. If slurry drilling methods are used, we recommend use of a polymer slurry that meets Caltrans requirements for drilled shaft construction or bentonite-based slurry, mixed and used in accordance with the guidelines in the FHWA Drilled Shaft Manual (Brown et. al, 2010).

LIMITATIONS

This work was performed in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder’s profession practicing in the same locality, under similar conditions and at the date the services are provided. Our conclusions, opinions, and recommendations are based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. Kleinfelder makes no other representation, guarantee, or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

CLOSING

We appreciate the opportunity to be of service on this project. If you have any questions or if we can be of further assistance, please contact our office.

Sincerely,

KLEINFELDER, INC.

Alvin Lin, EIT
Staff Engineer

Kenneth G. Sorensen, PE, GE
Sr. Principal Geotechnical Engineer

Attachments:

Figure 1	Site Vicinity Map
Figure 2	Site Plan
Figure 3	Geologic and Landslide Map
Appendix A	Previous Studies Geotechnical Design Report for Soundwall Foundations, Caltrans (2003)
Appendix B	USDA Soil Survey Reports
Appendix C	USDA Corrosion of Concrete and Steel Reports

cc: Kris Johnson (kjjohnson@kleinfelder.com)
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Ricky Simon (ricky.simon@dashiell.com)
Brandon Russell (brandon.russell@dashiell.com)
Mikell Franklin (mikell.franklin@dashiell.com)

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FIGURES

PLOTTED: 1/6/2021 5:24 PM BY: jeff sala

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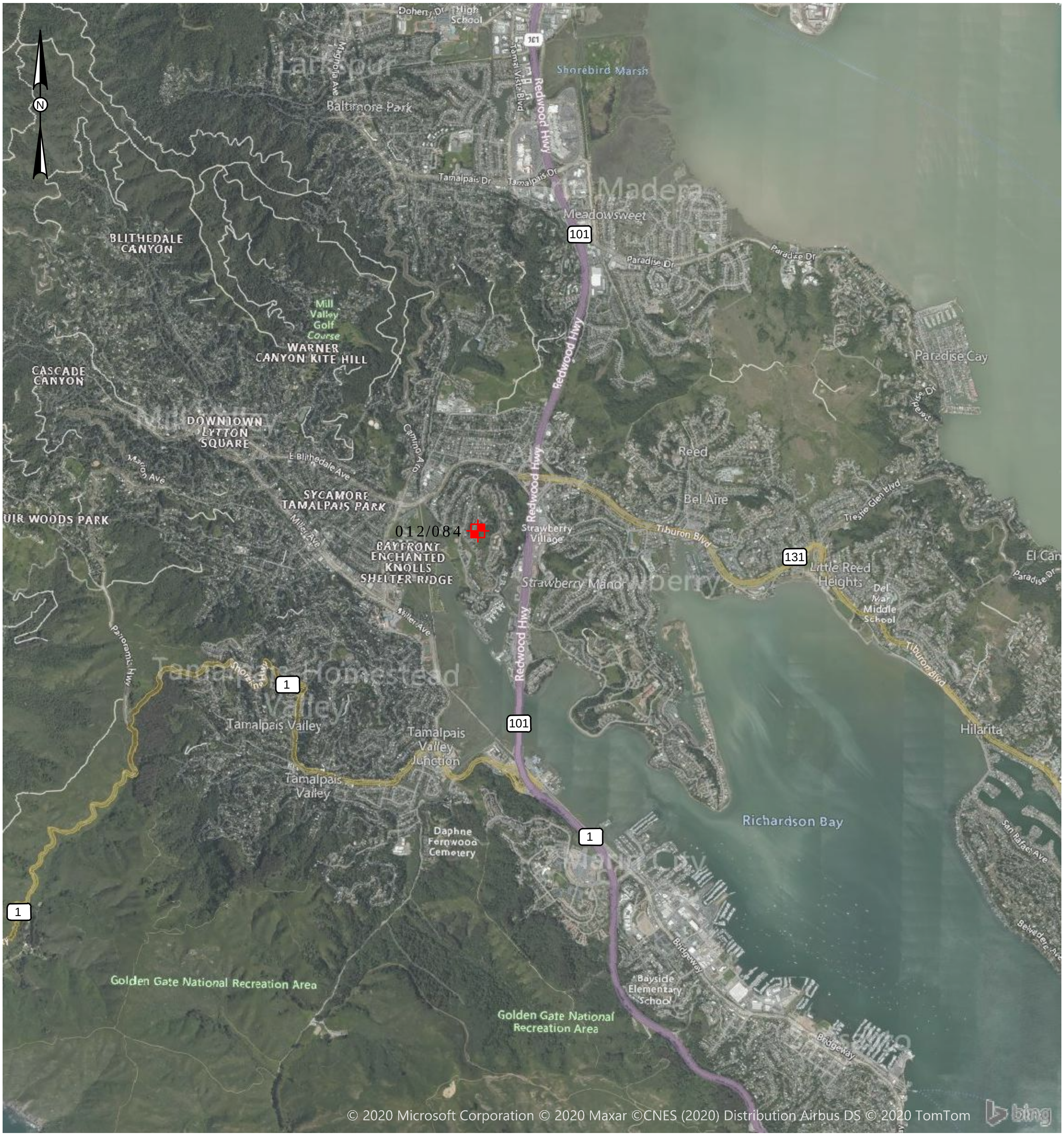

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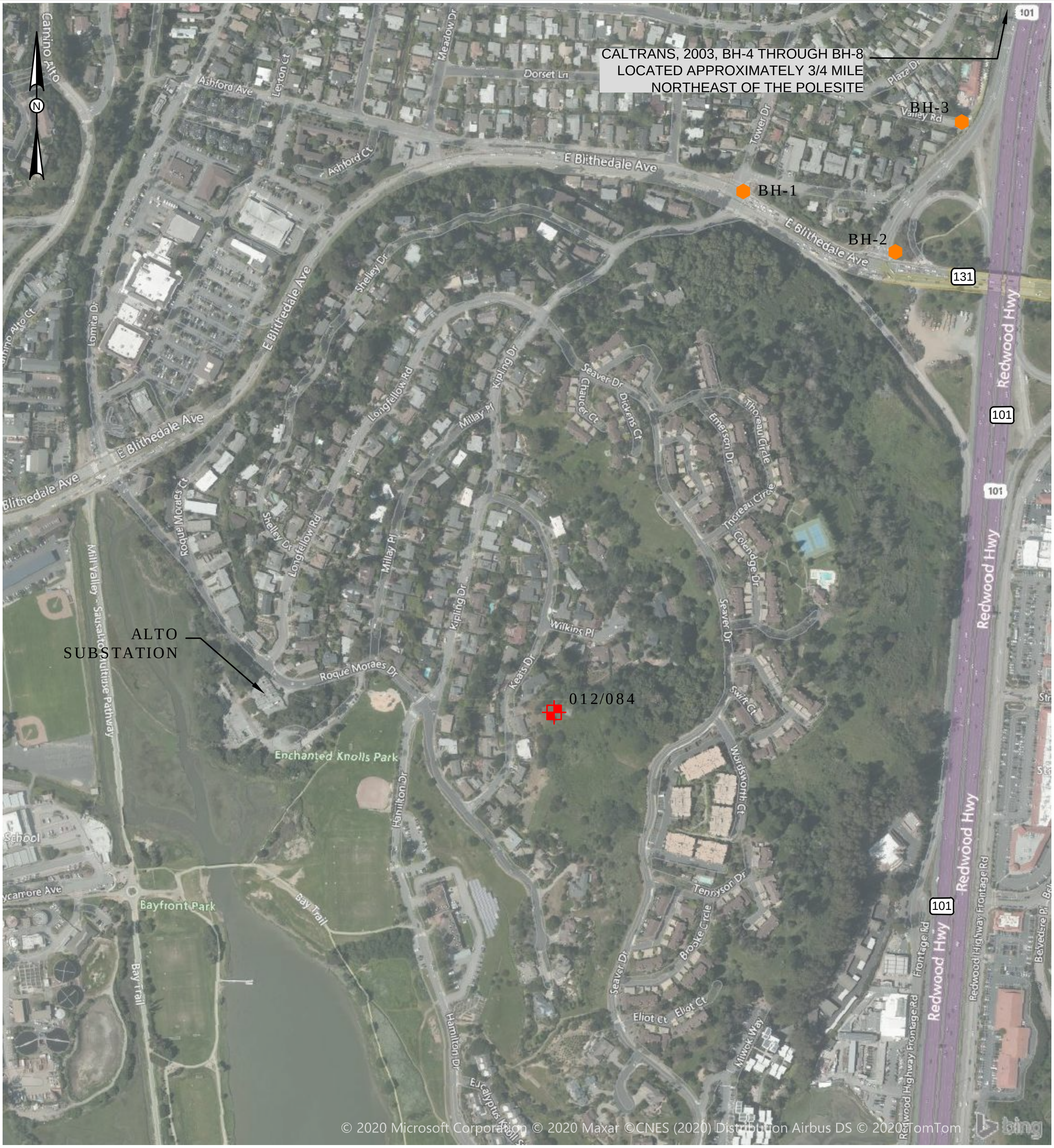
KLEINFELDER Bright People. Right Solutions.	PROJECT NO. 20203166 DRAWN BY: JDS CHECKED BY: AL DATE: 01/06/2021 REVISED:	SITE VICINITY MAP PG&E SCADA PSPS PROJECT BUNDLE C-26C MARIN COUNTY	FIGURE 1



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LEGEND

EXISTING STRUCTURE LOCATION

PREVIOUS EXPLORATIONS

(Caltrans, 2003)

KLEINFELDER
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PROJECT NO. 20203166	SITE PLAN	FIGURE
DRAWN BY: JDS		
CHECKED BY: AL	PG&E SCADA PSPS PROJECT BUNDLE C-26C MARIN COUNTY	2
DATE: 01/05/2021		
REVISED:		

PLOTTED: 1/6/2021 5:25 PM BY: jeff sala

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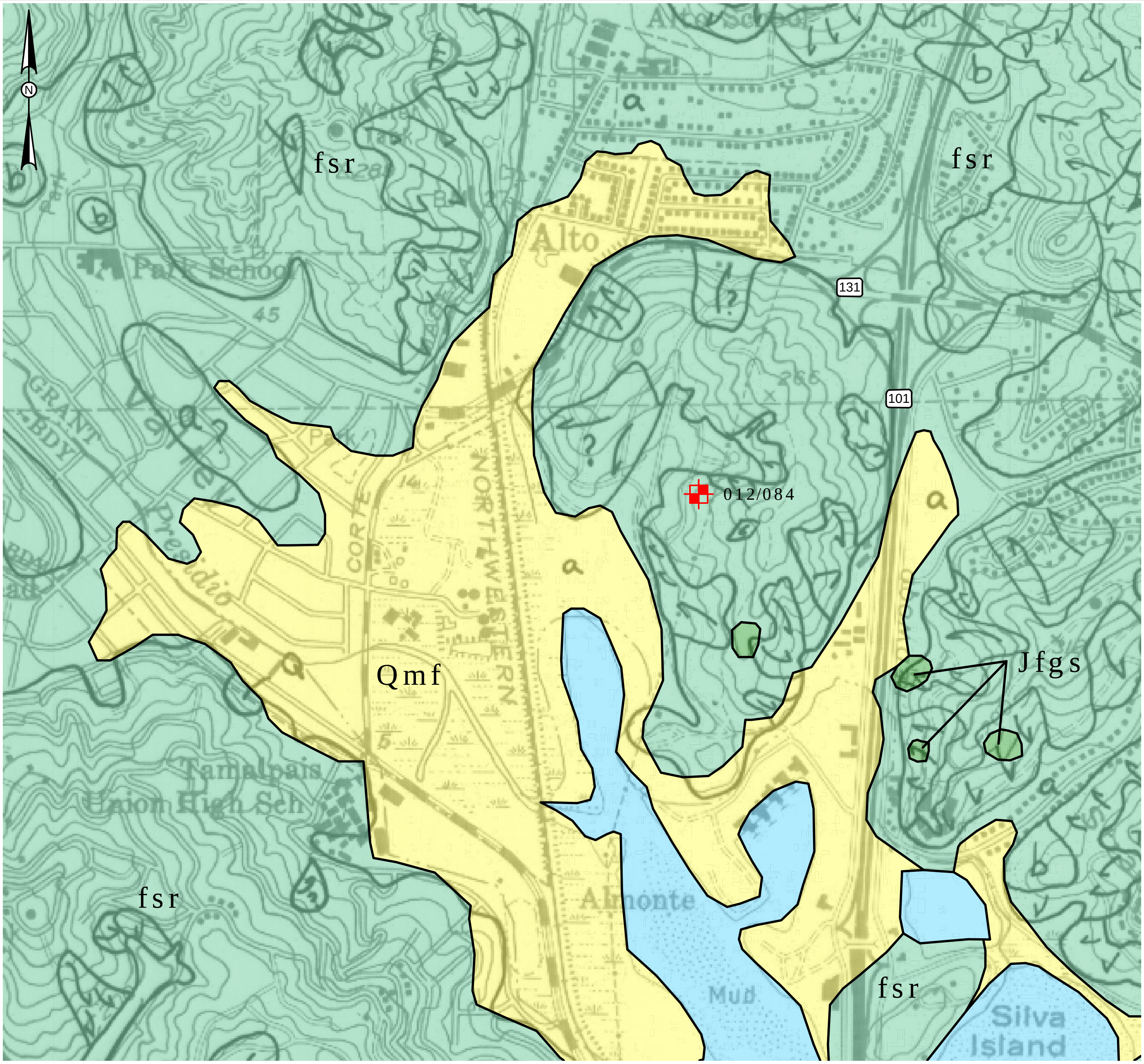

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GEOLOGY REFERENCE:
BLAKE, M.C., GRAYMER, R.W., JONES, D.L., AND SOULE, ADAM, 2000, GEOLOGIC MAP AND MAP DATABASE OF PARTS OF MARIN, SAN FRANCISCO, ALAMEDA, CONTRA COSTA, AND SONOMA COUNTIES, CA.: U.S.G.S., MISCELLANEOUS FIELD STUDIES MAP MF-2337;

LANDSLIDE REFERENCE:
CARL M. WENTWORTH & VIRGIL A. FRIZZELL, 1975, SAN RAFAEL, RECONNAISSANCE LANDSLIDE MAP OF PARTS OF MARIN & SONOMA COUNTIES, CA.: U.S.G.S., OPEN FILE MAP 75-281 (SHEET 11 OF 12)

LEGEND

	EXISTING STRUCTURE LOCATION		SEVERE CREEP
Qmf	ARTIFICIAL FILL (QUATERNARY)	a , a ?	YOUNG SEDIMENTARY DEPOSITS, UNCERTAIN WHERE QUERIED
Jfgs	GREENSTONE (JURASSIC)	b , b ?	BEDROCK WITH EROSIONAL TOPOGRAPHY, UNCERTAIN WHERE QUERIED
fsr	MELANGE		
	LANDSLIDE, UNCERTAIN WHERE QUERIED	Q	QUARRY

KLEINFELDER
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PROJECT NO.	20203166	GEOLOGIC AND LANDSLIDE MAP	FIGURE
DRAWN BY:	JDS		
CHECKED BY:	AL	PG&E SCADA PSPS PROJECT	3
DATE:	01/05/2021	BUNDLE C-26C	
REVISED:		MARIN COUNTY	

PLOTTED: 1/6/2021 5:27 PM BY: jeff sala

CAD FILE: W:\2021\20203166.001A - PG&E SCADA PSPS Project\C-26C\C-26C.dwg

APPENDIX A
PREVIOUS STUDIES

- Geotechnical Design Report for Soundwall Foundations, Soundwall/Ramp Widening Project at East Blithdale/Off-Ramp to it from 101SB, 04-MRN-101-KP9 9.2/9.7 (PM 5.71/6.03), Caltrans (2003)

DIST.	COUNTY	ROUTE	KILOMETER POSTS TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Mrn	101	9.60		

00-00-00

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PLANS APPROVAL DATE

All Dimensions are in Meters unless otherwise shown

PRELIMINARY

P-1

PLAN

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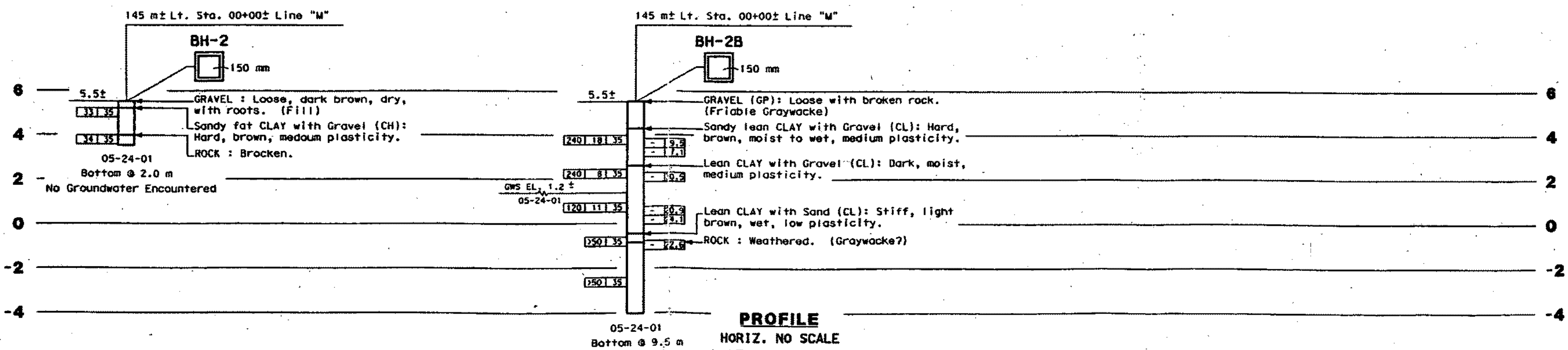

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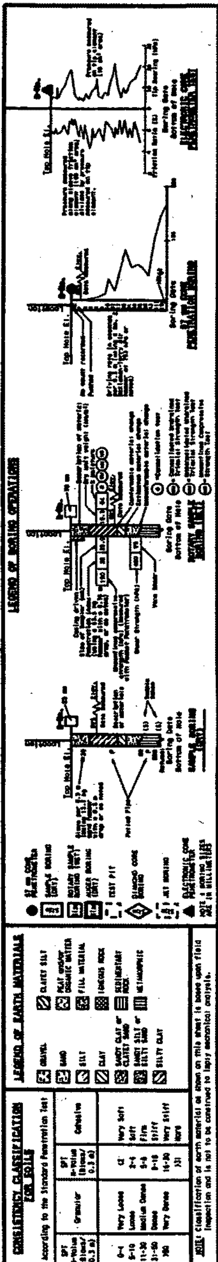
VERT. 1 : 100



DIVISION OF ENGINEERING SERVICES

DRAWN BY: M. Reynolds; 09/01

CHECKED BY: P. Sundaram

FIELD INVESTIGATION BY: P. Sundaram

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN - WEST

KILOMETER POST 9.60

SOUND WALL FOUNDATIONS
LOG OF TEST BORINGS

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 04
EA 2937U0

SHEET 1 OF 3

USERNAME => mreynold

DIST.	COUNTY	ROUTE	KILOMETER POSTS TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Mrn	101	9.60		

00-00-00

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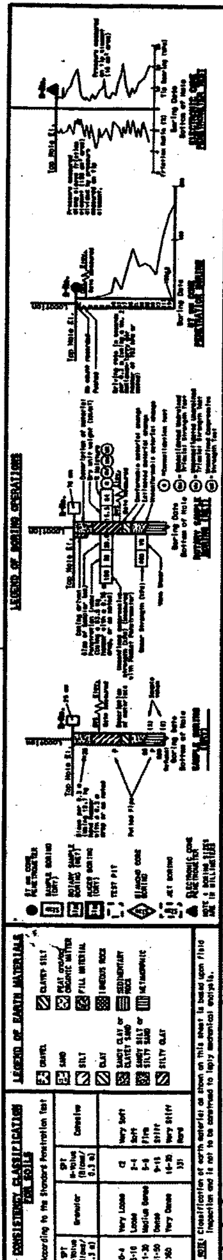
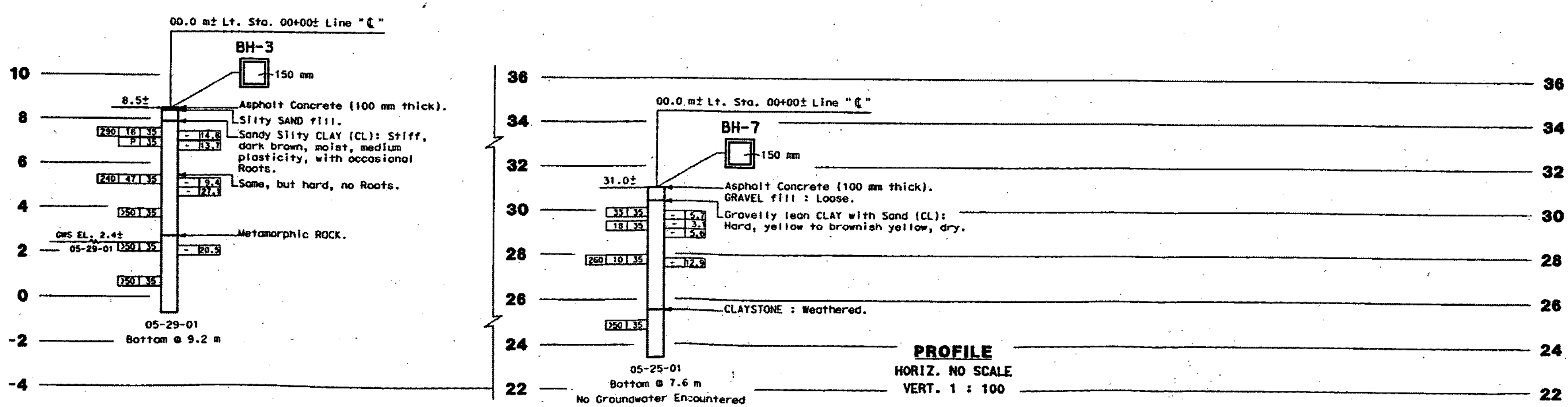
P-1

PLAN
SCALE 1 : 1000

PRELIMINARY





PROFILE
HORIZ. NO SCALE
VERT. 1 : 100

DIVISION OF ENGINEERING SERVICES		FIELD INVESTIGATION BY:	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	GEOTECHNICAL SERVICES OFFICE OF GEOTECHNICAL DESIGN - WEST	BRIDGE NO. / KILOMETER POST 9.60	SOUND WALL FOUNDATIONS — LOG OF TEST BORINGS
DRAWN BY	M. Reynolds 09/01	P. Sundaram				
CHECKED BY	P. Sundaram					

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 04
EA 2937U0

SHEET 2 OF 3

DATE PLOTTED => 02-SEP-2003

DIST.	COUNTY	ROUTE	KILOMETER POSTS TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Mrn	101	9.29/10.46		

00-00-00

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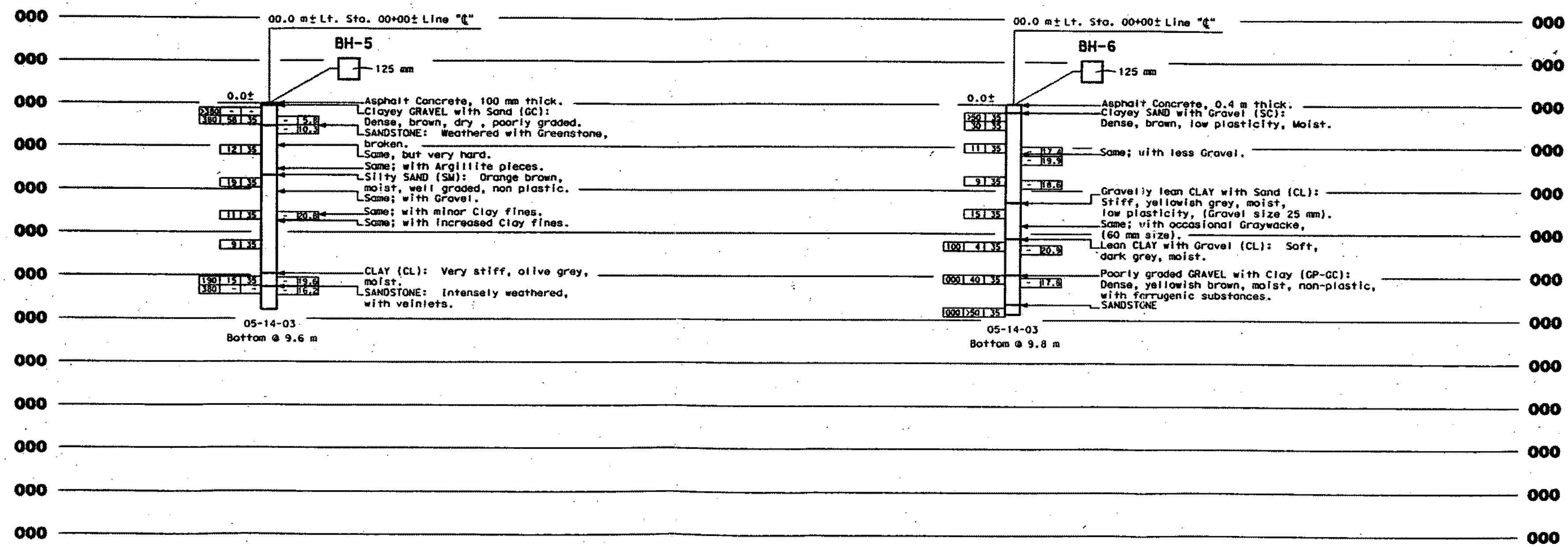
PLAN

SCALE 1 : 2000

(For boring location see PLAN, LOTB sheet 0 of 0)

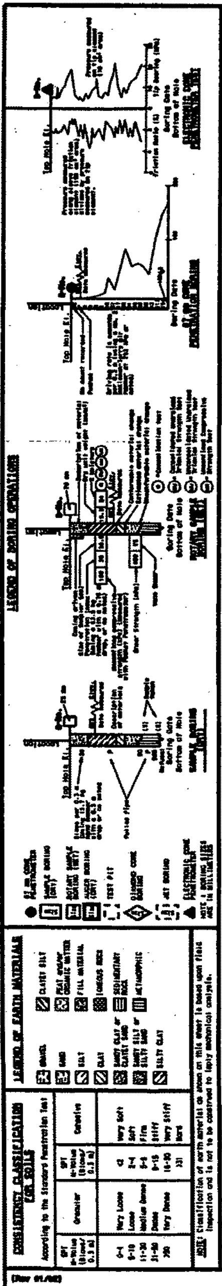


PROFILE

HORIZ. NO SCALE

VERT. 1 : 100

LOCATION 0



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DRAWN BY	M. Reynolds; 09/01					SOUND WALL FOUNDATIONS
CHECKED BY	P. Sundaram	P. Sundaram			9.60	LOG OF TEST BORINGS

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 04
EA 2937U0

SHEET 3 OF 3

USERNAME => mreynold

STATE OF CALIFORNIA
DEPT OF TRANSPORTATION
GEOTECHNICAL LAB

E.A. 04-128300
(04-293700)
Br. #

Received Sept 25, 01

CLASSIFICATION TEST SUMMARY

LOCATION	% FINER THAN															ATT. LIMITS		Gs	pcf % IN-SITU		LAB. COMP	
Sample I.D.	1 1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200	5µ	2µ	1µ	LL	PI		γ_d	%m	γ_d	%m
BH-1-SS-1		100	90	90	90	90	89	87	85	79	62	48	22	-	13	24	19			16.7		
BH-1-SS-2																26	9	2.72		24.5		
BH-1-SS-3				100	98	98	97	96	95	92	84	75	43	-	31	40	20			25.6		
BH-1-BS-1						100	99	97	94	88	74	61	24	-	16					29.0		
BH-1-US-1-IV																		2.49		118.2		
BH-1-US-1-I																			72.4	50.0		
BH-1-US-1-II																			71.0	50.0		
BH-2B-SS-1																26	10			9.5		
BH-2B-SS-2			100	98	95	89	86	82	78	73	67	60	33	-	18	50	19			30.5		
BH-2B-SS-3						100	97	96	95	91	81	71	35	-	22	32	13			20.9		
BH-2B-SS-4		100	93	91	89	79	73	68	65	60	51	42	20	-	15	27	12	2.74		22.6		
BH-2B-BS-1	100	96	92	87	83	75	68	64	59	54	47	39	20	-	13					7.1		
BH-2B-BS-2	100	98	98	97	96	94	92	90	88	83	74	65	35	-	24					24.1		
BH-3-SS-1																32	13	2.72		14.8		
BH-3-SS-2		100	84	78	76	56	50	45	41	39	37	35	18	-	8	36	14			9.4		
BH-3-BS-1		100	99	98	96	92	88	85	82	78	70	60	30	-	21					13.7		
BH-3-BS-2			100	98	98	95	93	90	87	84	78	69	39	-	25	39	21	2.73		27.1		
BH-3-BS-3					100	97	90	84	79	73	65	55	28	-	17	28	13	2.76		20.5		
BH-7-SS-1																27	10	2.74		5.7		
BH-7-SS-2	100	92	77	70	66	62	59	57	54	50	42	33	14	-	8			2.70		5.6		
BH-7-SS-3						100	99	97	96	91	77	62	30	-	18	24	8			12.9		
BH-7-BS-1	100	99	95	92	89	80	70	64	60	55	46	37	17	-	11					3.1		
BH-7-BS-2					100	98	95	92	90	34	72	59	30	-	18	28	11	2.71				

NOT INCLUDED FOR ANALYSIS. OUTSIDE PROJECT LIMITS

* Sample received fractured -- Not suitable for testing
** Sample disintegrated while preparing for testing -- Not suitable for testing
*** Sample received desiccated -- Test results may not represent the true soil conditions

STATE OF CALIFORNIA
DEPT OF TRANSPORTATION
GEOTECHNICAL LAB

E.A. 04-293700

Br. #

CLASSIFICATION TEST SUMMARY

LOCATION	% FINER THAN																	ATT. LIMITS		Gs	AS RECEIVED		LAB. COMP	
Sample I.D.	2 1/2	2	1 1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200	5μ	2μ	1μ	LL	PI		γ_d	%m	γ_d	%m
BH-5-BS-1	100	90	90	90	89	87	83	77	67	57	50	42	33	26	7	-	1	25	4	2.75		5.8		
BH-5-BS-2			100	90	85	77	70	54	48	44	41	37	33	28	10	-	4	25	8	2.78		10.3		
BH-5-BS-3	100	91	91	90	90	87	86	82	77	74	72	67	54	40	11	-	4		NP	2.76		16.9		
BH-5-BS-4				100	97	91	89	83	80	78	76	71	60	47	16	-	6	27	5	2.77		20.8		
BH-5-BS-5				100	98	94	93	86	86	86	85	77	59	43	10	-	4		NP	2.76		16.2		
BH-5-SS-1				100	94	83	75	58	52	47	44	39	34	28	12	-	5					5.6		
BH-5-SS-6																		32	12			19.6		
BH-6-US-1			100	98	96	92	90	85	83	82	81	77	65	52	16	-	7	26	5	2.73		19.9		
BH-6-US-2					100	97	96	87	79	75	73	68	56	44	15	-	7	24	5	2.72		18.6		
BH-6-US-5				100	96	77	66	49	47	46	45	42	36	30	13	-	7	29	10	2.79		17.8		
BH-6-SS-2																				2.73		17.4		
BH-6-SS-4																		31	11			19.0		
BH-6-SS-5						100	99	99	98	96	95	91	81	69	28	-	11	23	7			20.9		

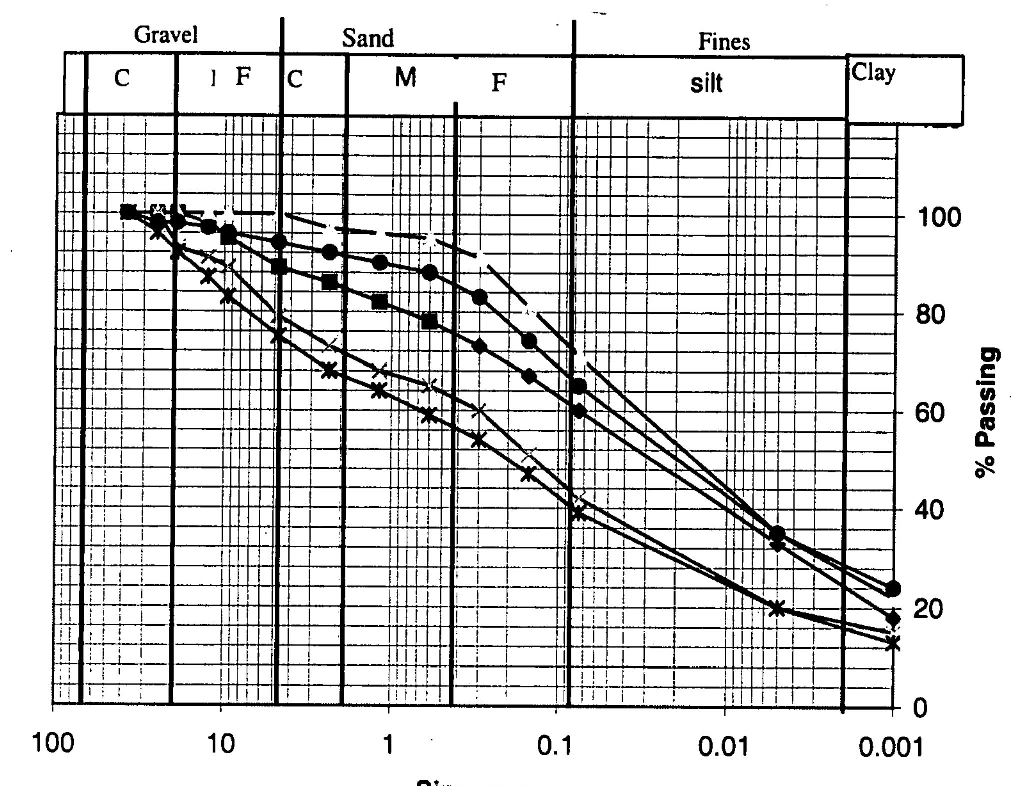
NP - Non-plastic
* Sample received fractured -- Not suitable for testing
** Sample disintegrated while preparing for testing -- Not suitable for testing
*** Sample received desiccated -- Test results may not represent the true soil conditions

Summary of Gradation Data: 04 293700

Bore Hole BH-2B at the junction of E.Blithedale and offramp from 101SB

	% Passing for Sample No (Average depth in meters).					
Size,mm	SS-2(3.28)	SS-3(4.80)	SS-4(6.33)	BS-1(2.4)	BS-2(5.5)	
50						
37.5				100	100	
25			100	96	98	
19	100		93	92	98	
12.5	98		91	87	97	
9.5	95		89	83	96	
4.75	89	100	79	75	94	
2.36	86	97	73	68	92	
1.18	82	96	68	64	90	
0.6	78	95	65	59	88	
0.3	73	91	60	54	83	
0.15	67	81	51	47	74	
0.075	60	71	42	39	65	
0.005	33	35	20	20	35	
0.001	18	22	15	13	24	

Gravel %	11	0	21	25	6	
Sand %	49	29	37	36	29	
Fines %	40	71	42	39	65	



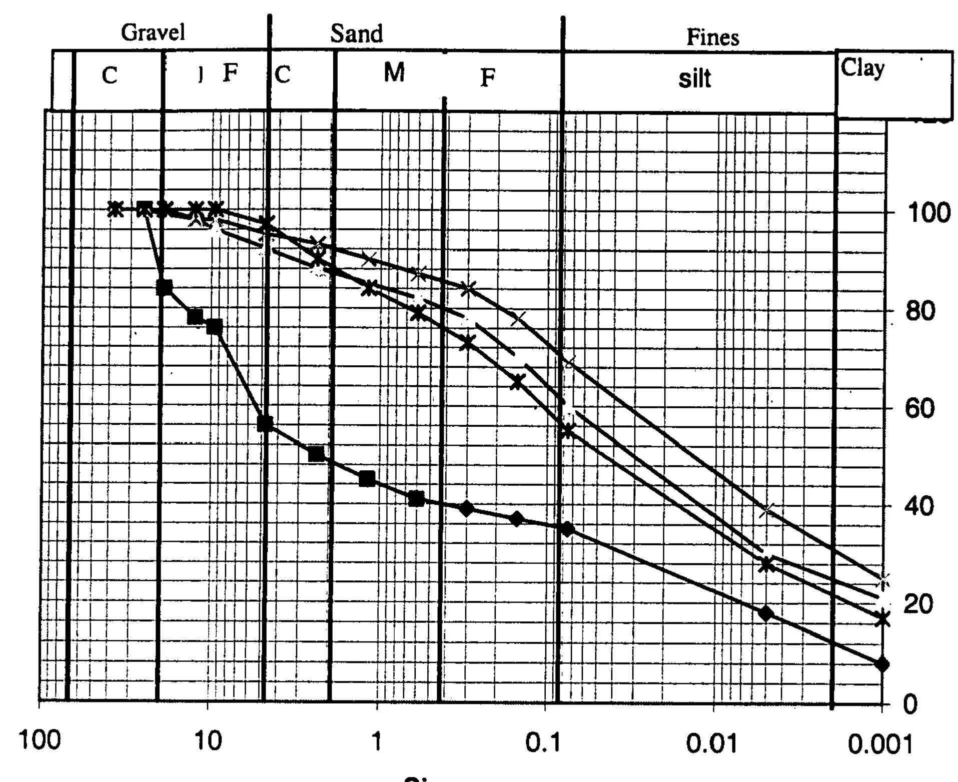
Gradation Results for BH-2B

Bore Hole BH-3 at the west end of Valley Rd (44,Valley) near 101SB

Summary of Gradation Data: 04 293700

Size,mm	% Passing for Sample No (Average depth in meters).					
	SS-2(3.28)	BS-1(2.0)	BS-2(3.7)	BS-3(6.55)		
50						
37.5						
25	100	100	100			
19	84	99	100			
12.5	78	98	98			
9.5	76	96	98	100		
4.75	56	92	95	97		
2.36	50	88	93	90		
1.18	45	85	90	84		
0.6	41	82	87	79		
0.3	39	78	84	73		
0.15	37	70	78	65		
0.075	35	60	69	55		
0.005	18	30	39	28		
0.001	8	21	25	17		

Gravel %	44	8	5	3		
Sand %	21	32	26	42		
Fines %	35	60	69	55		



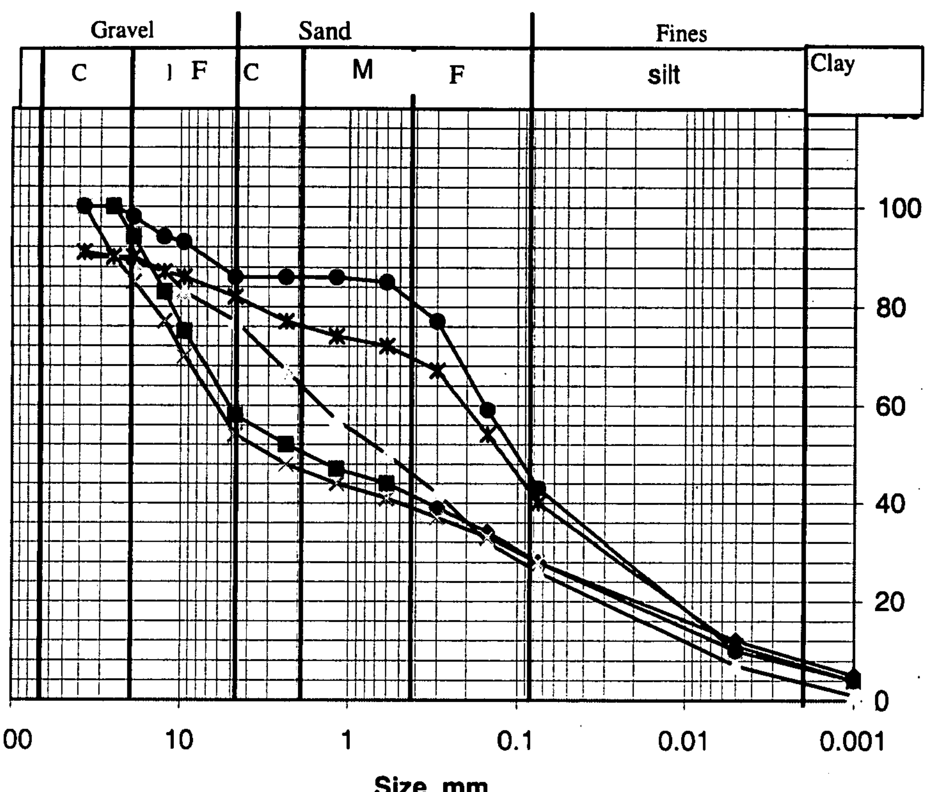
Gradation Results for BH-3

Summary of Gradation Data: 04 293700

Bore Hole BH-5 near PM 6.00 marker on west side of Rte.101 SB.

	% Passing for Sample No (Average depth in meters).					
Size,mm	SS-1(0.85)	BS-1(1.2)	BS-2(1.5)	BS-3(4.6)	BS-5(9.1)	
50		90		91		
37.5		90	100	91		
25	100	90	90	90	100	
19	94	89	85	90	98	
12.5	83	87	77	87	94	
9.5	75	83	70	86	93	
4.75	58	77	54	82	86	
2.36	52	67	48	77	86	
1.18	47	57	44	74	86	
0.6	44	50	41	72	85	
0.3	39	42	37	67	77	
0.15	34	32	33	54	59	
0.075	28	26	28	40	43	
0.005	12	7	10	11	10	
0.001	5	1	4	4	4	

Gravel %	42	23	46	18	14	
Sand %	30	51	26	42	41	
Fines %	28	26	28	40	43	



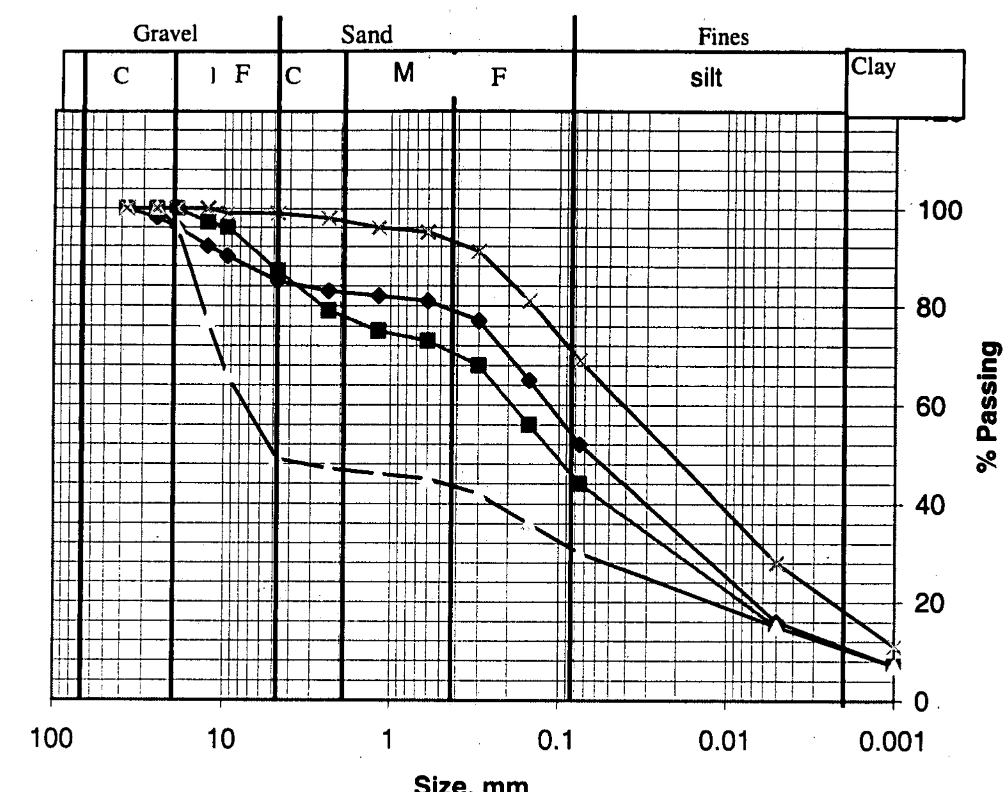
Gradation Results for BH-5

Summary of Gradation Data: 04 293700

Bore Hole BH-6 60-m north of Post Mile Marker 6.00 on the west side shoulder of off ramp to E.Blithedale from 101SB

Size,mm	% Passing for Sample No (Average depth in meters).					
	US-1(7.40)	US-2(7.40)	US-5(7.4)	SS-5(6.7)		
50						
37.5	100					
25	98		100			
19	96	100	96			
12.5	92	97	77	100		
9.5	90	96	66	99		
4.75	85	87	49	99		
2.36	83	79	47	98		
1.18	82	75	46	96		
0.6	81	73	45	95		
0.3	77	68	42	91		
0.15	65	56	36	81		
0.075	52	44	30	69		
0.005	16	15	15	28		
0.001	7	7	7	11		

Gravel %	15	13	51	1		
Sand %	33	43	19	30		
Fines %	52	44	30	69		



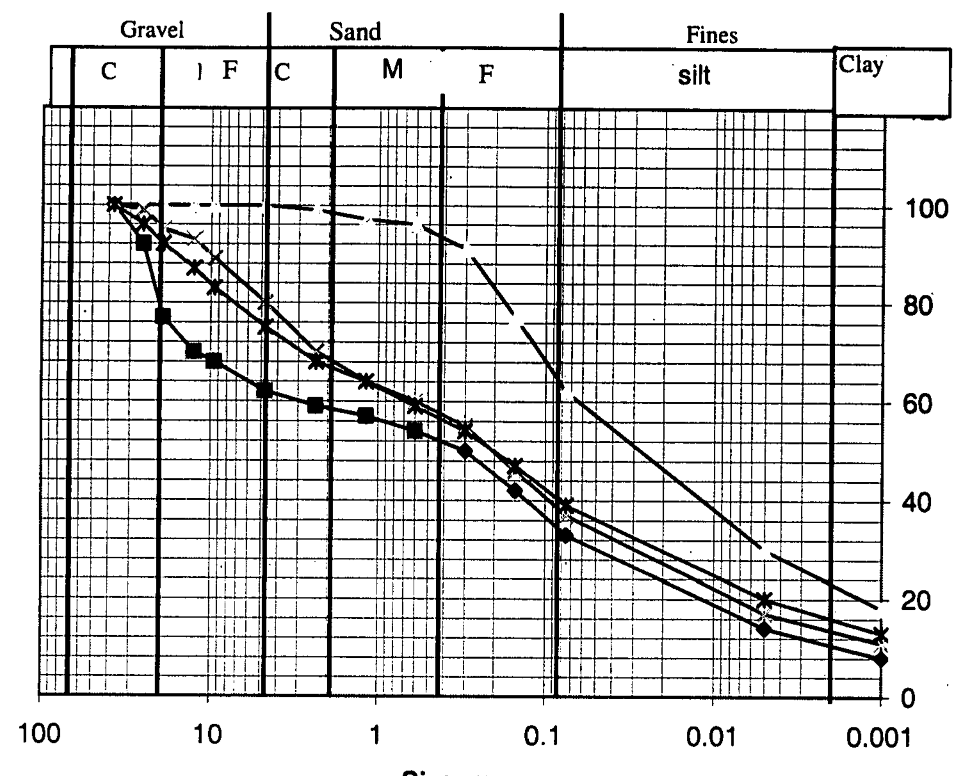
Gradation Results for BH-6

Bore Hole BH-7 on Lomita Dr. east of Plaza Dr in the City of Mill Valley close to Rte. 101 SB

Summary of Gradation Data: 04 293700

	% Passing for Sample No (Average depth in meters).					
Size,mm	SS-2(1.8)	SS-3(3.3)	BS-1(1.1)	BS-2(3.5)		
50						
37.5	100		100	100		
25	92		99	96		
19	77		95	92		
12.5	70		93	87		
9.5	68		89	83		
4.75	62	100	80	75		
2.36	59	99	70	68		
1.18	57	97	64	64		
0.6	54	96	60	59		
0.3	50	91	55	54		
0.15	42	77	46	47		
0.075	33	62	37	39		
0.005	14	30	17	20		
0.001	8	18	11	13		

Gravel %	38	0	20	25		
Sand %	29	38	43	36		
Fines %	33	62	37	39		



Gradation Results for BH-7

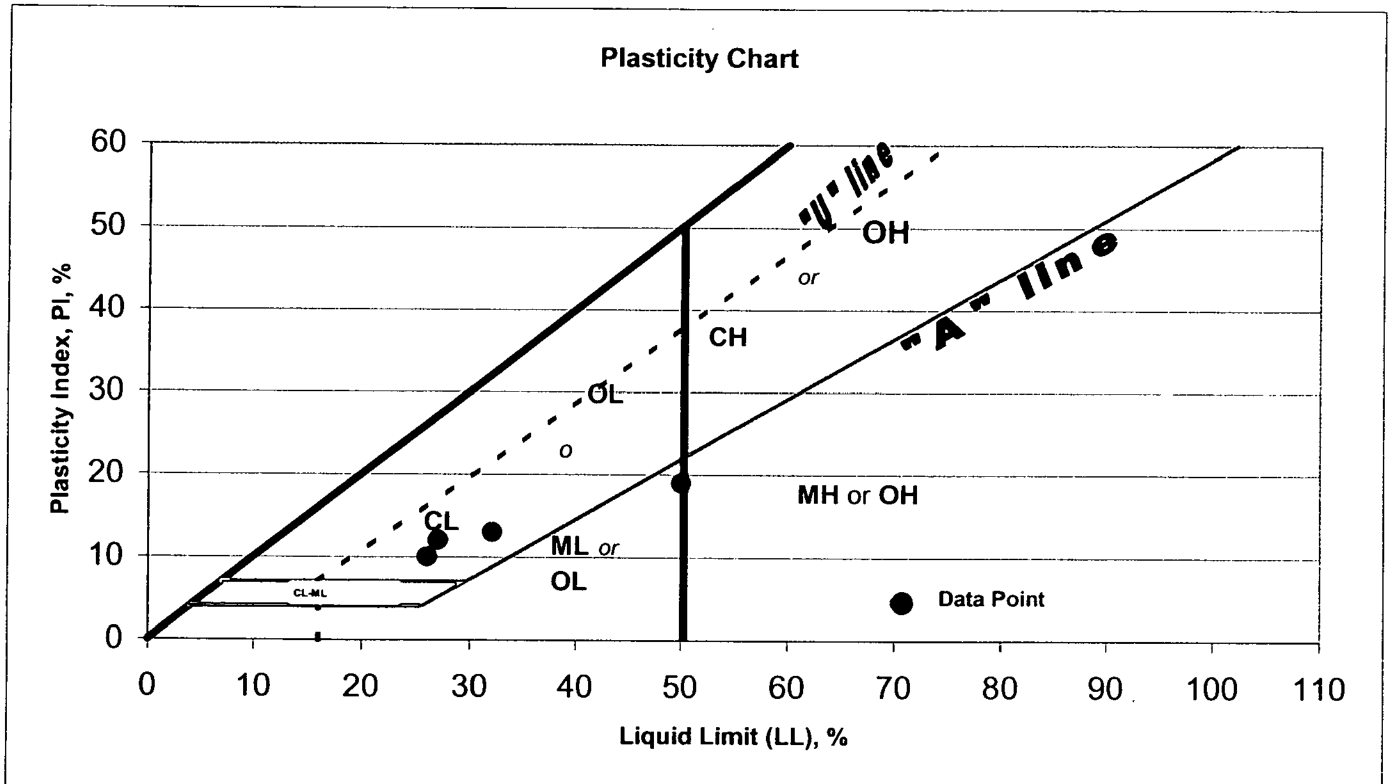


Figure : Interpretation of Plasticity Data - Soil Samples from BH-2B - 04 2937U0	

Geotechnical Design Branch D

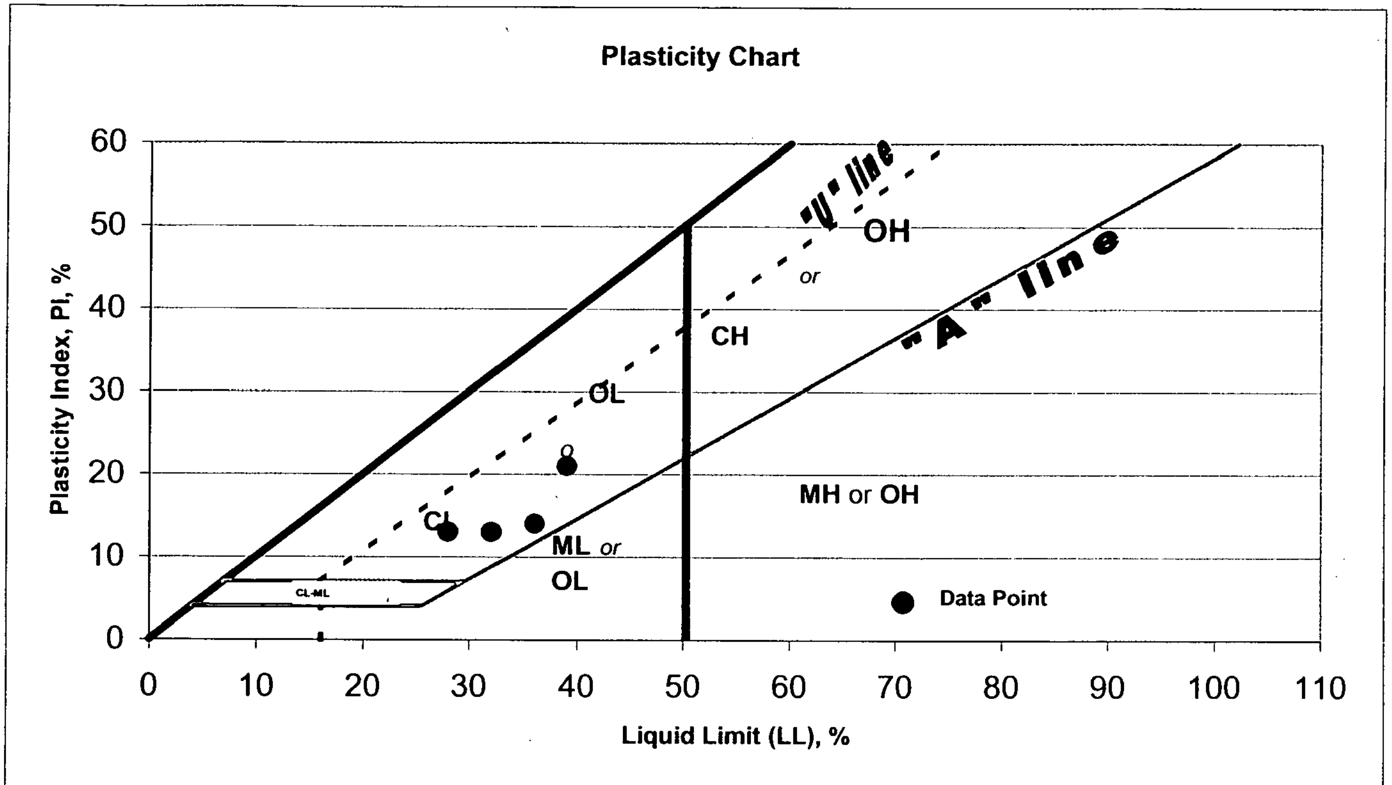


Figure : Interpretation of Plasticity Data - Soil Samples from BH-3 - 04 2937U0

Geotechnical Design Branch D

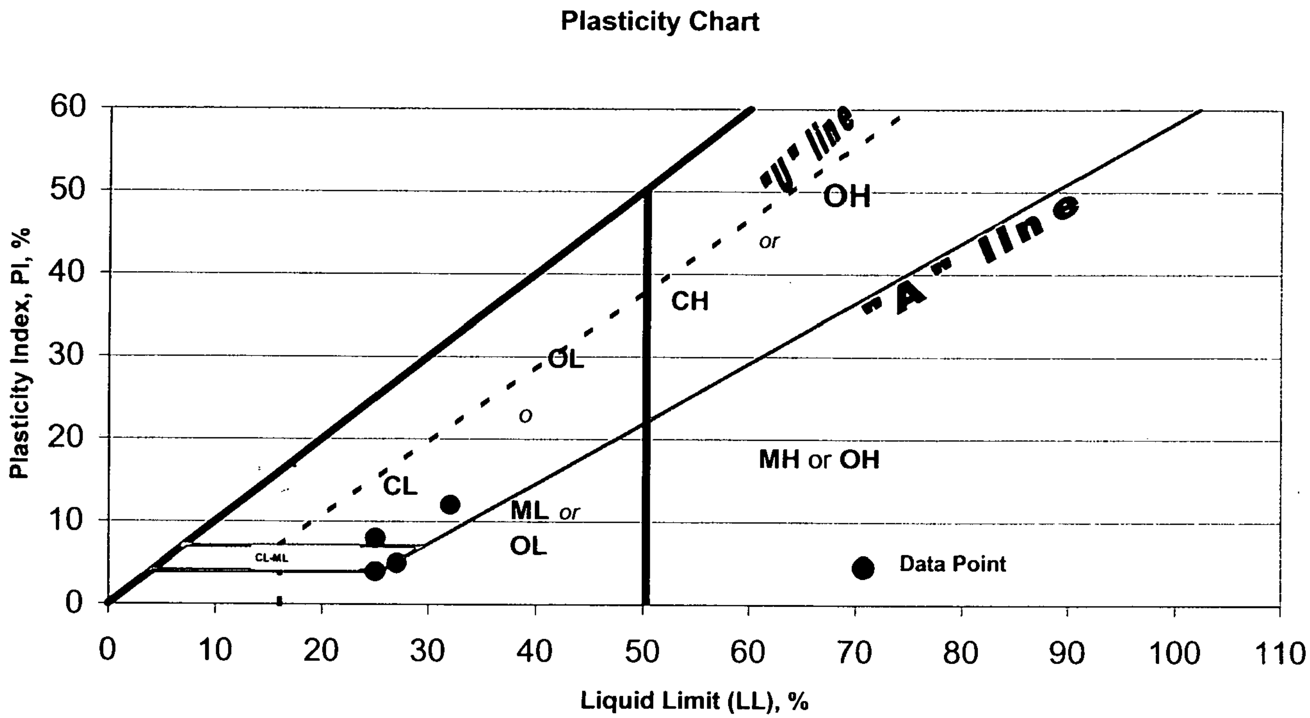


Figure : Interpretation of Plasticity Data - Soil Samples from BH-5 - 04 2937U0

Caltrans

Geotechnical Design Branch D

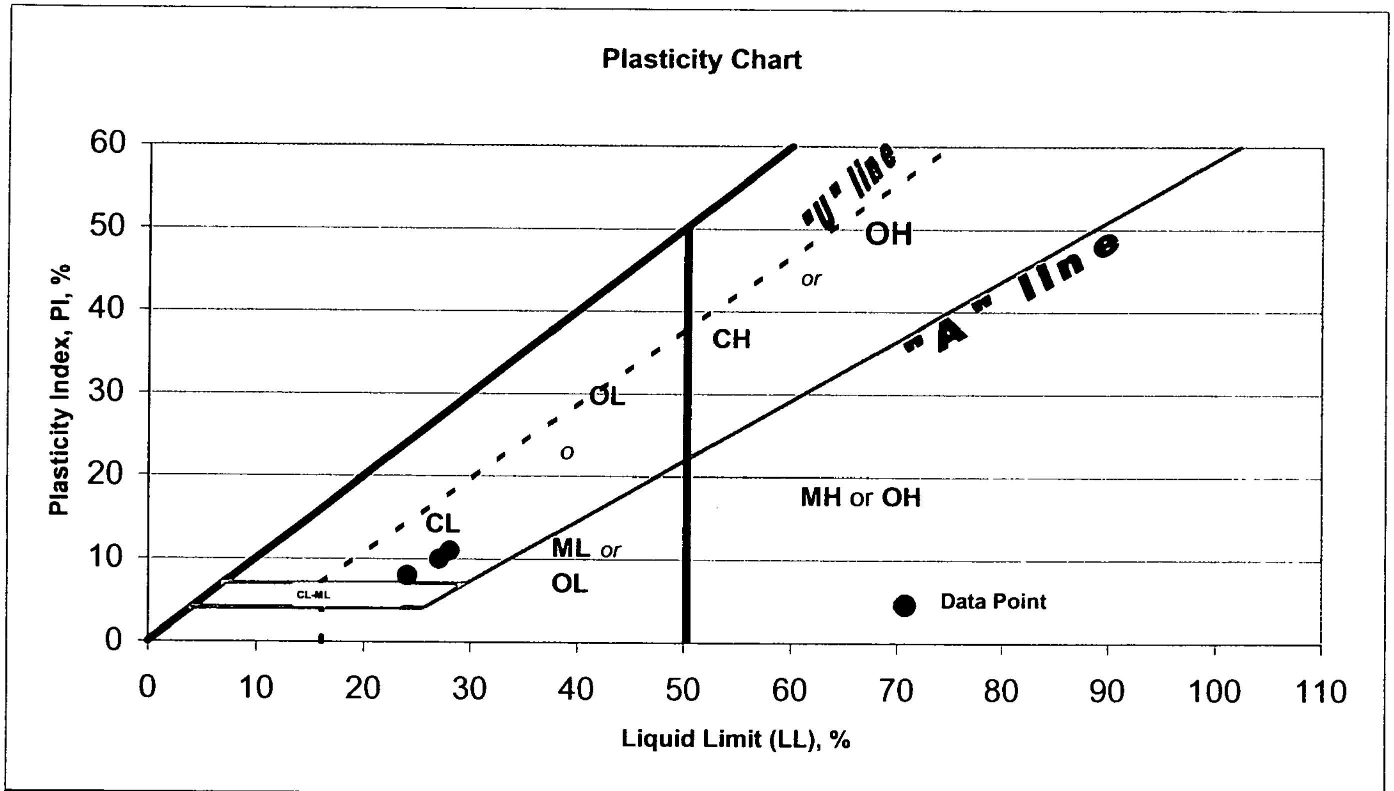


Figure : Interpretation of Plasticity Data - Soil Samples from BH-7 - 04 2937U0

Geotechnical Design Branch D

APPENDIX B
USDA SOIL SURVEY REPORT

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Marin County, California

January 5, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:1,790 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 25, 50, 100, 150

Feet: 0, 50, 100, 200, 300

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Marin County, California
Survey Area Data: Version 14, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 22, 2019—Apr 25, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
166	Saurin-Urban land-Bonnydoon complex, 30 to 50 percent slopes	16.9	100.0%
Totals for Area of Interest		**16.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Marin County, California

166—Saurin-Urban land-Bonnydoon complex, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: hf37
Elevation: 50 to 1,500 feet
Mean annual precipitation: 25 to 40 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 270 to 320 days
Farmland classification: Not prime farmland

Map Unit Composition

Saurin and similar soils: 30 percent
Urban land: 25 percent
Bonnydoon and similar soils: 20 percent
Minor components: 21 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Saurin

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 10 inches: clay loam
H2 - 10 to 33 inches: clay loam
H3 - 33 to 37 inches: bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Hydric soil rating: No

Description of Urban Land

Setting

Landform: Hills

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear

Interpretive groups
Land capability classification (irrigated): 8
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Description of Bonnydoon

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from sandstone and shale

Typical profile
H1 - 0 to 11 inches: gravelly loam
H2 - 11 to 15 inches: bedrock

Properties and qualities
Slope: 30 to 50 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.4 inches)

Interpretive groups
Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Xerorthents
Percent of map unit: 5 percent
Hydric soil rating: No

Tocaloma
Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed, shallow
Percent of map unit: 5 percent
Hydric soil rating: No

Slumps
Percent of map unit: 2 percent
Hydric soil rating: No

Los osos

Percent of map unit: 2 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 percent
Hydric soil rating: No

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APPENDIX C
USDA CORROSION OF CONCRETE REPORT

Map Scale: 1:1,790 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0, 25, 50, 100, 150

Feet: 0, 50, 100, 200, 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- High
- Moderate
- Low
- Not rated or not available

Soil Rating Lines

- High
- Moderate
- Low
- Not rated or not available

Soil Rating Points

- High
- Moderate
- Low
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Marin County, California
Survey Area Data: Version 14, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 22, 2019—Apr 25, 2019

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

Corrosion of Concrete

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
166	Saurin-Urban land-Bonnydoon complex, 30 to 50 percent slopes	Low	16.9	100.0%
Totals for Area of Interest			**16.9**	**100.0%**

Description

"Risk of corrosion" pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens concrete. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the concrete in installations that are entirely within one kind of soil or within one soil layer.

The risk of corrosion is expressed as "low," "moderate," or "high."

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Advice 6186-E-B
March 9, 2022

Attachment 4

Erosion and Sediment Control Plan

Project Description

Project Name: Ignacio-Alto-Sausalito #1 & #2 SCADA Bundle C-26C	PG&E Project Manager: Yasmin Hassen
Project Location: 37.8984582, -122.5207762	Phone: 925-378-0352
Annual rainfall for the project area: 37.59 inches (https://www.idcide.com/weather/ca/sausalito.htm).	
Amount of soil disturbance for the Project: 0.860 acres	

Construction Activities Include: ☒ *Concrete work* ☐ *Demolition* ☒ *Excavation/Trenching* ☒ *Grading*
☒ *Material/Stockpile Management* ☒ *Pavement work* ☒ *Pole replacement*
☐ *Other:*

Unique Site Features

☐ Biological Assessment has been prepared for the project
☒ Soil disturbance on slopes could result in high soil erosion potential (slope ≥2:1)
☒ Adjacent to sensitive habitat including wetlands or 303(d) listed surface water bodies (< 25 feet)

Project Schedule

Start of soil disturbing activities:	05/01/2022
End of soil disturbing activities:	06/30/2022
End of construction:	06/30/2022

BMP Inspections, Maintenance, and Repair

BMPs will be inspected once a month, unless directed otherwise by the Project Team. A Construction Site Inspection Checklist is provided in *Attachment C*. In the event that deficiencies in BMPs are found during the inspection, the cause of the failure will be determined and the BMP will be repaired or replaced. PG&E's Activity Specific-Erosion and Sediment Control Plan (A-ESCP) for Good Housekeeping (PG&E 2013a) and Soil Stockpiles (PG&E 2013b) shall be used as a minimum standard for good housekeeping practices on-site.

Discharge Reporting

If a discharge occurs or if the Project receives a written notice or order from any regulatory agency, contact the local Environmental Field Specialist (EFS) representative first to ensure that all PG&E Spill Response Measures are followed as required. A Notice of Discharge form is provided in *Attachment D*.

EFS 24-hour contact number is 800-874-4043.

Training

The Erosion and Sediment Control Manager (ESCM) assigned to this Project is:

Name: Jeff Menacho	Phone: 916-769-4064
Company: Ahtna Government Services Corporation	Address: 3100 Beacon Blvd., West Sacramento, CA 95691

The ESCM will have primary responsibility for the implementation, maintenance, and inspection of the ESCP. A training log showing training of various personnel is shown in *Attachment E*.

Post-Construction Storm Water Management

Upon completion of construction within the Project area, all temporary BMPs will be removed. All construction equipment will be demobilized and removed from the site. A final site inspection will be conducted to ensure that all disturbed soil areas have been stabilized with vegetation or other method per Project specifications (minimum of 70% of pre-existing vegetative cover or equivalent soil stabilization in all disturbed soil areas). A Final Site Inspection Checklist is provided in *Attachment F*.

Best Management Practices (BMP) Checklist

(Select BMPs that apply to this project)

Erosion Control

- ☒ *EC-1, Scheduling*
- ☒ *EC-2**, Preservation of Existing Vegetation*
- ☐ *EC-3, Hydraulic Mulch*
- ☒ *EC-4, Hydroseeding **
- ☐ *EC-5, Soil Binders*
- ☐ *EC-6**, Straw Mulch **
- ☒ *EC-7**, Geotextiles, Plastic Covers, and Erosion Control Blankets/Mats*
- ☐ *EC-8**, Wood Mulch*
- ☒ *EC-9**, Earth Dikes and Drainage Swales*
- ☐ *EC-10, Velocity Dissipation Devices*
- ☐ *EC-11, Slope Drains*
- ☐ *EC-12, Streambank Stabilization*
- ☐ *EC-14, Compost Blankets*
- ☐ *EC-15, Soil Preparation / Roughening*
- ☒ *EC-16**, Non-Vegetative Stabilization*

Sediment Control

- ☒ *SE-1**, Silt Fence*
- ☐ *SE-2, Sediment Basin*
- ☐ *SE-3, Sediment Trap*
- ☐ *SE-4, Check Dam*
- ☒ *SE-5**, Fiber Rolls*
- ☒ *SE-6**, Gravel Bag Berm*
- ☒ *SE-7, Street Sweeping and Vacuuming*
- ☐ *SE-8, Sandbag Barrier*
- ☐ *SE-9, Straw Bale Barrier*
- ☒ *SE-10**, Storm Drain Inlet Protection*
- ☐ *SE-11, Active Treatment Systems*
- ☐ *SE-12, Temporary Silt Dike*
- ☐ *SE-13, Compost Socks and Berms*
- ☐ *SE-14, Biofilter Bags*

Tracking Control

- ☒ *TC-1**, Stabilized Construction Entrance/Exit*
- ☐ *TC-2**, Stabilized Construction Roadway*
- ☐ *TC-3**, Entrance / Outlet Tire Wash*

Wind Erosion Control

- ☒ *WE-1, Wind Erosion Control*

Non-Storm Water

- ☒ *NS-1, Water Conservation Practices*
- ☒ *NS-2, Dewatering Operations*
- ☒ *NS-3**, Paving and Grinding Operations*
- ☐ *NS-4, Temporary Stream Crossing*
- ☐ *NS-5, Clean Water Diversion*
- ☒ *NS-6, Illicit Connection / Discharge*
- ☒ *NS-7, Potable Water / Irrigation*
- ☒ *NS-8, Vehicle and Equipment Cleaning*
- ☒ *NS-9**, Vehicle & Equipment Fueling*
- ☒ *NS-10, Vehicle and Equipment Maintenance*
- ☐ *NS-11, Pile Driving Operations*
- ☒ *NS-12, Concrete Curing*
- ☒ *NS-13, Concrete Finishing*
- ☐ *NS-14, Material Over Water*
- ☐ *NS-15, Demolition Adjacent to Water*
- ☐ *NS-16, Temporary Batch Plants*

Waste Management and Materials Pollution Control

- ☒ *WM-1**, Material Delivery and Storage*
- ☒ *WM-2**, Material Use*
- ☒ *WM-3**, Stockpile Management*
- ☒ *WM-4**, Spill Prevention and Control*
- ☒ *WM-5**, Solid Waste Management*
- ☒ *WM-6**, Hazardous Materials/Waste Management*
- ☒ *WM-7**, Contaminated Soil Management*
- ☒ *WM-8**, Concrete Waste Management*
- ☒ *WM-9**, Sanitary/Septic Waste Management*
- ☒ *WM-10**, Liquid Waste Management*

* Seed mixtures/straw used for erosion control must be certified weed free. Check with a PG&E Biologist whether special seed mixes are required for your geography.
** Has a PG&E cut sheet

ATTACHMENT A

WATER POLLUTION CONTROL DRAWINGS (WPCD)

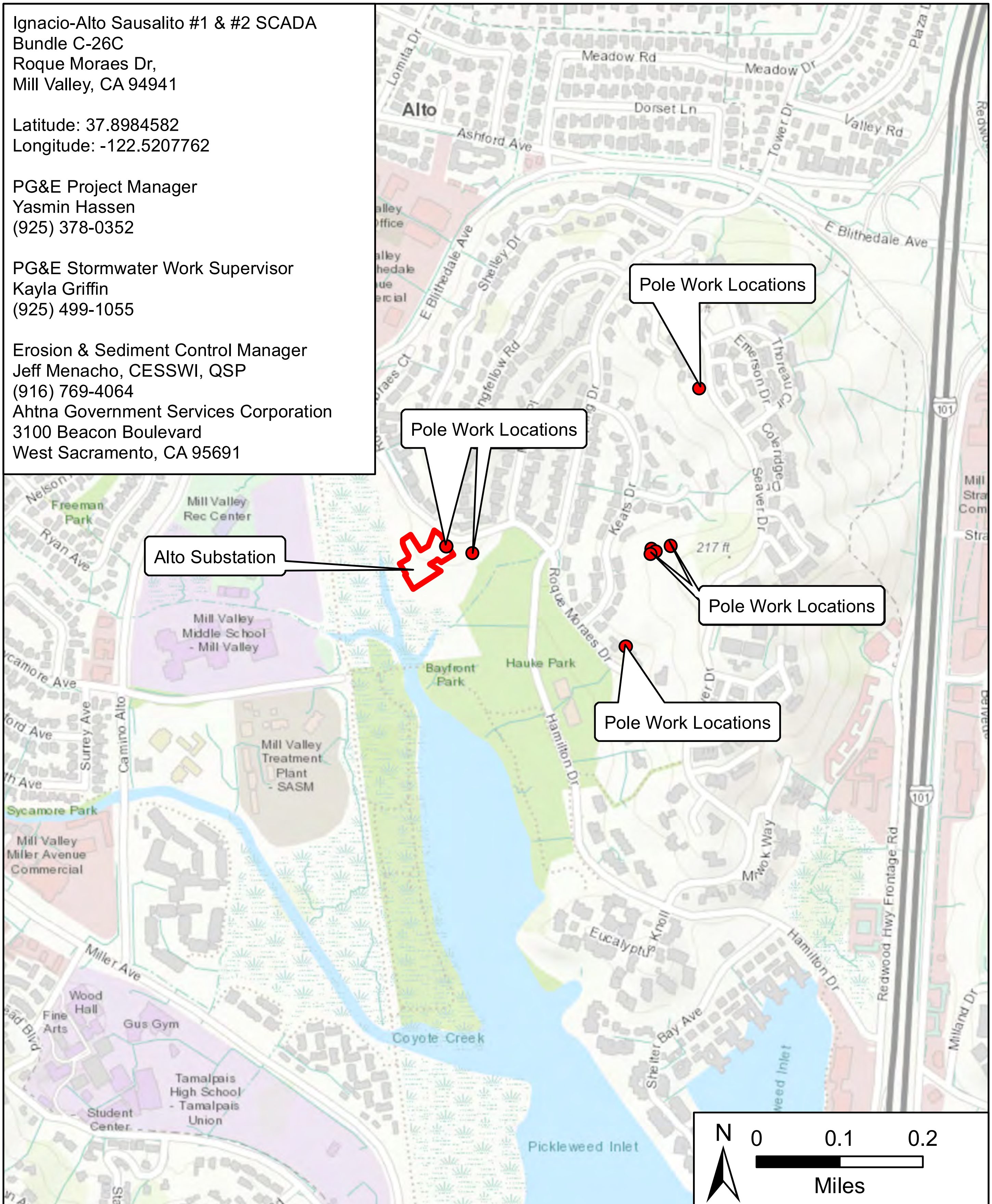
Ignacio-Alto Sausalito #1 & #2 SCADA
Bundle C-26C
Roque Moraes Dr,
Mill Valley, CA 94941

Latitude: 37.8984582
Longitude: -122.5207762

PG&E Project Manager
Yasmin Hassen
(925) 378-0352

PG&E Stormwater Work Supervisor
Kayla Griffin
(925) 499-1055

Erosion & Sediment Control Manager
Jeff Menacho, CESSWI, QSP
(916) 769-4064
Ahtna Government Services Corporation
3100 Beacon Boulevard
West Sacramento, CA 95691



PG&E Ahtna Government Services Corporation	Order No.: 74019482	**Project Location Map**	Figure
	S-ESCP FEB 2022	Ignacio-Alto Sausalito #1 & #2 SCADA Bundle C-26C Mill Valley, Marin County CA 94941 USGS 7.5 min San Rafael Quadrangle, 2018	1

Source: Digital USGS topo data provided by ESRI. *Project area is for graphical purposes only.

☒	Proposed Overhead Tower Work
⊙	Proposed New TSP
✳	Proposed New LDSP
	Proposed Drainage Swale
→	Flow Direction
	Fiber Roll
	ERTEC Silt Fence
	Substation
	Staging Area
	Hydroseeding and Erosion Control Blanket
	Crane Pad
	Proposed Limit of Grading
	Proposed Tower Access
	Wetland
	Existing Earthen Access Road
	Stockpile Area

Ignacio-Alto Sausalito #1 & #2 SCADA Bundle C-26C
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West Sacramento, CA 95691

Contractor/crew shall ensure protection of existing vegetation; fencing will not be present.

Vehicle fueling and maintenance will occur off-site.

Disturbed areas shall be returned to pre-construction conditions or better using seeding, erosion control blanket, gravel, compaction, and concrete.

An effective combination of dust control, street sweeping and tracking controls shall be implemented to reduce fugitive dust and trackout based on daily visual observations.

Sanitation stations are anticipated to be towed behind work trucks and shall have spill trays.

Refer to Grading Plans for grading and drainage design details.

Refer to CASQA SE-5 Fiber Roll BMP sheet for installation guidelines on mid-slopes.

BMPs

BMPs not called out at specific locations on the figure apply to ALL work locations.

Erosion Control

EC-1	Scheduling
EC-2	Preservation Of Existing Vegetation
EC-4	Hydroseeding
EC-7	Geotextiles, Plastic Covers, and Erosion Control Blankets/Mats
EC-9	Earth Dikes and Drainage Swales
EC-16	Non-Vegetative Stabilization

Sediment Control

SE-1	Silt Fence
SE-5	Fiber Roll/ProWattle
SE-6	Gravel Bag Berm
SE-7	Street Sweeping and Vacuuming
SE-10	Storm Drain Inlet Protection

Tracking Control

TC-1	Stabilized Construction Entrance/Exit

Wind Erosion Control

WE-1	Wind Erosion Control

Non-Storm Water

NS-1	Water Conservation Practices
NS-2	Dewatering Operations
NS-3	Paving and Grinding Operations
NS-6	Illicit Connection/Discharge
NS-7	Potable Water/Irrigation
NS-8	Vehicle and Equipment Cleaning
NS-9	Vehicle and Equipment Fueling
NS-10	Vehicle and Equipment Maintenance
NS-12	Concrete Curing
NS-13	Concrete Finishing

Waste Management and Materials Pollution Control

WM-1	Material Delivery and Storage
WM-2	Material Use
WM-3	Stockpile Management
WM-4	Spill Prevention and Control
WM-5	Solid Waste Management
WM-6	Hazardous Materials/ Waste Management
WM-7	Contaminated Soil Management
WM-8	Concrete Waste Management
WM-9	Sanitary/Septic Waste Management
WM-10	Liquid Waste Management
A-ESCP	Sawcutting, Grinding, and Paving
A-ESCP	Good Housekeeping
A-ESCP	Stockpile Management

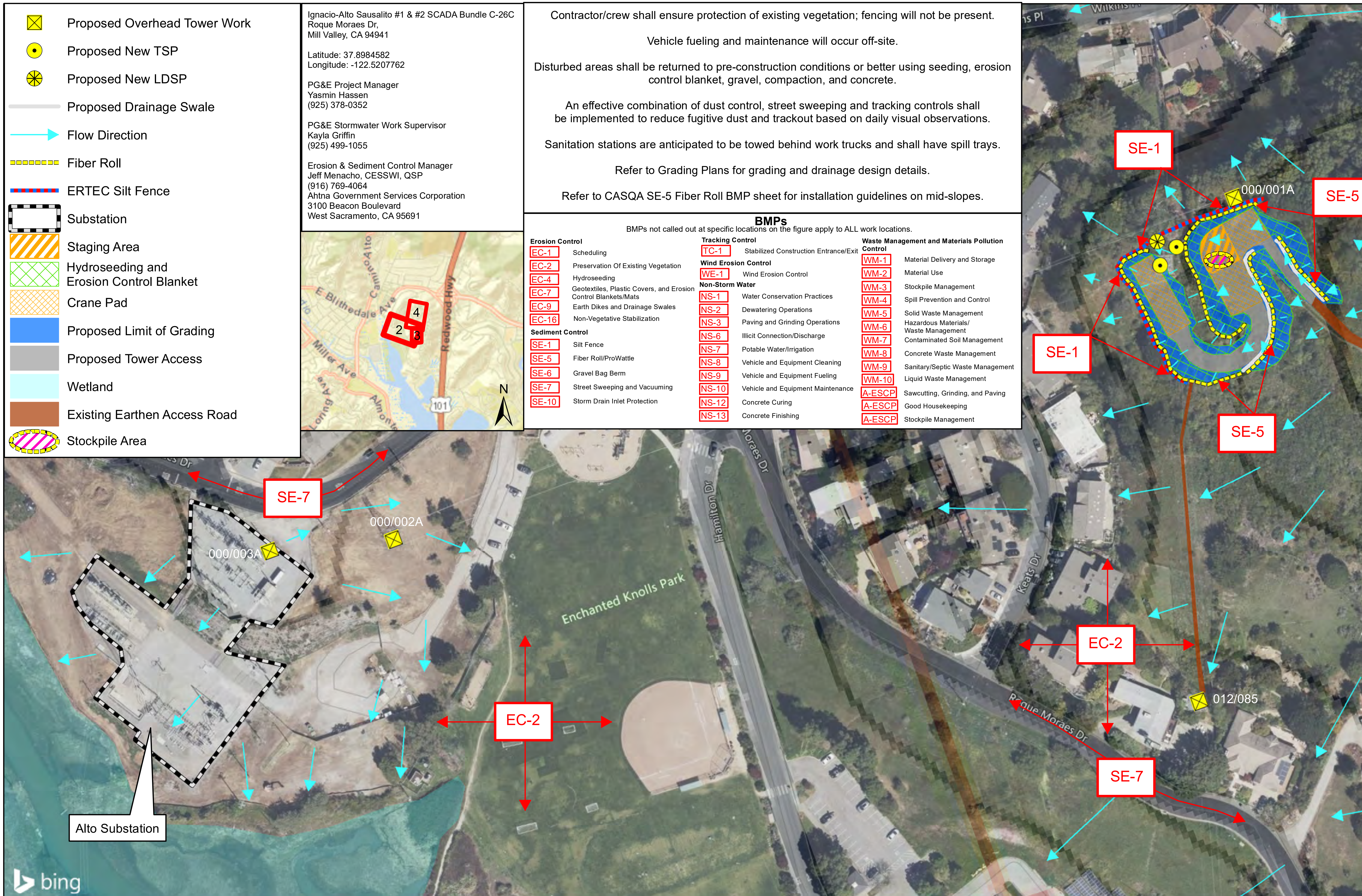


Figure 2

Erosion and Sediment Control Drawing
Ignacio-Alto Sausalito #1 & #2 SCADA Bundle C-26C
Mill Valley, Marin County CA 94941

0 80 160 Feet

S-ESCP
FEB 2022

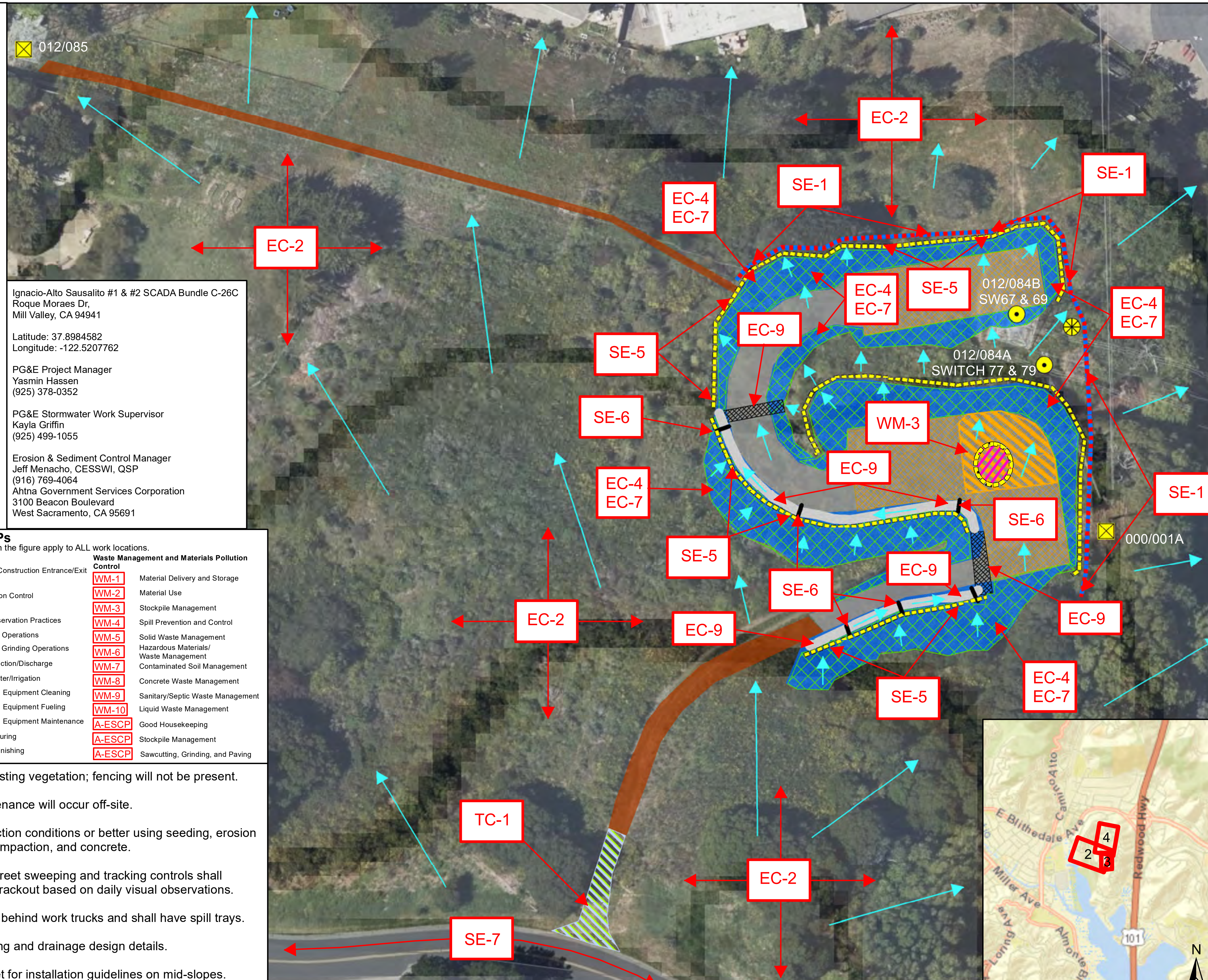
Order Number:
74019482

Ahtna Government Services Corporation

PG&E

Source: Digital aerial photo data provided by ESRI streaming mapserver. *This map and it's elements are for graphical purposes only.

- Proposed Temporary LDSP
- Proposed New TSP
- Proposed Overhead Tower Work
- Flow Direction
- Proposed Drainage Swale
- Fiber Roll
- ERTEC Silt Fence
- Gravel Bag Berm
- Proposed Stone Trench
- Hydroseeding and Erosion Control Blanket
- Stabilized Construction Entrance
- Staging Area
- Proposed Crane Pad
- Existing Earthen Access Road
- Proposed Limit of Grading
- Proposed Access
- Stockpile Area



Ignacio-Alto Sausalito #1 & #2 SCADA Bundle C-26C
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BMPs

BMPs not called out at specific locations on the figure apply to ALL work locations.

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SE-7	Street Sweeping and Vacuuming
SE-10	Storm Drain Inlet Protection

Tracking Control

TC-1	Stabilized Construction Entrance/Exit

Wind Erosion Control

WE-1	Wind Erosion Control

Non-Storm Water

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WM-10	Liquid Waste Management
A-ESCP	Good Housekeeping
A-ESCP	Stockpile Management
A-ESCP	Sawcutting, Grinding, and Paving

Contractor/crew shall ensure protection of existing vegetation; fencing will not be present.

Vehicle fueling and maintenance will occur off-site.

Disturbed areas shall be returned to pre-construction conditions or better using seeding, erosion control blanket, gravel, compaction, and concrete.

An effective combination of dust control, street sweeping and tracking controls shall be implemented to reduce fugitive dust and trackout based on daily visual observations.

Sanitation stations are anticipated to be towed behind work trucks and shall have spill trays.

Refer to Grading Plans for grading and drainage design details.

Refer to CASQA SE-5 Fiber Roll BMP sheet for installation guidelines on mid-slopes.

Figure 3

Erosion and Sediment Control Drawing
Ignacio-Alto Sausalito #1 & #2 SCADA Bundle C-26C
Mill Valley, Marin County CA 94941

0 40 80
Feet
N

S-ESCP
FEB 2022

Order Number: 74019482

Ahtna Government Services Corporation

PG&E

Source: Digital aerial photo data provided by ESRI streaming mapservice. *This map and it's elements are for graphical purposes only.

Contractor/crew shall ensure protection of existing vegetation; fencing will not be present.

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Sediment Control

SE-1	Silt Fence
SE-5	Fiber Roll/ProWattle
SE-6	Gravel Bag Berm
SE-7	Street Sweeping and Vacuuming
SE-10	Storm Drain Inlet Protection

Tracking Control

TC-1	Stabilized Construction Entrance/Exit

Wind Erosion Control

WE-1	Wind Erosion Control

Non-Storm Water

NS-1	Water Conservation Practices
NS-2	Dewatering Operations
NS-3	Paving and Grinding Operations
NS-6	Illicit Connection/Discharge
NS-7	Potable Water/Irrigation
NS-8	Vehicle and Equipment Cleaning
NS-9	Vehicle and Equipment Fueling
NS-10	Vehicle and Equipment Maintenance
NS-12	Concrete Curing
NS-13	Concrete Finishing

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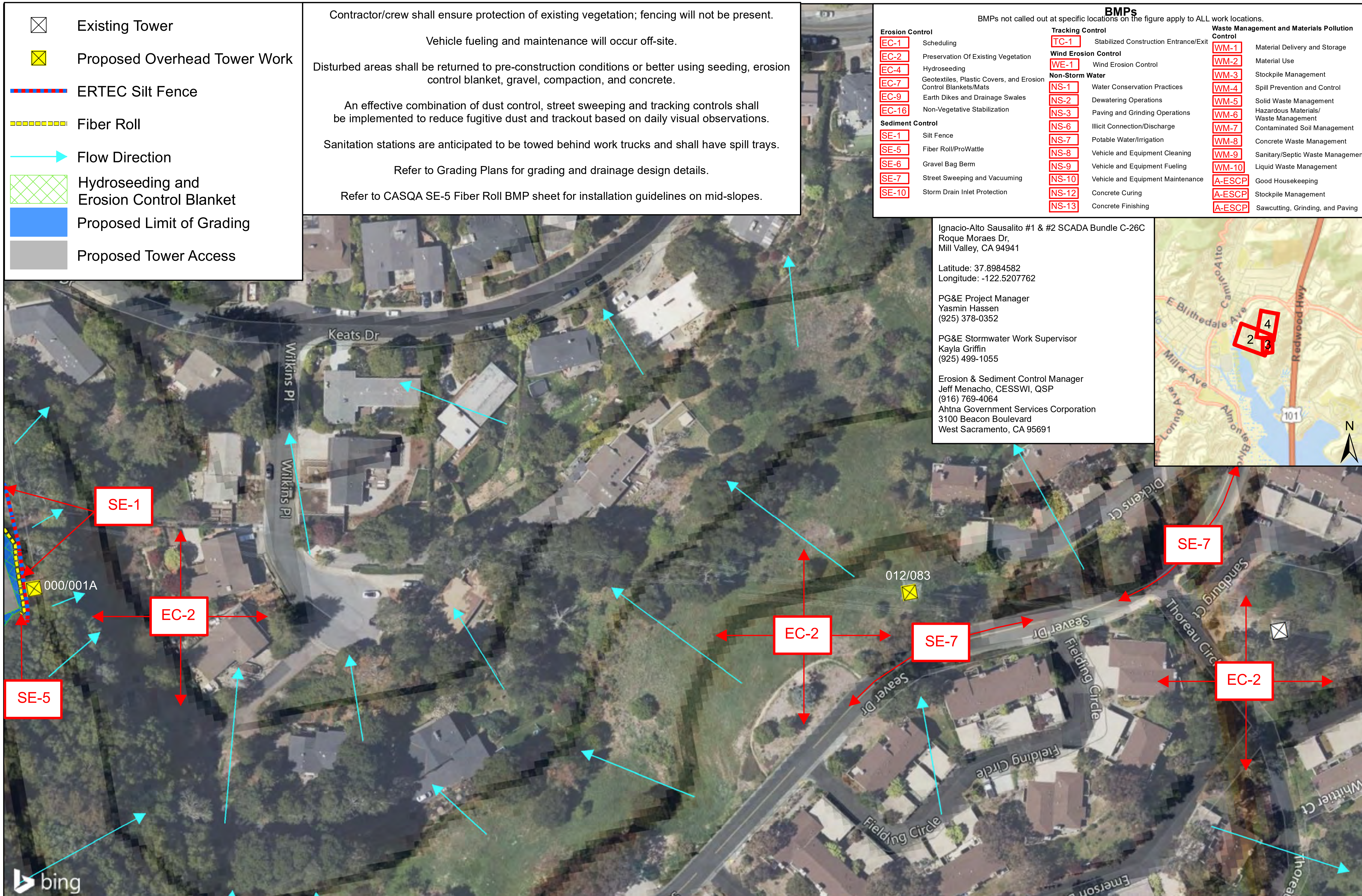


Figure 4

Erosion and Sediment Control Drawing

Ignacio-Alto Sausalito #1 & #2 SCADA Bundle C-26C
Mill Valley, Marin County CA 94941

S-ESCP
FEB 2022

Order Number: 74019482

Ahtna Government Services Corporation

PG&E

Source: Digital aerial photo data provided by ESRI streaming mapserver. *This map and it's elements are for graphical purposes only.

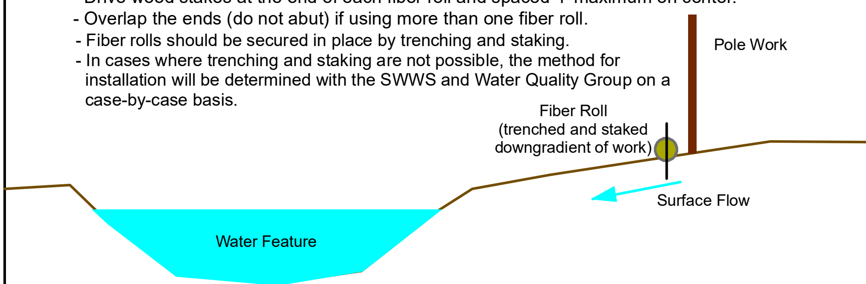
Best Management Practice Typical
Sediment Control: SE-5, Fiber Roll

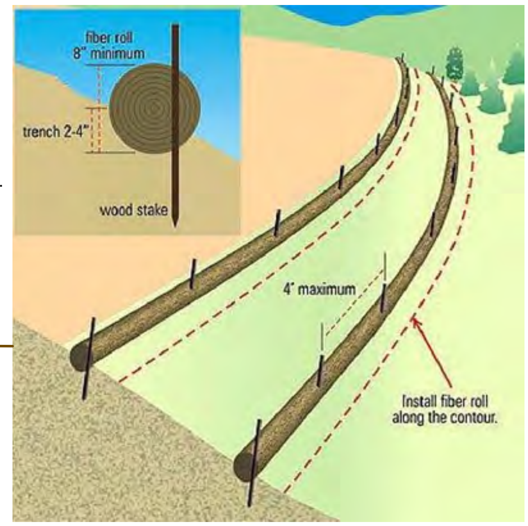
Categories:
SE Sediment Control (Primary)
EC Erosion Control (Secondary)

A fiber roll consists of straw, coir, or other biodegradable materials bound into a tight tubular roll wrapped with burlap or similar.
When placed at the toe or on the face of slopes along contours they act to intercept runoff and reduce its flow velocity. Runoff is released as sheet flow and sediment is removed in the process.

Graphic 1.1
Suitable Application Examples:
- Along the toe, top, face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
-Downgradient of pole install or removal work
- At the end of a downward slope where it transitions to a steeper slope
- Along the perimeter of a project
- Down-slope of exposed soil areas

Installation Tips:
- Prepare the slope before installation.
- Install perpendicular to water movement and parallel to slope contour.
- Turn the ends of the fiber roll up slope to precent runoff from going around the roll.
- Stake fiber rolls into a trench (1/4 to 1/3 as deep as the thickness of the roll and equally as wide).
- Drive wood stakes at the end of each fiber roll and spaced 4' maximum on center.
- Overlap the ends (do not abut) if using more than one fiber roll.
- Fiber rolls should be secured in place by trenching and staking.
- In cases where trenching and staking are not possible, the method for installation will be determined with the SWWS and Water Quality Group on a case-by-case basis.





Best Management Practice Stockpile Typical

Graphic 1.2
Suitable Application Examples:
- Around temporary stockpiles

Installation Tips:
- Place fiber rolls around the base of active stockpiles.
- Secure in place with wood stakes. Sand/gravel bags may be used as fiber roll anchors only on paved surfaces.

Inspection and Maintenance:
- Inspect and replace and split, torn, unraveling or slumping fiber rolls.
- Periodically remove any sediment that accumulates to one-third the designated sediment storage depth.
- Inspect in accordance with General Permit Requirements for the associated project type and risk level at a minimum weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
-Repair any rills or gullies promptly.

PG&E / Ahtna Government Services Corporation	Order Number: 74019482 ESCP FEB 2022	**BMP Typical** Ignacio-Alto Sausalito #1 & #2 SCADA Bundle C-26C	Figure Typ. 1

Best Management Practice Typical
Tracking Control: TC-1, Stabilized Construction Entrance

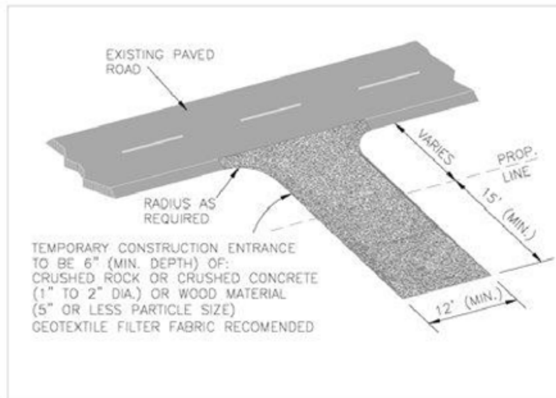
Categories:
EC Erosion Control (Secondary)
SE Sediment Control (Secondary)
TC Tracking Control (Primary)

A stabilized construction entrance reduces or eliminates the tracking of sediment onto public 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. They should be used anywhere traffic will be entering or leaving the construction site.

Graphic 2.1
Suitable Application Examples:
- Where dirt or mud can be tracked onto public roads.
- Adjacent to water bodies.
- Where poor soils are encountered.

Installation:
- Construct on level ground where possible.
- Construct length of 50' or maximum site will allow and 10' minimum width to accomodate traffic.
- Rumble racks constructed of steel panels with ridges will help removed additional sediment.
- Limit points of entrance/exit to site.
- Limit vehicle speed to control dust.
- Properly grade entrance/exit to prevent runoff from leaving construction site.
- Route runoff through a sediment trapping device before discharge.

Inspection and Maintenance:
- Inspect and verify performance meets 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.
- Check for damage and repair as needed.
- Replace gravel material when surface voids are visible.



Sediment Control: SE-7, Street Sweeping and Vacuuming

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. It prevents sediment from the project site from entering storm drains or receiving waters.

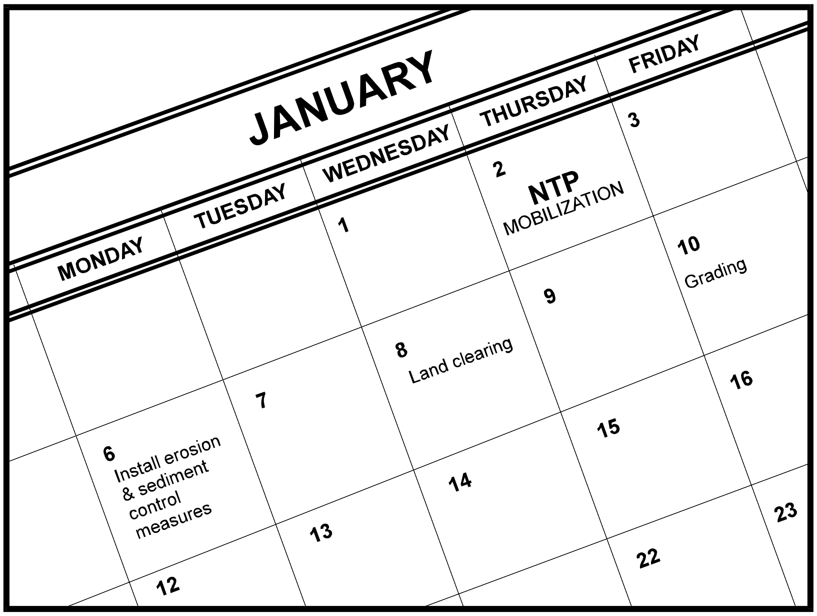
Graphic 2.2
Implementation:
- Control the number of points where vehicles can leave the site to focus sweeping and vacuuming efforts.
- Inspect potential sediment tracking locations daily.
- Visible sediment tracking should be swepts or vacuumed on a daily basis.
- Do not use kick brooms or sweeper attachments as they spread dirt rather than remove it.
- If not mixed with debris or trash, consider inforporating the removed sediment back into the project.

Inspection and Maintenance:
- Inspect in accordance with General Permit Requirements for the associated project type and risk level at a minimum weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect points of ingress and egress daily.
- Remove tracked or spilled sediment outside of construction limits daily if required by your jurisdiction.
- Do not sweep unknown substances or potentially hazardous objects.
- Adjust brooms frequently to maximize efficiency.
- Properly dispose of sweeper wastes at an approved dumpsite.

Categories:
SE Sediment Control (Secondary)
TC Tracking Control (Primary)

ATTACHMENT B

BEST MANAGEMENT PRACTICES (BMP) CUT SHEETS



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

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 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.
- Avoid soil disturbance during periods with high wind velocities.

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

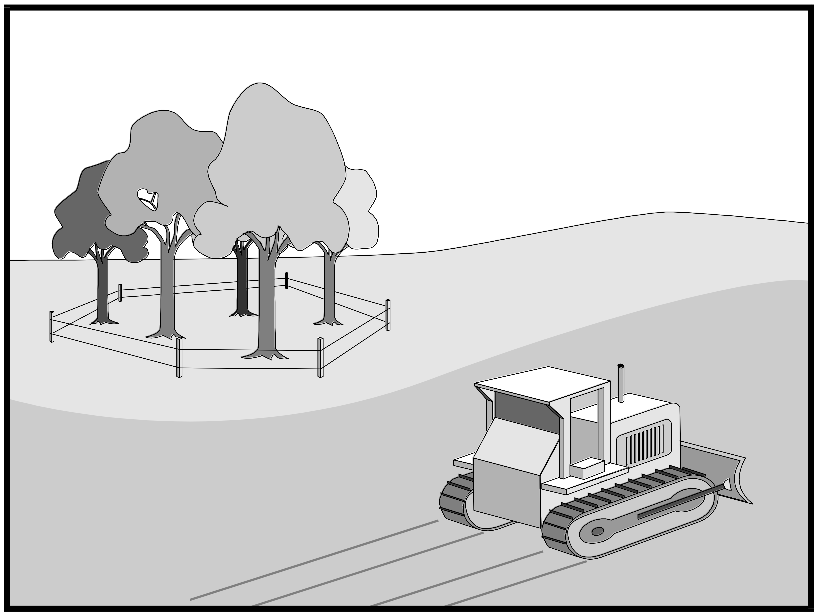
- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Amend the schedule when changes are warranted.
- Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

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



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

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.
- Protecting existing vegetation buffers and swales.

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.

- Consider pruning or mowing vegetation instead of removing it to allow for regrowth.

- If possible, retain vegetation buffer around the site and adjacent waterways.

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 trees in the late fall or early spring. Although to note, many native species do not require fertilization.

  - 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.

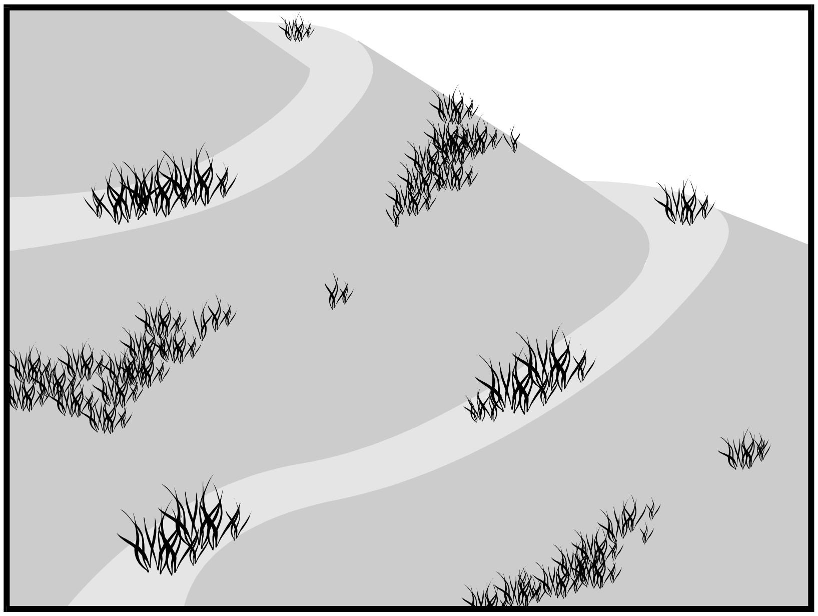
References

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.



Categories

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SE	Sediment Control	
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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

Description and Purpose

Hydroseeding typically consists of applying a mixture of a hydraulic mulch, seed, and water with the possible addition of tackifier, compost, mycorrhizae inoculant, fertilizer, and/or soil conditioner, 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 and temporary erosion control is established by means of the mulch component.

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, Geotextiles and Mats) 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.
- To vegetate swales and earthen berms.

- Areas not subject to heavy wear by construction equipment or high traffic.

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).
- Vegetation may not establish when hydroseed is applied to very compact soils.
- Mulch may inhibit germination when applied at high rates.
- 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's Safety Data Sheet (SDS), although, note that not all SDS's provide ecological information; products should be evaluated for project-specific implementation by the QSD. Refer to fact sheet EC-05, Soil Binders, 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 $2,400 per acre for flat slopes and stable soils, to $5,200 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	$2,400-$5,200

Source: Cost information received from individual product manufacturers solicited by Geosyntec Consultants (2004). Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

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.

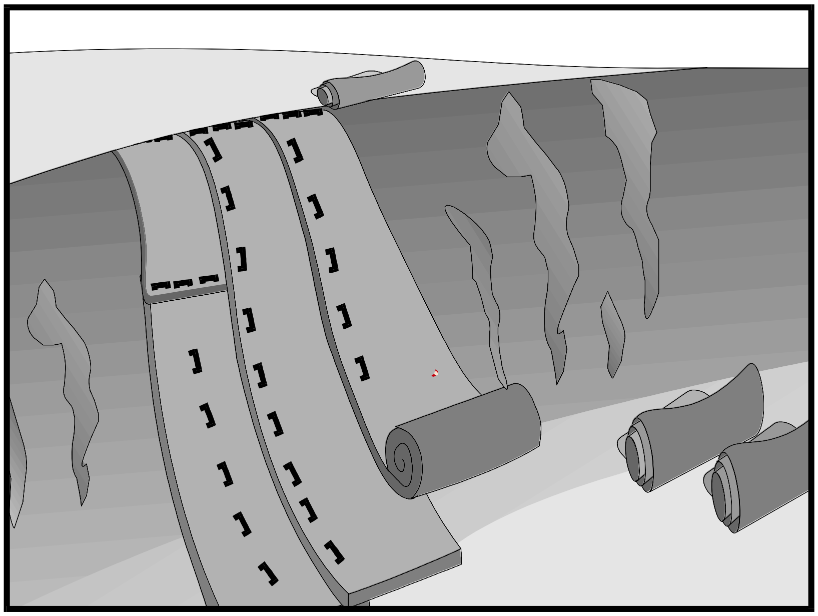
- Irrigation systems should be inspected for complete coverage and adjusted as needed to maintain complete coverage.

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

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Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-4 Hydroseeding

Description and Purpose

Rolled Erosion Control Products (RECPs), also known as erosion control matting or blankets, 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).
- Long slopes.
- Slopes where the erosion potential is high.
- Slopes and disturbed soils where mulch must be anchored.

- Disturbed areas where temporary cover is needed, or plants are slow to establish or will not establish.
- 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 and/or sunlight.
- 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 sheeting should be limited to covering stockpiles or very small graded areas for short periods of time (such as through one imminent storm event) until other 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.
- According to the State Water Board's *CGP Review, Issue #2*, only RECPs that either do not contain plastic netting or contain netting manufactured from 100% biodegradable non-plastic materials, such as jute, sisal, or coir fiber should be used due to plastic pollution and wildlife concerns. If a plastic-netted product is used for temporary stabilization, it must be promptly removed when no longer needed and removed or replaced with non-plastic netted RECPs for final stabilization.
- 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. As per State Water Board guidance, RECPs that

contain plastic netting are discouraged for temporary controls and are not acceptable alternatives for permanent controls. RECPs that do not contain plastic netting or contain netting manufactured from 100% biodegradable non-plastic materials such as jute, sisal, or coir fiber should be used.

- RECPs may have limitations in extremely windy climates; they are susceptible to wind damage and displacement. 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. Only biodegradable RECPs can remain on a site applying for a Notice of Termination due to plastic pollution and wild life concerns (State Waterboard, 2016). RECPs containing plastic that are used on a site must be disposed of for final stabilization.

- **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 geometric 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
Biodegradable	Jute Mesh	$7,700-$9,000
	Curled Wood Fiber	$10,200-$13,400
	Straw	$10,200-$13,400
	Wood Fiber	$10,200-$13,400
	Coconut Fiber	$16,600-$18,000
	Coconut Fiber Mesh	$38,400-$42,200
	Straw Coconut Fiber	$12,800-$15,400
Non-Biodegradable	Plastic Netting	$2,600-$2,800
	Plastic Mesh	$3,800-$4,500
	Synthetic Fiber with Netting	$43,500-$51,200
	Bonded Synthetic Fibers	$57,600-$70,400
	Combination with Biodegradable	$38,400-$46,100

Source: Cost information received from individual product manufacturers solicited by Geosyntec Consultants (2004). Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

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.

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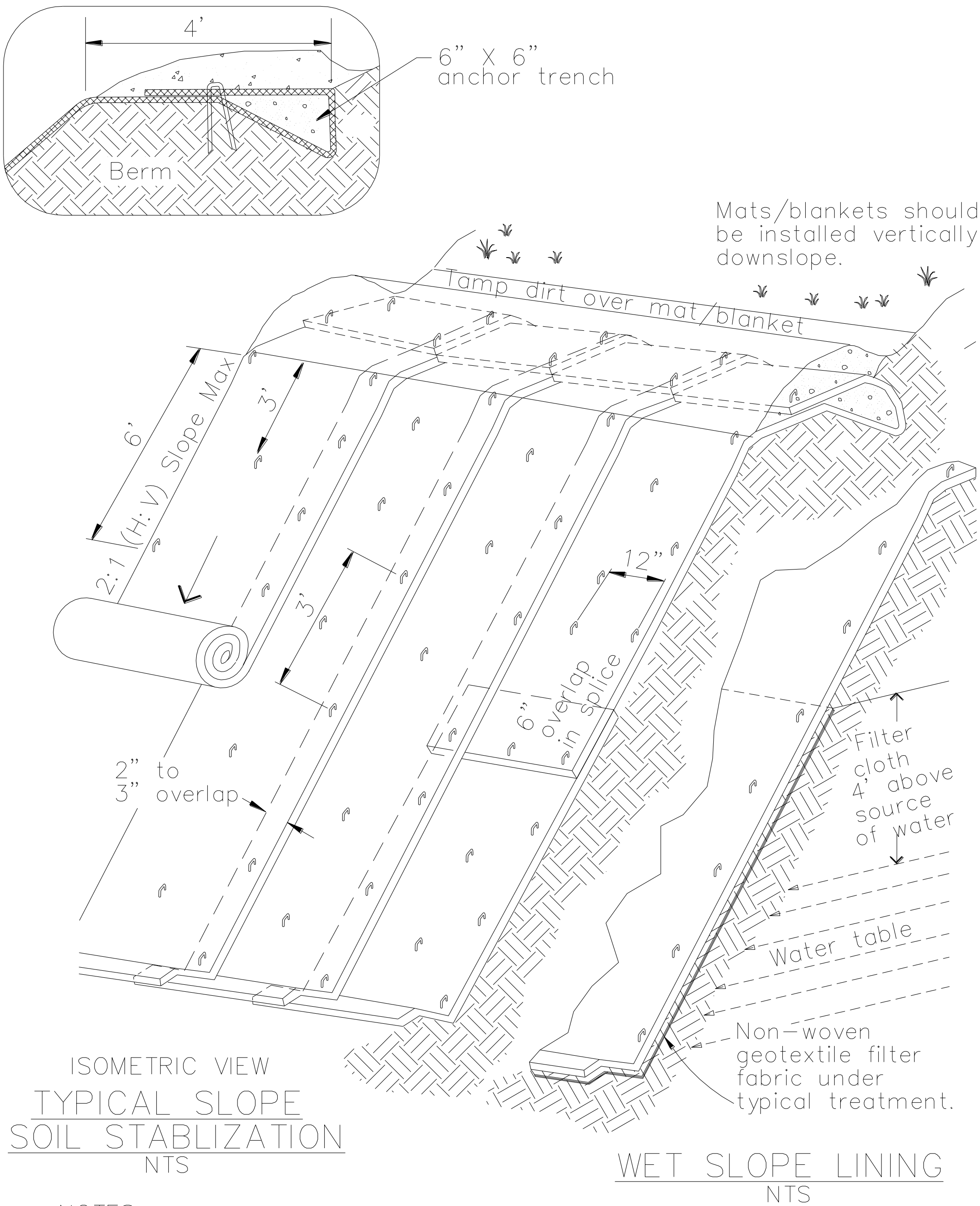
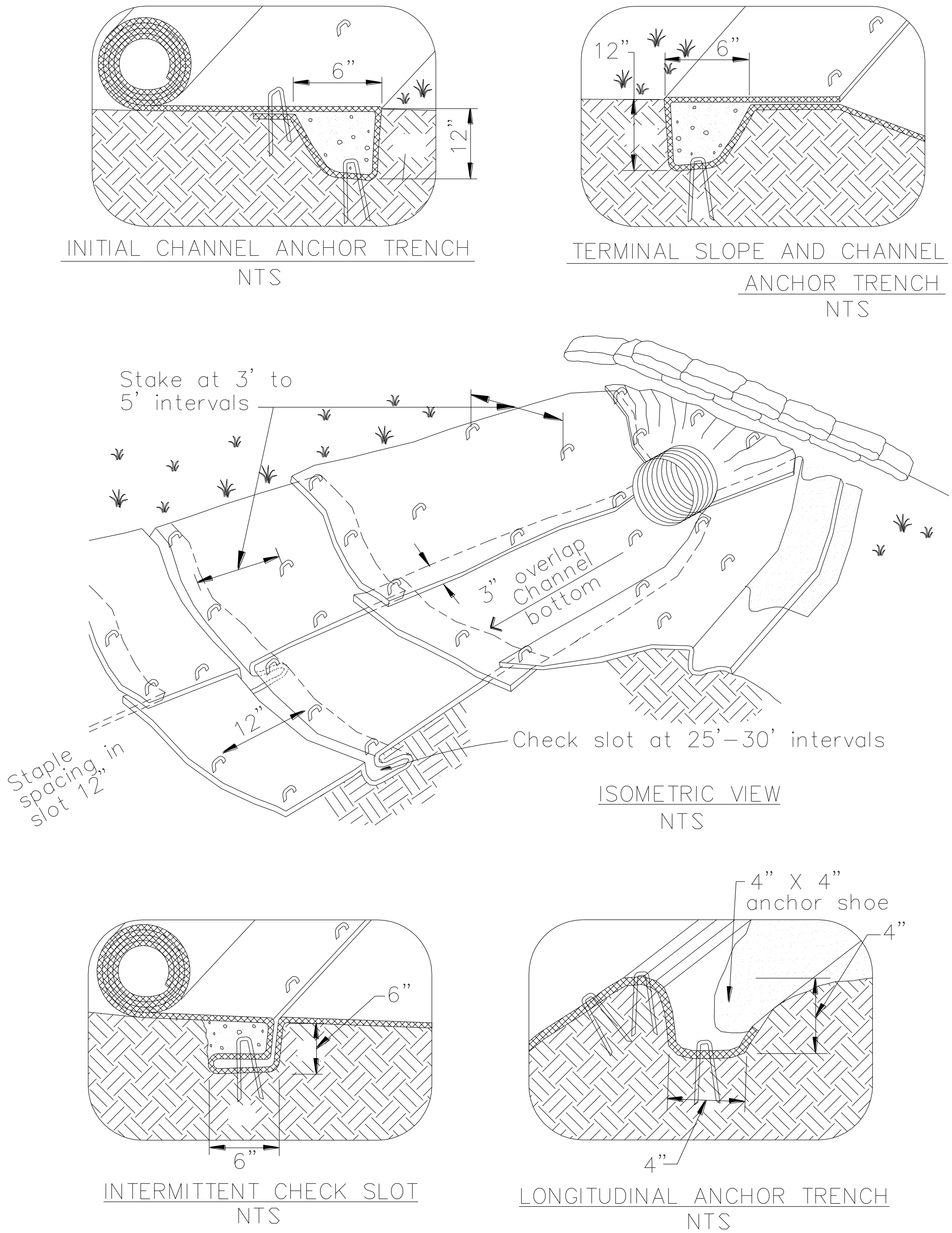


NOTES:

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

TYPICAL INSTALLATION DETAIL

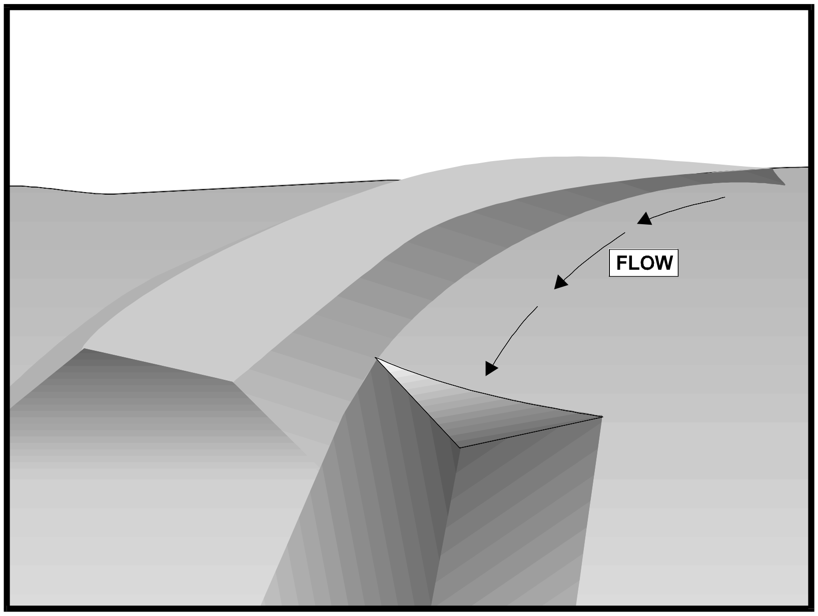


NOTES:

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

Earth Dikes and Drainage Swales EC-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 Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

An earth dike is a temporary berm or ridge of compacted soil used to divert runoff or channel water to a desired location. A drainage swale is a shaped and sloped depression in the soil surface used to convey runoff to a desired location. Earth dikes and drainage swales are used to divert off site runoff around the construction site, divert runoff from stabilized areas and disturbed areas, and direct runoff into sediment basins or traps.

Suitable Applications

Earth dikes and drainage swales are suitable for use, individually or together, where runoff needs to be diverted from one area and conveyed to another.

- Earth dikes and drainage swales may be used:
  - To convey surface runoff down sloping land
  - To intercept and divert runoff to avoid sheet flow over sloped surfaces
  - To divert and direct runoff towards a stabilized watercourse, drainage pipe or channel
  - To intercept runoff from paved surfaces
  - To intercept and divert run-on
  - Below steep grades where runoff begins to concentrate

- Along roadways and facility improvements subject to flood drainage
- At the top of slopes to divert runon from adjacent or undisturbed slopes
- At bottom and mid slope locations to intercept sheet flow and convey concentrated flows
- Divert sediment laden runoff into sediment basins or traps

Limitations

Dikes should not be used for drainage areas greater than 10 acres or along slopes greater than 10 percent. For larger areas more permanent drainage structures should be built. All drainage structures should be built in compliance with local municipal requirements.

- Earth dikes may create more disturbed area on site and become barriers to construction equipment.
- Earth dikes must be stabilized immediately, which adds cost and maintenance concerns.
- Diverted stormwater may cause downstream flood damage.
- Dikes should not be constructed of soils that may be easily eroded.
- Regrading the site to remove the dike may add additional cost.
- Temporary drains and swales or any other diversion of runoff should not adversely impact upstream or downstream properties.
- Temporary drains and swales must conform to local floodplain management requirements.
- Earth dikes/drainage swales are not suitable as sediment trapping devices.
- It may be necessary to use other soil stabilization and sediment controls such as check dams, plastics, and blankets, to prevent scour and erosion in newly graded dikes, swales, and ditches.
- Sediment accumulation, scour depressions, and/or persistent non-stormwater discharges can result in areas of standing water suitable for mosquito production in drainage swales.

Implementation

The temporary earth dike is a berm or ridge of compacted soil, located in such a manner as to divert stormwater to a sediment trapping device or a stabilized outlet, thereby reducing the potential for erosion and offsite sedimentation. Earth dikes can also be used to divert runoff from off site and from undisturbed areas away from disturbed areas and to divert sheet flows away from unprotected slopes.

An earth dike does not itself control erosion or remove sediment from runoff. A dike prevents erosion by directing runoff to an erosion control device such as a sediment trap or directing runoff away from an erodible area. Temporary diversion dikes should not adversely impact adjacent properties and must conform to local floodplain management regulations and should not be used in areas with slopes steeper than 10%.

Slopes that are formed during cut and fill operations should be protected from erosion by runoff. A combination of a temporary drainage swale and an earth dike at the top of a slope can divert runoff to a location where it can be brought to the bottom of the slope (see EC-11, Slope Drains). A combination dike and swale is easily constructed by a single pass of a bulldozer or grader and compacted by a second pass of the tracks or wheels over the ridge. Diversion structures should be installed when the site is initially graded and remain in place until post construction BMPs are installed and the slopes are stabilized.

Diversion practices concentrate surface runoff, increasing its velocity and erosive force. Thus, the flow out of the drain or swale must be directed onto a stabilized area or into a grade stabilization structure. If significant erosion will occur, a swale should be stabilized using vegetation, chemical treatment, rock rip-rap, matting, or other physical means of stabilization. Any drain or swale that conveys sediment laden runoff must be diverted into a sediment basin or trap before it is discharged from the site.

General

- Care must be applied to correctly size and locate earth dikes, drainage swales. Excessively steep, unlined dikes, and swales are subject to erosion and gully formation.
- Conveyances should be stabilized.
- Use a lined ditch for high flow velocities.
- Select flow velocity based on careful evaluation of the risks due to erosion of the measure, soil types, overtopping, flow backups, washout, and drainage flow patterns for each project site.
- Compact any fills to prevent unequal settlement.
- Do not divert runoff onto other property without securing written authorization from the property owner.
- When possible, install and utilize permanent dikes, swales, and ditches early in the construction process.
- Provide stabilized outlets.

Earth Dikes

Temporary earth dikes are a practical, inexpensive BMP used to divert stormwater runoff. Temporary diversion dikes should be installed in the following manner:

- All dikes should be compacted by earth moving equipment.
- All dikes should have positive drainage to an outlet.
- All dikes should have 2:1 or flatter side slopes, 18 in. minimum height, and a minimum top width of 24 in. Wide top widths and flat slopes are usually needed at crossings for construction traffic.

- May be covered with hydro mulch, hydroseed, wood mulch, compost blanket, or RECP for stabilization.
- The outlet from the earth dike must function with a minimum of erosion. Runoff should be conveyed to a sediment trapping device such as a Sediment Trap (SE-3) or Sediment Basin (SE-2) when either the dike channel or the drainage area above the dike are not adequately stabilized.
- Temporary stabilization may be achieved using seed and mulching for slopes less than 5% and either rip-rap or sod for slopes in excess of 5%. In either case, stabilization of the earth dike should be completed immediately after construction or prior to the first rain.
- If riprap is used to stabilize the channel formed along the toe of the dike, the following typical specifications apply:

Channel Grade	Riprap Stabilization
0.5-1.0%	4 in. Rock
1.1-2.0%	6 in. Rock
2.1-4.0%	8 in. Rock
4.1-5.0%	8 in. -12 in. Riprap

- The stone riprap, recycled concrete, etc. used for stabilization should be pressed into the soil with construction equipment.
- Filter cloth may be used to cover dikes in use for long periods.
- Construction activity on the earth dike should be kept to a minimum.

Drainage Swales

Drainage swales are only effective if they are properly installed. Swales are more effective than dikes because they tend to be more stable. The combination of a swale with a dike on the downhill side is the most cost-effective diversion.

Standard engineering design criteria for small open channel and closed conveyance systems should be used (see the local drainage design manual). Unless local drainage design criteria state otherwise, drainage swales should be designed as follows:

- No more than 5 acres may drain to a temporary drainage swale.
- Place drainage swales above or below, not on, a cut or fill slope.
- Swale bottom width should be at least 2 ft.
- Depth of the swale should be at least 18 in.
- Side slopes should be 2:1 or flatter.
- Drainage or swales should be laid at a grade of at least 1 %, but not more than 15 %.

- The swale must not be overtopped by the peak discharge from a 10-year storm, irrespective of the design criteria stated above.
- Remove all trees, stumps, obstructions, and other objectionable material from the swale when it is built.
- Compact any fill material along the path of the swale.
- Stabilize all swales immediately. Seed and mulch swales at a slope of less than 5 % and use rip-rap or sod for swales with a slope between 5 and 15 %. For temporary swales, geotextiles and mats (EC-7) may provide immediate stabilization.
- Irrigation may be required to establish sufficient vegetation to prevent erosion.
- Do not operate construction vehicles across a swale unless a stabilized crossing is provided.
- Permanent drainage facilities must be designed by a professional engineer (see the local drainage design criteria for proper design).
- At a minimum, the drainage swale should conform to predevelopment drainage patterns and capacities.
- Construct the drainage swale with a positive grade to a stabilized outlet.
- Provide erosion protection or energy dissipation measures if the flow out of the drainage swale can reach an erosive velocity.

Costs

- Cost ranges from $19 to $70 per ft. for both earthwork and stabilization and depends on availability of material, site location, and access (Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.).
- Small dikes: $3 - $8/linear ft.; Large dikes: $3/yd^3 (Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.).
- The cost of a drainage swale increases with drainage area and slope. Typical swales for controlling internal erosion are inexpensive, as they are quickly formed during routine earthwork.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.

- Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment. Remove debris and sediment and repair linings and embankments as needed.
- Temporary conveyances should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction

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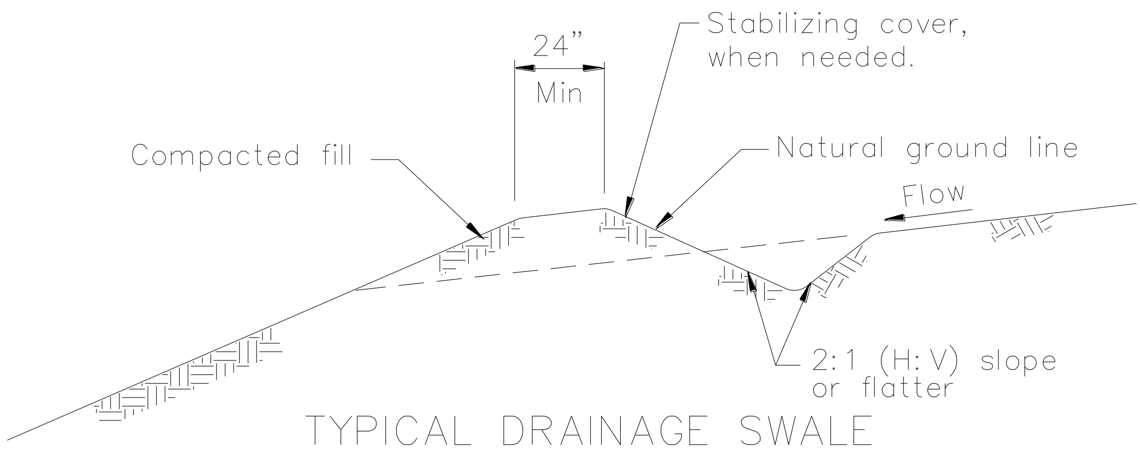
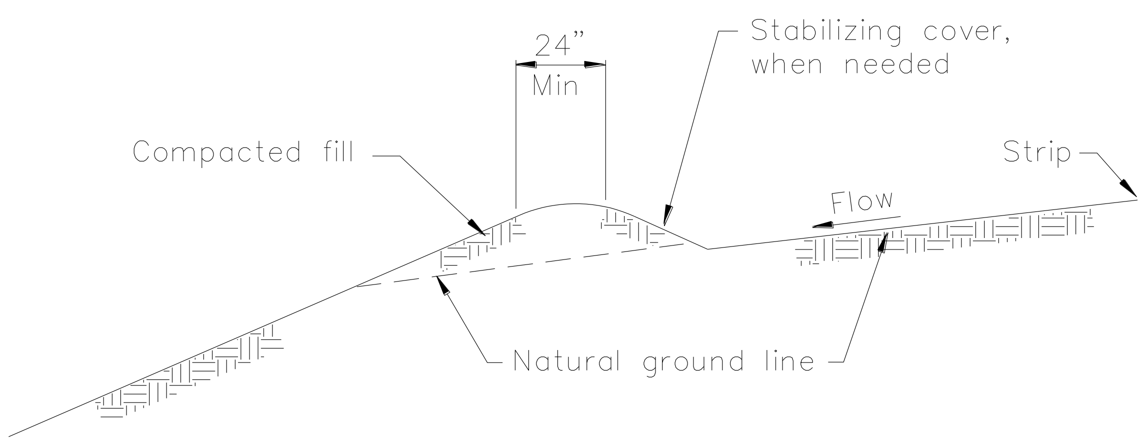


TYPICAL DRAINAGE SWALE
NOT TO SCALE

NOTES:

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



TYPICAL EARTH DIKE
NOT TO SCALE

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

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 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 \$13 - \$20/yd^2 in flat areas and \$14 - \$30/yd^2 on side slopes (adjusted for inflation, 2016 dollars).

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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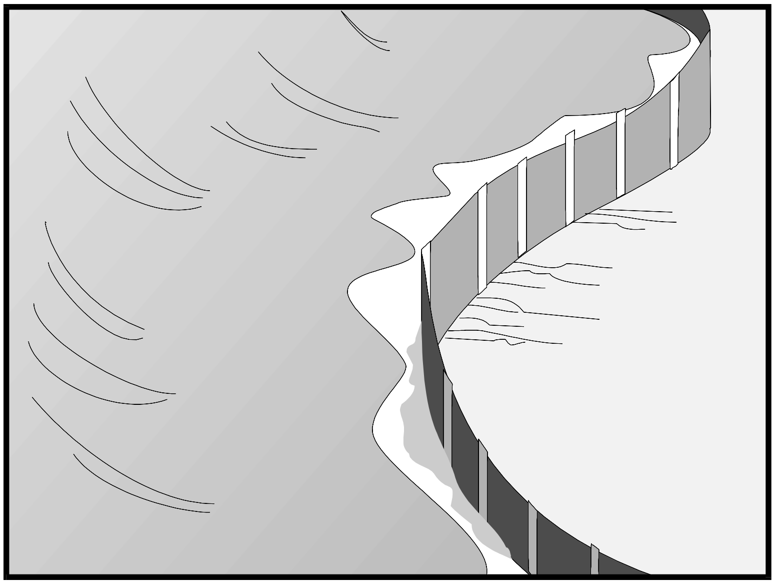
Silt Fence SE-1



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

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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 (Storm Drain Inlet Protection, 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 (although they should not be installed up and down slopes).
- 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.
- According to the State Water Board's *CGP Review, Issue #2* (2014), silt fences reinforced with metal or plastic mesh should be avoided due to plastic pollution and wildlife concerns.
- 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 ft.^{2} of disturbed area.) (EPA, 2012)

- The maximum length of slope draining to any point along the silt fence should be 100 ft. per ft 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 in. into the soil while at the same time pulling silt geotextile fabric into the ground through the opening created by the blade to the depth of the blade. Once the geotextile is installed, the soil is compacted using tractor tires.
- This method will not work with pre-fabricated, wire backed silt fence.
- Benefits:
  - Ease of installation (most often done with a 2-person crew).
  - Minimal soil disturbance.
  - Better level of compaction along fence, less susceptible to undercutting
  - Uniform installation.
- Limitations:
  - Does not work in shallow or rocky soils.
  - Complete removal of geotextile material after use is difficult.
  - Be cautious when digging near potential underground utilities.

Costs

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

Inspection and Maintenance

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

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

References

CGP Review #2, State Water Resources Control Board, 2014. Available online at: http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/training/cgp_review_issue2.pdf.

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

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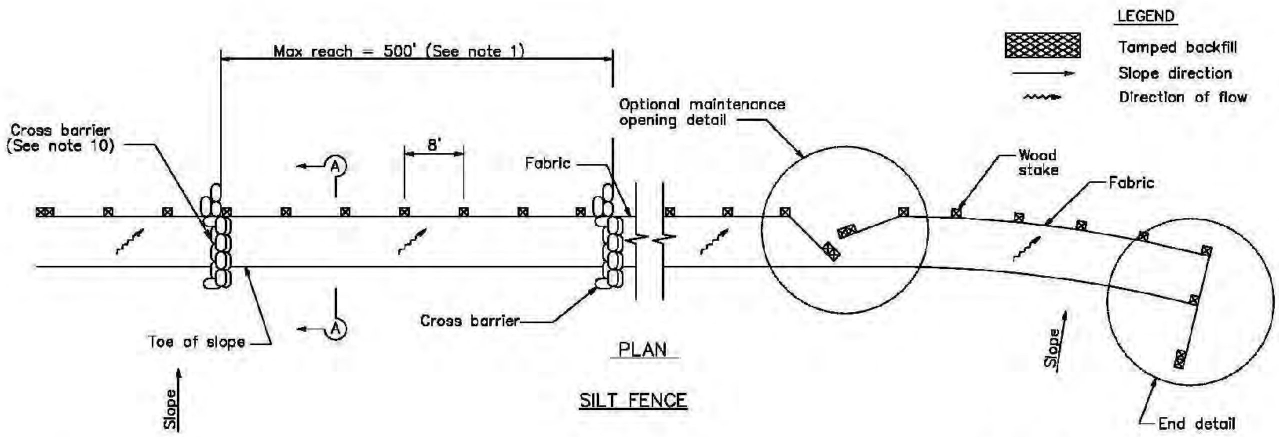
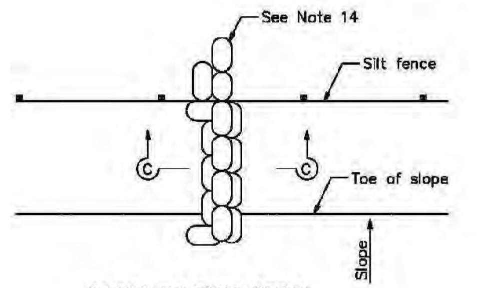
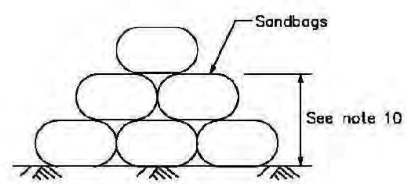
Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



SILT FENCE



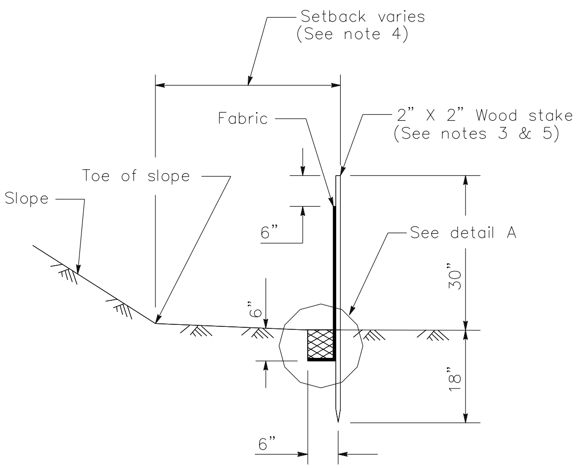
CROSS BARRIER DETAIL



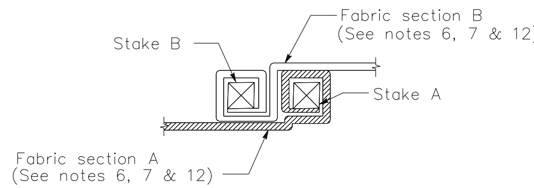
SECTION C–C

NOTES

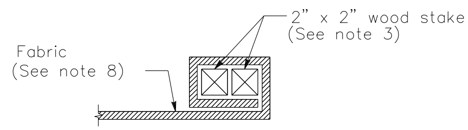
1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the linear barrier, in no case shall the reach length exceed 500'.
2. The last 8'–0" of fence shall be turned up slope.
3. Stake dimensions are nominal.
4. Dimension may vary to 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.



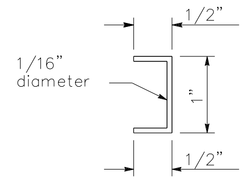
SECTION A–A



JOINING SECTION DETAIL (TOP VIEW)

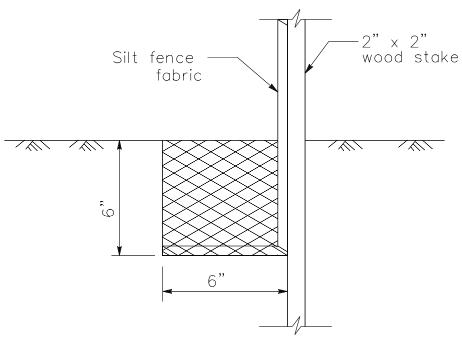


END STAKE DETAIL (TOP VIEW)

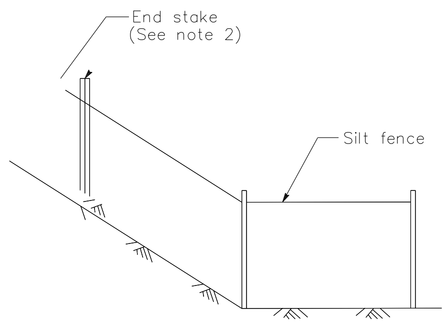


STAPLE DETAIL

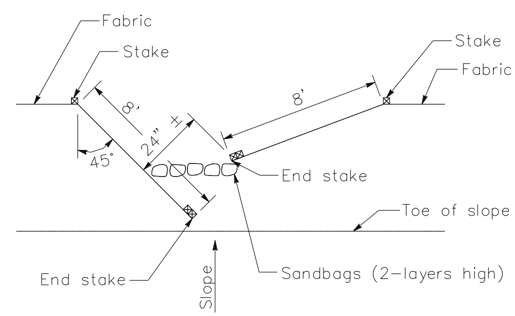
(SEE NOTE 9)



DETAIL A

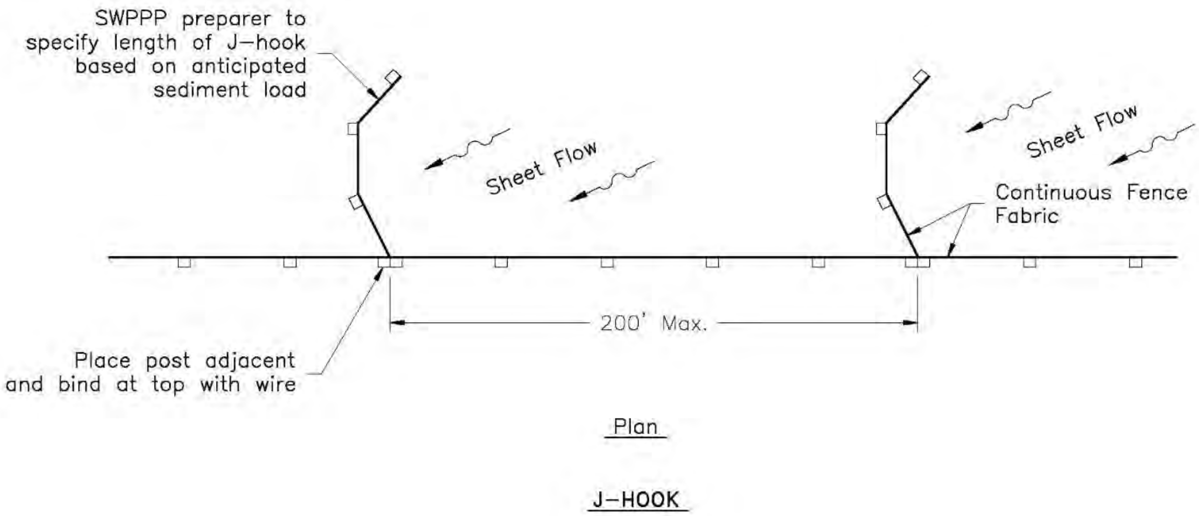


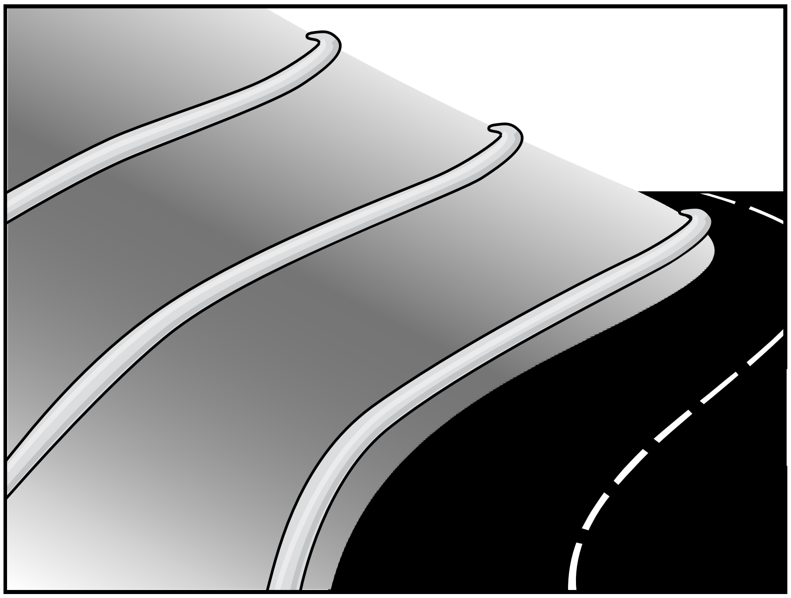
END DETAIL



OPTIONAL MAINTENANCE OPENING DETAIL

(SEE NOTE 11)


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



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

Description and Purpose

A fiber roll (also known as wattles or logs) consists of straw, coir, curled wood fiber, or other biodegradable materials bound into a tight tubular roll wrapped by plastic netting, which can be photodegradable, or natural fiber, such as jute, cotton, or sisal. 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.
- Around temporary stockpiles.

Limitations

- Fiber rolls should be used in conjunction with erosion control, such as hydroseed, RECPs, etc.
- Only biodegradable fiber rolls containing no plastic can remain on a site applying for a Notice of Termination due to plastic pollution and wildlife concerns (State Water Board, 2016). Fiber rolls containing plastic that are used on a site must be disposed of for final stabilization.
- Fiber rolls are not effective unless trenched in and staked. If not properly staked and trenched in, fiber rolls will not work as intended and could be transported by high flows.
- Not intended for use in high flow situations (i.e., for concentrated flows).
- Difficult to move once saturated.
- Fiber rolls have a 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 and roll material.

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, curled wood fiber, or coir bound into a tight tubular roll by netting or natural fiber (see *Limitations* above regarding plastic netting).
- Typical fiber rolls vary in diameter from 6 in. to 20 in. Larger diameter rolls are available as well. The larger the roll, the higher the sediment retention capacity.
- Typical fiber rolls lengths are 4, 10, 20 and 25 ft., although other lengths are likely available.

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). Fiber rolls encased with plastic netting or containing any plastic material will need to be removed from the site for final stabilization. Fiber rolls used in a permanent application are to be encased with a non-plastic material and are left in place. Removal of a fiber roll used in a permanent application can result in greater disturbance; therefore, during the BMP planning phase, the areas where fiber rolls will be used on final slopes, only fiber rolls wrapped in non-plastic material should be selected.

- 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 straw fiber rolls range from $26 - $38 per 25-ft. roll[1] and curled wood fiber rolls range from $30 - $40 per roll[2].

Material costs for PAM impregnated fiber rolls range between $9.00-$12.00 per linear foot, based upon vendor research[1] .

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.

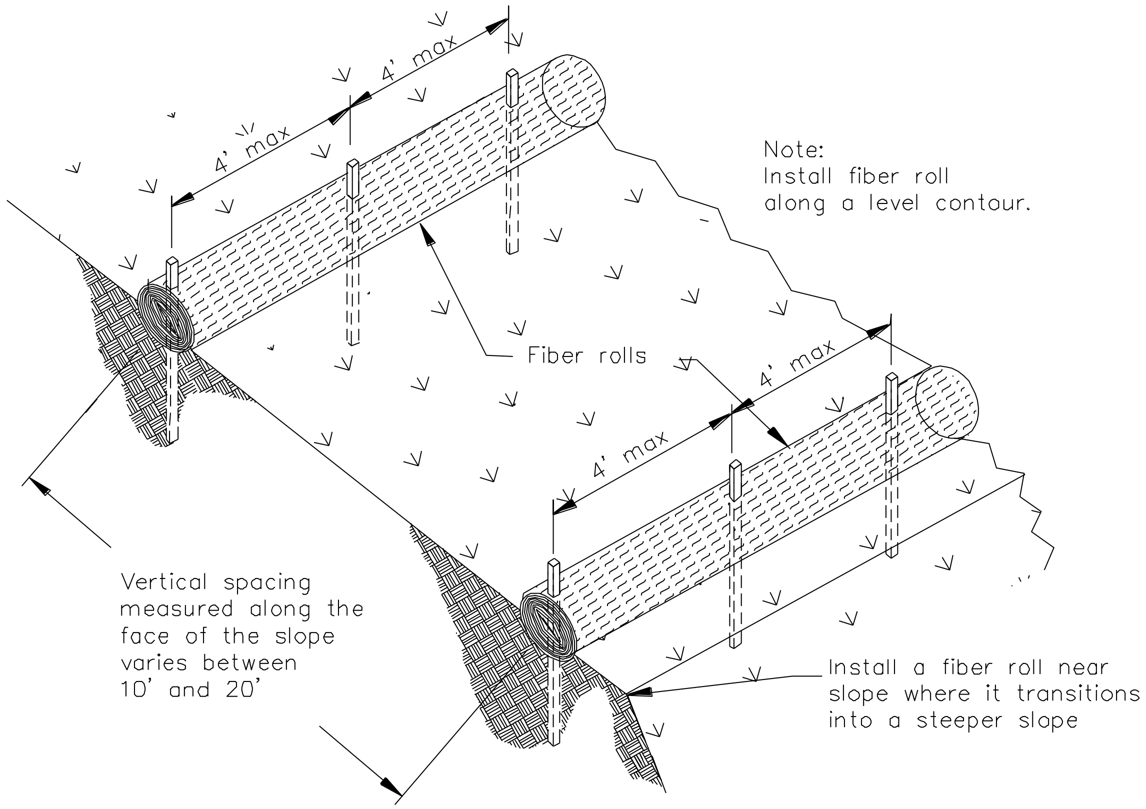
References

General Construction – Frequently Asked Questions, Storm Water Program website, State Water Resources Control Board, 2009 updated in 2016. Available online at: http://www.waterboards.ca.gov/water_issues/programs/stormwater/gen_const_faq.shtml.

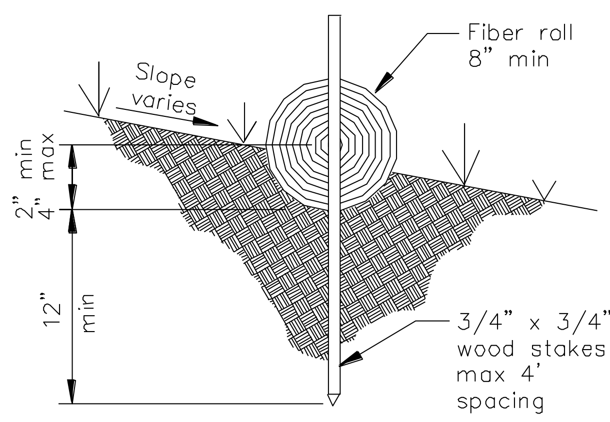
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

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

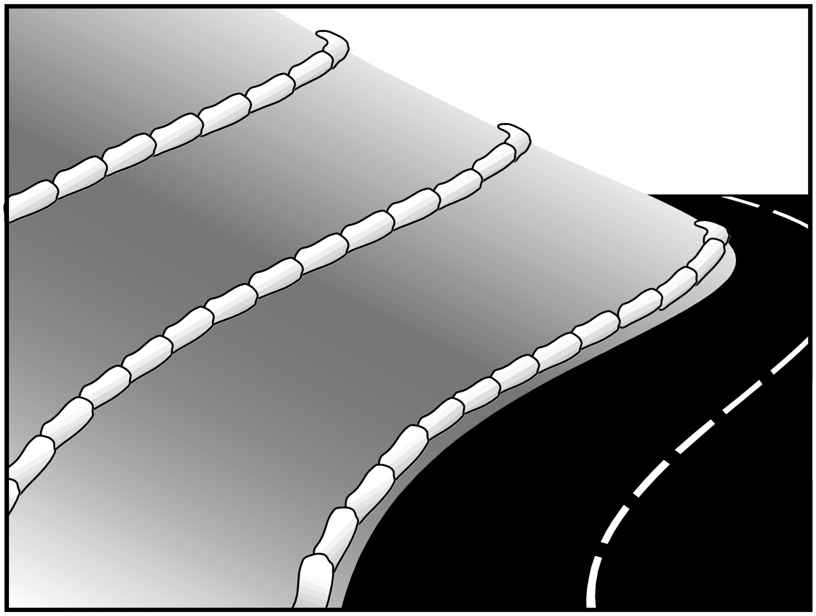
[1] Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.
[2] Costs estimated based on vendor query by Tetra Tech, Inc. 2016.



TYPICAL FIBER ROLL INSTALLATION
N.T.S.



ENTRENCHMENT DETAIL
N.T.S.



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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

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.

- 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. $3.20-$3.80 per filled gravel bag is standard based upon vendor research (Adjusted for inflation, 2016 dollars, by Tetra Tech, Inc.).

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.

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

If User/Subscriber modifies this fact sheet in any way, the CASQA name/logo and footer below must be removed from each page and not appear on the modified version.

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).
- Sweeping may be less effective for fine particle soils (i.e., clay).

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.
- 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 $ 650/day to $2,500/day[1], 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

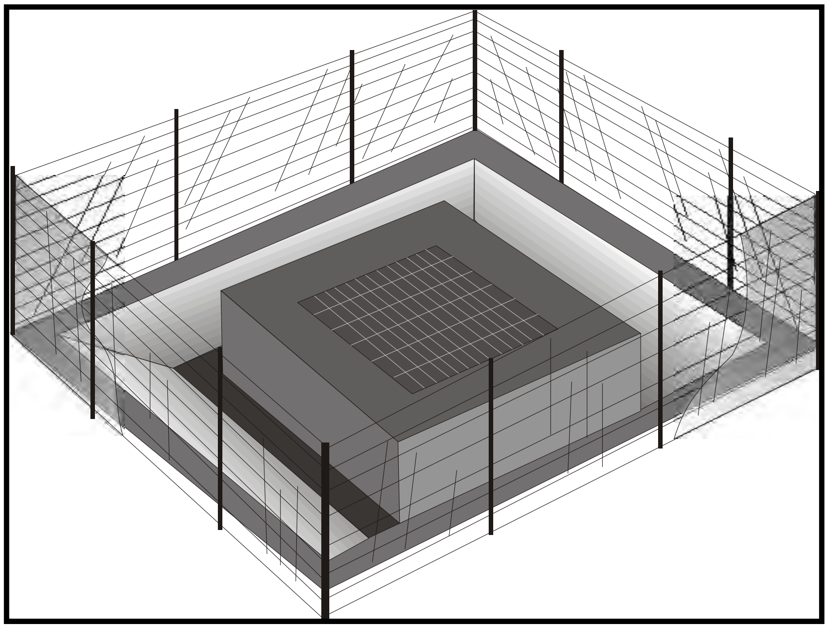
- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- When actively in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

[1] Based on contractor query conducted by Tetra Tech, Inc. November 2016.

Storm Drain Inlet Protection SE-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 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

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

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.

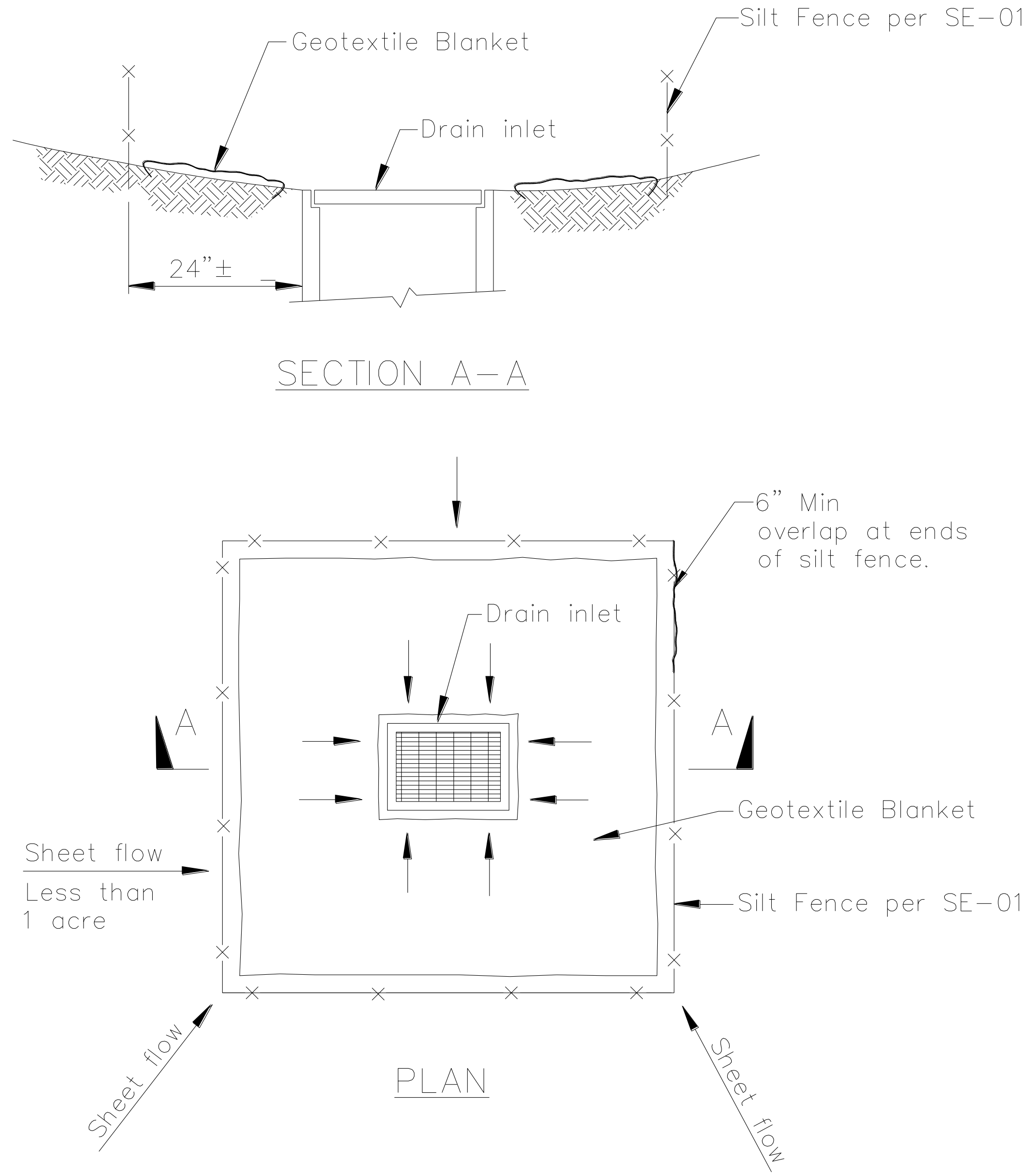
  - Clean and regrade area around the inlet and clean the inside of the storm drain inlet, as it should be free of sediment and debris at the time of final inspection.

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.

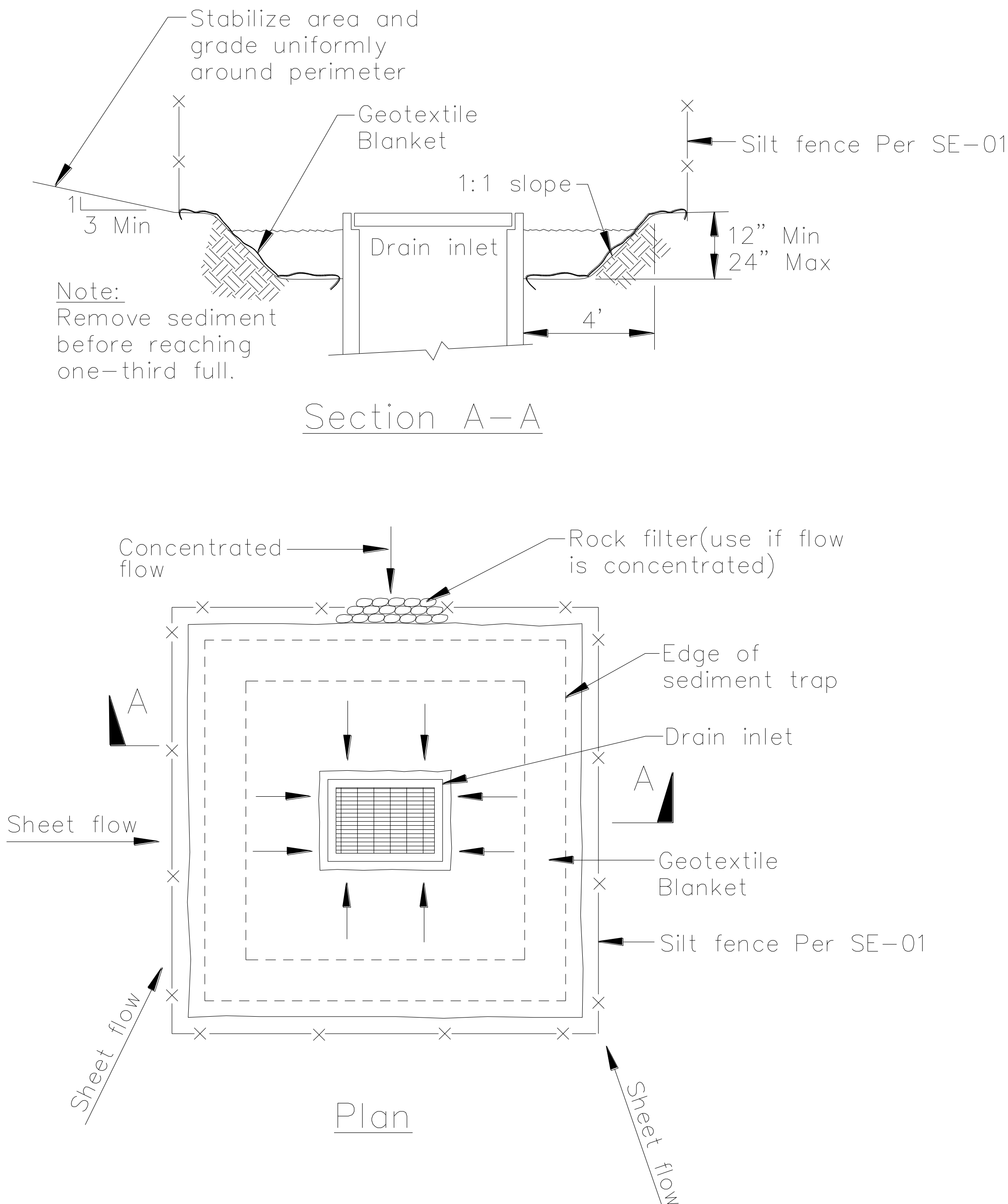
Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



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.

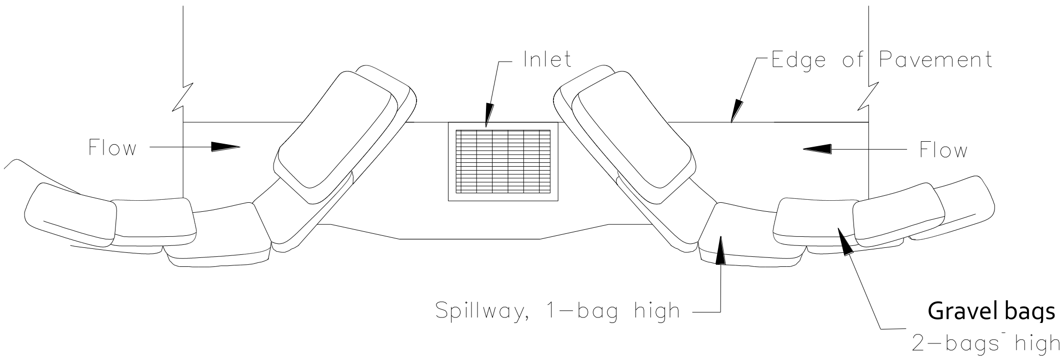


DI PROTECTION TYPE 2

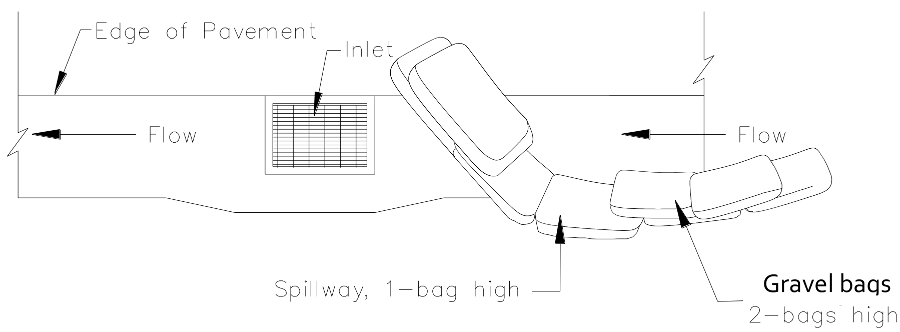
NOT TO SCALE

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



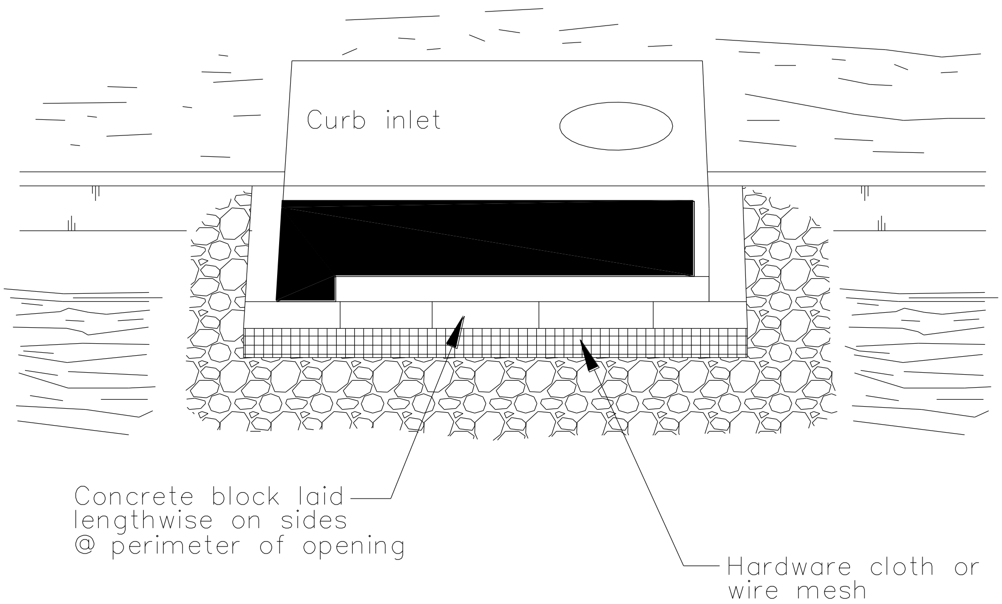
TYPICAL PROTECTION FOR INLET ON GRADE

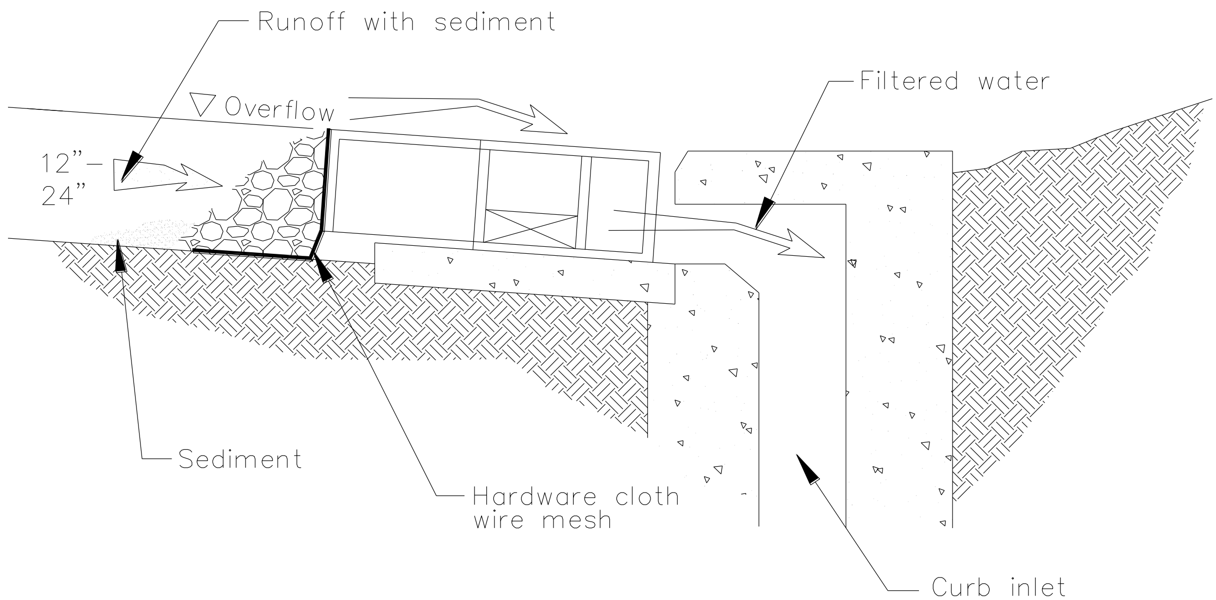
NOTES:

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

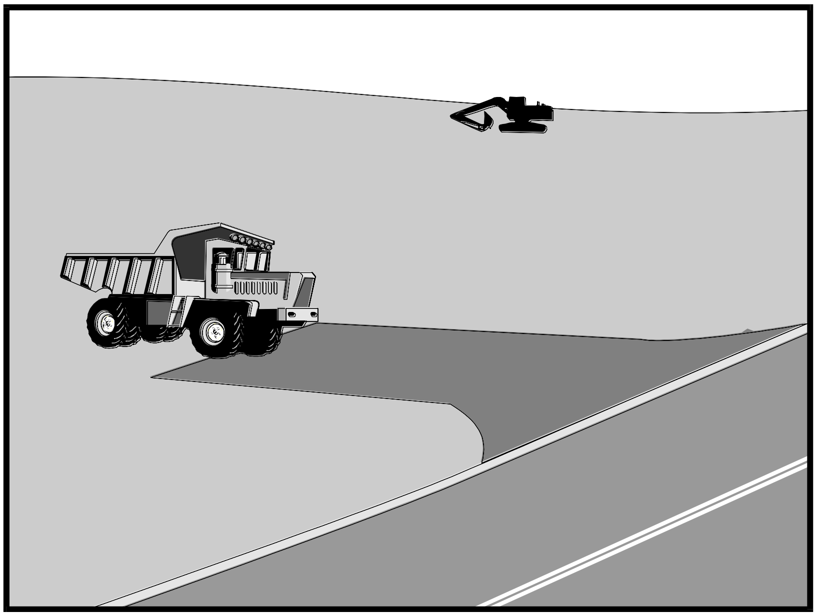
NOT TO SCALE





DI PROTECTION – TYPE 4

NOT TO SCALE



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

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 $1,500 to $6,100 each, averaging $3,100 per entrance. Costs will increase with addition of washing rack and sediment trap. With wash rack, costs range from $1,500 - $7,700 each, averaging $4,600 per entrance (All costs adjusted for inflation, 2016 dollars, by Tetra Tech Inc.

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.

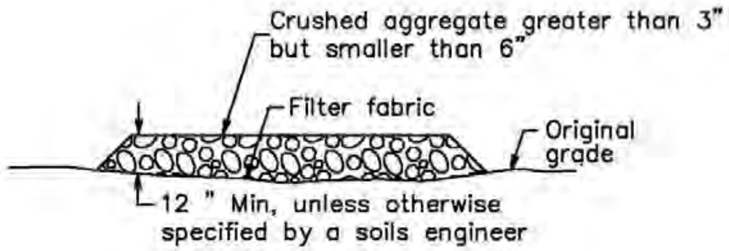
Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

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

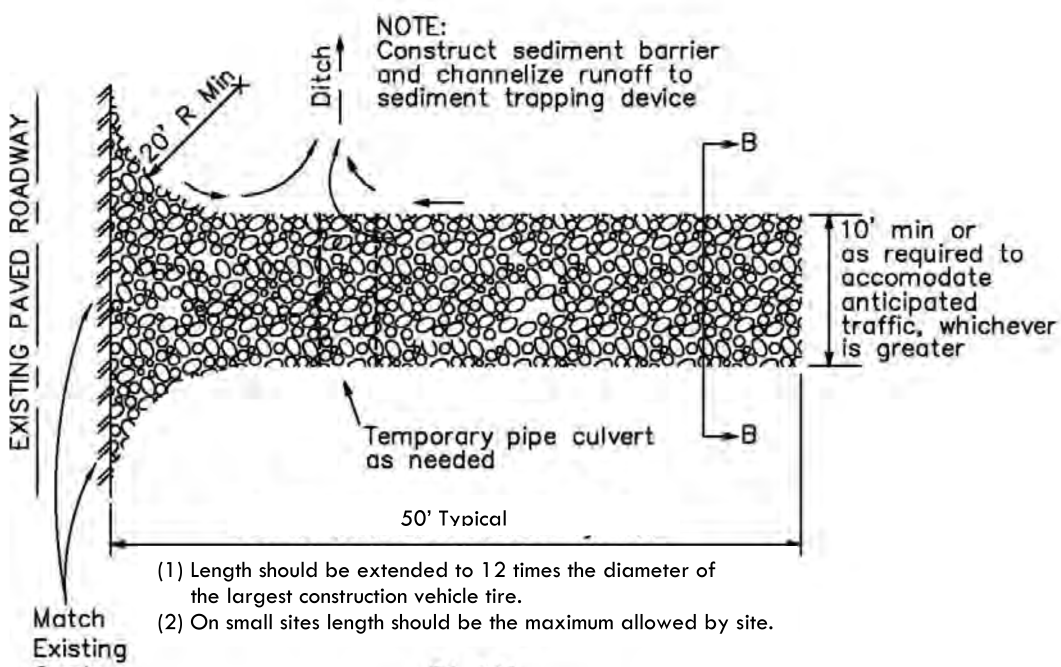
Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

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.

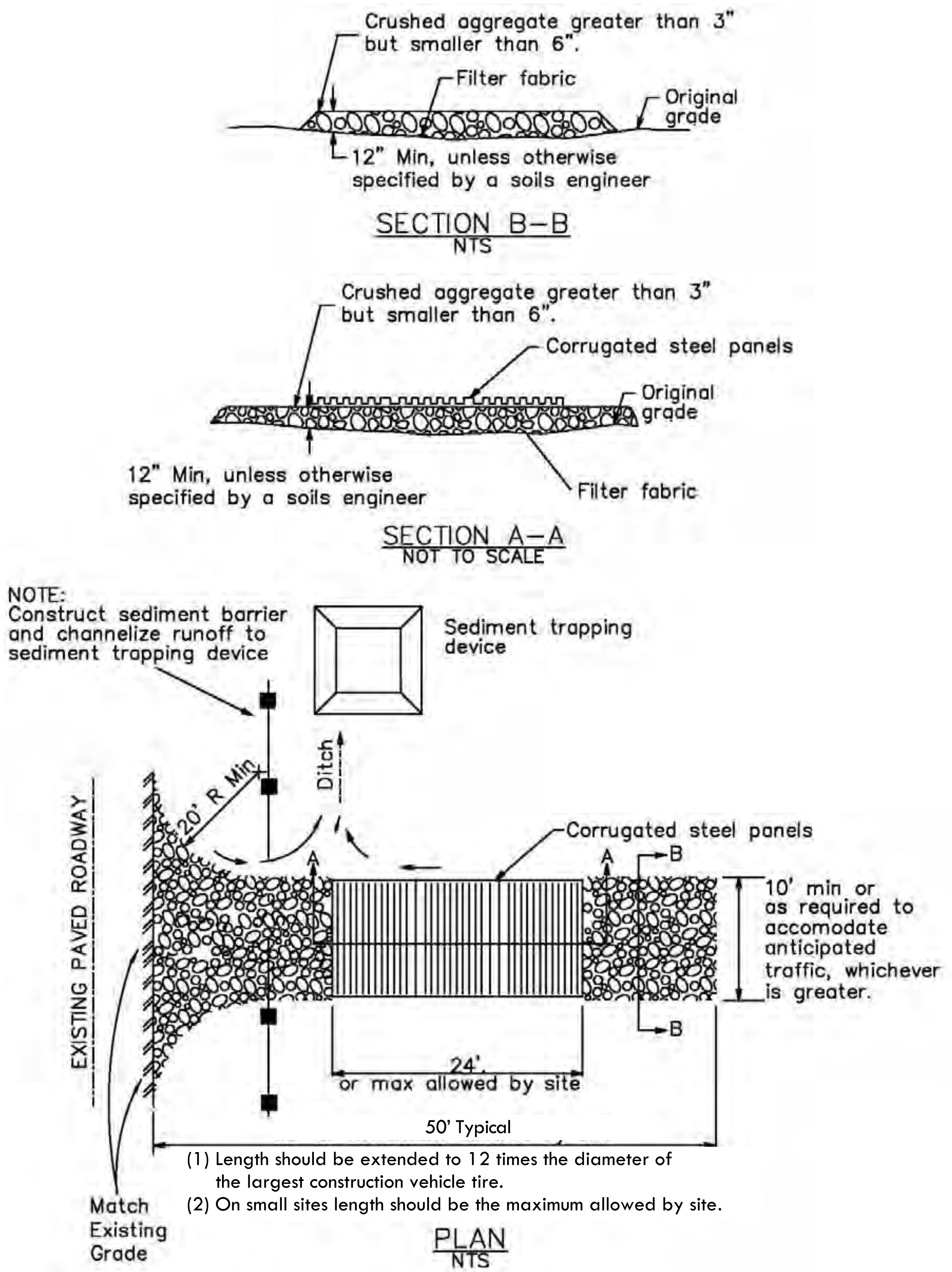


SECTION B–B
NTS

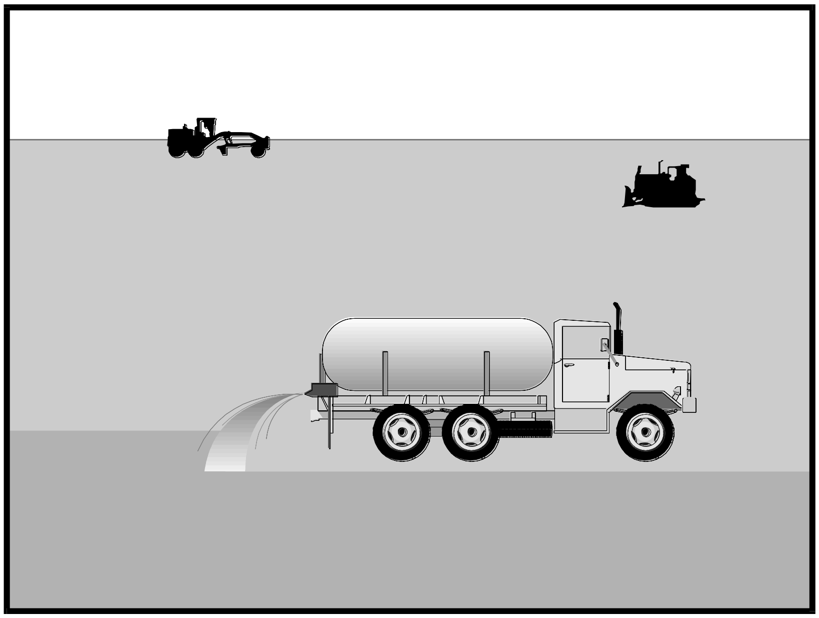


(1) Length should be extended to 12 times the diameter of the largest construction vehicle tire.
(2) On small sites length should be the maximum allowed by site.

PLAN
NTS


Crushed aggregate greater than 3" but smaller than 6".
Filter fabric
Original grade
12" Min, unless otherwise specified by a soils engineer
SECTION B-B
NTS
Crushed aggregate greater than 3" but smaller than 6".
Corrugated steel panels
Original grade
12" Min, unless otherwise specified by a soils engineer
Filter fabric
SECTION A-A
NOT TO SCALE
NOTE:
Construct sediment barrier and channelize runoff to sediment trapping device
Sediment trapping device
Ditch
20' R Min
EXISTING PAVED ROADWAY
Corrugated steel panels
A
A
B
B
10' min or as required to accomodate anticipated traffic, whichever is greater.
24' or max allowed by site
50' Typical
(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.
Match Existing Grade
PLAN
NTS

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:

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

Limitations

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

Implementation

Dust Control Practices

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

Chemical dust suppressants include: mulch and fiber based dust palliatives (e.g. paper mulch with gypsum binder), salts and brines (e.g. calcium chloride, magnesium chloride), non-petroleum based organics (e.g. vegetable oil, lignosulfonate), petroleum based organics (e.g. asphalt emulsion, dust oils, petroleum resins), synthetic polymers (e.g. polyvinyl acetate, vinyl, acrylic), clay additives (e.g. bentonite, montmorillonite) and electrochemical products (e.g. enzymes, ionic products).

Site Condition	Dust Control Practices							
	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt	Temporary Gravel Construction Entrances/Equipment Wash Down	Synthetic Covers	Minimize Extent of Disturbed Area
Disturbed Areas not Subject to Traffic	X	X	X	X	X			X
Disturbed Areas Subject to Traffic			X	X	X	X		X
Material Stockpiles		X	X	X			X	X
Demolition			X			X	X	
Clearing/ Excavation			X	X				X
Truck Traffic on Unpaved Roads			X	X	X	X	X	
Tracking					X	X		

Additional preventive measures include:

- Schedule construction activities to minimize exposed area (see EC-1, Scheduling).
- Quickly treat exposed soils using water, mulching, chemical dust suppressants, or stone/gravel layering.
- Identify and stabilize key access points prior to commencement of construction.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Restrict construction traffic to stabilized roadways within the project site, as practicable.
- Water should be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment should be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the project.
- If reclaimed waste water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality

Control Board (RWQCB) requirements. Non-potable water should not be conveyed in tanks or drain pipes that will be used to convey potable water and there should be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances should be marked, "NON-POTABLE WATER - DO NOT DRINK."

- Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances and wheel wash areas.
- Stabilize inactive areas of construction sites using temporary vegetation or chemical stabilization methods.

For chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. If chemical stabilization is used, the chemicals should not create any adverse effects on stormwater, plant life, or groundwater and should meet all applicable regulatory requirements.

Costs

Installation costs for water and chemical dust suppression vary based on the method used and the length of effectiveness. Annual costs may be high since some of these measures are effective for only a few hours to a few days.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Check areas protected to ensure coverage.
- Most water-based dust control measures require frequent application, often daily or even multiple times per day. Obtain vendor or independent information on longevity of chemical dust suppressants.

References

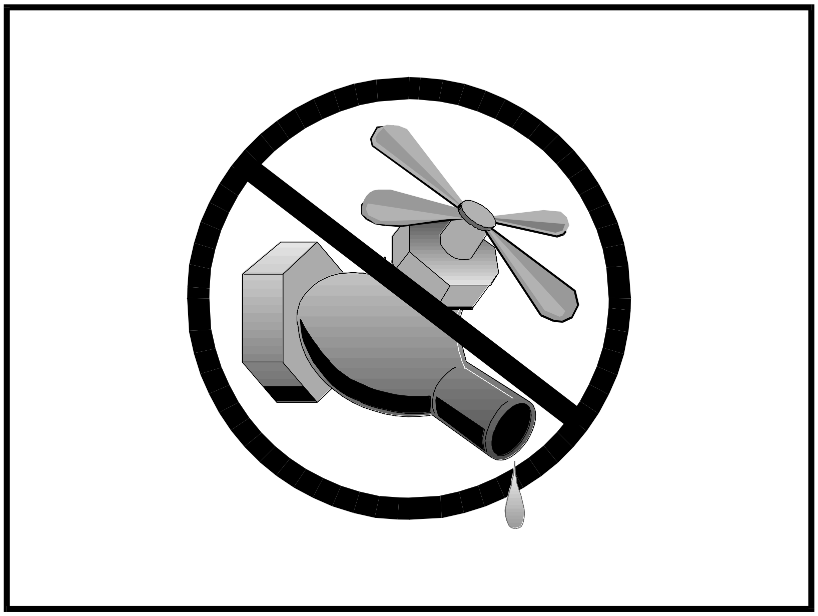
Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

California Air Pollution Control Laws, California Air Resources Board, updated annually.

Construction Manual, Chapter 4, Section 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative", California Department of Transportation (Caltrans), July 2001.

Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.

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



Categories

EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

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.

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- Direct construction water runoff to areas where it can soak into the ground or be collected and used.
- 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

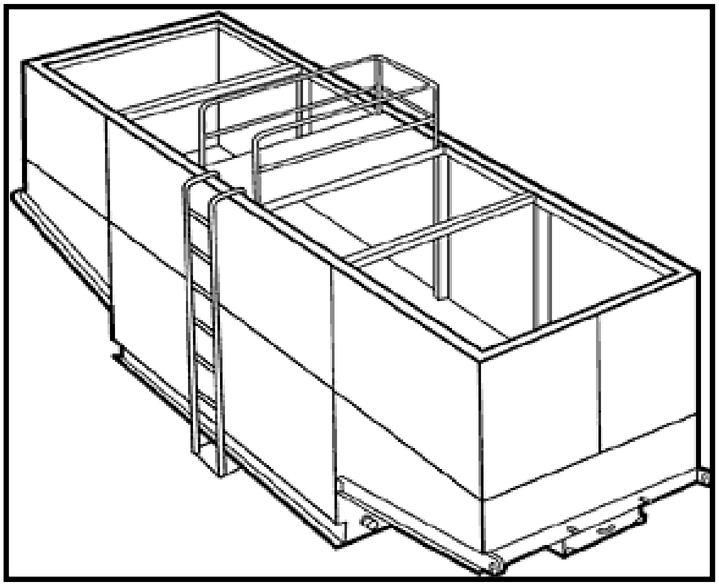
The cost is small to none compared to the benefits of conserving water.

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.



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

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.

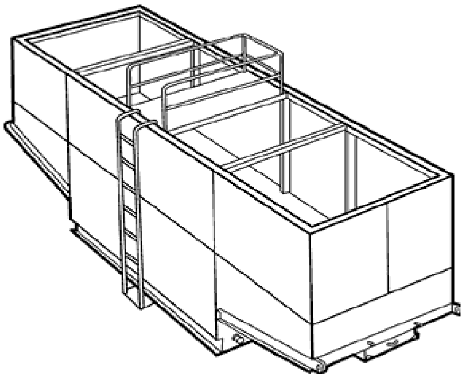
Implementation:

- 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.

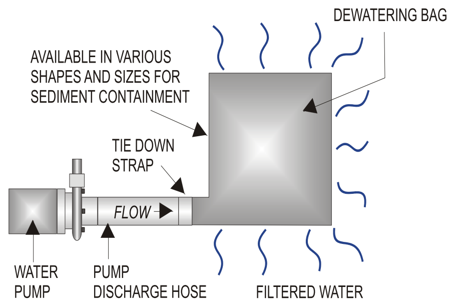
- Tank size will depend on flow volume, constituents of concern, and residency period required. Vendors should be consulted to appropriately size tank.

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 $460 per month for a 1,000-gallon tank to $3,400 per month for a 10,000-gallon tank (adjusted for inflation, 2016 dollars, by Tetra Tech Inc.). 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.

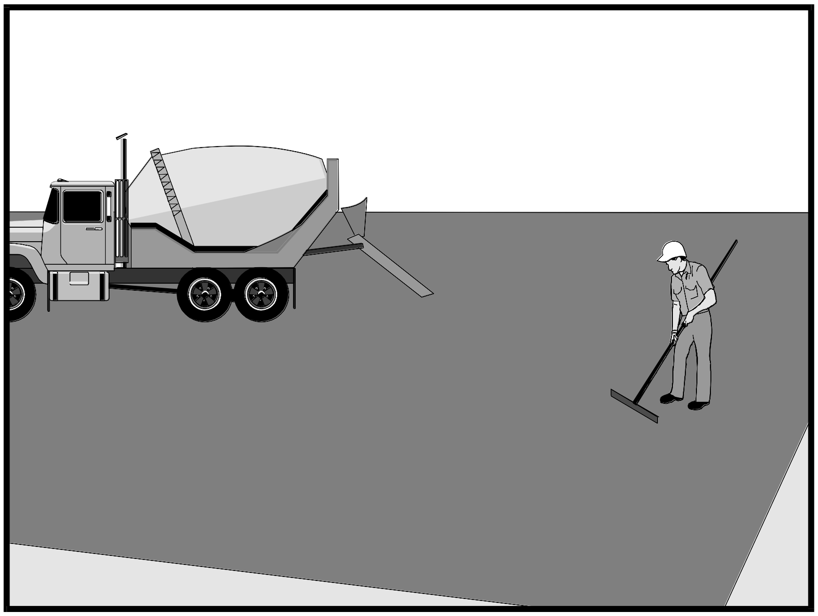
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003; Updated March 2004.

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



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 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.

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

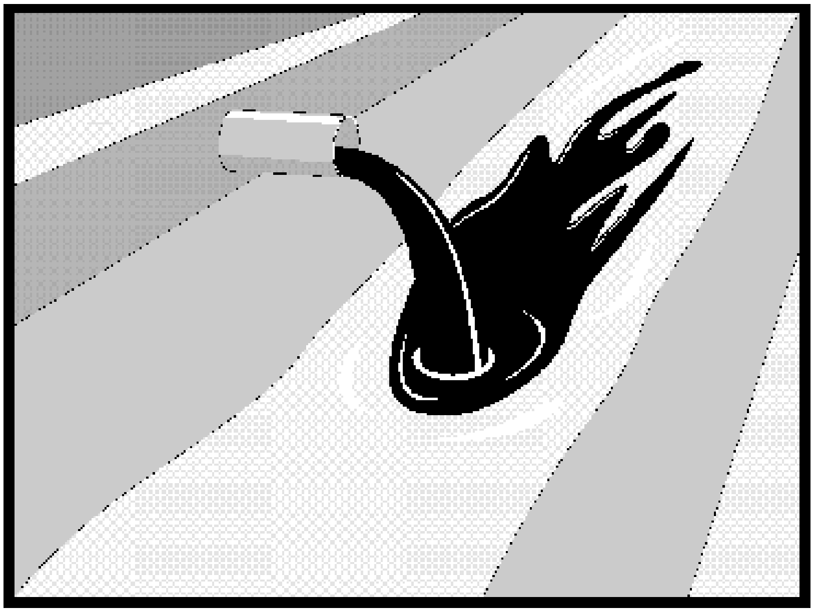
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

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.

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**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

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

Suitable Applications

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

Limitations

Illicit connections and illegal discharges or dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor. If pre-existing hazardous materials or wastes are known to exist onsite, they should be identified in the SWPPP and handled as set forth in the SWPPP.

Implementation

Planning

- Review the SWPPP. Pre-existing areas of contamination should be identified and documented in the SWPPP.

- Inspect site before beginning the job for evidence of illicit connections, illegal dumping or discharges. Document any pre-existing conditions and notify the owner.

- 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.

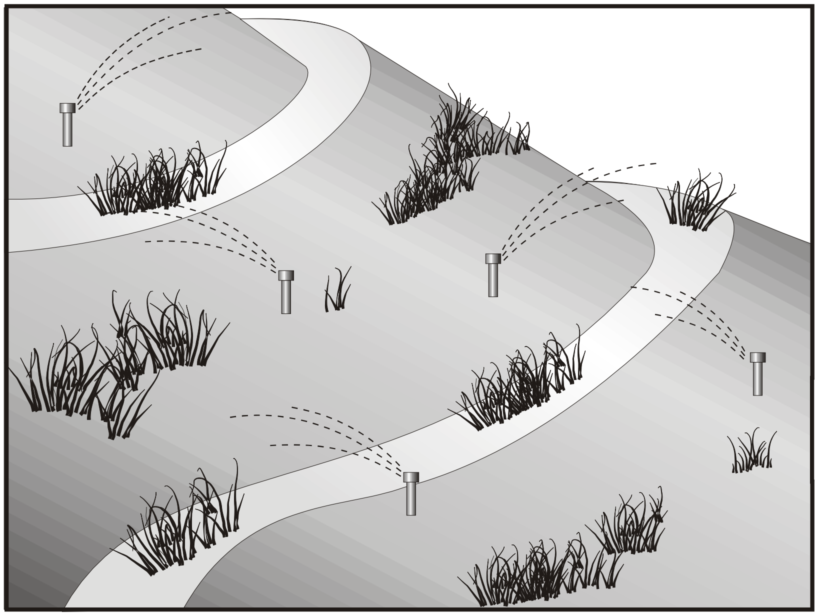
References

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



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

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.

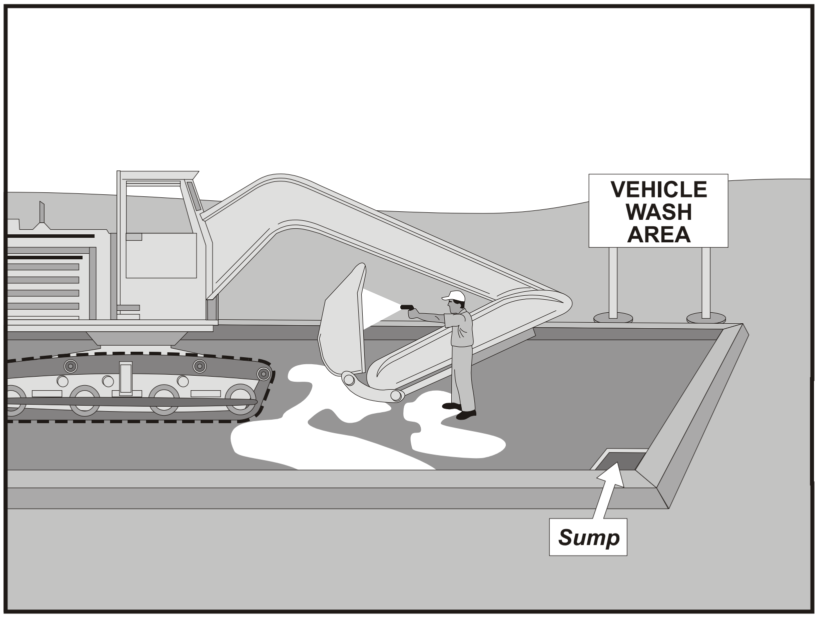
References

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



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Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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

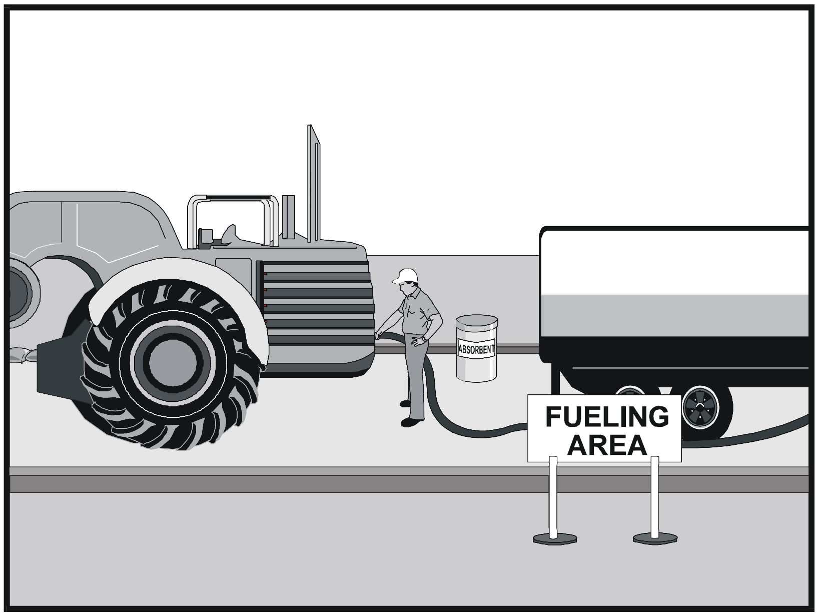
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at 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



Categories

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Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

If User/Subscriber modifies this fact sheet in any way, the CASQA name/logo and footer below must be removed from each page and not appear on the modified version.

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.

- 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.

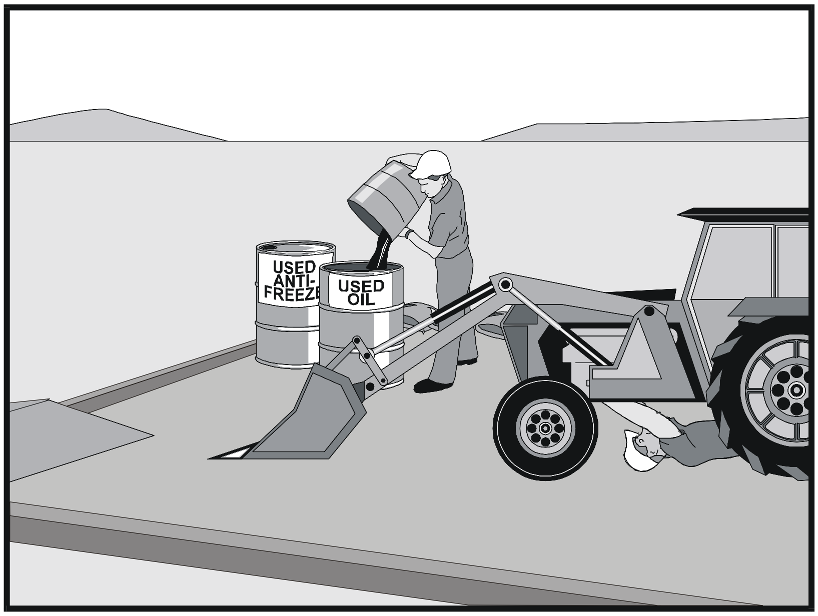
References

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.



Categories

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Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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, 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.

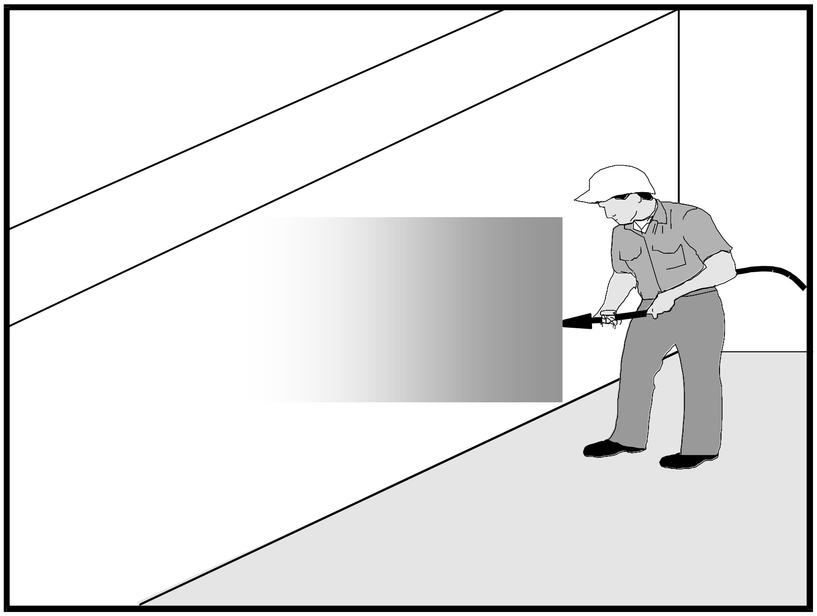
References

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.

Concrete Curing NS-12



Categories

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Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

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

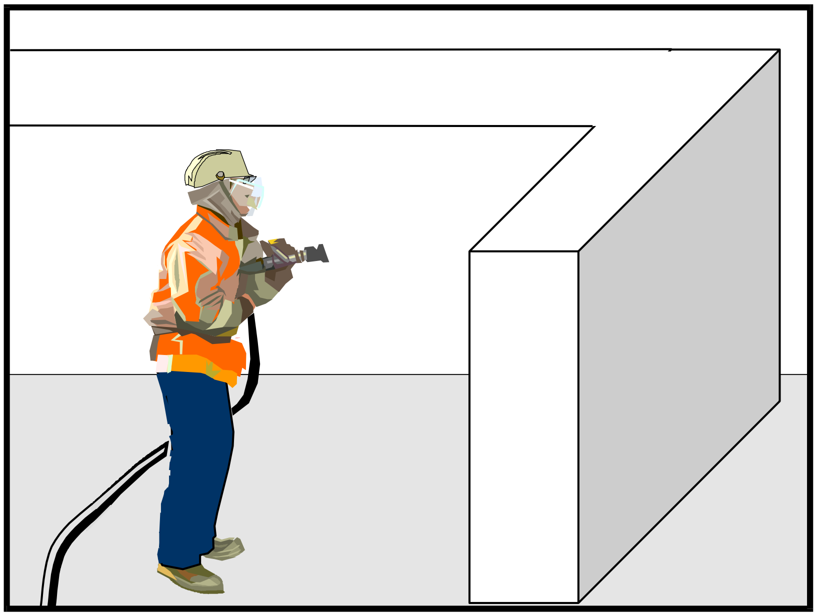
Blue Print for a Clean Bay-Construction-Related Industries: Best Management Practices for Stormwater Pollution Prevention; Santa Clara Valley Non-Point Source Pollution Control Program, 1992.

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



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 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.

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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.

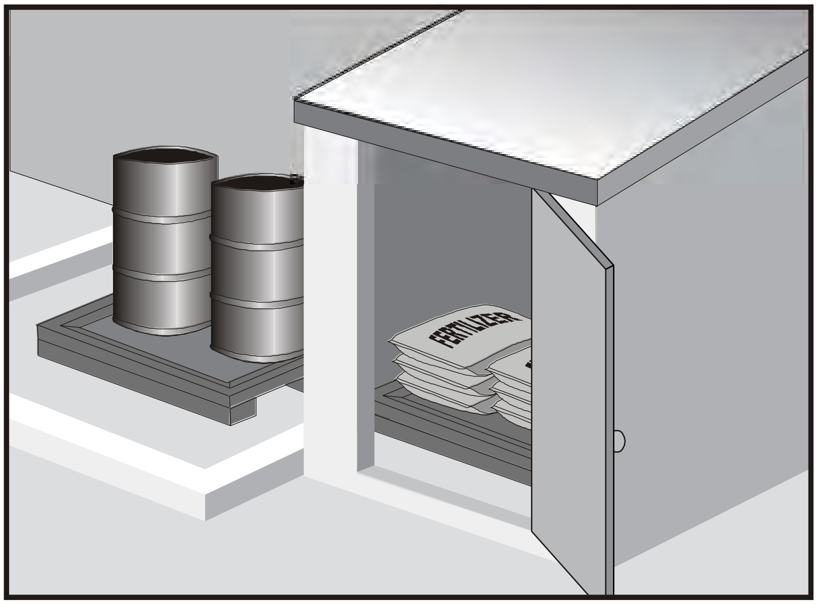
References

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**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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

- 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

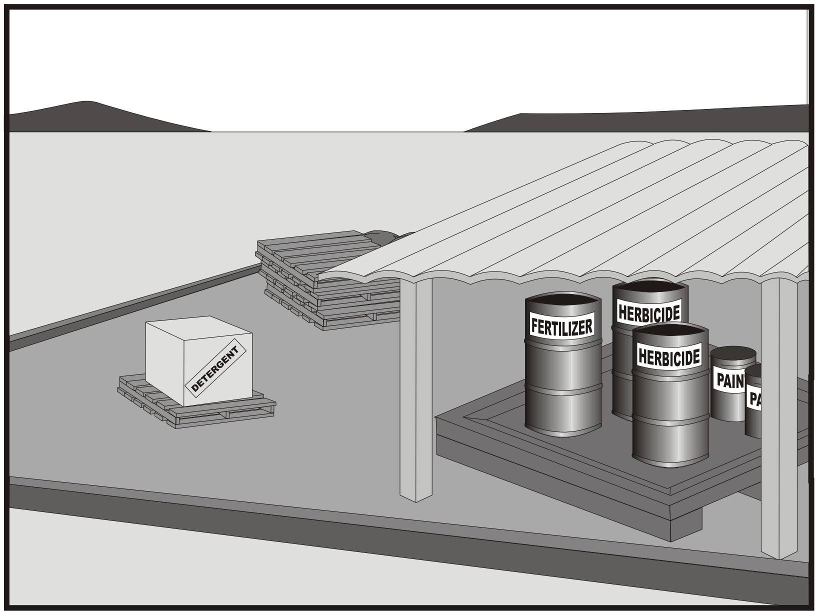
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

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.

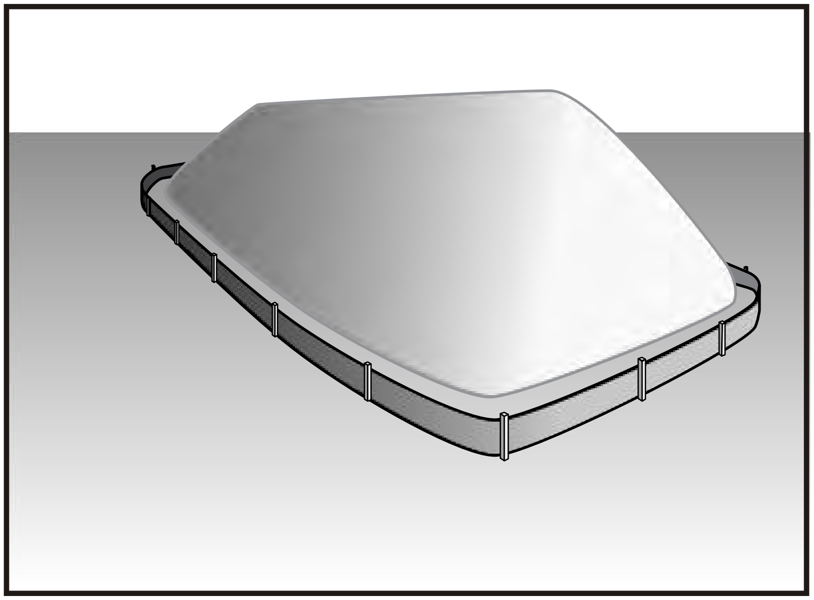
Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

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



Treat 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

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:

- 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 run-on 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 treated wood

- 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).

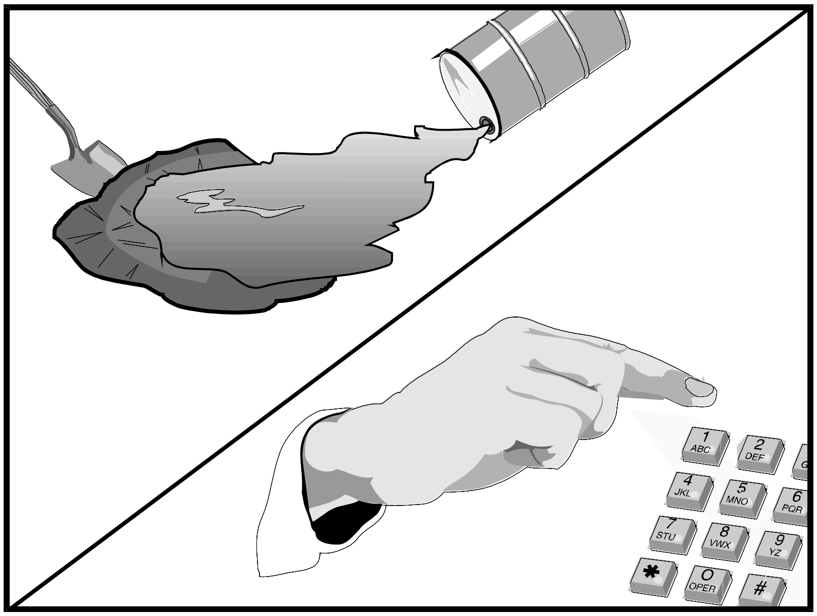
- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.

- 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.

Spill Prevention and Control WM-4



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 spill's 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.

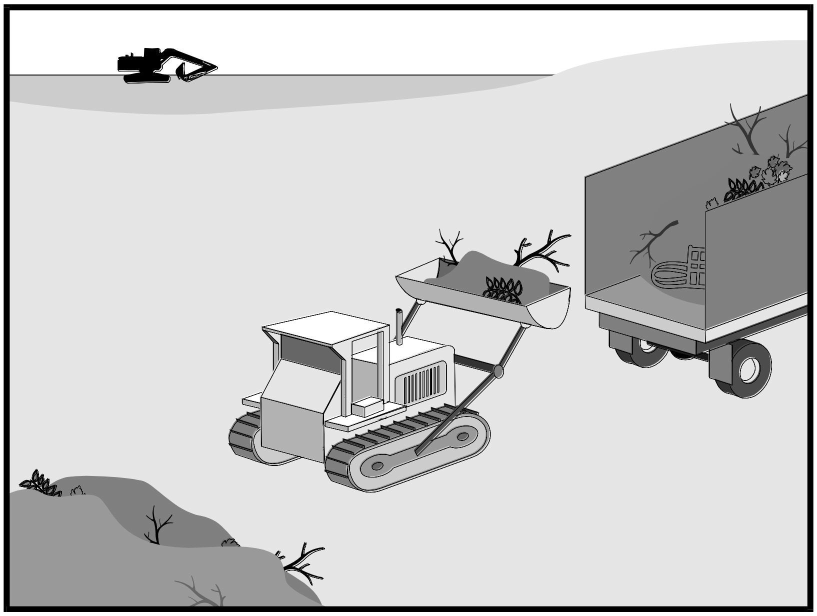
References

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



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

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

- 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.

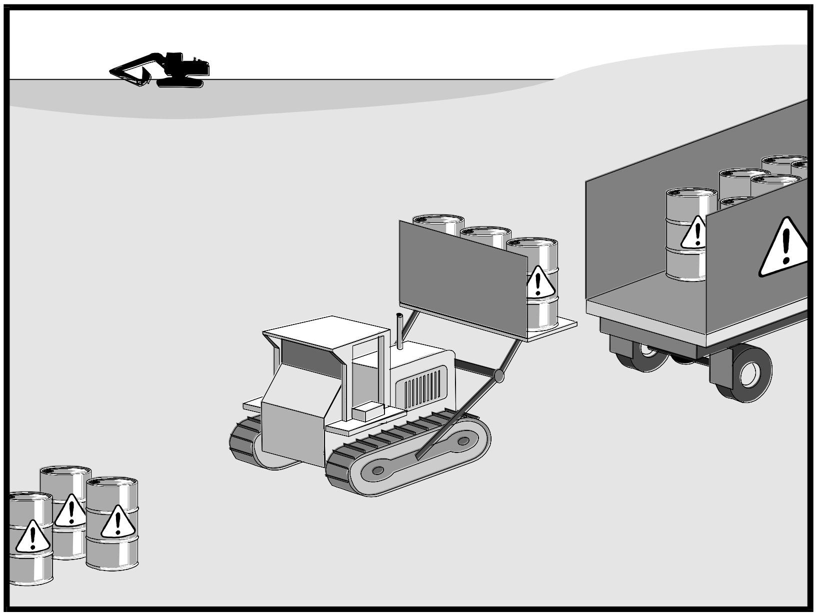
References

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
- Asphalt Products
- Concrete Curing Compounds
- Pesticides
- Palliatives
- Acids
- Septic Wastes
- Paints
- Stains
- Solvents
- Wood Preservatives
- 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

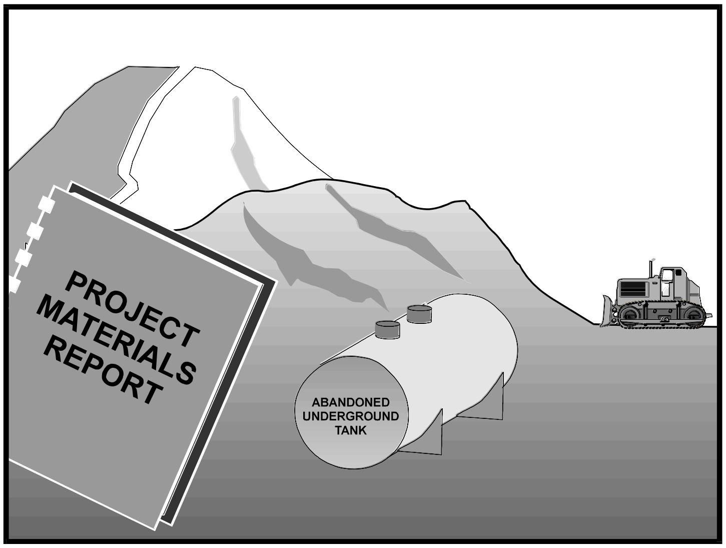
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

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	
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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

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.

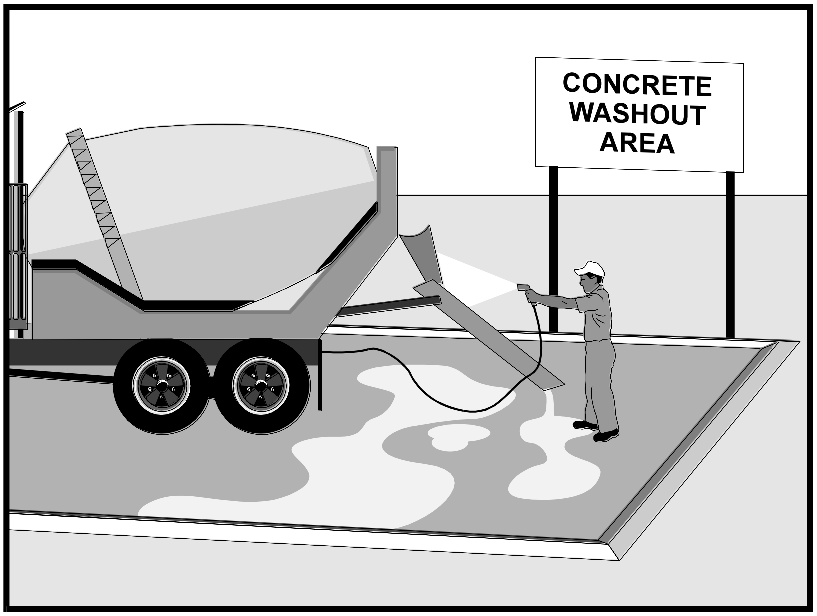
References

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.

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



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

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.

- Mortar-mixing stations exist.
- Stucco mixing and spraying.
- See also NS-8, Vehicle and Equipment Cleaning.

Limitations

- Offsite washout of concrete wastes may not always be possible.
- Multiple washouts may be needed to assure adequate capacity and to allow for evaporation.

Implementation

The following steps will help reduce stormwater pollution from concrete wastes:

- Incorporate requirements for concrete waste management into material supplier and subcontractor agreements.
- Store dry and wet materials under cover, away from drainage areas. Refer to WM-1, Material Delivery and Storage for more information.
- Avoid mixing excess amounts of concrete.
- Perform washout of concrete trucks in designated areas only, where washout will not reach stormwater.
- Do not wash out concrete trucks into storm drains, open ditches, streets, streams or onto the ground. Trucks should always be washed out into designated facilities.
- Do not allow excess concrete to be dumped onsite, except in designated areas.
- For onsite washout:
  - On larger sites, it is recommended to locate washout areas at least 50 feet from storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
  - Washout wastes into the temporary washout where the concrete can set, be broken up, and then disposed properly.
  - Washouts shall be implemented in a manner that prevents leaching to underlying soils. Washout containers must be water tight and washouts on or in the ground must be lined with a suitable impervious liner, typically a plastic type material.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile or dispose in the trash.
- See typical concrete washout installation details at the end of this fact sheet.

Education

- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.

- Arrange for contractor's superintendent or representative to oversee and enforce concrete waste management procedures.
- Discuss the concrete management techniques described in this BMP (such as handling of concrete waste and washout) with the ready-mix concrete supplier before any deliveries are made.

Concrete Demolition Wastes

- Stockpile concrete demolition waste in accordance with BMP WM-3, Stockpile Management.
- Dispose of or recycle hardened concrete waste in accordance with applicable federal, state or local regulations.

Concrete Slurry Wastes

- PCC and AC waste should not be allowed to enter storm drains or watercourses.
- PCC and AC waste should be collected and disposed of or placed in a temporary concrete washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below).
- A foreman or construction supervisor should monitor onsite concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.
- Saw-cut concrete slurry should not be allowed to enter storm drains or watercourses. Residue from grinding operations should be picked up by means of a vacuum attachment to the grinding machine or by sweeping. Saw cutting residue should not be allowed to flow across the pavement and should not be left on the surface of the pavement. See also NS-3, Paving and Grinding Operations; and WM-10, Liquid Waste Management.
- Concrete slurry residue should be disposed in a temporary washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below) and allowed to dry. Dispose of dry slurry residue in accordance with WM-5, Solid Waste Management.

Onsite Temporary Concrete Washout Facility, Transit Truck Washout Procedures

- Temporary concrete washout facilities should be located a minimum of 50 ft from storm drain inlets, open drainage facilities, and watercourses. Each facility should be located away from construction traffic or access areas to prevent disturbance or tracking.
- A sign should be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.
- Temporary concrete washout facilities should be constructed above grade or below grade at the option of the contractor. Temporary concrete washout facilities should be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

- Temporary washout facilities should have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.
- Temporary washout facilities should be lined to prevent discharge to the underlying ground or surrounding area.
- Washout of concrete trucks should be performed in designated areas only.
- Only concrete from mixer truck chutes should be washed into concrete wash out.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of or recycled offsite.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete should be broken up, removed, and disposed of per WM-5, Solid Waste Management. Dispose of or recycle hardened concrete on a regular basis.
- Temporary Concrete Washout Facility (Type Above Grade)
  - Temporary concrete washout facility (type above grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft; however, smaller sites or jobs may only need a smaller washout facility. With any washout, always maintain a sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
  - Materials used to construct the washout area should conform to the provisions detailed in their respective BMPs (e.g., SE-8 Sandbag Barrier).
  - Plastic lining material should be a minimum of 10 mil in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
  - Alternatively, portable removable containers can be used as above grade concrete washouts. Also called a “roll-off”; this concrete washout facility should be properly sealed to prevent leakage and should be removed from the site and replaced when the container reaches 75% capacity.
- Temporary Concrete Washout Facility (Type Below Grade)
  - Temporary concrete washout facilities (type below grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft. The quantity and volume should be sufficient to contain all liquid and concrete waste generated by washout operations.
  - Lath and flagging should be commercial type.
  - Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

- The base of a washout facility should be free of rock or debris that may damage a plastic liner.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, the hardened concrete should be removed and properly disposed or recycled in accordance with federal, state or local regulations. Materials used to construct temporary concrete washout facilities should be removed from the site of the work and properly disposed or recycled in accordance with federal, state or local regulations.

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

Costs

All of the above are low cost measures. Roll-off concrete washout facilities can be more costly than other measures due to removal and replacement; however, provide a cleaner alternative to traditional washouts. The type of washout facility, size, and availability of materials will determine the cost of the washout.

Inspection and Maintenance

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

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

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

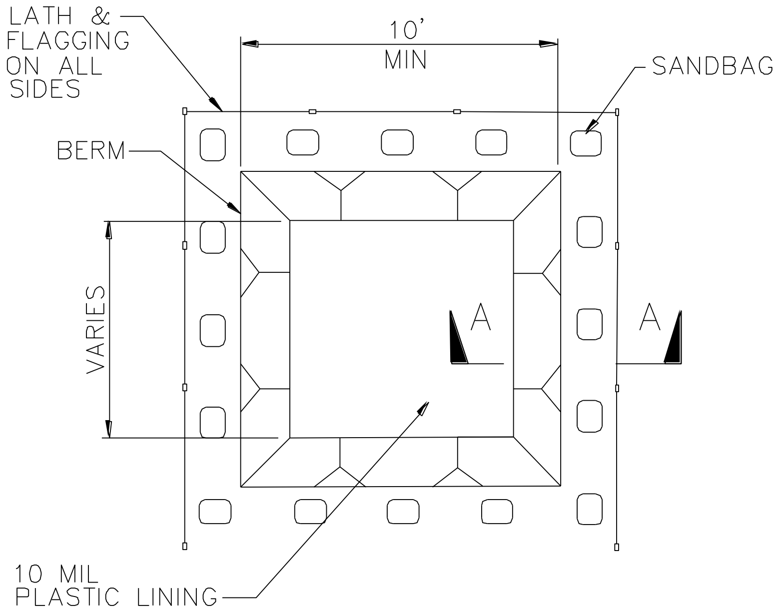
- Inspect washout facilities for damage (e.g. torn liner, evidence of leaks, signage, etc.). Repair all identified damage.

References

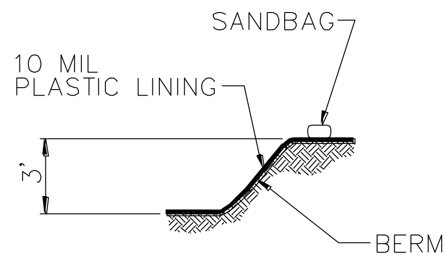
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000, Updated March 2003.

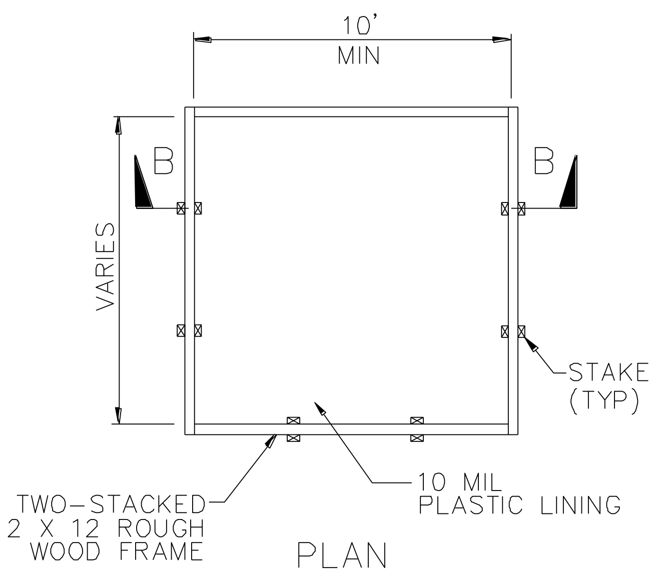
Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



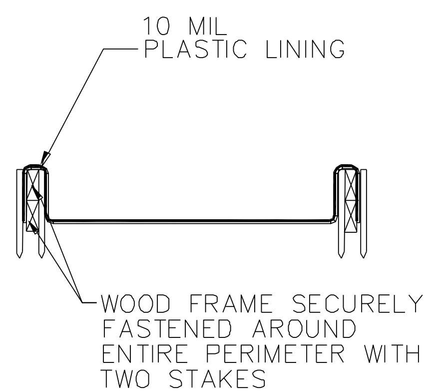
PLAN
NOT TO SCALE
TYPE "BELOW GRADE"



SECTION A–A
NOT TO SCALE



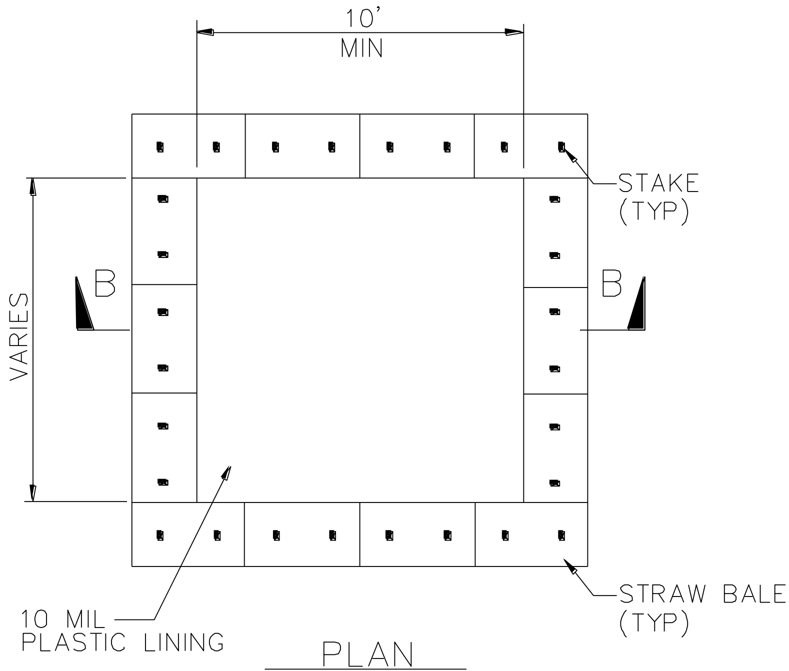
PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"



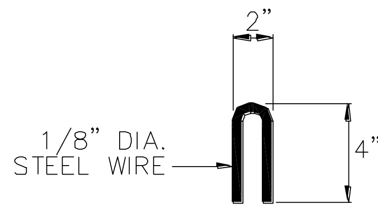
SECTION B–B
NOT TO SCALE

NOTES

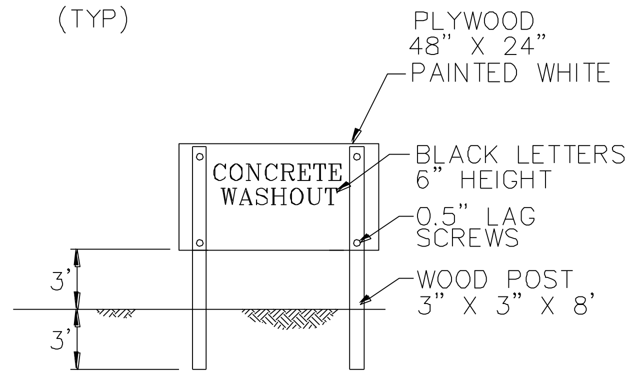
1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.



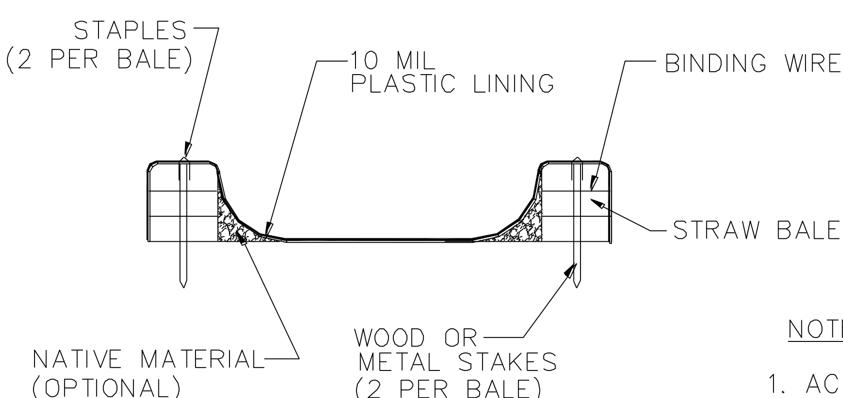
PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"
WITH STRAW BALES



STAPLE DETAIL



CONCRETE WASHOUT
SIGN DETAIL
(OR EQUIVALENT)

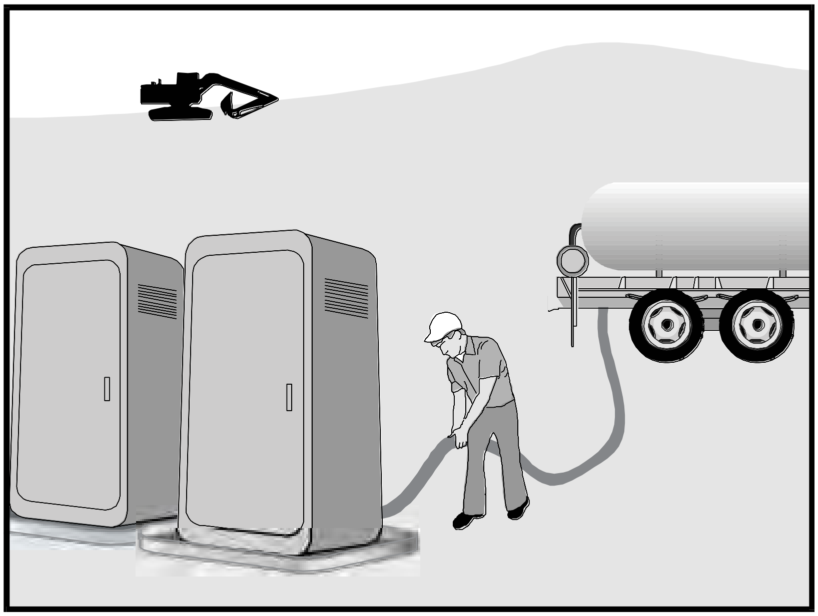


SECTION B–B
NOT TO SCALE

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

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.

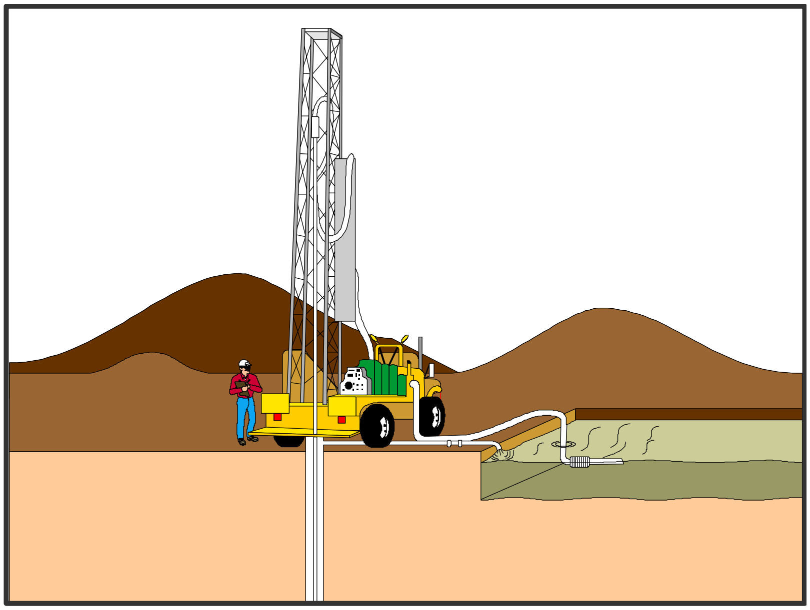
- If high winds are expected, portable sanitary facilities must be secured with spikes or weighed down to prevent over turning.

- 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.



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

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.

Good Housekeeping

Activity Specific Erosion and Sediment Control Plan
(A-ESCP)

For questions or concerns, please contact your assigned
PG&E Environmental Field Specialist (EFS)

Prepared by:
PG&E Construction Stormwater Group

April 2017

TABLE OF CONTENTS

Attachments

Attachment A Activity Specific Installation Detail

GH-01 Typical BMP Use Detail

References

Referenced BMP Fact Sheets

EC-2	Preservation of Existing Vegetation
EC-5	Soil Binders
EC-6	Straw Mulch
EC-7	Geotextiles, Plastic Covers, and Erosion Control Blankets/Mats
EC-16	Non-Vegetative Stabilization
SE-1	Silt Fence
SE-5	Fiber Rolls
SE-6	Gravel Bag Berm
SE-7	Street Sweeping and Vacuuming
SE-10	Storm Drain Inlet Protection
NS-3	Paving and Grinding Operations
NS-9	Vehicle and Equipment Fueling
TC-1	Stabilized Construction Entrance/Exit
TC-2	Stabilized Construction Roadway
TC-3	Tire Wash
WM-1	Material Delivery and Storage
WM-2	Material Use
WM-3	Stockpile Management
WM-4	Spill Prevention and Control
WM-5	Solid Waste Management
WM-6	Hazardous Materials and Waste Management
WM-7	Contaminated Soil Management
WM-8	Concrete Waste Management
WM-9	Sanitary/Septic Waste Management
WM-10	Liquid Waste Management

1.0 WHAT IS GOOD HOUSEKEEPING?

1.1 Introduction

Good Housekeeping includes Best Management Practices (BMPs) to minimize contact of potential pollutants with stormwater, discharge of pollutants to storm drains or surface water, and the contamination of soils at all project sites.

All PG&E Project Teams, Crews, and Subcontractors are **required**
to be familiar with the information contained within this A-ESCP

GOAL: Prevent the discharge of, or soil contamination from, potential pollutants found on construction sites.

1.2 Good Housekeeping Requirements

- This A-ESCP applies to all PG&E construction projects, regardless of size or complexity.
- Know what potential pollutants exist on the site.
- Good Housekeeping must take place year-round.
- Waste must be covered at the end of every day and during rain events.
- Spills must be prevented or cleaned up immediately.

1.3 Planning for success

- Ensure covers are available for any waste.
- Ensure trays are available to prevent spills of potential pollutants.
- Ensure spill kits are available on maintenance trucks and at each site.

2.0 GOOD HOUSEKEEPING PROCEEDURES

The following procedures are intended to prevent the discharge of, or contamination of soil by, construction site pollutants.

The BMPs for the project should be installed in areas similar to those shown on the Typical BMP Use Detail, Attachment A.

2.1 Product and Materials Inventory

Description:

Inventory products and materials that are on-site and are not designed to be outdoors.

Requirements:

- Inventory products and materials. Consider delivery, storage, spill prevention, and cleanup requirements.
- Consider 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.
- Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.
- Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges.
- Assess past spills or leaks, non-stormwater discharges, and discharges from adjoining areas.
- Retain sampling, visual observation, and inspection records.
- Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

Associated BMPs and Other Plans:
For additional detail and guidance, refer to the following:

- WM-1 – Materials Delivery and Storage
- WM-2 – Material Use

Figure 1: Materials properly contained

Figure 2: Materials needing covered storage

2.2 Liquid Pollutant Storage

Description:

Implement proper storage, spill prevention, and Spill Kits if there are any of the following on the construction site:

- Petroleum products such as oils, fuels, grease, cold mix asphalt, and tar
- Glues, adhesives, solvents, and cleaning products
- Herbicides, pesticides, and fertilizers
- Paints, stains, and curing compounds
- Vehicle and equipment fluids such as anti-freeze, exhaust fluid, washer fluid, or battery acid
- Soil binders or amendments
- Sewage or line flushing/sanitizing agents
- Other hazardous or toxic substances

Requirements:

- Minimize the amount of hazardous materials stored at the construction site.
- Store hazardous liquids, wastes, and all chemicals in watertight containers with appropriate secondary containment to prevent any spillage or leakage, or in a completely enclosed storage shed.
- Cover all temporary containment facilities prior to forecast rain, at the end of each day, and during non-work days.
- Do not mix waste or hazardous materials. Doing so may complicate or inhibit disposal and recycling options and can result in dangerous chemical reactions.

Associated BMPs and Other Plans:

For additional detail and guidance, refer to the following:

- NS-9 – Vehicle and Equipment Fueling
- WM-1 – Material Delivery and Storage
- WM-2 – Material Use
- WM-4 – Spill Prevention and Control
- WM-6 – Hazardous Materials/Waste Management
- WM-10 – Liquid Waste Management

Figure 3: Properly contained in secondary containment

Figure 4: Improperly placed and stored on the ground

2.3 Construction Material Storage

Description:

Implement material storage BMPs if any of the following are expected to be on the construction site:

- Asphalt
- Cement
- Dry mix concrete
- Fertilizer, Herbicides, or Pesticides
- Grease
- Soil amendments
- Any other construction materials not designed to be exposed to weather or rain.

Requirements:

- Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks etc.).

Associated BMPs and Other Plans:

For additional detail and guidance, refer to the following:

- Stockpile Management A-ESCP
- WM-1 – Material Delivery and Storage
- WM-2 – Material Use
- WM-3 – Stockpile Management
- WM-4 – Spill Prevention and Control
- WM-6 – Hazardous Materials/Waste Management
- WM-7 – Contaminated Soil Management

Figure 5: Properly wrapped in plastic, on pallet, and on plastic

Figure 6: Improperly placed and stored on the ground

2.4 Tracking Controls

Description:

Implement tracking control BMPs if the following occurs on the construction site:

- Vehicle or equipment traffic to or from a construction, laydown, borrow, disposal, or staging area has the potential to contaminate the vehicle's tires with mud or sediment.
- Connections of non-stabilized access roads or any of the above connect to a paved roadway.
- Internal traffic areas, within a construction site, may lead to sediment laden discharge into storm drain systems or surface waters.

Requirements:

- Use 3" to 6" rock as much as 12" thick in the Construction Entrance to dislodge sediment and contain the sediment within the void areas of the rock.
- Limit traffic to using the entrance at all times. Block all other potential access locations.
- Slope entrance away from the adjoining roadway or provide drainage to prevent stormwater from conveying trapped sediments to the roadway.
- Build entrance with adequate length (50' min), width, (20') and turning radii (25').
- Inspect adjacent roadways daily and sweep or vacuum (SE-7) as needed.
- Include a sediment trap where water runs off of the entrance.
- Maintain the entrance by replacing or freshening rock as needed.

Associated BMPs and Other Plans:

For additional detail and guidance, refer to the following:

- SE-7 – Street Sweeping and Vacuuming
- SE-10 – Storm Drain Inlet Protection
- TC-1 – Stabilized Construction Entrance
- TC-2 – Stabilized Construction Roadway
- TC-3 – Tire Wash

Figure 7: Effective large angular material

Figure 8: Small ineffective material

2.5 Concrete and Other Rinse and Wash Waters

Description:

Implement proper BMPs if rinsing or washing any of the following is required on the construction site:

- Concrete, stucco, plaster, mortar, grout, tile, or gunite delivery, placement, finishing, pumping, or transporting equipment.
- Paint containers, sprayers, brushes, rollers, mixers, pumps, or cleaning supplies.
- Drywall materials, tools, texture guns and pumps, hoses, and waste.
- Tile mastic, grout, cuttings, or cleaning tools and equipment.
- Construction equipment, vehicles, tools, and materials.
- Cutting, grinding, coring, drilling, or re-finishing of any construction materials using water as a lubricant or coolant.
- Any other materials or equipment that may need to be washed or rinsed.

Requirements:

- Do not allow rinse or wash water to come into contact with the ground or paved surfaces.
- Rinse and wash water shall not be conveyed or dumped into any drain, inlet, or surface water.
- All concrete washout materials, including the water, cement, sand, and gravel shall be disposed of at a proper facility.

Associated BMPs and Other Plans:

For additional detail and guidance, refer to the following:

- NS-3 – Paving and Grinding Operations
- WM-4 – Spill Prevention and Control
- WM-6 – Hazardous Materials/Waste Management
- WM-8 – Concrete Waste Management
- WM-10 – Liquid Waste Management

Figure 9: Commercially available washout

Figure 10: Poorly located, installed, and maintained

2.6 Sanitation Facilities

Description:

Implement appropriate sanitation facility BMPs if the following are located at the construction site:

- Portable toilets
- Sanitary waste storage
- Hand wash stations

Requirements:

- Locate away from drainages and inlets (50’ if possible).
- Provide a tray to contain spills and minor leaks.
- Service and maintain facilities regularly to avoid overuse and overfilling.
- Protect from tipping, especially in high wind areas.

Associated BMPs and Other Plans:

For additional detail and guidance, refer to the following:

- WM-4 – Spill Prevention and Control
- WM-6 – Hazardous Materials/Waste Management
- WM-9 – Sanitary/Septic Waste Management
- WM-10 – Liquid Waste Management

Figure 11: Properly placed on tray and tied down

Figure 12: Poor location and protection

2.7 Waste Disposal Containers

Description:

Implement appropriate waste disposal BMPs if the following are present at the construction site:

- Construction debris
- Garbage
- Contaminated soil
- Demolition waste
- Concrete, stucco, mortar, drywall, or any other waste

Requirements:

- Cover waste disposal containers at the end of every day and prior to the onset of precipitation.
- Prevent discharges from waste disposal containers to the storm drain system or surface waters.
- Contain and securely protect stockpiled waste materials form wind and rain at all times unless actively being used.

Associated BMPs and Other Plans:

For additional detail and guidance, refer to the following:

- WM-5 – Solid Waste Management
- WM-6 – Hazardous Materials/Waste Management
- WM-7 – Contaminated Soil Management
- WM-8 – Concrete Waste Management

Figure 13: Large properly covered dumpster

Figure 14: Overused and improperly covered during rain

2.8 Hazardous and Non-Hazardous Spills

Description:

Take appropriate action if the following occur on the construction site:

- Any breach, malfunction, leakage, or spill of a potential pollutant.

Requirements:

- Keep spill cleanup kits on-site and with fueling and maintenance vehicles at all times.
- If safe to do so, stop the spill, and begin cleanup immediately.
- Clean the contaminated area and any soil or materials contaminated by the spill.
- Notify the EFS and project foreman.
- If rain is forecast, cover the spill and contaminated areas prior to the onset of precipitation.
- Clean the spill with absorbents. Do not wash the spill with water.
- Store and dispose of cleanup materials, contaminated materials, and recovered spilled material in accordance with federal, state, can local requirements.

To determine if the spill is reportable, contact the EFS. After hours or if the local EFS is unavailable, call the following 800 number: **800-874-4043.**

Associated BMPs and Other Plans:

For additional detail and guidance, refer to the following:

- NS-3 – Paving and Grinding Operations
- NS-9 – Vehicle and Equipment Fueling
- WM-1 – Material Delivery and Storage
- WM-2 – Material Use
- WM-4 – Spill Prevention and Control
- WM-6 – Hazardous Materials/Waste Management
- WM-8 – Concrete Waste Management
- WM-9 – Sanitary/Septic Waste Management
- WM-10 – Liquid Waste Management

Figure 15: Large, hazardous spill

Figure 16: Contaminated soil properly prepared for disposal

2.9 Spill Kits and Clean-up Materials

Description:

Maintain adequate supply of clean up materials if the following are located or performed at the construction site:

- Any construction activity
- Any stored equipment or liquids
- Any equipment or vehicle maintenance, repair, storage, or fueling

Requirements:

- Equipment and materials for cleanup of spills shall be available on site and spills and leaks shall be cleaned up immediately and disposed of properly.
- All personnel must be trained regarding Spill Kit locations, contents, and use.
- Have Spill Kit within reach during activities with potential to release pollutants, such as vehicle and equipment fueling and maintenance.
- All fueling and maintenance vehicles are required to have Spill Kits on board.
- Spill Kits should have a combination of All Absorbent (typically gray) pads and booms to absorb and retain oils, coolants, solvents and water and Oil Only (typically white) booms and pads to absorb only oil along with dry absorbent (kitty litter), gloves, and disposal bags.

Associated BMPs and Other Plans:

For additional detail and guidance, refer to the following:

- NS-3 – Paving and Grinding Operations
- NS-9 – Vehicle and Equipment Fueling
- WM-1 – Material Delivery and Storage
- WM-2 – Material Use
- WM-4 – Spill Prevention and Control
- WM-6 – Hazardous Materials/Waste Management
- WM-8 – Concrete Waste Management
- WM-9 – Sanitary/Septic Waste Management
- WM-10 – Liquid Waste Management

Figure 17: Typical Spill Kit contents

Figure 18: Hydraulic hose leak and absorbent deployment

2.10 Vehicle and Equipment Storage and Maintenance

Description:

Implement appropriate vehicle and equipment storage and maintenance procedures if there are any of the following on the construction site:

- Any vehicles or equipment being stored, fueled, or maintained.

Requirements:

- Allow only properly maintained vehicles and equipment onto the site.
- Place all equipment and vehicles, which are to be fueled, maintained, or stored in a designated area fitted with appropriate BMPs.
- Clean leaks immediately and properly dispose of leaked material or contaminated soil.
- A Spill Kit should be on each site, on every fueling or maintenance truck, and be easily accessible during fueling or maintenance activities.
- All personnel must be knowledgeable regarding Spill Kit locations, contents, and use.
- Designate one area for fueling and maintenance activities and inspect regularly for spills.

Associated BMPs and Other Plans:

For additional detail and guidance, refer to the following:

- WM-4 – Spill Prevention and Control
- WM-6 – Hazardous Materials/Waste Management
- WM-10 – Liquid Waste Management
- NS-9 – Vehicle and Equipment Fueling

Figure 19: Generator on secondary containment

Figure 20: Hydraulic tank leaking onto ground

2.11 Airborne Pollution Control

Description:

Implement appropriate airborne pollution control procedures if the following occurs on the construction site:

- Any construction activity with the ability to create any airborne pollution, including:
  - Sediment
  - Nutrients
  - Trash
  - Metals
  - Bacteria
  - Oil and grease
  - Organics

Requirements:

- Control all sources of potential airborne pollutants.
- Provide a water truck on-site during any time there is potential for dust (including winter).
- Cover or wet all stockpiles with potential for wind erosion.
- Respond quickly if dust or airborne pollutants are observed.
- Properly contain trash.

Associated BMPs and Other Plans:

For additional detail and guidance, refer to the following:

- EC-2 – Preservation of Existing Vegetation
- EC-7 – Geotextiles, Plastic Covers, and Erosion Control Blankets/Mats
- EC-16 – Non-Vegetative Stabilization
- NS-3 – Paving and Grinding Operations
- SE-7 – Street Sweeping and Vacuuming
- WM-3 – Stockpile Management
- WM-5 – Solid Waste Management

Figure 21: Water truck filling station

Figure 22: Uncontrolled dust

2.12 Where to Obtain BMP Materials

BMP products in Table 1 can be obtained through PG&E materials warehouses using project order numbers and established materials codes. Should the materials be unavailable from PG&E warehouses, BMP materials and products may be obtained from sources shown below, but may be obtained elsewhere depending on location and urgency of need.

TABLE 1
BMP PRODUCTS INFORMATION

Category	Product Name	Units
Certified Weed-Free Straw Mulch (EC-6)	Weed-Free Straw	Bales
Geotextiles and Mats (EC-7) Geotextile Fabric	Mirafi 600	Rolls: 12.5' x 360' 17.5' x 238'
Geotextiles and Mats (EC-7) Jute Mat	Eco-Jute	Rolls: 4' x 225'
Geotextiles and Mats (EC-7) Plastic Sheeting	Visqueen	Rolls: 20 or 40'x 100'; 10ml thick
Silt Fence (SE-1)	Caltrans Grade Silt Fence	100 feet with 36-inch wood posts at 6 foot spacing
Fiber Roll (SE-5)	Sediment Log Type II	25 foot rolls x 6 or 9" diameter
Gravel Bags (SE-6)	Roc Soc	mono filament
Inlet Protection (SE-10) Gravel Bag	Same as SE-6	
Inlet Protection (SE-10)	Same as SE-5	

Example suppliers include Reed & Graham, White Cap, and Curlex. Other options may include feed stores, retail building supply stores, or hardware stores.

3.0 INSPECTION AND MAINTENANCE REQUIREMENTS

Unless performed by a contractor, BMP installation, inspection, and maintenance will be performed by the PG&E construction crew. BMPs should be inspected daily during construction activities, especially prior to start of any rain event. In the event that BMPs appear to require maintenance or are not functioning as expected, the BMP will be maintained, repaired, or replaced to correct the deficiency.

4.0 TROUBLESHOOTING

Contact the local EFS if any of the following conditions occur:

- Visually cloudy/muddy water is observed leaving the work or staging area;
- Observed sheen, discoloration, foam, odor, or other pollutant indicator;
- Hazardous substance(s) is/are discharged or spilled; or
- There is potential for a non-visible or any other pollutant discharge.

After hours, call: (**800) 874-4043.**

If the project receives a written notice or order from any regulatory agency, immediately contact your local EFS for further direction.

Troubleshooting Guide	
Field Condition	**Common Solutions Are:**
Construction materials on-site	Properly handle, store, and use materials to prevent soil contamination of discharge from site.
Liquid pollutants on-site	Store in watertight container with appropriate secondary containment or in a fully enclosed storage shed. Maintain spill kit.
Dry pollutants on-site	Minimize exposure to precipitation.
Observed spill	Contain spill and clean up contaminants and contaminated soil. Properly dispose of waste. Maintain spill kits on-site.
Potential for tracking to paved surfaces	Install stabilized entrances and implement street sweeping.
Concrete pour	Provide appropriate washout containment and train personnel to wash equipment and tools into the containment BMP.
Concrete cutting or grinding	Use vacuum to collect cuttings or slurry and dispose of properly.
Portable toilets	Locate away from drainages, provide a tray to contain spills and minor leaks, protect from tipping, and service regularly.
Waste generated on-site	Provide waste receptacle (dumpster) adequate in size. Cover all waste containers at end of each day and prior to rain events.
Vehicles and equipment stored on-site	Maintain vehicles and equipment in good working condition. Perform fueling and maintenance activities only in areas fitted with appropriate BMPs. Maintain spill kits in case of spill.
Dust and airborne pollutants	Control all sources of airborne pollutants including trash. Apply water to keep soil moist and reduce any potential for dust.

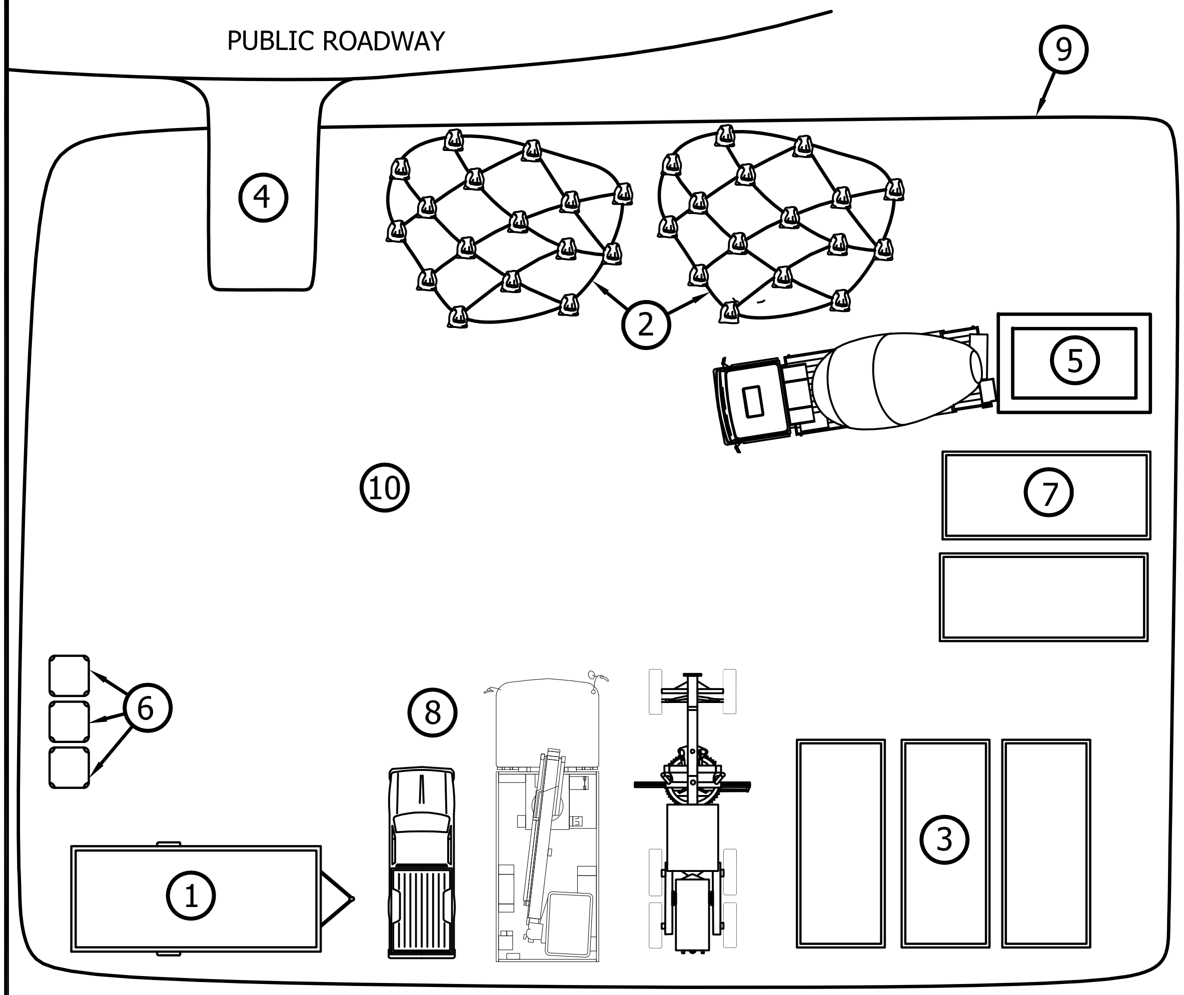
5.0 POST-CONSTRUCTION

Upon completion of construction within the project area:

- Remove all temporary, non-biodegradable BMPs.
- Remove all construction equipment from the site.
- Clear all staging areas of any debris, construction materials, waste, and contaminants.
- Return all drainage ways to their pre-construction line and grade.
- Return all construction site and staging areas to pre-construction or equivalent conditions.
- Cover remaining disturbed soil areas with a combination of temporary cover (mulch) and means to establish permanent vegetative stabilization (seed, fertilizer, soil amendments, etc.).

Attachment A Typical BMP Installation Map

The following installation schematic is included to illustrate installation techniques.



1. CONSTRUCTION TRAILER:
KEEP PRODUCT INVENTORY, SPILL KIT, SDS's, SWPPP OR ESCP AND INSPECTION REPORTS, AND EMERGENCY CONTACT PHONE NUMBERS. REFER TO SECTIONS 2.1, 2.8, AND 2.9

2. COVERED STOCKPILES:
REFER TO STOCKPILE MANAGEMENT A-ESCP.

3. CONSTRUCTION STORAGE CONTAINERS:
KEEP LIQUID POLLUTANTS AND MATERIALS NOT MEANT FOR OUTSIDE STORAGE. ALTERNATIVES INCLUDE STORING SUCH MATERIALS ON SECONDARY CONTAINMENT WITH WEATHERPROOF COVER. REFER TO SECTIONS 2.2 AND 2.3.

4. STABILIZED CONSTRUCTION ENTRANCE
REFER TO SECTION 2.4.

5. WASHOUT
CONCRETE, PAINT, OR OTHER RINSE WATERS. REFER TO SECTION 2.5.

6. SANITATION FACILITIES
REFER TO SECTION 2.6.

7. WASTE DISPOSAL CONTAINERS
REFER TO SECTION 2.7.

8. VEHICLE STORAGE AND MAINTENANCE
REFER TO SECTION 2.10.

9. PERIMETER CONTROL
SILT FENCE (SE-1), FIBER ROLL (SE-5), GRAVEL BAG BERM (SE-6) OR OTHER FUNCTIONING ALTERNATIVE.

10. AIR POLLUTION CONTROL/STABILIZED ROADWAY
CONTROL ALL AIRBORNE POLLUTANTS AT ALL TIMES AND MAINTAIN GRAVEL SURFACE TO SUPPORT CONSTRUCTION TRAFFIC WITHOUT TRACKING OR SEDIMENT LADEN DISCHARGE. REFER TO SECTION 2.11.

Pacific Gas and Electric Company	TYPICAL BMP USE DETAIL A-ESCP - GOOD HOUSEKEEPING	GH-01

Stockpile Management

Activity Specific Erosion and Sediment Control Plan
(A-ESCP)

For questions or concerns, please contact your assigned PG&E Environmental Field Specialist (EFS)

Prepared by:
PG&E Construction Stormwater Group

March 2017

TABLE OF CONTENTS

Attachments

References

Referenced BMP Fact Sheets

EC-3	Temporary Hydraulic Mulch
EC-5	Soil Binders
EC-6	Straw Mulch
EC-7	Geotextiles, Plastic Covers, and Erosion Control Blankets/Mats
EC-9	Earth Dikes and Drainage Swales
SE-1	Silt Fence
SE-5	Fiber Rolls
SE-6	Gravel Bag Berm
TC-1	Stabilized Construction Entrance/Exit
TC-2	Stabilized Construction Roadway
WE-1	Wind Erosion Control
WM-3	Stockpile Management
WM-5	Solid Waste Management
WM-7	Contaminated Soil Management
WM-8	Concrete Waste Management

1.0 WHAT IS STOCKPILE MANAGEMENT?

1.1 Introduction

Stockpile management includes Best Management Practices (BMPs) to minimize erosion and sediment transport originating from stockpiles.

All PG&E Project Teams, Crews, and Subcontractors are **required** to be familiar with the information contained within this A-ESCP

Stockpiles may include, but are not limited to, the following materials: soil, aggregate base, construction debris, demolition debris, any metal debris, or a combination thereof.

GOAL: Prevent rainfall from contacting stockpile materials and transporting sediment and other pollutants offsite or to surface waters.

Sediment in stormwater is pollution!

1.2 Requirements for All Stockpiles

- Have BMP materials on site **before** rain events!
- Stockpile protection must take place year-round
- Perimeter controls must be installed around stockpiles (may include earthen berms, straw wattles, or silt fence)
- Cover soil stockpiles with soil binders (such as Gorillasnot) or plastic sheeting
- Locate stockpile away from drainage systems such as swales and drainage inlets

1.3 Planning for Work Involving Stockpiles

- If using soil binders, ensure binders and a water source are present on site at all times during the project including a water truck or water buffalo used to spray the stockpiles.
- If using plastic sheeting, ensure plastic sheeting and associated tie down materials are available on site at all times.

1.4 Definitions

High Risk Stockpiles Specific types of stockpiles that require additional protection because they contain any of the following materials: contaminated soil (TPH, PCBs, etc.), Portland cement, concrete rubble, fly ash, stucco, hydrated lime, and cut back or cold mix asphalt. Specific management for these and similar materials are located in Section 2.2.

Active Stockpiles Active stockpiles are defined as scheduled to be used or accessed within 14 days.

Inactive Stockpiles If a pile is not scheduled to be used within 14 days, it immediately becomes inactive and must be stabilized.

Soil Binders Soil binders are glue-like products sprayed onto soil stockpiles and is the preferred method to stabilize stockpiles. Soil binders may be combined with hydromulch per the manufacturer's specifications. Many soil binders require a minimum curing time to be fully effective and typically need at least 24 hours to cure prior to a rain event. Do not use soil binders within 100' of any surface water source, including diches and storm drain inlets without contacting your assigned EFS.

Plastic Sheeting Plastic sheeting is a rolled product held down using ropes or other means to cover stockpiles. Plastic sheeting should be avoided when possible as it is hard to manage, increases runoff, breaks down quickly in sunlight, and can become airborne during high winds causing damage to power lines and other substation equipment.

2.0 STOCKPILE MANAGEMENT PROCEDURES

The following procedures are intended to address activities related to most stockpile management situations. Although your project may not include all such activities, the project shall follow the procedures contained within this section that apply to your project.

2.1 Active and Inactive Stockpiles

Requirements:

- Inactive stockpiles must be stabilized **at all times.**
- All active stockpiles must be stabilized prior to and during a rain event

Protect From Rain

- Stockpiles must be stabilized to protect from rainfall (splash) erosion, and surface flow erosion.
- Stabilization materials include:
    - Soil Binders (EC-5), or combined with Temporary Hydraulic Mulch (EC-3) if necessary
    - Plastic Covers (EC-7)
    - Erosion Control Blankets (EC-7)

Stockpile Perimeter Controls

- All stockpiles should be protected with perimeter controls such as:
    - Silt Fences (SE-1)
    - Fiber Rolls (SE-5), commonly called Straw Wattle
    - Gravel Bag Berms (SE-6)
    - Earth Dikes and Drainage Swales (EC-9)
- Provide a minimum 50' separation from concentrated flows of stormwater, drainage courses, and storm drain inlets. If space is limited to less than 50', provide additional diversion or protection adjacent to the concentrated flow.

Protect From Wind

- In windy areas for stockpiles susceptible to wind erosion, stockpiles should be securely and temporarily stabilized at the end of every day, and kept wet during working hours to minimize wind erosion. **Do not apply so much water that runoff occurs.**
- Consider if plastic sheeting may come into contact with electrical equipment if it dislodges from the stockpile, and use alternatives if necessary.

Example Photos

Figure 1. Cover pulled back for access during use

Figure 2. Soil binder and mulch application prior to rain

Figure 3. Stockpile stabilized with soil binder and temporary hydraulic mulch

Figure 4. Stockpile stabilized with erosion control blanket

2.2 High Risk Stockpiles

Description:

High risk stockpiles may include visible and non-visible pollutants including, but not limited to:

- Concrete (pH and metals) and asphalt (petroleum) rubble
- Contaminated soil (TPH, PCBs, etc.)
- Cold mix asphalt, aka "cut-back" (petroleum based contaminates)
- Hazardous construction materials
  - Construction waste such as retired transformers
  - New construction materials waiting for installation such as liming agents or gypsum
- Treated wood waste (TWW)
- Soil amendments
  - Fly ash or Hydrated lime
- Fertilizers (ammonium nitrate, urea, anhydrous ammonia, etc.)

Requirements:

High risk stockpiles require additional considerations, some of which include:

- Placing stockpiles in areas that will not have any run-on. If such a location is unavailable, protect from run-on using a diversion ditch or gravel bag berm;
- Containing any possible run-off from the pile by creating a berm or basin to collect stormwater runoff downslope of the stockpile;
- Containing any runoff from piles likely to include non-visible pollutants prior to leaving the project site. If run-off cannot be contained, contact the EFS and collect samples of the runoff for laboratory analysis;
- Bagging and placing contaminated materials on pallets to be stored under cover until they can be moved to a legal collection facility, if possible; and
- Place stockpile on an impervious surface such as pavement, trench plate, or plastic sheeting.

Example Photos

Figure 5. Contaminated stockpile under cover

Figure 6. Concrete rubble stockpile in need of cover

2.3 Where to Obtain BMP Materials

BMP products should be obtained through PG&E materials warehouses using project order numbers and established materials codes. Should the materials be unavailable from PG&E warehouses, BMP materials and products shown below can be obtained from sources shown, but may be obtained elsewhere depending on location and urgency of need.

TABLE 1
BMP PRODUCTS INFORMATION

Category	Product Name	Units
Hydraulic Mulch (EC-3)	Flexterra FGM	Bales
Soil Binders (EC-5)	Soiltac, Gorillasnot	5 gallon buckets
Straw Mulch (EC-6)	Certified Weed-Free Straw	Bales
Geotextiles and Mats (EC-7) Geotextile Fabric	Mirafi 600	Rolls: 12.5' x 360' 17.5' x 238'
Geotextiles and Mats (EC-7) Jute Mat	Eco-Jute	Rolls: 4' x 225'
Geotextiles and Mats (EC-7) Plastic Sheeting	Visqueen	Rolls: 20 or 40'x 100'; 10ml thick
Silt Fence (SE-1)	Caltrans Grade Silt Fence	100 feet with 36-inch wood posts at 6 foot spacing
Fiber Roll (SE-5)	Curlex Sediment Log Type II	25 foot rolls x 6" or 9" diameter
Gravel Bags (SE-6)	Roc Soc or Monofilament Bags	Each
3/8" Nylon Rope	3/8" Nylon Rope	100' or 500'

Example suppliers include Reed & Graham, White Cap, and Curlex. Other options may include feed stores, retail building supply stores, or hardware stores. If you are still having trouble contact your project EFS for assistance.

3.0 INSPECTION AND MAINTENANCE REQUIREMENTS

- It is required that at a minimum, active stockpiles be inspected weekly, prior to forecast rain events, daily during extended rain events, and after the conclusion of rain events.
- During certain conditions it may be necessary to inspect stockpiles covered with plastic sheeting or rolled product more frequently (for example, high winds or extreme heat).

- Repair, re-apply, and/or replace linear sediment barriers, stabilization, and/or covers as needed to keep them functioning properly.
- Sediment shall be removed when it reaches one-third of the perimeter control height.
- Contaminated soil stockpiles or stockpiles with the potential to discharge visible and/or non-visible pollutants offsite should be inspected for signs of potential contaminate or pollutant discharge.
    - Should a discharge be observed that is likely to contain pollutants, notify the EFS for sampling requirements.
- If spilled or leaking hazardous materials contact soil stockpiles, implement appropriate spill control equipment and procedures to completely clean up the pollutant to prohibit additional soil contamination or pollutant discharge from the site. If the extent of the impact of the pollutant is unknown, contact your EFS as soil testing may be necessary.

4.0 TROUBLESHOOTING

Contact your local EFS if any of the following conditions occur:
- Visually cloudy/muddy water is observed leaving the work area;
- Observed sheen, discoloration, foam, odor, or other pollutant indicator;
- Hazardous substance(s) is/are discharged or spilled; or
- There is potential for a non-visible or any other pollutant discharge.

After hours, call: **(800) 874-4043.**

If the project receives a written notice or order from any regulatory agency, immediately contact your local EFS for further direction.

Troubleshooting Guide	
Field Condition – Stockpile Management	**Common Solutions Are:**
Soil stockpile erodes	Cover stockpile with plastic sheeting or spray with a soil stabilizer. Protect with a temporary perimeter sediment barrier around the stockpile
Stockpile is in flow line	Remove stockpile from drainage path or protect with a berm, dike, or temporary diversion device
Storm water run-on impacts the stockpile	Protect the stockpile by using temporary perimeter sediment barriers such as berms, dikes, silt fencing, or sandbags
Wind causes erosion and or blowing dust	Cover stockpile or spray with a soil stabilizer. Use a water application to suppress dust
Field Condition – Soil Binders	**Common Solutions Are:**
Slope was improperly dressed before application	Roughen embankment and fill areas by rolling with a crimping or punching type roller or track walking where rolling is impractical. Pre-wet the areas of application.

Troubleshooting Guide	
Coverage is inadequate	Follow recommended application rates. Count the number of bags of the product to ensure the correct amount of material is implemented. Reapply to the areas
Sprayed areas degrade or become ineffective	Follow recommended application rates. Consider other or additional BMPs. Reapply binder as necessary
Sprayed slope has spot failures	Repair slopes and re-spray damaged areas
Portions of the sprayed area have been disturbed	Keep workers and equipment off sprayed areas. Repair and re-spray areas that have been damaged
Binder fails to penetrate soil	Roughen soil and pre-wet to manufacturer's recommendations. Reapply to areas where necessary
Soil binder is washed off slope	Allow at least 24 hours for the materials to dry before a rain event. Follow manufacturer's recommendations. Reapply as necessary
Excessive water flows across stabilized surface.	Use other BMPs to limit flow onto stabilized area. Use other BMPs to reduce slope lengths. Do not use to stabilize areas with swift moving concentrated flows
Field Condition – Erosion control blankets	**Common Solutions Are:**
Improper anchoring	Dig trench along the top and bury the blankets. Use staples to anchor according to manufacturer's recommendations
Undercutting due to inadequate preparation	Prepare the soil surface. Remove rocks, clods and other obstructions. Fill in rills in uneven areas to promote good contact between mat and soil
Excessive water flow across stabilized surface	Use other BMPs to limit flow onto stabilized area. Use other BMPs to reduce slope lengths. Do not use to stabilize areas with swift moving concentrated flows
Field Condition – Straw wattle	**Common Solutions Are:**
Runoff flows under the fiber roll or daylight shows under fiber roll	Trench-in rolls to a depth of 4 in and stake. Place compacted soil along the uphill side of the fiber roll
Runoff flows between fiber rolls	Ensure that fiber rolls are butted tightly together and staked
There is excessive sediment accumulation	Remove accumulated sediment. Apply soil stabilization measures to contributing areas
Field Condition – Wind Erosion	**Common Solutions Are:**
Excessive dust leaves the site	Increase frequency of water application. Consider using a palliative or binder on inactive areas
Watering for dust control causes erosion	Reduce water pressure on the water truck. Check watering equipment to ensure that it has a positive shutoff. Water less frequently
Sprayed areas are ineffective at limiting dust	Re-spray areas and ensure that the application rate is proper

5.0 POST-CONSTRUCTION

Upon completion of construction within the project area:

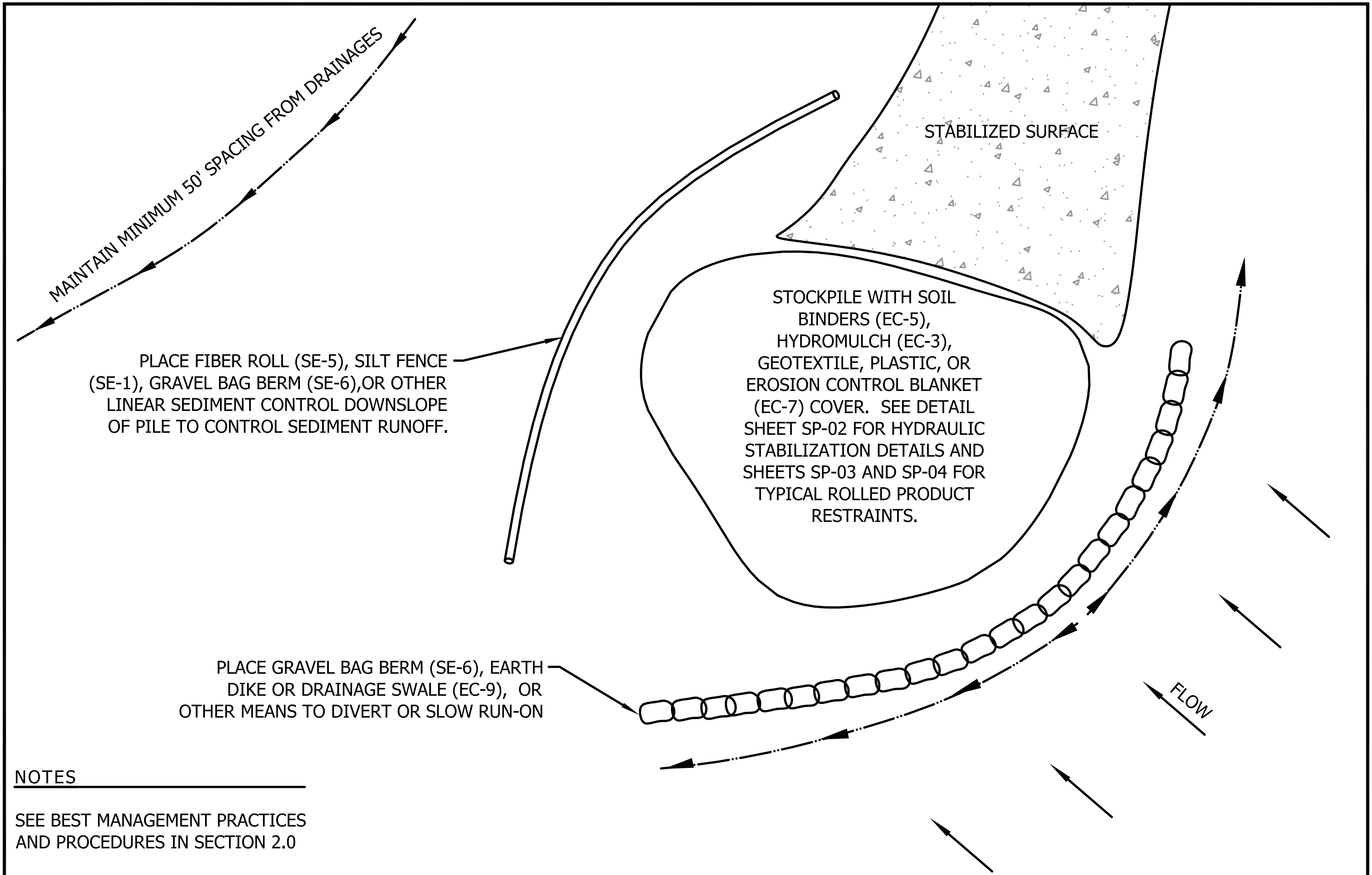
- Remove all temporary, non-biodegradable BMPs;
- Remove all construction equipment from the site;
- Clear all staging areas of any debris, construction materials, and contaminants;
- Return all drainage ways affected by any stockpiles or stockpile to their pre-construction line and grade; and
- Cover disturbed soil areas with temporary and/or permanent stabilization.

Attachment A Activity Specific Installation Details

The following installation details are included to illustrate installation techniques. It is noted that specific installation of any facility must consider the restrictions of the installation site, and that modifications to the following may be required given local conditions.

The following details are included in this Plan

SP-01 Typical Stockpile Placement
SP-02 Hydraulic Stabilization
SP-03 Typical Plastic or Fabric Cover Restraints



NOTES

SEE BEST MANAGEMENT PRACTICES AND PROCEDURES IN SECTION 2.0

NOT TO SCALE

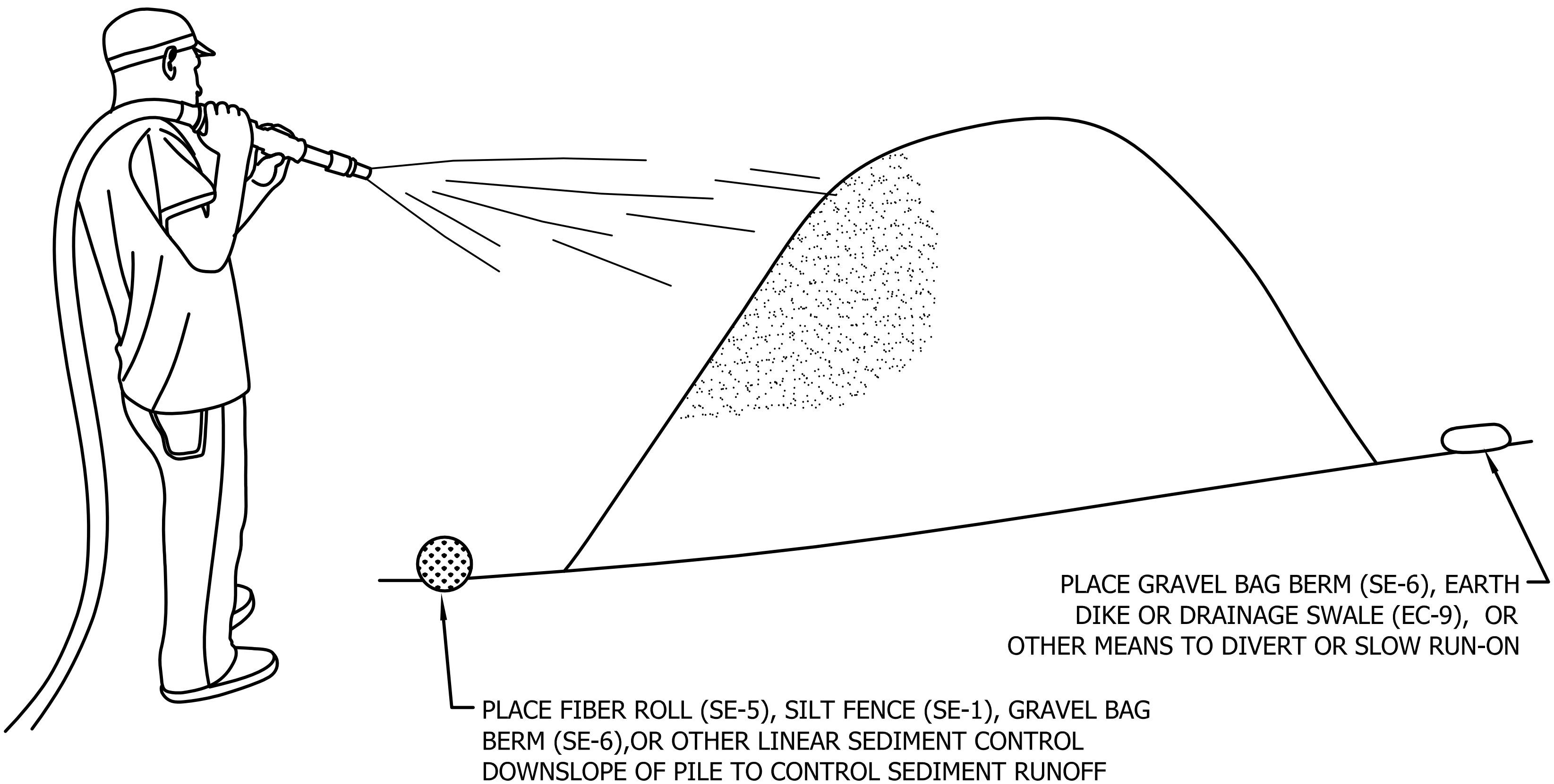
Pacific Gas and Electric Company

TYPICAL STOCKPILE PLACEMENT

A-ESCP - STOCKPILE MANAGEMENT

SP-01

PRODUCT	DURATION	APPLICATION RATE	DILUTION RATE	NOTES
SOILTAC	6 MONTHS	1 GAL / 220 S.F.	9 PARTS WATER TO 1 PART PRODUCT	APPLY IN 2 PASSES
FLEXTERRA FGM	6 MONTHS	1 BALE / 800 S.F.	1 BALE TO 125 GAL WATER	SPECIAL EQUIPMENT / VENDOR REQUIRED



NOTES

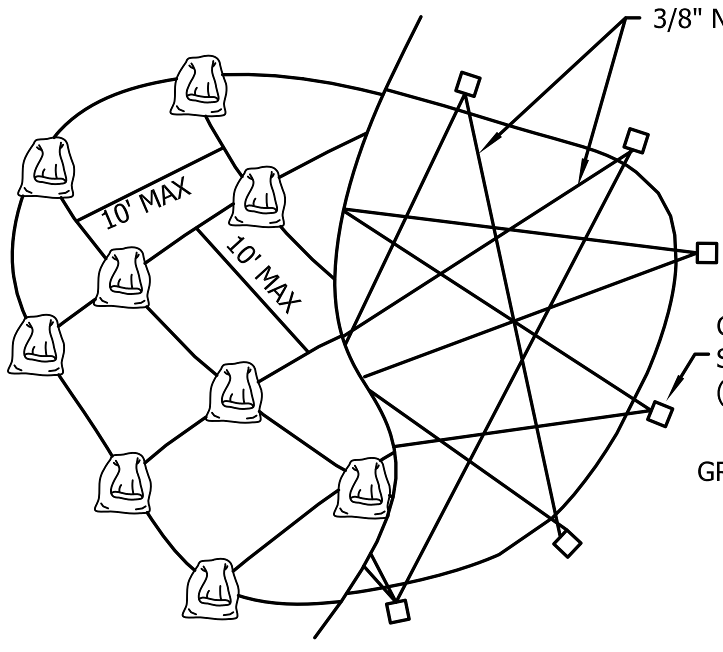
1. SEE BEST MANAGEMENT PRACTICES AND PROCEDURES IN SECTION 2.0.
2. SPRAY FROM MULTIPLE DIRECTIONS TO AVOID SHADOWING.
3. FOLLOW MANUFACTURERS MIXING AND APPLICATION GUIDES.
4. ENSURE THE PRODUCT IS APPLIED WITH ADEQUATE TIME TO CURE.
5. IF SOIL BINDERS ARE USED IN ON-SITE WATER TRUCKS OR TRAILERS, MAKE SURE TO CLEAN ALL BINDER RESIDUE FROM EQUIPMENT AFTER SPRAYING.

PG&E Pacific Gas and Electric Company

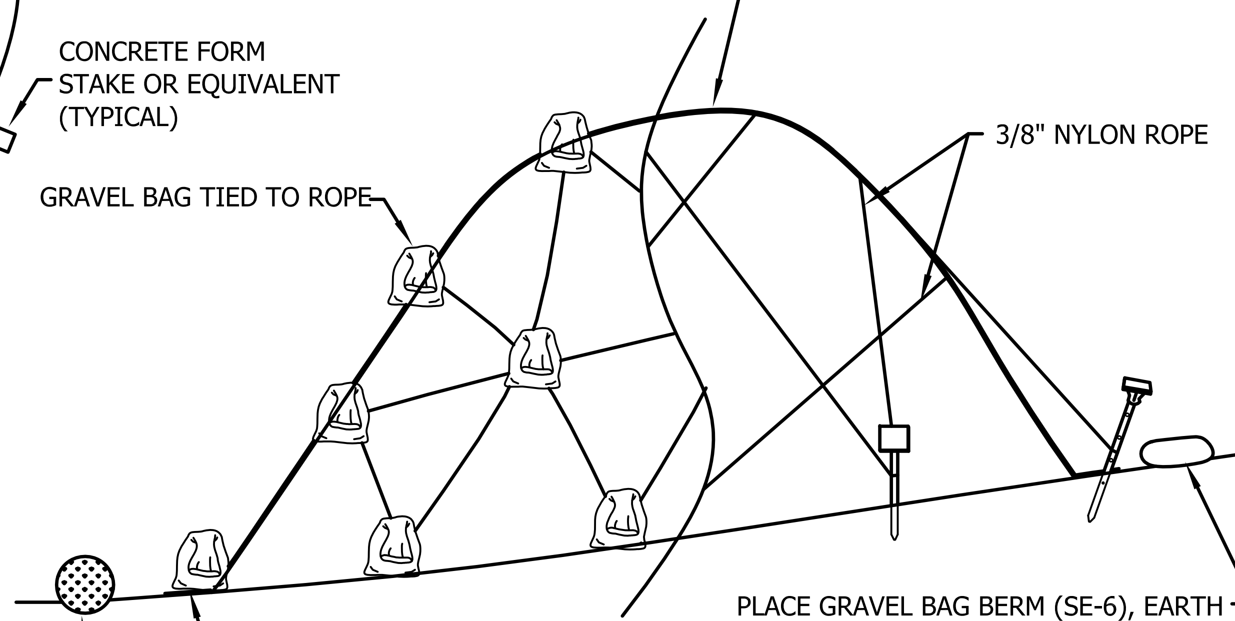
HYDRAULIC STABILIZATION

SOIL BINDER OR HYDROMULCH
A-ESCP - STOCKPILE MANAGEMENT

SP-02



PLAN VIEW



PROFILE VIEW

NOTES

SEE BEST MANAGEMENT PRACTICES AND PROCEDURES IN SECTION 2.0

PLACE BAGS AT 10' ON CENTER BOTH WAYS

NOT TO SCALE

PG&E Pacific Gas and Electric Company

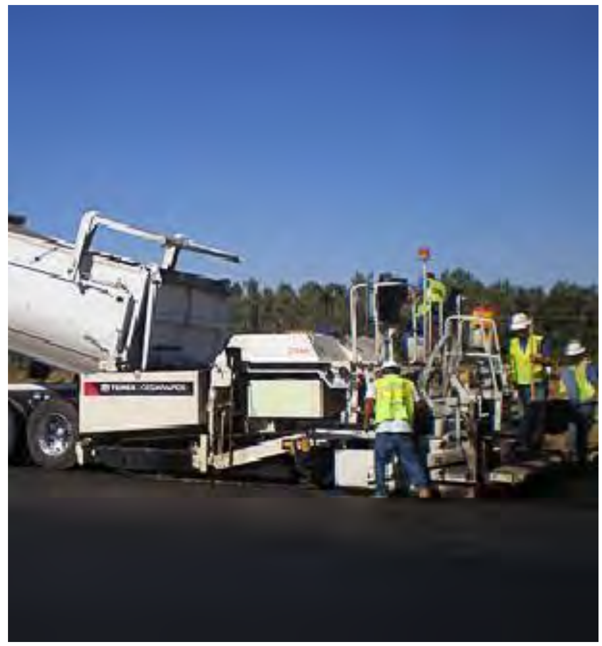
PLASTIC OR FABRIC COVER

GRAVEL BAG OR CONCRETE FOR STAKES AND ROPE
A-ESCP - STOCKPILE MANAGEMENT

SP-03

Sawcutting, Grinding, and Paving

Activity Specific Erosion and Sediment Control Plan
(A-ESCP)



If Cumulative Soil Disturbance Changes,
Contact the Environmental Field Specialists (EFS)
For Re-Evaluation of Storm Water Protection Needs

Prepared by

PG&E Water Quality Group

November 2013

TABLE OF CONTENTS

Attachments

1.0 WHAT IS COVERED UNDER THIS A-ESCP?

1.1 Sawcutting, Grinding, and Paving

Clearing, grading, site preparation, pavement removal, and other land disturbance and pollution generating activities associated with sawcutting, grinding, and paving operations have the potential to release sediment and other pollutants, potentially causing negative impacts to the environment.

This Activity Specific Erosion and Sediment Control Plan (A-ESCP) sets forth minimum Best Management Practices (BMPs) for Sawcutting, Grinding, and Paving activities at all Pacific Gas and Electric Company (PG&E) construction projects. Construction projects include all permitted, non-permitted, and maintenance operations/projects.

If specific environmental concerns are encountered, or if the procedures contained within this A-ESCP prove ineffective, contact your local Environmental Field Specialist (EFS).

1.2 Typical A-ESCPs Related to Sawcutting, Grinding, and Paving

In many cases, sawcutting, grinding, and paving activities involve procedures, requirements, or prohibition of practices covered under existing A-ESCPs which include:

- Good Housekeeping
- Stockpile Management
- Small Excavation, Construction, and Potholing
- Pavement Rehabilitation

1.3 Site Conditions Covered in this A-ESCP

This A-ESCP is applicable to all sawcutting, grinding, or paving project that disturb less than 0.9 acres, including all access roadways, staging areas that include the disturbance of soil, excavations, and any other land disturbance associated with the project. Such sawcutting, grinding, and paving projects can include minor paved area sawcutting and patching associated with facility repairs, new area paving, surfacing, resurfacing, as well as large pavement repair projects such as parking lots and access roads that may extend beyond 0.9 acres, but do not involve disturbing the underlying soil or base. The Small Excavation, Construction, and Potholing A-ESCP on SharePoint should be referenced for any construction, demolition, potholing or excavation work associated with the sawcutting, grinding, and/or paving project. If the paving project is expected to include Cement Treated Base (CTB), refer to the Pavement Rehabilitation A-ESCP available on SharePoint.

This document is intended to apply to all PG&E Sawcutting, Grinding, and Paving projects as well as any sawcutting, grinding, or paving activities being completed as a result of a larger project, and must be used as a reference for specific BMPs.

1.4 Scheduling Sawcutting, Grinding, and Paving BMP Installation

Planning for storm water pollution prevention is required for all PG&E construction projects throughout the year. The applicable BMPs described in this A-ESCP shall be implemented on all projects, regardless of the time of year and weather forecast.

2.0 BEST MANAGEMENT PRACTICES

The purpose of this A-ESCP is to specify appropriate BMPs for all Sawcutting, Grinding, and Paving projects. BMPs are scheduling of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants. BMPs also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

All PG&E Projects, Crews, and Subcontractors are required to be familiar with and follow, at a minimum, housekeeping and stockpile management standards as detailed in the Good Housekeeping A-ESCP and Stockpile Management A-ESCP prior to starting work. Should site personnel be unfamiliar with the requirements for Good Housekeeping or Stockpile Management, PG&E expects that they will obtain a copy of the A-ESCPs which are available on SharePoint. Good Housekeeping and Stockpile Management A-ESCP requirements may apply to all activities within this Plan, and therefore are not mentioned in each subsection.

Construction activities should be scheduled to minimize soil disturbing activities during rain events, if possible.

The BMPs for the project should be installed in areas similar to those shown on the Typical BMP Use Detail, Attachment A.

Existing A-ESCPs related to this activity are referenced in Attachment B and can be found in the Field Manual. A full version of the Field Manual is located on SharePoint.

PG&E has detailed Cut-Sheets for specific BMPs which include: when to use the BMP, how to use and install the BMP, and maintenance and inspection guidance for the BMP. BMP Cut-Sheets associated with Small Excavation, Construction, and Potholing are referenced in Attachment C and can be found in the Field Manual which is located on SharePoint.

The following activity specific procedures are intended to address activities related to any sawcutting, grading, or paving activity. Although the project may not include all such activities, the project shall follow the procedures contained within this Section that relate to the project.

2.1 Perimeter, Inlet, and Runoff Control

Description:
All sites where there is potential for the discharge of sediment or pollutant laden discharge, either from stormwater or other site related sources (broken waterlines, leaking hoses, run-on, tracking, etc.) shall establish effective perimeter control for all discharges, including vehicle and equipment tracking.

Requirements:
- All downhill areas where sheet flow may exit the project area should be protected with Silt Fence (SE-1) or Fiber Rolls (SE-5).
- All downhill areas where concentrated flow may exit the site should be protected with Gravel Bag Berms (SE-6) or similar.
- Protect downslope drainage inlets, including culvert inlets with Gravel Bag Berms (SE-6) and/or Storm Drain Inlet Protection (SE-10), or other effective combination.
- All equipment and vehicle access points shall include a Stabilized Construction Entrance (TC-1) or Stabilized Construction Roadway (TC-2).
- All adjacent roadways shall be monitored daily for tracking.
- All track-out shall be cleaned immediately by Street Sweeping and Vacuuming (SE-7).

Associated BMPs and Other Plans:
For additional detail and guidance, refer to the following:
- TC-1 - Stabilized Construction Entrance
- SE-1 - Silt Fence
- SE-5 - Fiber Rolls
- SE-6 - Gravel Bag Berms
- SE-10 – Storm Drain Inlet Protection

Stabilized Entrance to Staging Area

Runoff and sediment/perimeter control

2.2 Sawcutting and Grinding

Description:
Pavement, whether asphaltic or concrete, is typically sawcut or ground at transition areas, adjacent to buildings, where existing surfaces remain in good repair, entrances to public or existing roadways, at utility vaults, where existing asphalt needs to be removed to provide for re-paving, or other similar areas. Saw cutting and grinding processes can be performed wet or dry, and may lead to either wet slurry runoff, or dust, that is considered a pollutant, and must be collected or controlled to prevent pollutant discharge.

Requirements:
- Perform sawcutting and grinding during dry weather and monitor weather for changes.
- Protect all adjacent drainages, waterways, and surface waters, from the accidental discharge of pollutants, including dust (dry cutting or grinding) or slurry (wet cutting or grinding).
- Cover or barricade storm drains during sawcutting and grinding operations.
- When practical, use wet cutting and grinding to better control dust.
- Vacuum all slurry, grindings, and dust from all surfaces concurrently with sawcutting or grinding activities.
- Collect and dispose of dust, grindings, and slurry in a manner to prevent any discharge of collected material to surface waters or drain inlets.
- Protect downslope drainage inlets, including culvert inlets with Gravel Bag Berms (SE-6) and/or Storm Drain Inlet Protection (SE-10), or other effective combination.

Associated BMPs and Other Plans:
For additional detail and guidance, refer to the following:
- SE-6 – Gravel Bag Berms
- SE-10 – Storm Drain Inlet Protection

Grinding of existing asphalt

Sawcutting in preparation of excavation

2.3 Asphalt Pavement

Description:
Prevent or reduce the discharge of pollutants from paving operations by using measures to prevent run-on and run-off pollution, properly disposing of wastes, and training employees and subcontractors. Many associated materials contain chemicals and therefore additional care should be taken to prevent contact with stormwater flow.

Requirements:
- Only perform asphalt paving work during dry weather, and monitor weather for changes.
- Collect all old, removed asphalt from the site and recycle whenever possible.
- Leaks or spills from paving equipment can contain toxic levels of metals, oil, and grease. Place drip pans or absorbent materials under paving equipment when not in use. Clean spills with absorbent material and dispose in accordance with applicable regulations.
- Substances used to coat asphalt transport trucks and asphalt spreading equipment should not contain soap and should be non-foaming and non-toxic.
- Keep an adequate supply of drip pans and absorbent materials on-site during paving operations and use when fueling and as necessary to clean leaks and spills.
- Cover or barricade storm drains during paving, seal coat, slurry seal, and fog seal operations.
- Protect downslope drainage inlets, including culvert inlets with Gravel Bag Berms (SE-6) and/or Storm Drain Inlet Protection (SE-10), or other effective combination.

Associated BMPs and Other Plans:
For additional detail and guidance, refer to the following:
- WM-2 – Material Use
- SE-6 – Gravel Bag Berms
- SE-10 – Storm Drain Inlet Protection

Active Asphalt Paving

Active Asphalt Paving

2.4 Concrete Pavement

Description:
High traffic and loading areas may require the additional service life and strength of concrete pavement. This application requires consideration for additional BMPs to protect from the discharge of water high in contaminants, including metals and high pH.

Concrete and its associated curing materials have basic chemical properties that can raise the pH of water to levels outside of an allowable range. Discharges of stormwater and non-stormwater exposed to concrete during curing and for some time thereafter may have a high pH and may contain chemicals, metals, and fines.

Requirements:
- Cover or barricade storm drains within reasonable proximity to the work area.
- Re-schedule concrete work when rain is forecast.
- Avoid mixing or ordering excess amounts of concrete.
- Do not wash equipment or any concrete materials into footing excavations.
- Do not allow excess concrete to be dumped onsite, except in appropriate washout facilities.
- Protect downslope drainage inlets, including culvert inlets with Gravel Bag Berms (SE-6) and/or Storm Drain Inlet Protection (SE-10), or other effective combination.

Associated BMPs and Other Plans:
For additional detail and guidance, refer to the following:
- Sawcutting and Paving A-ESCP
- WM-2 – Material Use
- SE-6 – Gravel Bag Berms
- SE-10 – Storm Drain Inlet Protection

Concrete washout system


Concrete placement

2.5 Signage and Striping

Description:
After pavement projects are complete, pavement markings are painted, signs, wheel stops, and other removed items are returned or installed. Signage and striping activities have the potential to discharge pollutants such as paint, glue, and concrete to surface waters.

Requirements:
Striping Paint
- Clean spills immediately, do not wash spilled material, dispose of waste properly.

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.

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.

Signage
- See Small Excavation, Construction, and Potholing A-ESCP

Associated BMPs and Other Plans:
For additional detail and guidance, refer to the following:
- Small Excavation, Construction, and Potholing A-ESCP
- WM-2 – Material Use

Finished parking area with striping and signs


Striping activities

2.6 Site Stabilization

Description:
Consider site stabilization BMPs soil disturbance occurs on the construction site.

Requirements:
- Upon completion of sawcutting, grinding, and/or paving, stabilize all project related disturbed soil to return the area to pre-project condition which may include gravel/rock, landscaping, soil cover, seeding, or agricultural conditions.
- Cover disturbed soil areas with a combination of temporary and permanent vegetative stabilization.
- Soil stabilization may be in the form of Erosion Control Blankets (EC-7), Straw Mulch (EC-6), or Hydraulic Mulch (EC-3) along with Hydroseed (EC-4) or hand spread seed.
- Install biodegradable fiber rolls and blankets to protect against any transport of sediment offsite or to environmentally sensitive areas.
- Some projects require stabilization on non-PG&E property. In some cases the landowner may request that PG&E does not re-stabilize the disturbed soil. In an effort to avoid conflicts with landowners, property specific agreements can be established. These agreements will be coordinated by the PG&E Land Agent.

Associated BMPs and Other Plans:
For additional detail and guidance, refer to the following:
- EC-3 – Hydraulic Mulch
- EC-4 - Hydroseed
- EC-6 - Straw Mulch
- EC-7 - Erosion Control Blankets
- EC-16 - Non-Vegetative Stabilization
- TC-2 - Stabilized Construction Roadway

Planter area in need of soil stabilization

Stabilized disturbed soil area

2.7 Where to Obtain BMP Materials

BMP products in Table 1 can be obtained through PG&E materials warehouses using project order numbers and established materials codes. Should the materials be unavailable from PG&E warehouses, BMP materials and products may be obtained from sources shown below, but may be obtained elsewhere depending on location and urgency of need.

TABLE 1
BMP PRODUCTS INFORMATION

Category	Product Name	Units
Certified Weed-Free Straw Mulch (EC-6)	Weed-Free Straw	Bales
Geotextiles and Mats (EC-7) Geotextile Fabric	Mirafi 600	Rolls: 12.5' x 360' 17.5' x 238'
Geotextiles and Mats (EC-7) Jute Mesh	jmesh-4225	4'x225' (staples required)
Geotextiles and Mats (EC-7) Plastic Sheeting	Visqueen	Rolls: 20 or 40'x 100'; 10ml thick
Silt Fence (SE-1)	sfo-b-6	100 feet with 36-inch wood posts at 6 foot spacing
Fiber Roll (SE-5)	Sediment Log Type II	25 foot rolls x 6 or 9" diameter
Fiber Roll (SE-5) Animal Friendly Wattle	BioFiber Roll	8"x12' or 8"x24' (wood stakes required)
Fiber Roll (SE-5) HDPE Wattle	ERTEC ProWattle	5" x 7' (wood stakes and rebar j-hooks required at 5' spacing)
Gravel Bags (SE-6)	Roc Soc	mono filament
Inlet Protection (SE-10) Gravel Bag	Same as SE-6	
Inlet Protection (SE-10) Filter Guard	ERTEC Gr8 Guard	Each (UV stable zip ties required)
Inlet Protection (SE-10) Hard Surface Guard	Product #344321	6.5" x 7' (nails with pre-mounted steel washers required)

Example suppliers include Reed & Graham and White Cap. Other options may include feed stores, retail building supply stores, or hardware stores.

3.0 BMP INSPECTION AND MAINTENANCE

BMP installation, inspection and maintenance will be performed by the PG&E construction crew. BMPs should be inspected daily during construction activities. In the event that BMPs appear to require maintenance or are not functioning as expected, the BMP will be maintained, repaired, or replaced to correct the deficiency.

4.0 WHOM TO CALL

If the project receives a written notice or order from any regulatory agency, immediately contact your local EFS for further direction.

Contact the local EFS if any of the following conditions occur:

- Visually cloudy/muddy water is observed leaving the work or staging area.
- Discharge or spill of hazardous substance.
- Project area increases.
- Procedures within this A-ESCP are ineffective.
- An environmental Regulator visits the site.
- An underground storage tank is discovered.
- A subsurface component related to site remediation activities (e.g., monitoring well, recovery well, injection well) is discovered.

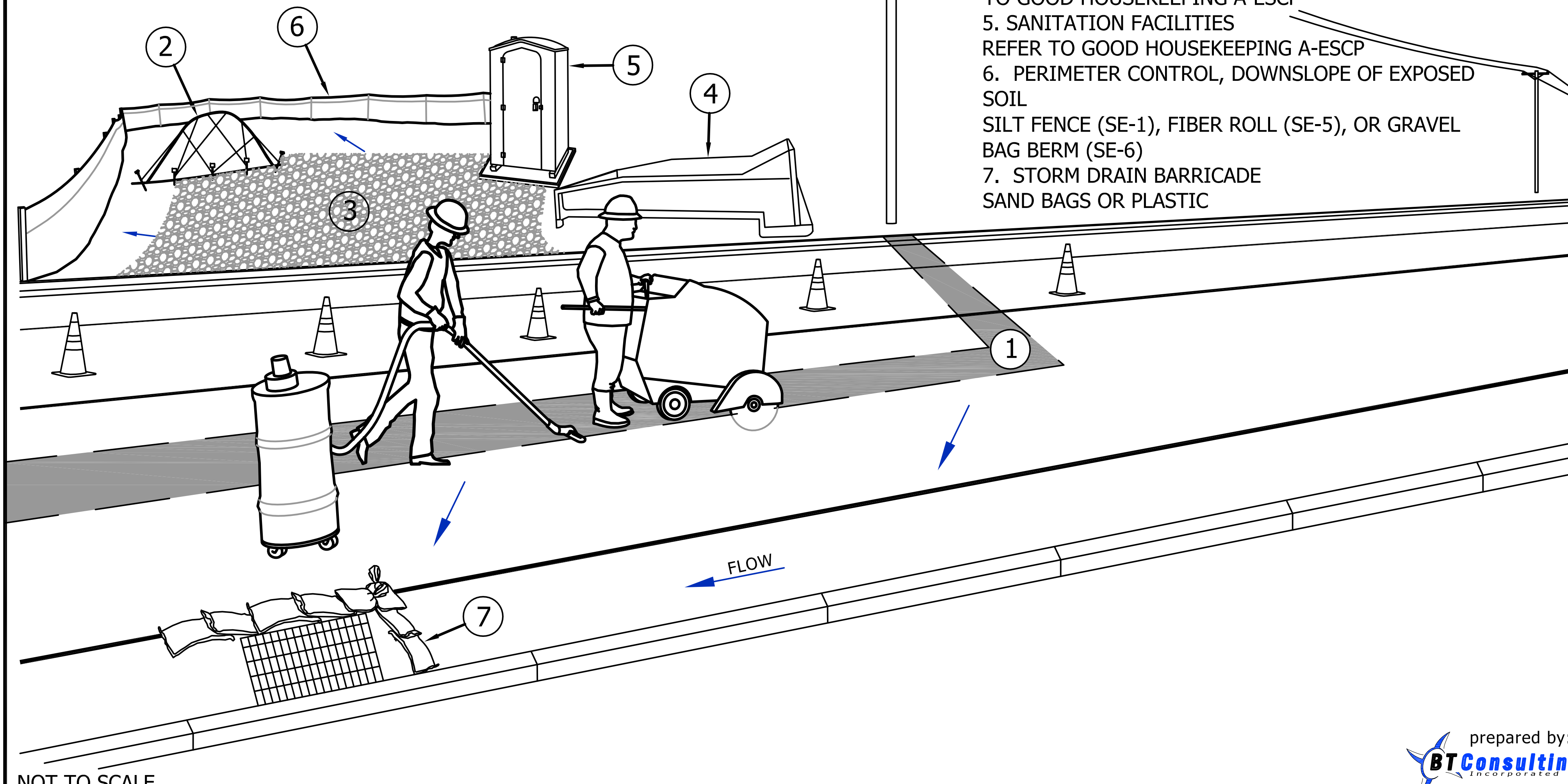
After hours or if the local EFS are unavailable, call the following 800 number:
800-874-4043.

5.0 POST-CONSTRUCTION

Upon completion of construction within the project area:

- Remove all temporary, non-biodegradable BMPs.
- Remove all construction equipment from the site.
- Clear all staging areas of any debris, construction materials, and contaminants.
- Return all drainage ways to their pre-construction line and grade.
- Cover disturbed soil areas with a combination of temporary and permanent vegetative stabilization.

Attachment A
Activity Specific Installation Details



NOTES:
1. SAWCUT AND PAVING LOCATION
2. COVERED STOCKPILES:
REFER TO STOCKPILE MANAGEMENT A-ESCP
3. STABILIZED CONSTRUCTION ENTRANCE
USE IF NECESSARY
4. WASHOUT
CONCRETE, PAINT OR OTHER RINSE WATERS. REFER TO GOOD HOUSEKEEPING A-ESCP
5. SANITATION FACILITIES
REFER TO GOOD HOUSEKEEPING A-ESCP
6. PERIMETER CONTROL, DOWNSLOPE OF EXPOSED SOIL
SILT FENCE (SE-1), FIBER ROLL (SE-5), OR GRAVEL BAG BERM (SE-6)
7. STORM DRAIN BARRICADE
SAND BAGS OR PLASTIC

prepared by: BT Consulting Incorporated

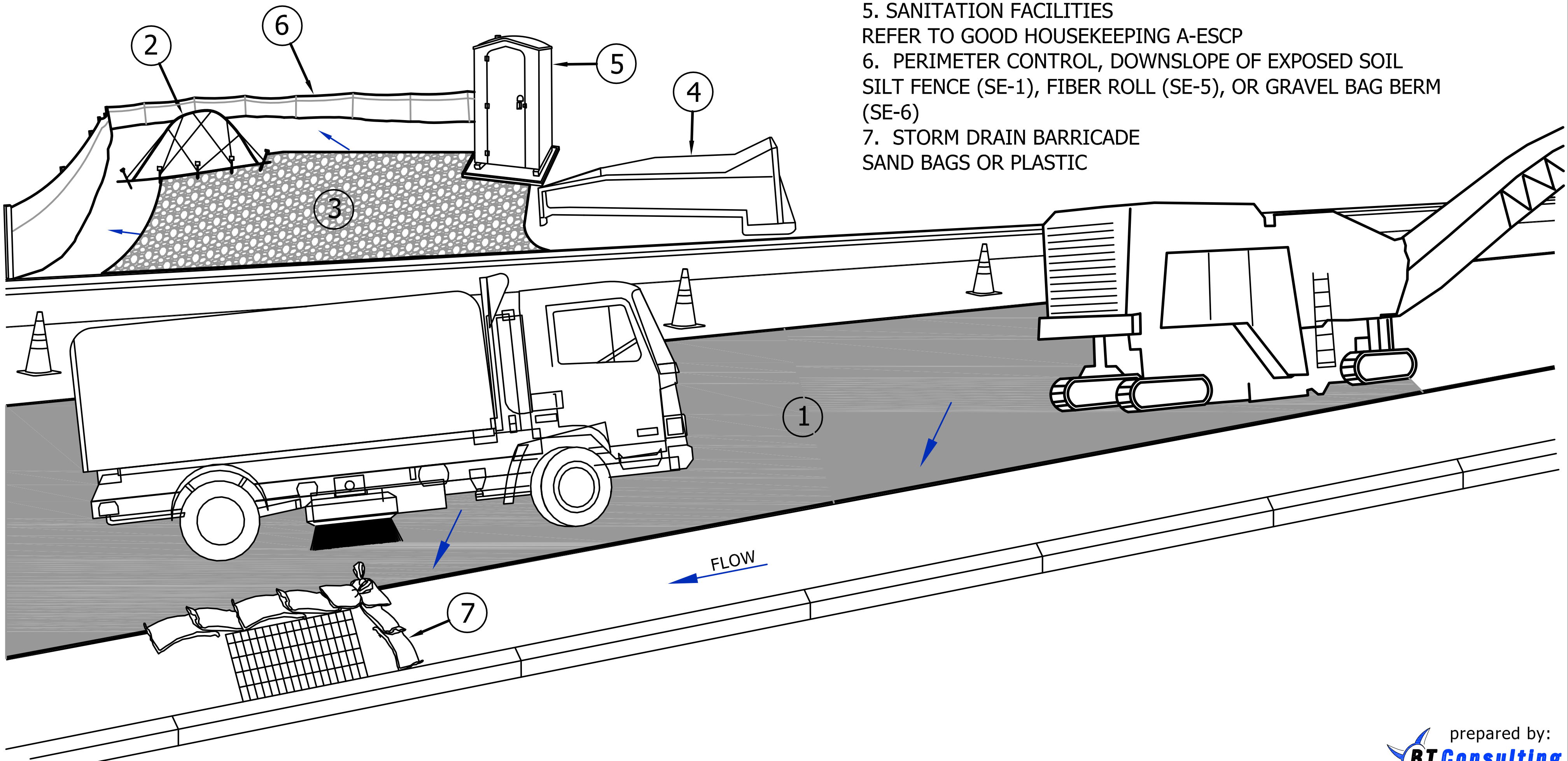
NOT TO SCALE

Pacific Gas and Electric Company®

TYPICAL BMP USE DETAIL

A-ESCP - SAWCUTTING, GRINDING, AND PAVING

SGP-01



NOTES:
1. GRINDING AND SWEEPING LOCATION
2. COVERED STOCKPILES:
REFER TO STOCKPILE MANAGEMENT A-ESCP
3. STABILIZED CONSTRUCTION ENTRANCE
USE IF NECESSARY
4. WASHOUT
CONCRETE, PAINT OR OTHER RINSE WATERS. REFER TO GOOD HOUSEKEEPING A-ESCP
5. SANITATION FACILITIES
REFER TO GOOD HOUSEKEEPING A-ESCP
6. PERIMETER CONTROL, DOWNSLOPE OF EXPOSED SOIL
SILT FENCE (SE-1), FIBER ROLL (SE-5), OR GRAVEL BAG BERM (SE-6)
7. STORM DRAIN BARRICADE
SAND BAGS OR PLASTIC

NOT TO SCALE

BMPs AS SHOWN ARE ALSO APPLICABLE IN PARKING AREAS AND YARDS

prepared by: BT Consulting Incorporated

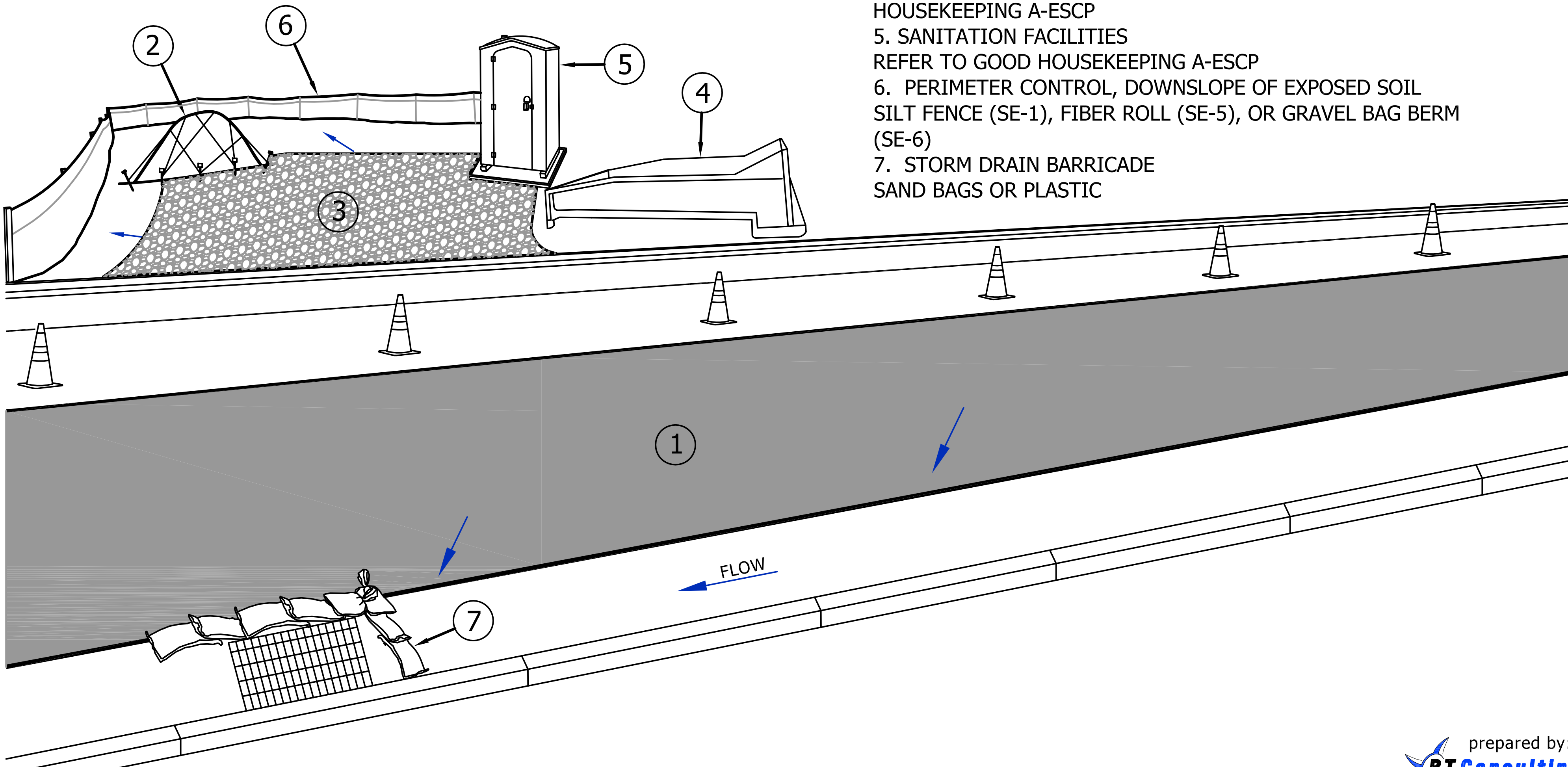
Pacific Gas and Electric Company®

TYPICAL BMP USE DETAIL

A-ESCP - SAWCUTTING, GRINDING, AND PAVING

SGP-02

NOTES:
1. PAVING (CONCRETE OR ASPHALT), STRIPING, AND/OR SEAL LOCATION
2. COVERED STOCKPILES:
REFER TO STOCKPILE MANAGEMENT A-ESCP
3. STABILIZED CONSTRUCTION ENTRANCE
USE IF NECESSARY
4. WASHOUT
CONCRETE, PAINT OR OTHER RINSE WATERS. REFER TO GOOD HOUSEKEEPING A-ESCP
5. SANITATION FACILITIES
REFER TO GOOD HOUSEKEEPING A-ESCP
6. PERIMETER CONTROL, DOWNSLOPE OF EXPOSED SOIL
SILT FENCE (SE-1), FIBER ROLL (SE-5), OR GRAVEL BAG BERM (SE-6)
7. STORM DRAIN BARRICADE
SAND BAGS OR PLASTIC



NOT TO SCALE

TYPICAL BMPs AS SHOWN ARE ALSO APPLICABLE IN PARKING AREAS AND YARDS

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TYPICAL BMP USE DETAIL

A-ESCP - SAWCUTTING, GRINDING, AND PAVING

SGP-03

Attachment B
Activity Specific Erosion & Sediment Control Plans (A-ESCPs)

The following A-ESCPs are included in the Plan by reference only and can be found in the Field Manual. A full version of the Field Manual that includes the A-ESCPs is located on SharePoint.

GH	Good Housekeeping
SM	Stockpile Management
SC	Small Excavation, Construction, and Potholing
PR	Pavement Rehabilitation

Attachment C
PG&E Best Management Practice (BMP) Cut-Sheets

The following BMP Fact Sheets are included in the Plan by reference only and can be found in Appendix C of the Field Manual. A full version of the Field Manual that includes the cut-sheets is located on SharePoint.

EC-3	Hydraulic Mulch
EC-4	Hydroseed
EC-6	Straw Mulch
EC-7	Geotextiles, Plastic Covers, and Erosion Control Blankets/Mats
EC-16	Non-Vegetative Stabilization
SE-1	Silt Fence
SE-5	Fiber Rolls
SE-6	Gravel Bag Berm
SE-10	Storm Drain Inlet Protection
TC-1	Stabilized Construction Entrance/Exit
TC-2	Stabilized Construction Roadway
WM-2	Material Use

Attachment D
Requirement Summary Table

Sawcutting, Grinding, and Paving

Best Management Practices to Reduce Environmental Impacts

Proper implementation of Best Management Practices (BMP) during Sawcutting, Grinding, and Paving projects can reduce adverse effects to water resources by reducing pollutant migration from facilities.

No.	Sawcutting, Grinding, and Paving	A-ESCP Section
1	Be familiar with and follow the requirments of the Good Housekeeping A-ESCP	2.0
2	Be familiar with and follow the requirments of the Stockpile Management A-ESCP	2.0
3	Schedule activities to minimize soil disturbance during rain.	2.0
4	Protect all areas that may receive sheet or concentrated runoff.	2.1
5	Protect downslope drainage inlets.	2.1, 2.2
6	Install a Stabilized Construction Entrnace of observe daily for any tracking. Clean if found.	2.1
7	Perform sawcutting, grinding, and paving in dry weather only.	2.2, 2.3
8	Cover or barricade storm drains during sawcutting, grinding, and paving operations.	2.2, 2.3, 2.4
9	Vacuum all slurry, grindings, or dust from all surfaces concurrently with sacutting or grinding activities.	2.2
10	Recycle asphalt or waste concrete materials when possible.	2.3
11	Pay particular attention to drips from paving equipment.	2.3
12	Re-schedule concrete work if rain is forecast.	2.4
13	Avoid mixing or ordering excess amount of concrete.	2.4
14	Do not wash equipment or any concrete materials into footing excavations.	2.4
15	Use extreme care to avoid spills when working with striping paint or thermoplastic to avois any leaks or spills.	2.5
16	Stabilize all project disturbed soils to return the area to pre-project condition at end of project.	2.6, 5.0
17	Cover disturbed soils with a combination of temporary and permanent vegetative stabilization.	2.6
18	When a landowner does not want disturbed soils stabilized, contact the PG&E Land Agent to corredinate a specific agreement with the landowner.	2.6
19	Inspect BMPs daily and maintain, replace, or repair as necessary.	3.0

ATTACHMENT C

CONSTRUCTION SITE INSPECTION CHECKLIST

Pacific Gas and Electric Company®

Non-Permitted Project Stormwater Inspection Form

Inspection Information				
Project Name:		Project Location:		
Inspection Date:	Inspection Time:	Inspection Type:	☐ Monthly ☐ Other:	
Weather Conditions:	☐ Clear	☐ Rain	☐ Fog	
	☐ Partly Cloudy	☐ Sleet	☐ High Winds	
	☐ Cloudy	☐ Snow	☐ Other:	

Deficiencies/Corrective Actions				
Action #	Deficiency/Corrective Action	Date Identified	Date Addressed	Initials

Notes/Comments/Concerns

Pacific Gas and Electric Company®

Non-Permitted Project Stormwater Inspection Form

Site Information	
Construction Phase(s)/Stage(s):	Recently Completed and Current Activities:
☐ Active Construction ☐ Final Stabilization ☐ Inactive	
S-ESCP Onsite? ☐ Yes ☐ No	Photos Taken: ☐ Yes ☐ No
Discharges	
Were any discharges observed?	☐ Yes ☐ No
Observations	
On-Site Observations:	
Inspector Information	
Inspector Name:	Inspector Title: QSD/QSP
Signature:	Report Date:

Pacific Gas and Electric Company®

Non-Permitted Project Stormwater Inspection Form

BMP Checklist				
Housekeeping - Construction Materials	Implemented? **Yes**	**No**	**N/A**	Action #
Are construction materials, chemicals, and equipment properly used and/or stored in a manner that prohibits pollutant discharge or soil contamination? (e.g., inside or under cover)	☐	☐	☐	
Is the site free of spills, leaks, breaches, or malfunctions that could result in the discharge of pollutants?	☐	☐	☐	
Are stockpiles adequately covered, bermed, and appropriately placed?	☐	☐	☐	
Housekeeping - Waste Management	Implemented? **Yes**	**No**	**N/A**	Action #
Is all waste, trash, and litter from the site collected and placed in covered waste receptacles?	☐	☐	☐	
Are washout facilities (e.g., paint, concrete) available and maintained?	☐	☐	☐	
Are portable restrooms placed appropriately (50' from drainages and inlets where possible), protected from tipping, and placed on a spill tray?	☐	☐	☐	
Are spilled materials, contaminated soils, and used absorbents disposed of properly?	☐	☐	☐	
Housekeeping - Vehicle Storage and Maintenance	Implemented? **Yes**	**No**	**N/A**	Action #
Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other improperly stored materials or waste?	☐	☐	☐	
Are spill cleanup materials available on site and in maintenance or fueling vehicles?	☐	☐	☐	
Housekeeping - Air Deposition	Implemented? **Yes**	**No**	**N/A**	Action #
Is dust and other wind blown material or waste effectively controlled?	☐	☐	☐	
Dewatering and Non-Storm Water Discharges	Implemented? **Yes**	**No**	**N/A**	Action #
Are non-stormwater discharges (e.g., wash water, pipe flushing, dust control) properly managed?	☐	☐	☐	
Is dewatering handled in accordance with PG&E expectations, requirements, and permits?	☐	☐	☐	
Is the project site and/or areas around the site free of any evidence of illicit discharges or illegal dumping?	☐	☐	☐	
Erosion Control	Implemented? **Yes**	**No**	**N/A**	Action #
Are all disturbed areas that are not actively being worked properly stabilized?	☐	☐	☐	

Non-Permitted Project Stormwater Inspection Form

Sediment Control	Implemented? Yes	No	N/A	Action #
Are sensitive areas (e.g., streams, wetlands, slopes, vegetation areas, etc.) adequately protected with barriers or similar BMPs?	☐	☐	☐	
Are perimeter controls and sediment barriers effective?	☐	☐	☐	
Is sediment prevented from being tracked off the project at site access points?	☐	☐	☐	

Run-off Control	Implemented? Yes	No	N/A	Action #
Are storm drain inlets effectively protected?	☐	☐	☐	
Are discharge points and receiving waters free of project related sediment, pollutants, or evidence thereof?	☐	☐	☐	

Summary and Documentation	Implemented? Yes	No	N/A	Action #
Does the S-ESCP adequately reflect the current conditions and activities?	☐	☐	☐	
Are all BMPs installed per the S-ESCP as necessary for current construction activities?	☐	☐	☐	
Are all other BMPs and site activities appropriate and being performed adequately to effectively protect water quality?	☐	☐	☐	

ATTACHMENT D

NOTICE OF DISCHARGE

Attachment D: Notice of Discharge

To: Storm Water Program Team   Date:

Subject: Notice of Discharge

Project Name: Ignacio-Alto-Sausalito #1 & #2 SCADA Bundle C-26C

Project Manager Name: Yasmin Hassen

Project Manager Phone: 925-378-0352

The following instance of discharge is noted and corresponding actions taken.

Date/Time of Discharge	
Location of Discharge	
Material(s) Discharged	
Operation that Caused Discharge	
Initial assessment of any impact caused by discharge	
Assessment of Existing BMPs in place prior to discharge (provide photo-documentation)	
Actions Taken to Prevent Future Discharge	
Steps taken or planned to reduce, eliminate and/or prevent recurrence of the discharge	
BMPs Repaired or BMPs Deployed After discharge (list location, BMP type, and action taken)	
Implementation and maintenance schedule for affected BMPs	

ATTACHMENT E

TRAINED PERSONNEL LOG

Attachment E: Trained Personnel Log

Storm Water Management Training Log

Project Name: Ignacio-Alto-Sausalito #1 & #2 SCADA Bundle C-26C

Project Manager Name: Yasmin Hassen

Project Manager Phone: 925-378-0352

Storm Water Management Topic: (check as appropriate)

- ❑ Temporary Soil Stabilization
- ❑ Temporary Sediment Control
- ❑ Wind Erosion Control
- ❑ Tracking Control
- ❑ Non-storm water management
- ❑ Waste Management and Materials Pollution Control
- ❑ Discharge Reporting
- ❑ Sensitive Habitat Issues/Receiving Water Issues

Training provided by: Ahtna

Location: ____________________ Date: ____________________

Instructor: Jeffrey Menacho Telephone: 916-769-4064

Course Length (hours): ____________________

Attendee Roster (attach additional forms if necessary)

Name	Company	Phone

COMMENTS:

SUMMARY

- *It's everybody's responsibility to perform their daily duties in compliance with the S-ESCP*
- *Plan accordingly and schedule activities with the predicted forecasts.*
- *Be aware of your surroundings when working within sensitive habitats or within close proximity to existing water bodies*
- *Preserve as much vegetation as possible, stay within designated project boundaries and use designated access points*
- *We are available to provide guidance and will be happy to answer any questions or address any concerns that you may have*

FINES AND PENALTIES

- *$10,000 per day plus $10 per gallon maximum discretionary administrative penalties; $25,000 per day by State in Court*
- *Citizen suit penalties up to $37,500 per day per violation, plus plaintiffs' attorneys' fees*

Contact Information

PG&E

PG&E Project Manager:
Yasmin Hassen : 925-378-0352
Email: yxhi@pge.com

PG&E Environmental Field Specialist:
Kevin Risley : 707-331-4213
Email: kxru@pge.com

AHTNA—TERRAPHASE

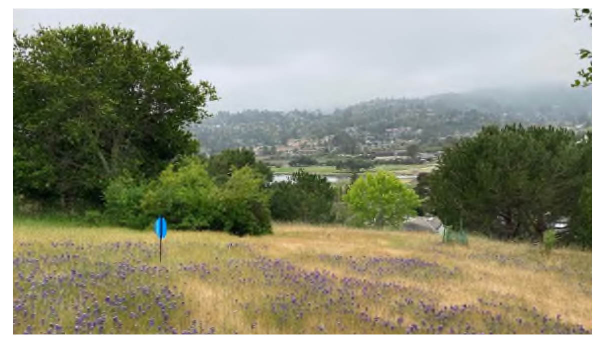
For site specific storm water concerns contact Erosion and Sediment Control Manager:

ESCM:
Jeffrey Menacho : 916-769-4064
Email: JMenacho@Ahtna.net

Water Pollution Prevention Training

MAY 2022 — JUNE 2022

Pacific Gas and Electric Company
Ignacio-Alto-Sausalito
Erosion and Sediment Control Plan
Mill Valley, Marin County, CA



Pacific Gas and Electric Company®

Provided by:

Ahtna
Government Services Corporation

S-ESCP

S-ESCP - required for all PG&E sites NOT subject to the State's Construction General Permit (2009-0009-DWQ). A S-ESCP is a site specific, dynamic plan that describes Best Management Practices (BMPs) for the construction site to control the discharge of pollutants to local storm drains and waterways. The Ignacio-Alto-Sausalito activities will disturb <1 acre of land. However, erosion and sediment control is required to prevent disturbed soil from entering surface water and to ensure compliance with the Clean Water Act, applicable biological permits, and Porter Cologne Water Quality Control Act. An Erosion Sediment Control Plan (ESCP) has been prepared for this project.

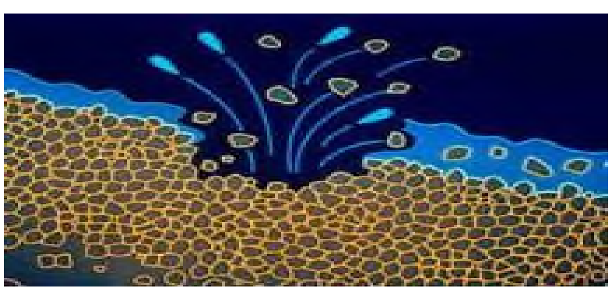
Project Watershed - The Project is located within the Corte Madera Creek-Frontal San Fransisco Bay Estuaries watershed and Arroyo Corte Madera Del Presidio-Frontal San Francisco Bay Estuaries sub watershed.

Erosion vs. Sedimentation:

Erosion - the act of water or wind contacting an unstabilized surface and displacing soil (Example controls: plastic sheeting, erosion control mats/blankets and hydroseed/mulch applications)

Sedimentation - the movement of soil onto, throughout or off of the site due to erosion (Example controls: fiber roll, silt fence, gravel bag dams, stabilized construction entrances)

*Use an effective combination of both erosion and sediment controls to effectively stabilize construction sites



BMPs

BMP - action, program or device which helps to reduce pollutants in site run-off. BMPs include:

- Good Housekeeping - waste management, material use and delivery, site access, street sweeping/vacuuming, spill control, secondary containment.
- Erosion and Sediment Controls - fiber rolls (must be non-monofilament and fully biodegradable), preservation of existing vegetation.
- Inspection & Maintenance - perform daily visual inspections and monthly inspections.
- Employee Training - perform preconstruction ESCP awareness training for onsite contractors and conduct trainings as needed throughout the duration of the project.

S-ESCP Concerns

- Track-out - If construction causes track out on adjacent streets and sidewalks, it will be swept up frequently during forecasted storms and at a minimum daily.
- Vehicle Maintenance and Material Storage - Vehicle/equipment maintenance and equipment/material staging shall only occur within designated locations, and at least 50 feet from water courses. Vehicles and equipment should be inspected daily for leaks.
- Sanitary Facilities - Sanitary facilities shall be located at least 50 feet from watercourses and have secondary containment in place.
- Stockpile Management - Sediment should be placed on visqueen. If on-site stockpiling occurs, it will be covered and bermed before and during anticipated rain events.
- Dust Control - Water shall be used on site for dust suppression. Care shall be taken not to overwater and create runoff, which may cause erosion and non-stormwater discharge.
- Good Housekeeping - Place trash and cigarette butts in proper covered receptacles or remove from site daily. Spill kits must be on-site.
- Preservation of Existing Vegetation - Do not disturb vegetation unless necessary to access work areas. Use designated access roads.
- Dewatering - Contact the EFS or QSP before dewatering.
- Concrete Waste Management - Concrete work shall be scheduled to avoid precipitation events when feasible. Washout should occur off-site or in to on-board facilities on the truck.
- Restoration - Disturbed areas shall be restored after construction is complete.
- Additional BMPs - Additional BMPs may be required based on site inspections.

CERTIFICATE OF TRAINING

CALIFORNIA CONSTRUCTION GENERAL PERMIT

QUALIFIED SWPPP PRACTITIONER (QSP)

Jeffrey Menacho

Apr 12, 2021 - Apr 12, 2023

Certificate # 27104

CASQA

CALIFORNIA STORMWATER QUALITY ASSOCIATION

California Stormwater Quality Association and
California Construction General Permit Training Team

ATTACHMENT F

FINAL SITE INSPECTION CHECKLIST

Attachment F: Final Site Inspection Checklist

GENERAL INFORMATION	
Project Name	Ignacio-Alto-Sausalito #1 & #2 SCADA Bundle C-26C
Contractor	Ahtna
Inspector's Name/Phone	Jeffrey Menacho (916) 769-4064
Signature	
Date of Final Site Inspection	

FINAL SITE INSPECTION CHECKLIST				
Requirement	**Yes**	**No**	**N/A**	**Notes**
Construction is complete and all construction equipment has been demobilized, and construction wastes and materials have been properly managed/disposed?				
All temporary BMPs have been removed?				
A minimum of 70% stabilization has been reached in all disturbed soil areas?				
There are NO remaining disturbed soil areas that would require stabilization measures? If no, then provide photo-documentation of all disturbed areas that require stabilization measures.				
If answered 'No' to any questions, what actions are required?				
List actions required:				

ATTACHMENT G

SOIL DISTURBANCE CALCULATION

Project Name: Ignacio-Alto-Sausalito #1 & #2 SCADA Bundle C-26C **Order #:** **74019482**

Calculating Soil Disturbance Areas of Construction Projects

The State Water Resources Control Board requires permitting under the New State General Storm Water Construction Permit for construction activities, where soil disturbance is one acre or greater. To determine whether a construction project or activity disturbs an acre or more of soil, the surface area (square feet) for the following activities* must be determined. Items numbered below refer to activities occurring on **unpaved** surfaces unless otherwise specified. If the sum of these activities equals or exceeds 39,200 square feet or 0.9 acre, then permit coverage and a Storm Water Pollution Prevention Plan (SWPPP) must be obtained before commencement of the construction activity. (Cells into which data should be entered are shaded green.)

ACTIVITIES - type in description of activity and put dimensions in green area	Width	Length	AREA IN FT2
1. Gas Transmission Surface areas of trenches and laterals (includes trenches within paved areas)			
			0
			0
			0
2. Gas Transmission Unpaved areas adjacent to trench (consider permanent easement plus temporary construction easement)			
			0
			0
			0
			0
3. Gas Transmission Ancillary facilities, such as jack/bore pits, HDD areas, poles, tension/pull sites, pads, and access vaults that are outside of the areas calculated in 1 or 2 above.			
			0
			0
			0
4. Gas Distribution Trenching Calculations — Enter the number of gas distribution locations or length of pipe here ▼			
Linear Feet/Length of Pipe on Pavement			0
Linear Feet/Length of Pipe on Shoulder			0
Linear Feet/Length of Pipe off the Shoulder			0
Number of Services Trenched			0
Number of Tie-ins			0
5. Gas Distribution Bore Calculations — Enter the number of gas distribution locations or length of pipe here ▼			
Length of HDD Bore			
Number of Services HDD			0
Number of Tie-ins			
Number of Bore/Bell Holes	0		0
Number of HDD Burp/Entry Holes	0		0
Number of Pot Holes/Utility Crossing	0		0
6. Regulator Station Footprint Dimentions			0
7. Area of the base of stockpiles on unpaved surfaces not included in 1-6 above.			
			0
			0
			0
			0
8. Borrow areas not included in 1-6 above.			
			0
			0
			0
			0
9. Area of equipment and material storage, staging, and preparation areas (laydown) not on paved surfaces and outside of 1-6 above.			
Crane/Work Pads and Grading			25700.4
			0
			0

Project Name: Ignacio-Alto-Sausalito #1 & #2 SCADA Bundle C-26C **Order #:** **74019482**

Calculating Soil Disturbance Areas of Construction Projects

The State Water Resources Control Board requires permitting under the New State General Storm Water Construction Permit for construction activities, where soil disturbance is one acre or greater. To determine whether a construction project or activity disturbs an acre or more of soil, the surface area (square feet) for the following activities* must be determined. Items numbered below refer to activities occurring on **unpaved** surfaces unless otherwise specified. If the sum of these activities equals or exceeds 39,200 square feet or 0.9 acre, then permit coverage and a Storm Water Pollution Prevention Plan (SWPPP) must be obtained before commencement of the construction activity. (Cells into which data should be entered are shaded green.)

ACTIVITIES - type in description of activity and put dimensions in green area			Width	Length	AREA IN FT2
10. Vehicle parking if unpaved outside of 1-6 above					
					0
					0
					0
					0
	Enter the number of poles or towers here ▼				
	Tubular Steel Poles - 40 ft x 40 ft	2			3200
	Wood/LDS Poles - 10 ft x 10 ft	1			100
11. Poles/ towers footprints of work areas	Towers - 50 ft x 50 ft	1			2500
12. Improved helicopter landing sites (e.g., graded and/or rocked) and sites where helicopter refueling will occur. (Vegetated areas used for touchdowns in the dry season should not be included if soil disturbance and refueling will not occur there.)					
					0
					0
					0
13. New road construction, upgrades to existing roads that would change composition (e.g., unpaved to paved), or change dimension of road (e.g., widening). Overland access where no roads are present, such as across grasslands would be included especially if use is during wet season. The exclusion of this activity can be evaluated by the Storm Water Team for dry season, limited drive-in and drive-out use as long as the activity does not cause soil disturbance (this needs to be confirmed with the Storm Water Team before excluding from the calculation).					
Access Road					5950
					0
					0
					0
14. Areas of paved surfaces constructed for the project other than roads included avove.					
					0
					0
					0
					0
15. Other:					
					0
					0
					0
					0
				Total Surface Area in Acres	**0.860**

PG&E Gas and Electric
Advice Submittal List
General Order 96-B, Section IV

AT&T
Albion Power Company

Alta Power Group, LLC
Anderson & Poole

Atlas ReFuel
BART

Barkovich & Yap, Inc.
Braun Blaising Smith Wynne, P.C.
California Cotton Ginners & Growers Assn
California Energy Commission

California Hub for Energy Efficiency Financing

California Alternative Energy and Advanced Transportation Financing Authority
California Public Utilities Commission
Calpine

Cameron-Daniel, P.C.
Casner, Steve
Center for Biological Diversity

Chevron Pipeline and Power
City of Palo Alto

City of San Jose
Clean Power Research
Coast Economic Consulting
Commercial Energy
Crossborder Energy
Crown Road Energy, LLC
Davis Wright Tremaine LLP
Day Carter Murphy

Dept of General Services
Don Pickett & Associates, Inc.
Douglass & Liddell

East Bay Community Energy Ellison Schneider & Harris LLP
Engineers and Scientists of California

GenOn Energy, Inc.
Goodin, MacBride, Squeri, Schlotz & Ritchie
Green Power Institute
Hanna & Morton
ICF
International Power Technology

Intertie

Intestate Gas Services, Inc.
Kelly Group
Ken Bohn Consulting
Keyes & Fox LLP
Leviton Manufacturing Co., Inc.

Los Angeles County Integrated Waste Management Task Force
MRW & Associates
Manatt Phelps Phillips
Marin Energy Authority
McClintock IP
McKenzie & Associates

Modesto Irrigation District
NLine Energy, Inc.
NRG Solar

OnGrid Solar
Pacific Gas and Electric Company
Peninsula Clean Energy

Pioneer Community Energy

Public Advocates Office

Redwood Coast Energy Authority
Regulatory & Cogeneration Service, Inc.
SCD Energy Solutions
San Diego Gas & Electric Company

SPURR
San Francisco Water Power and Sewer
Sempra Utilities

Sierra Telephone Company, Inc.
Southern California Edison Company
Southern California Gas Company
Spark Energy
Sun Light & Power
Sunshine Design
Tecogen, Inc.
TerraVerde Renewable Partners
Tiger Natural Gas, Inc.

TransCanada
Utility Cost Management
Utility Power Solutions
Uplight
Water and Energy Consulting Wellhead Electric Company
Western Manufactured Housing Communities Association (WMA)
Yep Energy