CLIMATE ACTION PLAN CONSISTENCY CHECKLIST INTRODUCTION

In December 2015, the City adopted a Climate Action Plan (CAP) that outlines the actions that City will undertake to achieve its proportional share of State greenhouse gas (GHG) emission reductions. The purpose of the Climate Action Plan Consistency Checklist (Checklist) is to, in conjunction with the CAP, provide a streamlined review process for proposed new development projects that are subject to discretionary review and trigger environmental review pursuant to the California Environmental Quality Act (CEQA).[1]

Analysis of GHG emissions and potential climate change impacts from new development is required under CEQA. The CAP is a plan for the reduction of GHG emissions in accordance with CEQA Guidelines Section 15183.5. Pursuant to CEQA Guidelines Sections 15064(h)(3), 15130(d), and 15183(b), a project's incremental contribution to a cumulative GHG emissions effect may be determined not to be cumulatively considerable if it complies with the requirements of the CAP.

This Checklist is part of the CAP and contains measures that are required to be implemented on a project-by-project basis to ensure that the specified emissions targets identified in the CAP are achieved. Implementation of these measures would ensure that new development is consistent with the CAP's assumptions for relevant CAP strategies toward achieving the identified GHG reduction targets. Projects that are consistent with the CAP as determined through the use of this Checklist may rely on the CAP for the cumulative impacts analysis of GHG emissions. Projects that are not consistent with the CAP must prepare a comprehensive project-specific analysis of GHG emissions, including quantification of existing and projected GHG emissions and incorporation of the measures in this Checklist to the extent feasible. Cumulative GHG impacts would be significant for any project that is not consistent with the CAP.

The Checklist may be updated to incorporate new GHG reduction techniques or to comply with later amendments to the CAP or local, State, or federal law.

[1] Certain projects seeking ministerial approval may be required to complete the Checklist. For example, projects in a Community Plan Implementation Overlay Zone may be required to use the Checklist to qualify for ministerial level review. See Supplemental Development Regulations in the project's community plan to determine applicability.

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CAP CONSISTENCY CHECKLIST SUBMITTAL APPLICATION

- The Checklist is required only for projects subject to CEQA review.[2]
- If required, the Checklist must be included in the project submittal package. Application submittal procedures can be found in Chapter 11: Land Development Procedures of the City's Municipal Code.
- The requirements in the Checklist will be included in the project's conditions of approval.
- The applicant must provide an explanation of how the proposed project will implement the requirements described herein to the satisfaction of the Planning Department.

Application Information

Contact Information

Project No./Name: PN 565738 Price-Cohen Residence

Property Address: 2045 Lowry Place

Applicant Name/Co.: Tom Cohen and Lena Price

Contact Phone: (913) 226-1001 Contact Email: [redacted]

Was a consultant retained to complete this checklist? ☐ Yes ■ No If Yes, complete the following

Consultant Name: _____ Contact Phone: _____

Company Name: _____ Contact Email: _____

Project Information

1. What is the size of the project (acres)? .14 acreas
2. Identify all applicable proposed land uses:
   - ■ Residential (indicate # of single-family units): one
   - ☐ Residential (indicate # of multi-family units): _____
   - ☐ Commercial (total square footage): _____
   - ☐ Industrial (total square footage): _____
   - ☐ Other (describe): _____
3. Is the project or a portion of the project located in a Transit Priority Area? ■ Yes ☐ No
4. Provide a brief description of the project proposed:

We propose to demolish an existing residence and construct a new 2-story residence with attached 2-car garage. As the new construction will be basically in the same footprint as the old, there is no new grading proposed, with the exception of structural footings. There are no new retaining walls or paving proposed. overall impervious are will be decreased by 23%.

[2] Certain projects seeking ministerial approval may be required to complete the Checklist. For example, projects in a Community Plan Implementation Overlay Zone may be required to use the Checklist to qualify for ministerial level review. See Supplemental Development Regulations in the project's community plan to determine applicability.

CAP CONSISTENCY CHECKLIST QUESTIONS

Step 1: Land Use Consistency

The first step in determining CAP consistency for discretionary development projects is to assess the project's consistency with the growth projections used in the development of the CAP. This section allows the City to determine a project's consistency with the land use assumptions used in the CAP.

Step 1: Land Use Consistency		
Checklist Item (Check the appropriate box and provide explanation and supporting documentation for your answer)	Yes	No
A. Is the proposed project consistent with the existing General Plan and Community Plan land use and zoning designations?;[3] OR, B. If the proposed project is not consistent with the existing land use plan and zoning designations, and includes a land use plan and/or zoning designation amendment, would the proposed amendment result in an increased density within a Transit Priority Area (TPA)[4] and implement CAP Strategy 3 actions, as determined in Step 3 to the satisfaction of the Development Services Department?; OR, C. If the proposed project is not consistent with the existing land use plan and zoning designations, does the project include a land use plan and/or zoning designation amendment that would result in an equivalent or less GHG-intensive project when compared to the existing designations?	☑	☐

If "***Yes***," proceed to Step 2 of the Checklist. For question B above, complete Step 3. For question C above, provide estimated project emissions under both existing and proposed designation(s) for comparison. Compare the maximum buildout of the existing designation and the maximum buildout of the proposed designation.

If "***No***," in accordance with the City's Significance Determination Thresholds, the project's GHG impact is significant. The project must nonetheless incorporate each of the measures identified in Step 2 to mitigate cumulative GHG emissions impacts unless the decision maker finds that a measure is infeasible in accordance with CEQA Guidelines Section 15091. Proceed and complete Step 2 of the Checklist.

This project is consistent with the General Plan and Community Plan as demonstreted by a unanimous approval from the La Jolla Community Planning Association and the La Jolla Shores Planned District Advisory board. Setbacks and FAR are established by La Jolla Shores on a case by case basis, and were deemed consistent with the General Plan, Community Plan and Zoning designations.

[3] This question may also be answered in the affirmative if the project is consistent with SANDAG Series 12 growth projections, which were used to determine the CAP projections, as determined by the Planning Department.

[4] This category applies to all projects that answered in the affirmative to question 3 on the previous page: Is the project or a portion of the project located in a transit priority area.

Step 2: CAP Strategies Consistency

The second step of the CAP consistency review is to review and evaluate a project's consistency with the applicable strategies and actions of the CAP. Step 2 only applies to development projects that involve permits that would require a certificate of occupancy from the Building Official or projects comprised of one and two family dwellings or townhouses as defined in the California Residential Code and their accessory structures.[5] All other development projects that would not require a certificate of occupancy from the Building Official shall implement Best Management Practices for construction activities as set forth in the Greenbook (for public projects).

Step 2: CAP Strategies Consistency			
Checklist Item (Check the appropriate box and provide explanation for your answer)	Yes	No	N/A
Strategy 1: Energy & Water Efficient Buildings			
1. *Cool/Green Roofs*. • Would the project include roofing materials with a minimum 3-year aged solar reflection and thermal emittance or solar reflection index equal to or greater than the values specified in the voluntary measures under California Green Building Standards Code (Attachment A)?; OR • Would the project roof construction have a thermal mass over the roof membrane, including areas of vegetated (green) roofs, weighing at least 25 pounds per square foot as specified in the voluntary measures under California Green Building Standards Code?; OR • Would the project include a combination of the above two options? Check "N/A" only if the project does not include a roof component. Our proposal will include roofing materials with a minimum 3-year solar reflection and thermal emittance or solar reflection index equal to or greater than the values specified in the voluntary measures under the California Green Building Standards. The use of solar panels will used to reduce electrical consumption. A battery storage system will also be employed to offset utility usage and will also supply back up power in the event of a power failure.	☑	☐	☐

[5] Actions that are not subject to Step 2 would include, for example: 1) discretionary map actions that do not propose specific development, 2) permits allowing wireless communication facilities, 3) special events permits, 4) use permits or other permits that do not result in the expansion or enlargement of a building (e.g., decks, garages, etc.), and 5) non-building infrastructure projects such as roads and pipelines. Because such actions would not result in new occupancy buildings from which GHG emissions reductions could be achieved, the items contained in Step 2 would not be applicable.

2. *Plumbing fixtures and fittings* With respect to plumbing fixtures or fittings provided as part of the project, would those low-flow fixtures/appliances be consistent with each of the following: Residential buildings: • Kitchen faucets: maximum flow rate not to exceed 1.5 gallons per minute at 60 psi; • Standard dishwashers: 4.25 gallons per cycle; • Compact dishwashers: 3.5 gallons per cycle; and • Clothes washers: water factor of 6 gallons per cubic feet of drum capacity? Nonresidential buildings: • Plumbing fixtures and fittings that do not exceed the maximum flow rate specified in Table A5.303.2.3.1 (voluntary measures) of the California Green Building Standards Code (See Attachment A); and • Appliances and fixtures for commercial applications that meet the provisions of Section A5.303.3 (voluntary measures) of the California Green Building Standards Code (See Attachment A)? Check "N/A" only if the project does not include any plumbing fixtures or fittings. With respect to plumbing fixtures and fittings provided as part of this project, the low-flow fixtures/ appliances will be consistent with each of the following: kitchen faucets: maximum flow rate not to exceed 1.5 gallons per minute @ 60 psi. Standard dishwasher(s) 4.25 gallons per cycle. Compact dishwashers: 3.5 gallons per cycle. Clothes Washer: water factor of 6 gallons per cubic foot of drum capacity.	☑	☐	☐

Strategy 3: Bicycling, Walking, Transit & Land Use			
3. *Electric Vehicle Charging* • Multiple-family projects of 17 dwelling units or less: Would 3% of the total parking spaces required, or a minimum of one space, whichever is greater, be provided with a listed cabinet, box or enclosure connected to a conduit linking the parking spaces with the electrical service, in a manner approved by the building and safety official, to allow for the future installation of electric vehicle supply equipment to provide electric vehicle charging stations at such time as it is needed for use by residents? • Multiple-family projects of more than 17 dwelling units: Of the total required listed cabinets, boxes or enclosures, would 50% have the necessary electric vehicle supply equipment installed to provide active electric vehicle charging stations ready for use by residents? • Non-residential projects: Of the total required listed cabinets, boxes or enclosures, would 50% have the necessary electric vehicle supply equipment installed to provide active electric vehicle charging stations ready for use? Check "N/A" only if the project is a single-family project or would not require the provision of listed cabinets, boxes, or enclosures connected to a conduit linking the parking spaces with electrical service, e.g., projects requiring fewer than 10 parking spaces. N.A. DUE TO SINGLE FAMILY RESIDENTIAL	☐	☐	☑

Strategy 3: Bicycling, Walking, Transit & Land Use (Complete this section if project includes non-residential or mixed uses)			
4. *Bicycle Parking Spaces* Would the project provide more short- and long-term bicycle parking spaces than required in the City's Municipal Code (Chapter 14, Article 2, Division 5)?[6] Check "N/A" only if the project is a residential project. N.A. DUE TO SINGLE FAMILY RESIDENTIAL	☐	☐	☑

[6] Non-portable bicycle corrals within 600 feet of project frontage can be counted towards the project's bicycle parking requirements.

5. *Shower facilities*

If the project includes nonresidential development that would accommodate over 10 tenant occupants (employees), would the project include changing/shower facilities in accordance with the voluntary measures under the California Green Building Standards Code as shown in the table below?

Number of Tenant Occupants (Employees)	Shower/Changing Facilities Required	Two-Tier (12" X 15" X 72") Personal Effects Lockers Required
0-10	0	0
11-50	1 shower stall	2
51-100	1 shower stall	3
101-200	1 shower stall	4
Over 200	1 shower stall plus 1 additional shower stall for each 200 additional tenant-occupants	1 two-tier locker plus 1 two-tier locker for each 50 additional tenant-occupants

Check "N/A" only if the project is a residential project, or if it does not include nonresidential development that would accommodate over 10 tenant occupants (employees).

N.A. DUE TO SINGLE FAMILY RESIDENTIAL

☐	☐	☑

6. *Designated Parking Spaces*

If the project includes a nonresidential use in a TPA, would the project provide designated parking for a combination of low-emitting, fuel-efficient, and carpool/vanpool vehicles in accordance with the following table?

Number of Required Parking Spaces	Number of Designated Parking Spaces
0-9	0
10-25	2
26-50	4
51-75	6
76-100	9
101-150	11
151-200	18
201 and over	At least 10% of total

This measure does not cover electric vehicles. See Question 4 for electric vehicle parking requirements.

Note: Vehicles bearing Clean Air Vehicle stickers from expired HOV lane programs may be considered eligible for designated parking spaces. The required designated parking spaces are to be provided within the overall minimum parking requirement, not in addition to it.

Check "N/A" only if the project is a residential project, or if it does not include nonresidential use in a TPA.

N.A. DUE TO SINGLE FAMILY RESIDENTIAL

☐	☐	☑

7. *Transportation Demand Management Program* If the project would accommodate over 50 tenant-occupants (employees), would it include a transportation demand management program that would be applicable to existing tenants and future tenants that includes: At least one of the following components: • Parking cash out program • Parking management plan that includes charging employees market-rate for single-occupancy vehicle parking and providing reserved, discounted, or free spaces for registered carpools or vanpools • Unbundled parking whereby parking spaces would be leased or sold separately from the rental or purchase fees for the development for the life of the development And at least three of the following components: • Commitment to maintaining an employer network in the SANDAG iCommute program and promoting its RideMatcher service to tenants/employees • On-site carsharing vehicle(s) or bikesharing • Flexible or alternative work hours • Telework program • Transit, carpool, and vanpool subsidies • Pre-tax deduction for transit or vanpool fares and bicycle commute costs • Access to services that reduce the need to drive, such as cafes, commercial stores, banks, post offices, restaurants, gyms, or childcare, either onsite or within 1,320 feet (1/4 mile) of the structure/use? Check "N/A" only if the project is a residential project or if it would not accommodate over 50 tenant-occupants (employees). N.A. DUE TO SINGLE FAMILY RESIDENTIAL	☐	☐	☑

Step 3: Project CAP Conformance Evaluation (if applicable)

The third step of the CAP consistency review only applies if Step 1 is answered in the affirmative under option B. The purpose of this step is to determine whether a project that is located in a TPA but that includes a land use plan and/or zoning designation amendment is nevertheless consistent with the assumptions in the CAP because it would implement CAP Strategy 3 actions. In general, a project that would result in a reduction in density inside a TPA would not be consistent with Strategy 3.The following questions must each be answered in the affirmative and fully explained.

1. **Would the proposed project implement the General Plan's City of Villages strategy in an identified Transit Priority Area (TPA) that will result in an increase in the capacity for transit-supportive residential and/or employment densities?**
   Considerations for this question:
   - Does the proposed land use and zoning designation associated with the project provide capacity for transit-supportive residential densities within the TPA?
   - Is the project site suitable to accommodate mixed-use village development, as defined in the General Plan, within the TPA?
   - Does the land use and zoning associated with the project increase the capacity for transit-supportive employment intensities within the TPA?

2. **Would the proposed project implement the General Plan's Mobility Element in Transit Priority Areas to increase the use of transit?**
   Considerations for this question:
   - Does the proposed project support/incorporate identified transit routes and stops/stations?
   - Does the project include transit priority measures?

3. **Would the proposed project implement pedestrian improvements in Transit Priority Areas to increase walking opportunities?**
   Considerations for this question:
   - Does the proposed project circulation system provide multiple and direct pedestrian connections and accessibility to local activity centers (such as transit stations, schools, shopping centers, and libraries)?
   - Does the proposed project urban design include features for walkability to promote a transit supportive environment?

4. **Would the proposed project implement the City of San Diego's Bicycle Master Plan to increase bicycling opportunities?**
   Considerations for this question:
   - Does the proposed project circulation system include bicycle improvements consistent with the Bicycle Master Plan?
   - Does the overall project circulation system provide a balanced, multimodal, "complete streets" approach to accommodate mobility needs of all users?

5. **Would the proposed project incorporate implementation mechanisms that support Transit Oriented Development?**
   Considerations for this question:
   - Does the proposed project include new or expanded urban public spaces such as plazas, pocket parks, or urban greens in the TPA?
   - Does the land use and zoning associated with the proposed project increase the potential for jobs within the TPA?
   - Do the zoning/implementing regulations associated with the proposed project support the efficient use of parking through mechanisms such as: shared parking, parking districts, unbundled parking, reduced parking, paid or time-limited parking, etc.?

6. **Would the proposed project implement the Urban Forest Management Plan to increase urban tree canopy coverage?**
   Considerations for this question:
   - Does the proposed project provide at least three different species for the primary, secondary and accent trees in order to accommodate varying parkway widths?
   - Does the proposed project include policies or strategies for preserving existing trees?
   - Does the proposed project incorporate tree planting that will contribute to the City's 20% urban canopy tree coverage goal?

CLIMATE ACTION PLAN CONSISTENCY CHECKLIST
ATTACHMENT A

This attachment provides performance standards for applicable Climate Action Pan (CAP) Consistency Checklist measures.

Table 1 Roof Design Values for Question 1: Cool/Green Roofs supporting Strategy 1: Energy & Water Efficient Buildings of the Climate Action Plan

Land Use Type	Roof Slope	Minimum 3-Year Aged Solar Reflectance	Thermal Emittance	Solar Reflective Index
Low-Rise Residential	≤ 2:12	0.55	0.75	64
	> 2:12	0.20	0.75	16
High-Rise Residential Buildings, Hotels and Motels	≤ 2:12	0.55	0.75	64
	> 2:12	0.20	0.75	16
Non-Residential	≤ 2:12	0.55	0.75	64
	> 2:12	0.20	0.75	16

Source: Adapted from the California Green Building Standards Code (CALGreen) Tier 1 residential and non-residential voluntary measures shown in Tables A4.106.5.1 and A5.106.11.2.2, respectively. Roof installation and verification shall occur in accordance with the CALGreen Code.

CALGreen does not include recommended values for low-rise residential buildings with roof slopes of ≤ 2:12 for San Diego's climate zones (7 and 10). Therefore, the values for climate zone 15 that covers Imperial County are adapted here.

Solar Reflectance Index (SRI) equal to or greater than the values specified in this table may be used as an alternative to compliance with the aged solar reflectance values and thermal emittance.

Table 2	Fixture Flow Rates for Non-Residential Buildings related to Question 2: Plumbing Fixtures and Fittings supporting Strategy 1: Energy & Water Efficient Buildings of the Climate Action Plan
Fixture Type	**Maximum Flow Rate**
Showerheads	1.8 gpm @ 80 psi
Lavatory Faucets	0.35 gpm @60 psi
Kitchen Faucets	1.6 gpm @ 60 psi
Wash Fountains	1.6 [rim space(in.)/20 gpm @ 60 psi]
Metering Faucets	0.18 gallons/cycle
Metering Faucets for Wash Fountains	0.18 [rim space(in.)/20 gpm @ 60 psi]
Gravity Tank-type Water Closets	1.12 gallons/flush
Flushometer Tank Water Closets	1.12 gallons/flush
Flushometer Valve Water Closets	1.12 gallons/flush
Electromechanical Hydraulic Water Closets	1.12 gallons/flush
Urinals	0.5 gallons/flush

Source: Adapted from the California Green Building Standards Code (CALGreen) Tier 1 non-residential voluntary measures shown in Tables A5.303.2.3.1 and A5.106.11.2.2, respectively. See the California Plumbing Code for definitions of each fixture type.

Where complying faucets are unavailable, aerators rated at 0.35 gpm or other means may be used to achieve reduction.

Acronyms:
gpm = gallons per minute
psi = pounds per square inch (unit of pressure)
in. = inch

Table 3	**Standards for Appliances and Fixtures for Commercial Application related to Question 2: Plumbing Fixtures and Fittings supporting Strategy 1: Energy & Water Efficient Buildings of the Climate Action Plan**	
Appliance/Fixture Type	**Standard**	
Clothes Washers	Maximum Water Factor (WF) that will reduce the use of water by 10 percent below the California Energy Commissions' WF standards for commercial clothes washers located in Title 20 of the *California Code of Regulations*.	
Conveyor-type Dishwashers	0.70 maximum gallons per rack (2.6 L) (High-Temperature)	0.62 maximum gallons per rack (4.4 L) (Chemical)
Door-type Dishwashers	0.95 maximum gallons per rack (3.6 L) (High-Temperature)	1.16 maximum gallons per rack (2.6 L) (Chemical)
Undercounter-type Dishwashers	0.90 maximum gallons per rack (3.4 L) (High-Temperature)	0.98 maximum gallons per rack (3.7 L) (Chemical)
Combination Ovens	Consume no more than 10 gallons per hour (38 L/h) in the full operational mode.	
Commercial Pre-rinse Spray Valves (manufactured on or after January 1, 2006)	Function at equal to or less than 1.6 gallons per minute (0.10 L/s) at 60 psi (414 kPa) and • Be capable of cleaning 60 plates in an average time of not more than 30 seconds per plate. • Be equipped with an integral automatic shutoff. • Operate at static pressure of at least 30 psi (207 kPa) when designed for a flow rate of 1.3 gallons per minute (0.08 L/s) or less.	

Source: Adapted from the California Green Building Standards Code (CALGreen) Tier 1 non-residential voluntary measures shown in Section A5.303.3. See the California Plumbing Code for definitions of each appliance/fixture type.

Acronyms:
L = liter
L/h = liters per hour
L/s = liters per second
psi = pounds per square inch (unit of pressure)
kPa = kilopascal (unit of pressure)

GEOTECHNICAL INVESTIGATION AND FAULT STUDY

Price-Cohen Residence
2045 Lowry Place
La Jolla, California

prepared for:

Ms. Lena Price
2045 Lowry Place
La Jolla, CA 92037

by:

TerraPacific Consultants, Inc.
4010 Morena Boulevard, Suite 108
San Diego, CA 92117

February 22, 2018
File No. 17183

TerraPacific
CONSULTANTS INC

Ms. Lena Price
2045 Lowry Place
La Jolla, CA 92037

February 22, 2018
File No. 17183

Subject: **Geotechnical Investigation and Fault Study**
Price-Cohen Residence
2045 Lowry Place
La Jolla, California

Dear Ms. Price:

In accordance with our proposal dated January 11, 2018, TerraPacific Consultants, Inc. (TCI) has prepared the following report presenting our findings and recommendations from a geotechnical investigation at the subject property. The purpose of the investigation was to evaluate the subsurface conditions at the site and potential fault rupture hazards in order to provide recommendations and design parameters for the proposed construction. The following report contains a summary of our findings and recommendations.

We greatly appreciate the opportunity to be of service. If you should have any questions or comments regarding this report or our findings, please do not hesitate to call.

Sincerely,
TerraPacific Consultants, Inc.

Cristopher C. O'Hern, CEG 2397
Senior Engineering Geologist

PROFESSIONAL GEOLOGIST
CRISTOPHER C. O'HERN
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CCO/OB:sm

Distribution: (3) – Mrs. Lena Price

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APPENDICES

1.0 INTRODUCTION

1.1 General

The following report presents the findings of a geotechnical investigation performed at 2045 Lowry Place in La Jolla, California. The location of the property is presented on the Site Location Plan, Figure 1 in Appendix A. The purpose of the investigation was to evaluate the subsurface conditions at the site and potential fault rupture hazards in order to provide recommendations and soil design parameters for the proposed construction.

1.2 Scope of Services

The scope of the investigation consisted of field reconnaissance, subsurface exploration, laboratory testing, document review, and engineering and geologic analysis of the obtained data. The following tasks were performed during the investigation and production of this report:

- Site reconnaissance and review of published geologic, seismologic, and geotechnical reports and maps pertinent to the project. A list of references is provided in Appendix B.

- Logging/sampling of three borings at the subject property. The Geotechnical Plan, Figure 2 in Appendix A, presents the approximate subsurface exploration locations. The excavation logs are presented in Appendix C.

- Collection of continuous soil samples from the entire boring depths within the excavations. Select samples were transported to our laboratory for testing and analysis.

- Laboratory testing of samples collected from the test excavations. The testing included direct shear, proctor moisture and density, in-situ moisture and density, expansion index, hydro-response and sulfate/chloride testing. The laboratory data is presented in Appendix D.

- Engineering and geologic analysis of data acquired from the investigation, which provided the basis for our conclusions and recommendations.

- Preparation of this report presenting our findings and recommendations.

2.0 PROJECT BACKGROUND

2.1 Site Description

The subject property is located on the southeast side of Lowry Place in La Jolla, California. The legal description of the property is Lot 1286, Map MM36, City of San Diego. The assessor's parcel number is 346-482-0400. The trapezoidal shaped lot is bordered by developed residential properties to the northeast, southwest, and southeast, and by Lowry Place to the northwest. The lot slopes gently downward to the northwest with approximately 7 feet of relief and elevations ranging from approximately 53 feet mean sea level (MSL) near the south property line to 46 feet MSL at the north property line. The lot is currently improved with a single-family residential structure and associated appurtenances, including retaining walls, site walls, and flatwork. The age of initial site development is unknown.

2.2 Proposed Development

Based on our review of the preliminary construction plans, it is our understanding that the project will involve razing the existing structure and improvements, and constructing a new two-story, single-family residence. Associated appurtenances, including flatwork and landscaping, are also planned.

3.0 SITE INVESTIGATION

The site investigation was conducted on January 26, 2018 and consisted of visual reconnaissance and subsurface exploration. The purpose of the investigation was to gain an understanding of the site configuration and subsurface conditions in the vicinity of the proposed construction.

3.1 Site Reconnaissance

Our site reconnaissance consisted of walking the site to determine if any indications of adverse geologic conditions were present. No outward signs of distress indicating adverse geologic conditions were noted.

3.2 Subsurface Exploration

The subsurface exploration consisted of three borings. The borings, B-1, B-2, and B-3, were excavated respectively in the front and central portions of the lot to depths of up to 24 feet below ground surface (bgs). The rear and side yard portions of the lot were inaccessible to excavation equipment due to the footprint of the existing structure and associated improvements. The approximate excavation locations are presented on the

Geotechnical Plan, Figure 2 in Appendix A. The borings were logged and sampled by a licensed geologist from our office.

In general, the subsurface exploration revealed that the site is mantled by relatively shallow fill, which is underlain by native formational paralic deposits identified as Quaternary-aged Old Paralic Deposits, Unit 6. Descriptions of each of the materials encountered are detailed in Section 4.2 Site Stratigraphy and the subsurface excavation logs are provided in Appendix C.

3.3 Laboratory Testing

Soil samples collected during the field exploration were transported to our laboratory for testing. The purpose of the testing was to characterize the soil types and evaluate the engineering properties of the soil. The laboratory testing included direct shear, proctor moisture and density, in-situ moisture and density, expansion index, hydro-response and sulfate/chloride testing. Each of the laboratory tests were performed in accordance with ASTM specifications or other accepted testing procedures. The results of the laboratory tests are presented in Appendix D.

4.0 SITE GEOLOGY

4.1 Geologic Setting

The site is located within the coastal portion of the Peninsular Ranges Geomorphic Province of California. This province, which extends 900 miles from Southern California to the southern tip of Baja California, is characterized by northwest-trending structural blocks. The coastal portion of the province in San Diego County is typically comprised of Tertiary-aged to upper Cretaceous-aged (1.8 million to 65 million years) marine and non-marine sedimentary bedrock units that have been deposited within a northwest trending basin known as the San Diego Embayment (Norris & Webb, 1976). Recent geologic uplift along the San Diego coastal margin, combined with sea level changes, have created marine terraces and associated deposits consisting of near-shore marine, beach estuarine, and lagoonal facies. These deposits range from early to mid Quaternary-aged (45,000 to 1.5 million years) and are designated in geologic literature as paralic deposits.

According to the geologic literature, the site is underlain by Quaternary-aged surficial deposits designated as young alluvial flood plain deposits. Surficial deposits designated as Old Paralic Deposits, Unit 6 are mapped approximately 100 feet west of the site. Our investigation indicates the site is underlain by the Old Paralic Deposits. Geologic literature describes the paralic deposits as "poorly sorted, moderately permeable, reddish-brown, interfingered strandline, beach, estuarine and colluvial deposits composed of siltstone,

sandstone, and conglomerate" (Kennedy and Tan, 2008). The site is not intersected by a fault based on this map.

Based on the City of San Diego Seismic Safety Study Map, the northern approximate ½ of the site is located within a Zone 52 – "other level areas, gently sloping to steep terrain, favorable geologic structure, low risk." The southern approximate ½ is located within a Fault Zone 11 - "Active, Alquist-Priolo Earthquake Fault Zone." According to the City Map, the site is not intersected by a fault; however, it is located within this hazard category due to the presence of an active fault mapped approximately 500 feet southwest of the site. The site is located on the Geologic Map, Figure 3 in Appendix A, the Seismic Safety Study Map, Figure 4 in Appendix A, and the Fault Rupture Hazard Map, Figure 5 in Appendix A.

4.2 Site Stratigraphy

The subsurface descriptions presented below are interpreted from the conditions exposed during the field investigation and/or inferred from local geologic literature. Also, Cross-Sections A-A' and B-B', Figures 6 and 7 in Appendix A, depict the general configuration of the subsurface conditions.

Fill Soil (Af) – Fill soil is earth material that has been placed using mechanical means, such as bulldozers or other large earthmovers. Typically, the fill soil has been removed from topographically high locations and placed in low-lying areas to create level building pads. When properly compacted, fill soil can be used to support structures. However, it is typically more compressible than natural formational soils.

Fill soils were encountered in each of the excavations to respective depths of 4.4, 5.3, and 4.2 feet bgs. The fill soils were relatively consistent, and were generally described as medium gray brown, soft to medium stiff, slightly moist sandy clay.

Old Paralic Deposits, Unit 6 (Qop6) – Terrace deposits designated as Quaternary-aged Old Paralic Deposits, Unit 6 were encountered in each of the excavations underlying the fill material. These deposits are associated with the Nestor marine terrace and are approximately 120,000 years old. The material encountered during our exploration was generally described as a medium olive brown to orange brown sandy claystone that was slightly moist and medium stiff to stiff. Undisturbed caliche stringers and a distinct zone of medium orange brown clayey sandstone was encountered within the paralic deposits within each of the borings.

4.3 Groundwater

Groundwater was not encountered within the excavations. It should be mentioned that, transient perched groundwater conditions can develop at different levels within the soil profile due to future irrigation patterns, periods of prolonged rainfall, and/or other conditions related to off-site development.

5.0 SEISMICITY

5.1 Regional Seismicity

Generally, the seismicity within California can be attributed to the regional tectonic movement taking place along the San Andreas Fault Zone, which includes the San Andreas Fault and most parallel and sub-parallel faulting within the state. A majority of Southern California, which includes the subject site, is considered seismically active. Seismic hazards can be attributed to potential ground shaking from earthquake events along nearby faults or more distant faulting.

According to regional geologic literature, the closest known active faults are located within the Rose Canyon Fault Zone. The Rose Canyon Fault Zone consists of a complex zone of several en echelon strike slip, oblique, reverse, and normal faults, which extend onshore in this area from San Diego Bay north to La Jolla Bay. Several other potentially active and pre-Quaternary faults also occur within the regional vicinity. Currently, the geologic literature presents varying opinions regarding the seismicity of these faults. As such, the following Seismic Analysis only considers the effects of nearby faults currently considered active.

5.2 Probabilistic Ground Acceleration

A deterministic seismic hazard analysis was performed for the site using the computer program EQFault (Blake, 2000). The analysis considers the maximum movement magnitude earthquake for active faults within the specified search radius to provide a maximum expected earthquake event for the known tectonic structure. For this site, we specified a search radius of 62.4 miles (100 km) and the attenuation equation of Campbell & Bozorgnia (1997 Rev.) for alluvium. The results of the analysis for the faults most likely to affect the site are presented in Appendix E, Summary of Active Faults.

We also referenced the 2008 National Seismic Hazards Maps on the United States Geological Survey website to estimate the peak ground acceleration for the site. This site allows the user to specify a 2 percent and 10 percent probability of exceedance in a 50-year period (2,475-year return period). The accelerations are based on a classification per

NEHRP as a Boundary B/C site. Peak ground acceleration of 0.59g for 2 percent and 0.27g for 10 percent were calculated for the site using the 2008 map.

The values provided above are for comparing the potential for seismic shaking due to fault activity most likely to affect the site. Other factors should be considered when completing seismic design, such as duration of shaking, period of the structure, design category, etc. The design structural engineer should consider the information provided herein and evaluate the structure(s) in accordance with the California Building Code (CBC) and guidelines of the City of San Diego. The earthquake design parameters based on the 2016 CBC applicable to the site are provided in Section 7.6.

5.3 Fault Rupture Hazard

An "active" fault, as defined by the Alquist-Priolo Earthquake Fault Zoning Act, is a fault that has had surface rupture within Holocene time (the past 11,000 years). A "potentially active" fault is defined as any fault that showed evidence of surface displacement during Quaternary time (last approximate 1.6 million years), but not since Holocene time.

As previously mentioned, "active" portions of the Rose Canyon Fault Zone are mapped approximately 500 feet southwest of the site based on the USGS Quaternary Faults Map. The western portion of the site is located within a Geologic Hazard Category Fault Zone 11, Alquist Priolo Fault Zone (AP Zone) based on the City of San Diego Seismic Safety Study Map. In conformance with the City of San Diego Municipal Code 145.1803, Bulletin 515 and the State of California AP Act, a geotechnical investigation, including a fault rupture hazard evaluation, was conducted for the proposed improvements due to the site location within an AP Zone. The investigation consisted of site specific subsurface exploration along with research and review of available geologic literature and recent fault studies conducted by others on adjacent properties.

A previous investigation by Geocon, was conducted in 1993 for 2035 Lowry Place, which is the neighboring lot to the southwest of the subject site. The investigation consisted of four test pits and one trench across the lot to evaluate for the presence of faulting. The trench was excavated in a northeast – southwest orientation, roughly perpendicular to the trend of nearby known faults, and extended across the rear portion of the neighboring lot to the west property line of the subject lot. The trench encountered fill soils to approximate 3-foot depths underlain by undisturbed terrace deposits. Geocon concluded that the site was not underlain by active or potentially active faults. The trench location is depicted on the Geotechnical Plan, Figure 2 in Appendix A, and the Fault Rupture Hazard Map, Figure 5 in Appendix A. The Geocon report is provided in Appendix F.

Our recent subsurface investigation included the excavation, logging, and sampling of three borings within the limits of the proposed development for the lot. The excavations, B-1, B-2, and B-3, were located in the north and central portions of the lot, and in a roughly east/west pattern, which is perpendicular to nearby known faults. The excavations encountered relatively shallow fill soils over undisturbed native paralic deposits. Within the paralic deposits, a distinct fine to medium grained, medium orange brown clayey sandstone bed was encountered within each of the excavations at a consistent depth and thickness indicating a lack of offset or disturbance. The distinct nature of this layer provides an excellent marker bed within the Pleistocene-aged paralic deposits.

Based on our review of the above mentioned report, similar stratigraphy and lithology was encountered within our site specific investigation with undisturbed native paralic deposits encountered at shallow depths across all locations. The location and orientation of the subsurface exploration conducted on the neighboring lots provides supplemental coverage for the 2045 Lowry Place property, and the lack of faulting as concluded in these investigations can be extrapolated to the subject property. The findings of our investigation did not identify faulting or fault related features within the limits of the site. The presence of the undisturbed Pleistocene-aged native paralic deposits and marker bed site allows us to form an opinion that the site is not intersected or underlain by geologic faulting. Based on the results of our investigation and review of previous investigations by others, with which we concur, we have conclusive evidence to form an opinion that the subject site, 2045 Lowry Place, is not intersected or underlain by geologic faults; as such, structural setbacks are not required.

5.4 Hazard Assessment

Seismically Induced Settlement – The results of our subsurface investigation indicate the site is underlain by dense formational soils at a relatively shallow depth. Based on the anticipated earthquake effect and the stratigraphy of the site, seismically induced settlement is expected to be minor and within tolerable limits. Structures that are designed and constructed in accordance with applicable building codes are expected to perform well with respect to settlement associated with predictable seismic events.

Liquefaction – Liquefaction involves the substantial loss of shear strength in saturated soil, usually taking place within a saturated medium exhibiting a uniform fine grained characteristic, loose consistency, and low confining pressure when subjected to impact by seismic or dynamic loading. Based on the shallow depth to competent formation, the site is considered to have a negligible risk for liquefaction.

Lurching and Shallow Ground Rupture – Rupturing of the ground is not likely due to the absence of active fault traces within the project limits. However, due to the generally active seismicity of Southern California and proximity to known geologic faults, the possibility for ground lurching or rupture cannot be completely ruled out. In this light, "flexible" design for on-site utility lines and connections should be considered.

Landsliding – Given the relatively shallow topographic relief of the site and lack of landslide features identified during our investigation, the possibility for landsliding is believed to be remote. Furthermore, the San Diego Seismic Safety Study does not depict any known landslides in the immediate vicinity of the site.

Seiches and Flooding – At the time of our investigation, there were no nearby contained bodies of water that could produce seiches ("tidal" waves in confined bodies of water) that may affect the site. No seiche or flooding potential was identified.

Tsunamis – Tsunamis are great sea waves produced by seismic events. Given the site elevation of approximately 45 feet (MSL), potential tsunami impact to the site is considered negligible. Historically, the magnitudes of tsunamis to impact the San Diego coastline have been fairly small, typically less than 1 meter in height. Recent studies into the possibility of off-shore seismic events triggering tsunamis via fault movement or undersea landslides has experts of the opinion that Southern California is not free from tsunami risks (Krier, 2005); however, predicting the level of risk is difficult due to the lack of knowledge about the off-shore fault system. In our opinion, there is no practical approach for mitigating the potential impact to the site from a tsunami. This is an inherent risk for those living within the coastal area.

6.0 CONCLUSIONS

Based on the results of our geologic reconnaissance and subsurface exploration, it is our opinion that the proposed construction is feasible from a geotechnical standpoint, provided the recommendations presented in the following sections are adopted and incorporated into the project plans and specifications.

The following sections provide detailed recommendations for the site preparation, design, and construction of the proposed foundations. The civil and/or structural engineer should use this information during the planning and design of the proposed structures. Once the plans and details have been prepared, they should be forwarded to this office for review and comment.

A key aspect of the site, which will need to be considered during the design, is the presence of undocumented fill soil within the upper approximate 5 feet of the site. It is

recommended that all areas to receive structures undergo removal and recompaction of the fill soils, or conduct removal and recompaction to a depth of 2 feet below the proposed foundation bottoms, whichever is greater. This will provide a uniform fill mat for future structures.

7.0 RECOMMENDATIONS

The following sections provide our recommendations for site preparation, design, and construction of the proposed foundation systems. Once the plans and details have been prepared, they should be forwarded to this office for review and comment.

7.1 Site Preparation and Grading

In order to prepare the site for the new construction, it is assumed that all of the existing improvements will be demolished and removed from the site. However, if unsuitable materials (i.e. construction debris, plant material, etc.) are encountered during the grading phase, they should be removed and properly disposed off-site.

As previously mentioned, grading will be conducted to provide a uniform fill mat for all structures. This will require removal and recompaction of the undocumented fill. Fill depths on the order of 5 feet were encountered within our borings. However, it should be mentioned that areas of deeper removals may be required. The removals should extend a minimum of 5 feet beyond the structural footprint and into the competent older native paralic deposits. Consideration to lessen the removal envelope along the side yards due to the proximity of neighboring structures may be considered at the time of construction.

In areas where less critical structures, such as site walls, driveways, and walkway slabs, are proposed, it is recommended that the upper approximate 18 inches of existing soil be moisture conditioned and recompacted. This will help provide a more uniform bearing support for these types of appurtenant structures.

Once the removal bottoms have been established, the bottoms should be scarified a minimum of 6 inches, moisture-conditioned, and compacted 90 percent relative compaction.

The on-site soil, less any organic debris, may be used for fill provided that it is placed in thin lifts (not exceeding 8 inches in loose thickness). All soil should be properly moisture conditioned and mechanically compacted to a minimum of 90 percent of the laboratory maximum dry density per ASTM D-1557 and at or slightly above optimum moisture condition. The removal bottoms, fill placement, and compaction should be observed and

tested by the geotechnical consultant. Standard guidelines for grading are provided in Appendix G.

7.2 Temporary Excavations

Foundation excavations, utility trenches, or other temporary vertical cuts may be conducted in compacted engineered fill or formational soils to a maximum height of 4 feet. Any temporary cuts beyond the above height restraint could experience sloughing or caving and, therefore, should be either shored or laid-back. Laid-back slopes should have a maximum inclination of 1:1 (horizontal:vertical) and not exceed a vertical height of 10 feet without further input from the geotechnical consultant. In addition, no excavation should undercut a 1:1 projection below the foundation for any existing improvements, i.e. existing building or retaining wall foundations both on and off-site. Temporary shoring may be required as a part of the construction process. Shoring design parameters can be provided upon request. Regional safety measures should be enforced and all excavations should be conducted in strict accordance with OSHA guidelines.

Excavation spoils should not be stockpiled adjacent to excavations as they can surcharge the soils and trigger failure. In addition, proper erosion protection, including runoff diversion, is recommended to reduce the possibility for erosion of slopes during grading and building construction. Ultimately, it is the contractor's responsibility to maintain safe working conditions for persons on-site.

7.3 Foundation Recommendations

The following sections provide the soil parameters and general guidelines for foundation design and construction. It is anticipated that all new construction will be supported by conventional continuous and spread footings. As mentioned previously, the new foundations should be supported on competent engineered fill in accordance with Section 7.1. If additional parameters are desired, they can be provided on request.

The foundation design parameters and guidelines that are provided below are considered to be "minimums" in keeping with the current standard-of-practice. They do not preclude more restrictive criteria that may be required by the governing agency or structural engineer. The architect or structural engineer should evaluate the foundation configurations and reinforcement requirements for structural loading, concrete shrinkage, and temperature stress.

7.4 Soil Design Criteria

The following separate soil design criteria are provided for design and construction of the conventional foundations for light building structures. The parameters that are provided

assume foundation embedment in competent engineered fill material with an expansion index classification as "medium" or lower.

Conventional Foundations

Allowable bearing capacity for square or continuous footings..... 2,000 psf

Minimum embedment in competent engineered fill..... 24 inches

Minimum width for continuous footings..... 15 inches

Minimum width for square footings.....3.0 feet

Note: The bearing capacity value may be increased by one-third for transient loads such as wind and seismic. In addition, the value provided may be increased by 500 psf for each additional foot of width or depth beyond the minimums provided. The increased bearing capacity should not exceed 4,000 psf.

Coefficient of friction against sliding 0.35

Passive resistance ..... 280 psf/ft up to a maximum of 2,000 psf

7.5 Retaining Walls

Lateral Loading and Resistance Parameters

For retaining walls, the bearing capacity and foundation dimensions provided for Section 7.4 may be followed. Additional design parameters for lateral loading and resistance are provided below:

Active earth pressure for level backfill (non-restrained walls).....43 psf/ft

At rest earth pressure for level backfill (restrained walls) .....63 psf/ft

Note: The active and at-rest pressures are provided assuming importing granular soil is used for backfill. Backfill and subdrain recommendations are provided in the following sections.

Passive resistance in competent fill .....280 psf/ft

Coefficient of friction against sliding 0.35

Note: The passive resistance and coefficient of friction may be used in combination if there is a fixed structure, such as a floor slab over the toe of the retaining wall. If the two values are used in combination, the passive resistance value should be reduced by one-third.

Earthquake Loads

Seismic loading for retaining walls with level backfill should be approximated by applying an 19 psf/ft in an inverse triangle shape where the lateral force at the bottom of the wall is equal to zero and the lateral force at the top of the retaining wall is equal to 19 psf times the height of the wall. The resultant seismic load should be applied from the bottom of the wall a distance of 0.6 times the overall height of the wall.

The seismic loads would be in addition to the normal earth pressure loads applied on the retaining walls, which are provided above. The structural engineer should evaluate the overall height of the wall and apply the appropriate retaining wall loading parameters to be used for analysis and design.

7.6 Earthquake Design Parameters

Earthquake resistant design parameters may be determined from the California Building Code (2016 Edition). Based on our investigation and characterization of the site, the following design parameters may be adopted:

Site coordinates ..... Latitude: 32.8504, Longitude: -117.2567

Site classification .....D

Site coefficient Fa 1.000

Site coefficient Fv 1.500

Spectral response acceleration at short periods Ss..... 1.306

Spectral response acceleration at 1-second period S1 ..... .0.506

Maximum spectral response accelerations at short periods Sms..... 1.306

Maximum spectral response accelerations at 1-second period Sm1 ..... 0.759

Design spectral response accelerations at short periods Sds..... 0.870

Design spectral response accelerations at 1-second period Sd1 ..... 0.506

7.7 Foundation and Retaining Wall Design Guidelines

The following guidelines are provided for assistance in the design of the various foundation elements and are based on the anticipated medium expansion potential of the bearing soils. As is always the case, where more restrictive, the structural and/or architectural design criteria should take precedent.

Foundations – Continuous footings for the building should be a minimum of 24 inches deep. Reinforcement should consist of a minimum four No. 5 rebar, two placed at the top and two at the bottom of the footing. All footing embedments should be verified by the soil engineer.

Slabs-on-Grade – Interior and exterior slabs-on-grade should be a minimum of 5 inches thick (net) and reinforced with No. 4 rebar placed at a maximum spacing of 18 inches on center, each way. The steel reinforcement should be placed at the mid-point or slightly above the mid-point in the slab section. For exterior slabs, control joints should be installed at a maximum spacing of 10 feet in each direction. Prior to construction of slabs, the subgrade should be moistened to approximately 12 inches in depth at least 24 hours before placing the concrete. Exterior slabs that will abut soil or planter areas should be constructed with a 12-inch thick by 12-inch wide thickened edge to help mitigate lateral moisture migration. The above recommendations are considered minimums for the site soil.

All interior floor slabs should be underlain by 2 inches of clean sand, followed by a minimum 15-mil PVC vapor retarder (Stego Wrap or similar). The vapor retarder should be further underlain by a 4-inch thick layer of gravel or crushed rock. Also, the vapor retarder should be properly lapped and sealed around all plumbing penetrations. Exterior driveway slabs should be underlain by 4 inches of Class II base.

Retaining Walls – Retaining walls should be provided with a gravel subdrain system. The drain system should start with a minimum 4-inch diameter perforated PVC Schedule 40 or ABS pipe, which is placed at the heel of the wall footing and below the adjacent slab level. The pipe should be sloped at least 1 percent to a suitable outlet, such as an approved site drainage system or off-site storm drain. The pipe should be surrounded by a gravel backfill consisting of tamped $^{3}/_{4}$-inch sized gravel. This gravel backfill zone should be a minimum of 12 inches wide and should extend from slightly below the drainpipe up to approximately $^{2}/_{3}$ of wall height. The entire gravel section should be wrapped in a filter cloth, such as Mirafi 140 NS or similar, to prevent contamination with fines. Alternatively, walls can be drained using geo-composite panel drains that connect to a gravel sub-drain at the heel of the wall. In addition, the wall should be properly moisture proofed per the project architect. See the Retaining Wall Drain Details, Figure 8 in Appendix A.

Foundation and Slab Concrete – The results of the corrosion tests indicate low levels of sulfates and chlorides within the on-site soils. However, given the relative proximity to the ocean, it is recommended that the concrete used for foundation elements contain Type V cement. The concrete should be mixed and placed in accordance with ACI specifications.

Water should not be added to the concrete at the site, as this can reduce the mix and lead to increased porosity and shrinkage cracking.

Proper curing techniques and a reduction in mixing water can help reduce cracking and concrete permeability. In order to further reduce shrinkage cracking and slab permeability, consideration should be given to using a concrete mix that possesses a maximum water cement ratio of 0.5.

It should be noted that TCI does not consult in the field of corrosion engineering. Thus, the client project architect and project engineer should agree on the level of corrosion protection required for the project and seek consultation from a qualified professional, as warranted.

Appurtenances – Other site appurtenances, such as planter walls, site walls, etc., can be constructed on continuous footings. Footings for such appurtenances should be a minimum of 18 inches deep, 12 inches wide, and minimally reinforced with four No. 4 rebar, two top and two bottom, on center, each way. The bearing capacity for such appurtenances is 1,500 psf.

7.8 Trench Backfill

Trench excavations for utility lines should be properly backfilled and compacted. Utilities should be properly bedded and backfilled with clean sand or approved granular soil to a depth of at least 1 foot over the pipe. This backfill should be uniformly watered and compacted to a firm condition for both vertical and lateral pipe support. The remainder of the backfill may be typical on-site soil or low-expansive import placed near optimum moisture content in lifts not exceeding 8 inches in thickness and mechanically compacted to at least 90 percent relative compaction.

7.9 Site Drainage

Drainage should be designed to direct surface water away from structures and on to an approved disposal area. For earth areas, a minimum gradient of 2 percent should be maintained, with drainage directed away from slopes and toward approved swales or collection facilities. In order to reduce saturation of the building foundation soils, positive drainage should be maintained within an away gradient of at least 5 percent for a minimum distance of 10 feet from foundations. Where property line constraints prohibit this distance, a 5 percent gradient to an approved drainage diversion (i.e. area drains or swales) should be provided. Impervious surfaces within 10 feet of the building foundation should be sloped a minimum of 2 percent away from the building. Drainage patterns approved after grading should be maintained throughout the life of the development. In addition, it is

recommended that roof gutters be installed with downspouts that are tied into the yard drain system.

7.10 Plan Review and Geotechnical Observation

When grading and/or foundation plans are completed, they should be review by TCI for compliance with the recommendations presented here. Observation by TCI, or another company's geotechnical representative, is essential during foundation construction to confirm conditions anticipated by the preliminary investigation, to adjust designs to actual field conditions, and to determine that the foundation excavations are conducted in general accordance with our recommendations. All foundation excavations should be reviewed for conformance with the plans prior to the placement of forms, reinforcement, or concrete. Observation, testing, and engineering consulting services are provided by our firm and should be budgeted within the cost of development.

8.0 CLOSURE

8.1 Limits of Investigation

Our investigation was performed using the skill and degree of care ordinarily exercised, under similar circumstances, by reputable soils engineers and engineering geologists practicing in this or similar localities. No warranty, expressed or implied, is made as to the conclusions and professional advice in this report. This report is prepared for the sole use of our client and may not be assigned to others without the written consent of the client and TCI.

The samples taken and used for testing, and the observations made, are believed representative of the site conditions; however, soil and geologic conditions can vary significantly between test excavations and surface exposures. As in most projects, conditions revealed by construction excavations may vary with the preliminary findings. If this occurs, the geotechnical engineer should evaluate the changed conditions and adjust recommendations and designs, as necessary. It should be noted that existing retaining walls were not evaluated, and do not form a part of the conclusions or recommendations presented in this report and no warranty either expressed or implied is provided with respect to the future performance of these structures

This report is issued with the understanding that it is the responsibility of the owner, or of his representative, to ensure that the information and recommendations contained herein are brought to the attention of the project architect and engineer. Appropriate recommendations should be incorporated into the structural plans and the necessary steps

taken to see that the contractor and subcontractors carry out such recommendations in the field.

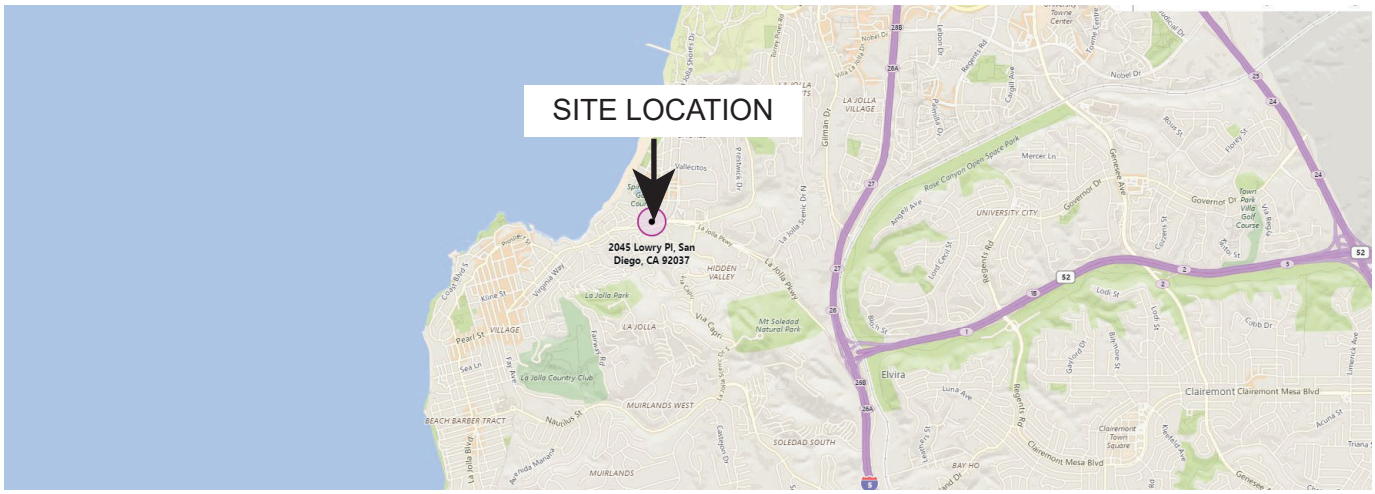
The findings of this report are valid as of the present date; however, the conditions can change with the passage of time, whether they are due to natural processes or the works of man. In addition, changes in applicable or appropriate standards may occur from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside of our control. This report is subject to review and should be updated after a period of 3 years.

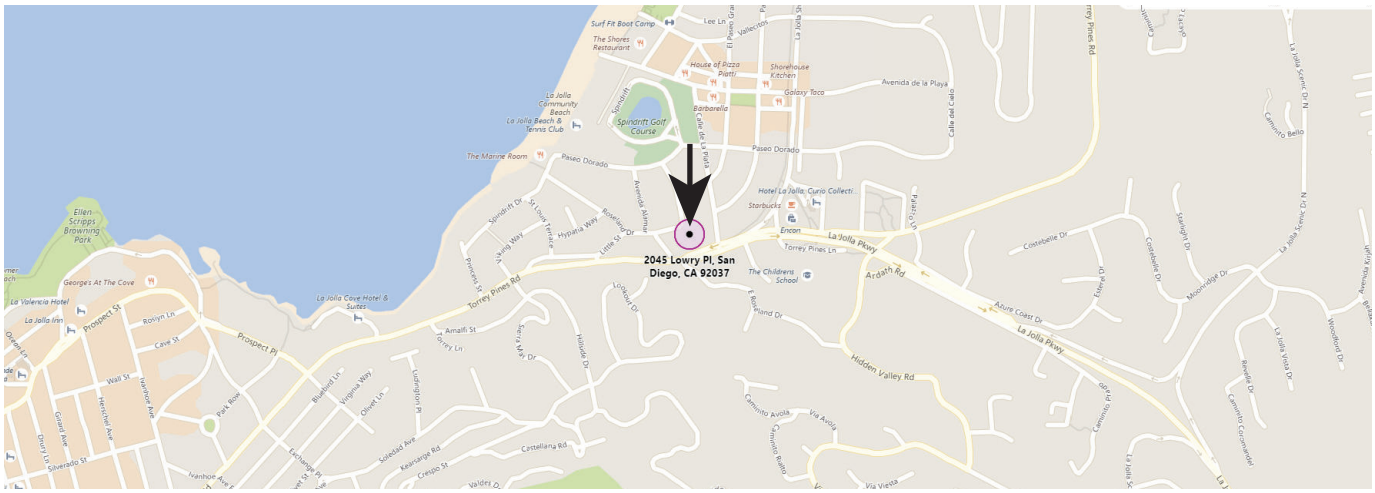
*** * * TerraPacific Consultants, Inc. * * ***

APPENDIX A

Figures

LOCATION:
2045 Lowry Place,
La Jolla, CA





REFERENCE: Bing Maps

N

TerraPacific CONSULTANTS INC 4010 Morena Boulevard Suite 108 San Diego CA 92117 858-521-1190	***Site Location Plan***	*Cohen-Price Residence* File No. 17183 February 2018	Figure 1

LEGEND

B-3 ⊕	Approximate location of boring by TerraPacific Consultants, Inc.
Af	Artificial fill
(Qop$_6$)	Old Paralic Deposits, unit 6 (bracketed where buried)

Af
(Qop$_6$)

PROPOSED 2-CAR GARAGE

PROPOSED 2-STORY SINGLE FAMILY RESIDENCE

B-1 B-2 B-3

LOT 4 LOT 5 LOT 6 LOT 7 LOT 3

N 58° 11' 02" W 72.02'

N 16° 33' 30" W 40.09'

N 73° 26' 30" E 63.31'

N 15° 16" E 39.92'

N 7.5° 15' 16" E

N 14° 44' 44" W 12.80'

N 36° 46' 52" W 71.83'

N 16° 33' 30" W 15.00'

47.00'
LOWEST ORIGINAL GRADE 5' FROM THE BUILDING

53.20'
HIGHEST ORIGINAL GRADE 5' FROM THE BUILDING

SIDE SETBACK 4'-0"

REAR SETBACK 13'-0"

SIDE SETBACK 4'-1"

ROOF ABOVE

EXISTING HOUSE

PLANT'G AREA

PAVING AREA

PLANTING AREA

CONC. S.W.

ASPHALT DRIVEWAY

RECONSTRUCT DAMAGED SIDEWALK

ASPHALT ROADWAY

LOWRY PLACE

(E) CONCRETE CURB

CURB TO C.L. 17'-0"

CURB TO P.L. 14'-4"

6" CURB AND GUTTER

CONC. S.W.

THERE IS A FIRE HYDRANT APPROX. 210'' FEET TO THE WEST

GEOCON TRENCH 1993

SINGLE FAMILY RESIDENCE

SINGLE F RESIDE

45.0' AC
45.4' AC
44.6' AC
43.4' AC
40.0' TC
41.0' TC

REFERENCE:
2045 Lowry Place, La Jolla, CA,
Site, Grading and Drainage Plan,
sheet 1, dated January 15, 2018
prepared by Bruce Peeling, Architect

0 5 10
APPROX. SCALE IN FEET

TerraPacific CONSULTANTS INC
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San Diego CA 92117
858-521-1190

Geotechnical Plan

Cohen-Price Residence

File No. 17183
February 2018

Figure 2

Compiled by
Michael P. Kennedy and Siang S. Tan
2008

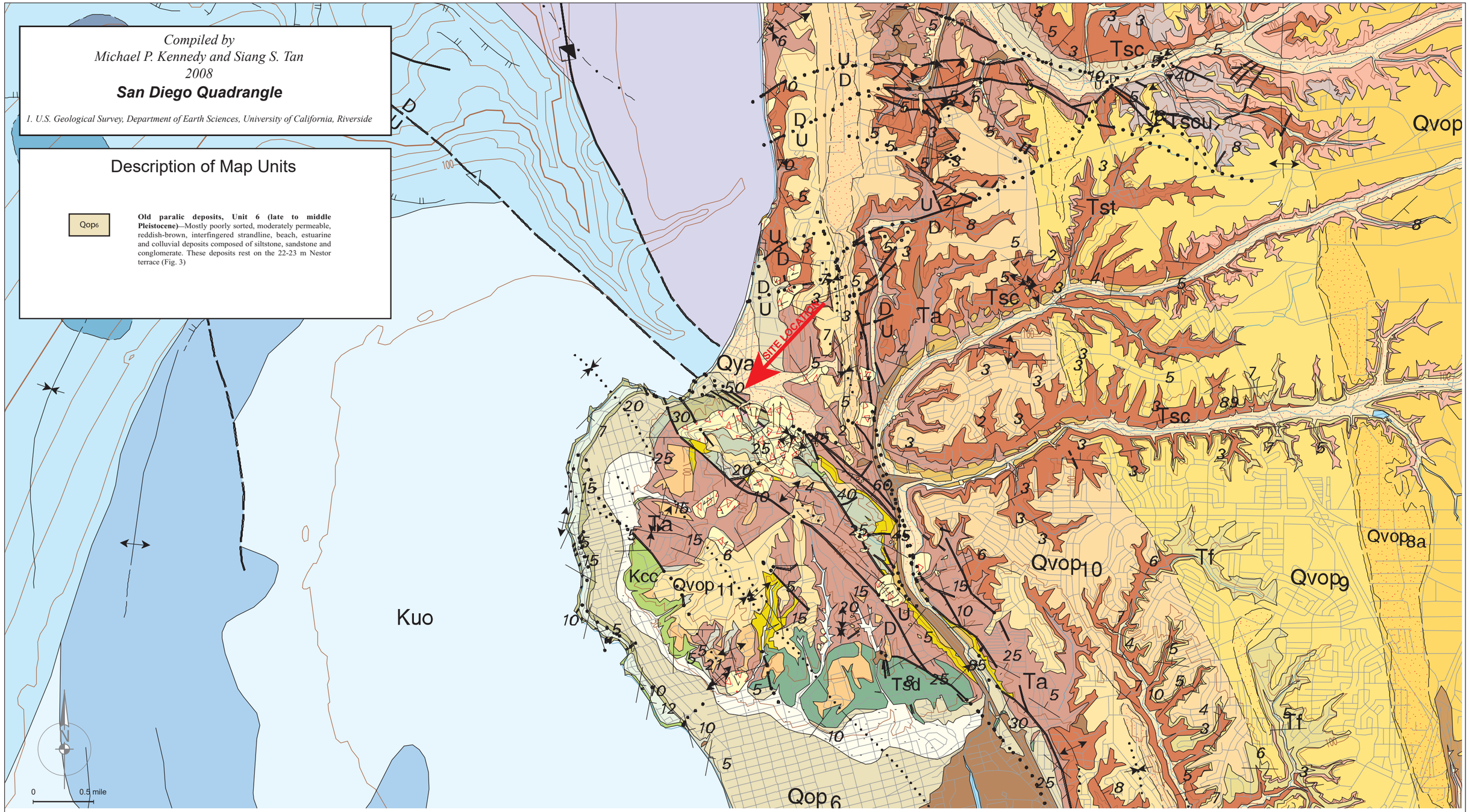
San Diego Quadrangle

1. U.S. Geological Survey, Department of Earth Sciences, University of California, Riverside

Description of Map Units

Qop6

Old paralic deposits, Unit 6 (late to middle Pleistocene)—Mostly poorly sorted, moderately permeable, reddish-brown, interfingered strandline, beach, estuarine and colluvial deposits composed of siltstone, sandstone and conglomerate. These deposits rest on the 22-23 m Nestor terrace (Fig. 3)



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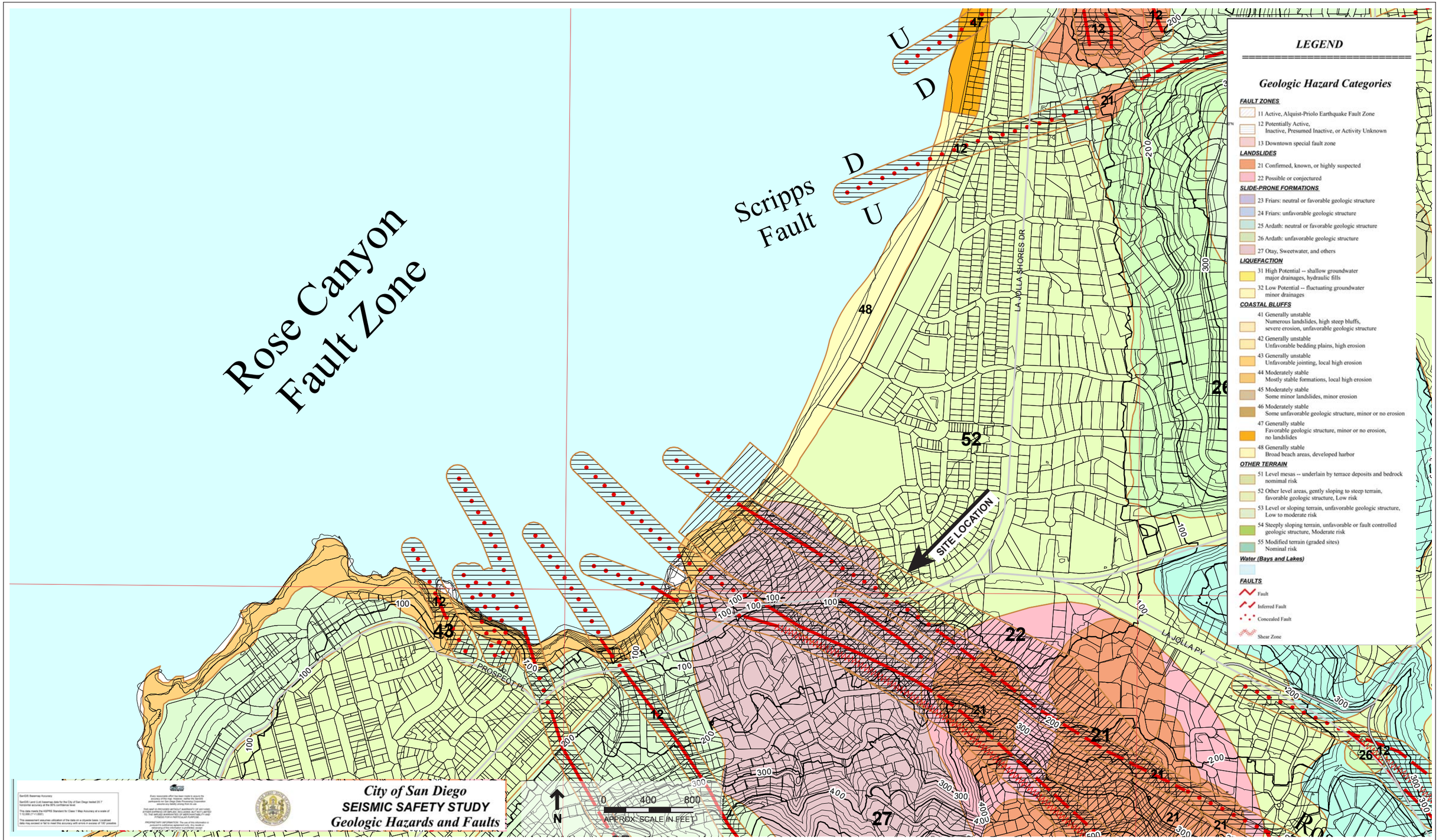
Geologic Map

Cohen-Price Residence

File No. 17183
February 2018

Figure 3



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Seismic Safety Study Map

Cohen-Price Residence

File No. 17183
February 2018

Figure 4

REFERENCE:
Aerial image from Google Earth

LEGEND

- B-3 ⊕ Approximate location of continuous sample boring by TerraPacific, 2018
- FAULT LOCATION BY USGS QUATERNARY FAULT MAP
- FAULT LOCATION BY City of San Diego Seismic Safety Study (concealed)
- Trench location by Geocon, 1993
- 2045 Lowery Place

Avenida Alamar
Roseland Dr
Lowry Terrace
B-1
B-3
B-2
Calle De La Plata
olla Shores Dr
Torrey Pines Rd
Calle Juela
E Roseland Dr
Lookout Dr
N
0 50 100
APPROX. SCALE IN FEET

TerraPacific CONSULTANTS INC
4010 Morena Boulevard
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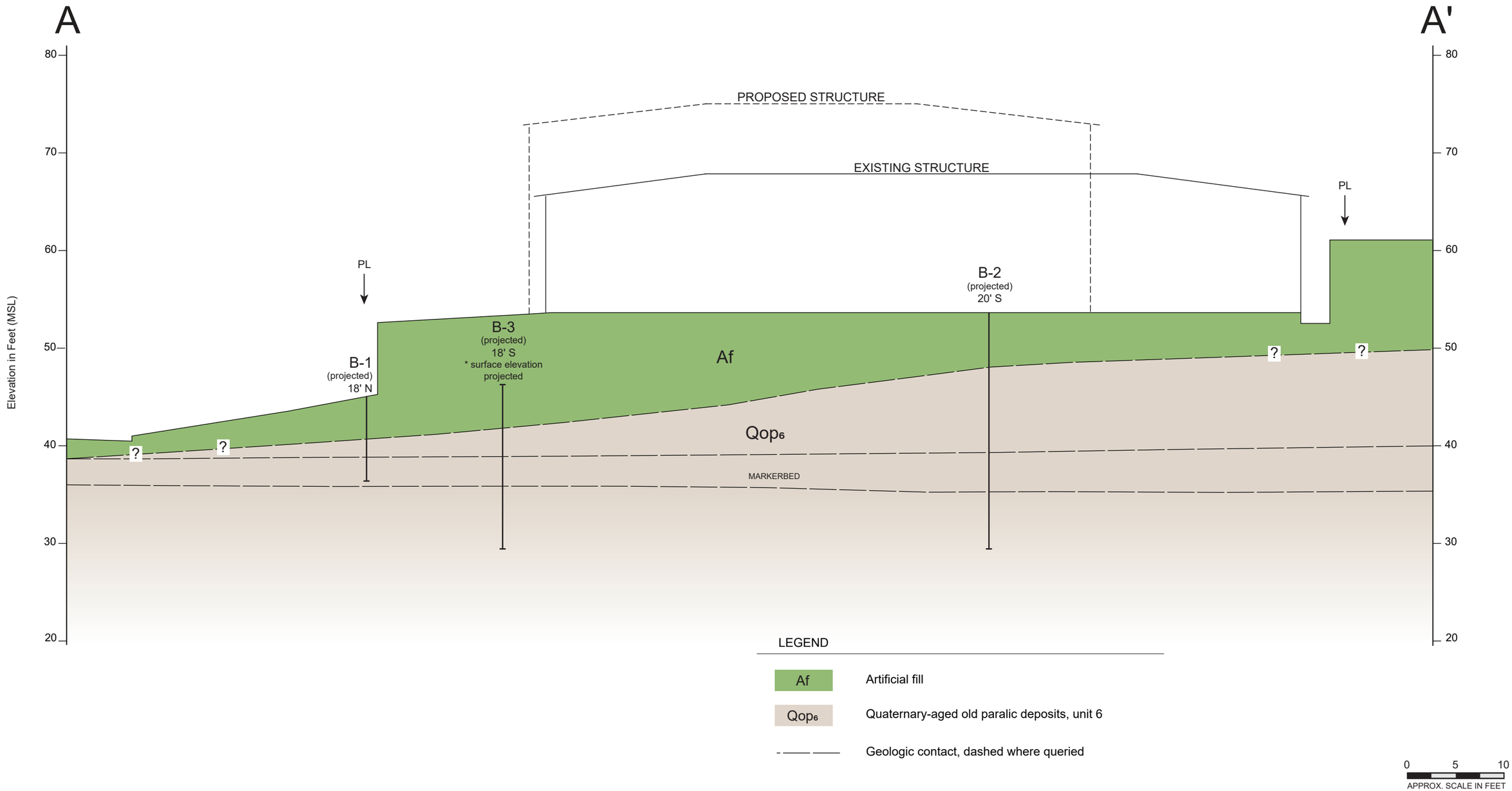
San Diego CA 92117
858-521-1190

Fault Rupture Hazard Map

Cohen-Price Residence

File No. 17183
February 2018

Figure 5



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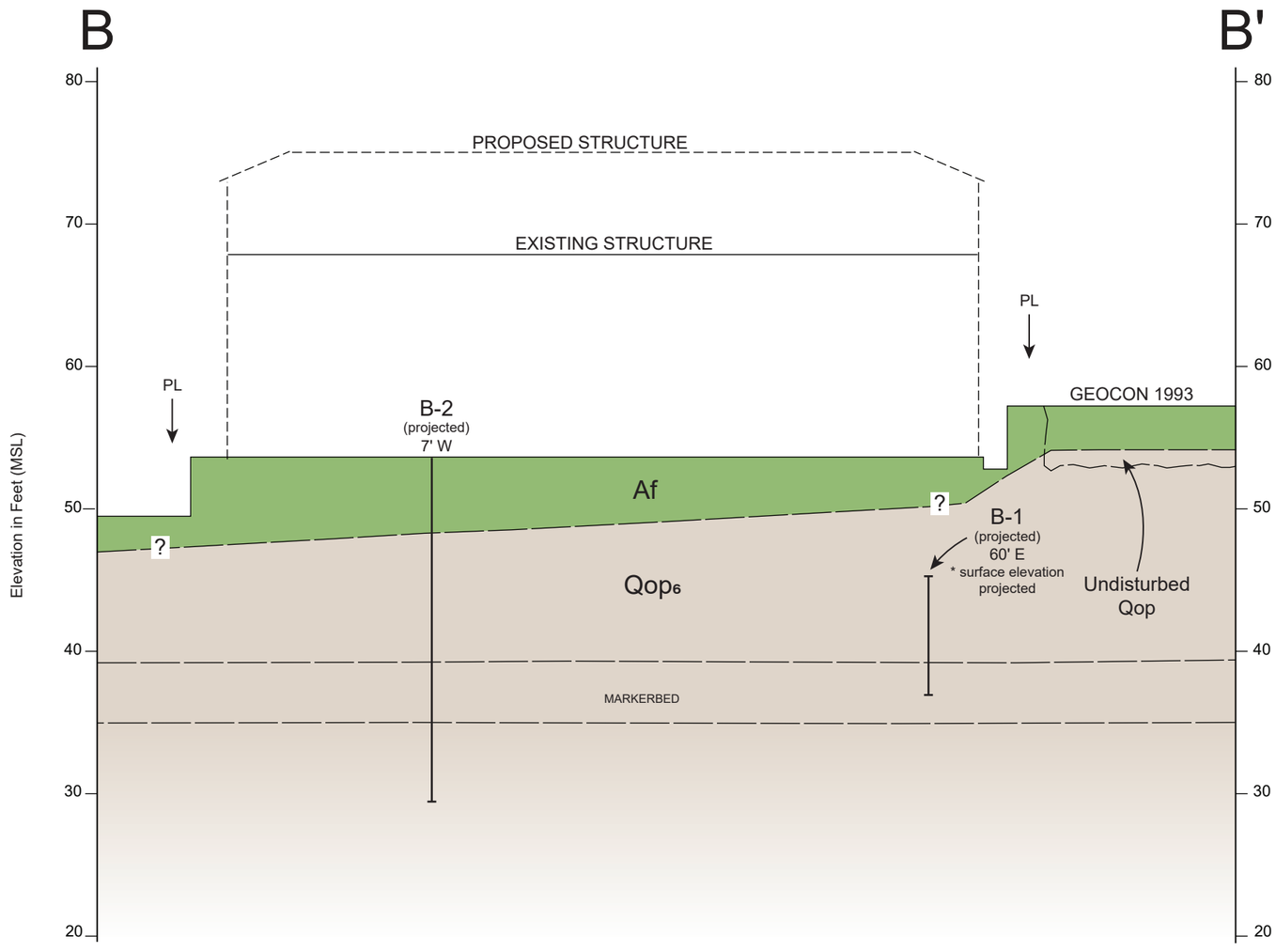
Cross Section A-A'

Cohen-Price Residence

File No. 17183
February 2018

Figure 6



LEGEND

Af	Artificial fill
Qop_6	Quaternary-aged old paralic deposits, unit 6
- —— ——	Geologic contact, dashed where queried

0 5 10

APPROX. SCALE IN FEET

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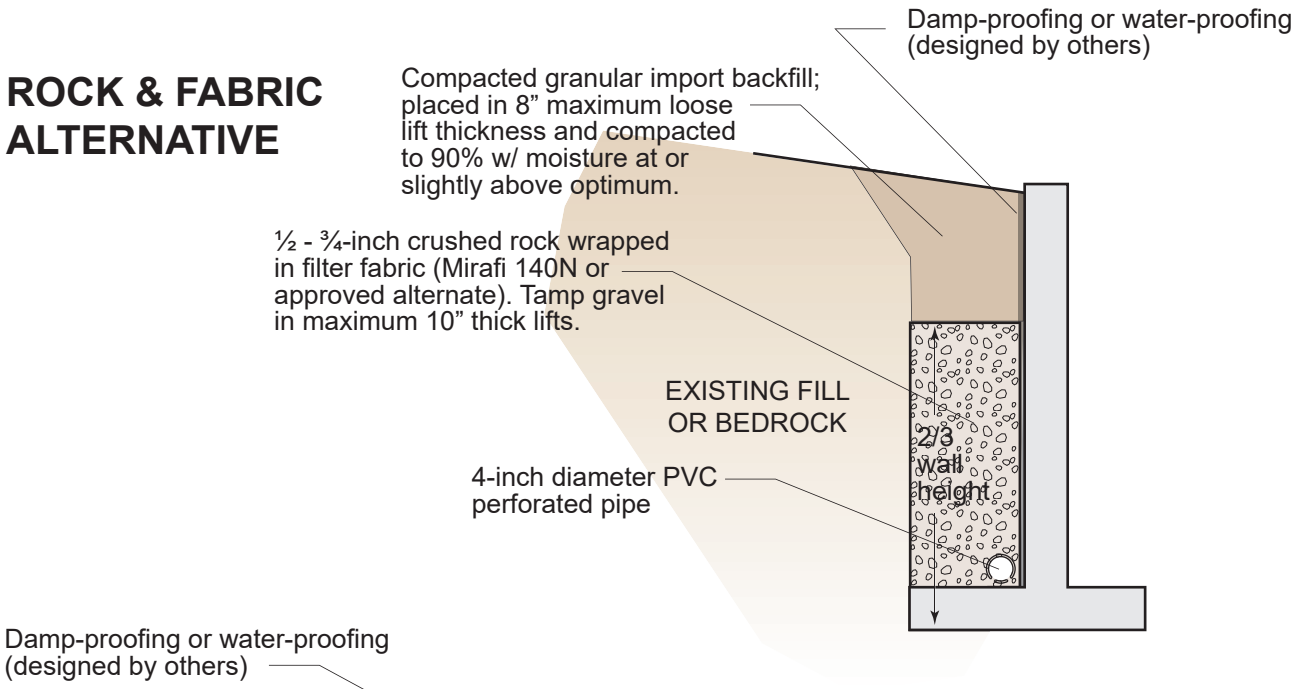
Cross Section B-B'

Cohen-Price Residence

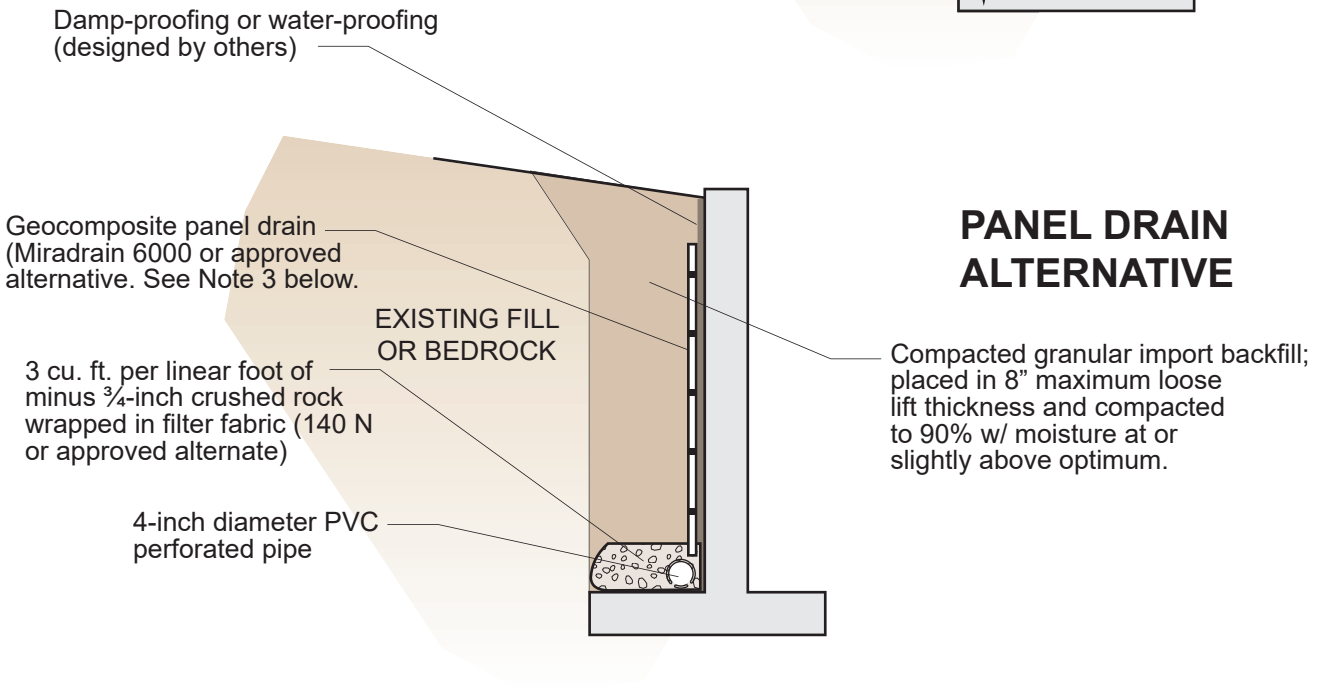
File No. 17183
February 2018

Figure 7

ROCK & FABRIC ALTERNATIVE



PANEL DRAIN ALTERNATIVE



NOTES:

1) Perforated pipe should outlet through to a solid pipe at maximum 25 foot centers to a free gravity outfall. Perforated pipe and outlet pipe should have a fall of at least 1%.

2) Filter fabric should consist of Mirafi 140N or similar approved fabric. Filter fabric should be overlapped at least 6-inches.

3) Geocomposite panel drain should consist of Miradrain 6000, Mirafi G100N, J-Drain 400, or approved similar product.

4) Drain installation should be observed by the geotechnical consultant prior to backfilling.

NOT TO SCALE

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858-521-1190

Retaining Wall Drain Details

Cohen-Price Residence

File No. 17183
February 2018

Figure 8

APPENDIX B

References

REFERENCES

1) American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures, ASCE Standard 7-05, 2006.

2) American Society for Testing and Materials, Annual Books of ASTM Standards, Section 4, Construction, Volume 04.08 Soil and Rock (I): D 420 – D 4914, west Conshohocken, PA, 2008.

3) Bing or Google Maps, Site Location Map for 2045 Lowry Place, San Diego, CA, 2018.

4) Blake, T.F., EQFAULT, EQSEARCH, FRISK: Computer Programs for Estimation of Peak Horizontal Acceleration from Southern California Historic Earthquakes, 2000.

5) Bruce Peeling, Architect, Plans for Price – Cohen Residence, 2045 Lowry Place, San Diego, CA, dated January 15, 2018.

6) California Building Standards Commission, California Building Code, 2016 Edition.

7) California Department of Conservation, Fault-Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps, Special Publication 42, California Geological Survey, Interim Revision 2007.

8) California Geological Survey, Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117, 2008.

9) California Geological Survey, Probabilistic Seismic Hazards Mapping Ground Motion Page, California Geological Survey website.

10) City of San Diego, Guidelines for Geotechnical Reports, 2011.

11) Geocon, Geotechnical Investigation, Rizzo Residence, 2035 Lowry Place, San Diego, CA, dated April 2, 1993.

12) Harden, D., California Geology, 1997.

13) International Conference of Building Officials, Uniform Building Code, 1997 Edition, Whittier, California, 3 Volumes.

14) International Code Family, International Building Code, 2006 Edition.

15) Jennings, C.W., Fault Activity Map of California and Adjacent Areas, California Division of Mines and Geology, Map No. 6, Scale 1:750,000, 1994.

16) Kennedy, Michael P. and Peterson, G.L., Geology of San Diego Metropolitan Area, California, California Department of Conservatory Division of Mines and Geology, Bulletin 200, 2001 Re-Print.

17) Kennedy, M.P. and Tan, S.S., Geologic Map of the San Diego 30' by 60' Quadrangle, California, California Geological Survey, Regional Geologic Map Series, 1:100,000 Scale, Map No. 3, San Diego Quadrangle, 2008.

REFERENCES

18) Krier, Robert, Wave Warning, Tsunami Risk on San Diego Coast Could Be Higher Than Previously Thought, San Diego Union Tribune Article, July 6, 2005.

19) Leyendecker, Frankel, and Rukstales, Earthquake Ground Motion Parameters Version 5.0.9a, dated November 13, 2009

20) Murbach, Monte, The Rose Canyon Fault Zone: New Evidence of Holocene Earthquake Activity in La Jolla, CA, 2000.

21) Norris, Robert M. and Webb, Robert W., Geology of California, John Wiley & Sons, 1976.

22) Quick Survey, Site Map for 2045 Lowry Place, May 10, 2017.

23) San Diego Municipal Code, Chapter 14: General Regulations, Article 5: Building Regulations, Division 18: Additions and Modifications to Chapter 18 of the 2010 California Building Code, dated August 30, 2012.

24) Treiman, J.A., The Rose Canyon Fault Zone, Southern California, California Department of Conservation, Division of Mines and Geology, DMG open-file report 93-02, 1993.

25) United States Geological Survey, California-Nevada Active Faults Index Map, http://quake.wr.usgs.gove/info/faultmaps/index.html.

26) United States Geological Survey, Earthquake Hazards Program, Seismic Hazards Maps and Data, http://earthquake.usgs.gov/hazards.

27) United States Geological Survey, Earthquake Hazards Program, 2010 Fault Activity Map of California, http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html.

APPENDIX C

Subsurface Excavation Logs

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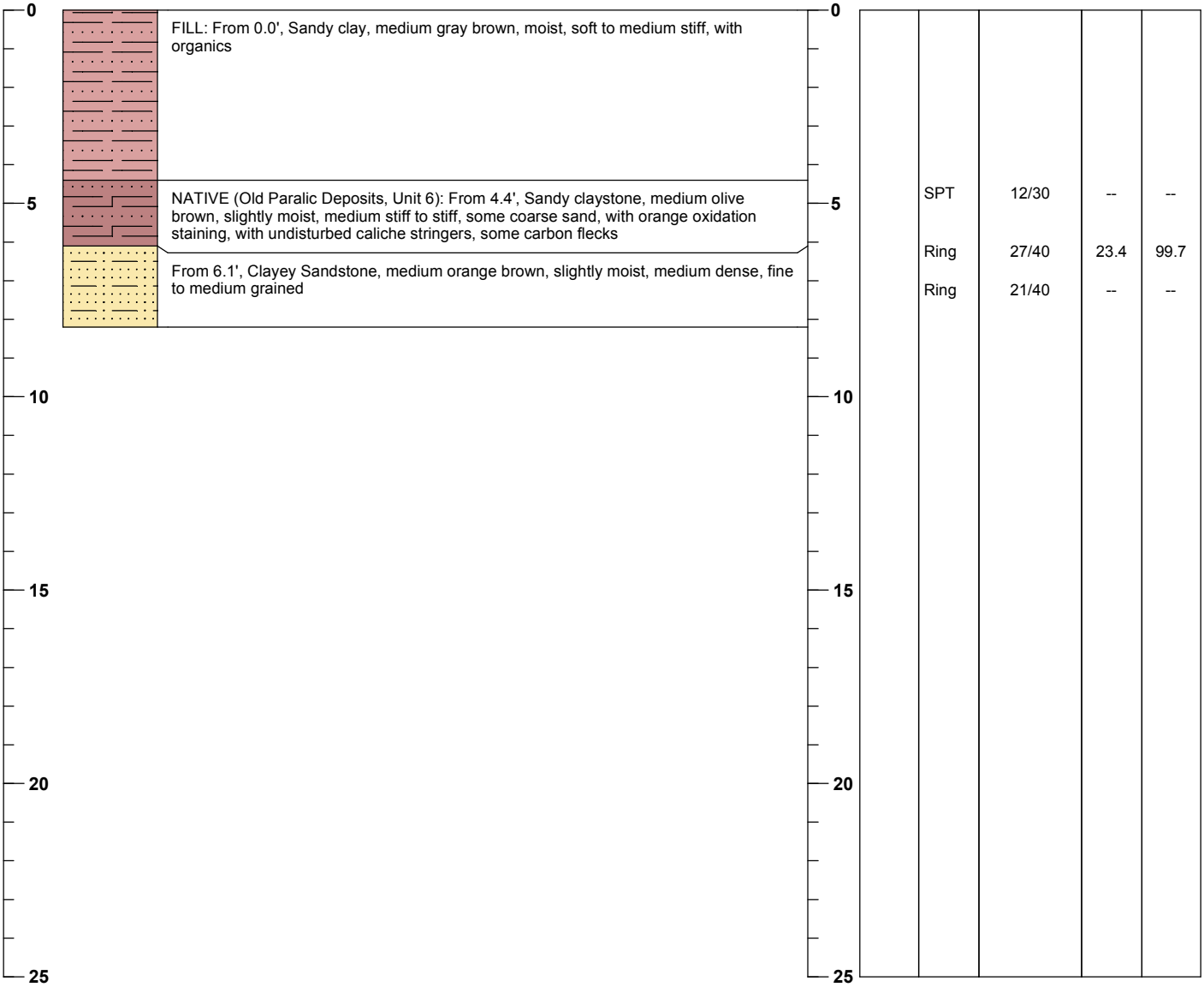
Subsurface Boring Log

Boring No: B-1

Project No: 17183
Project Name: Cohen-Price Residence
Location: 2045 Lowry Place
Sample Method: Modified California Sampler
Instrumentation: None installed
Elevation: 45'

Date: 1/26/18
Logged By: C. O'Hern
Drilling Company: Baja Exploration
Driller: Otto
Drill Rig Type: Hand Auger
Hammer Wt. & Drop: 35 lbs. for 30"



Depth (ft)	Lithology	DESCRIPTION & REMARKS	USCS	Sample Type	Blow Counts (6", 12", 18")	Dry Density (pcf)	Moisture (%)
				SPT	12/30	--	--
				Ring	27/40	23.4	99.7
				Ring	21/40	--	--

Total Depth: 8.2'
Water: No
Caving: No
Hole Diameter: 8"

Boring

B-1

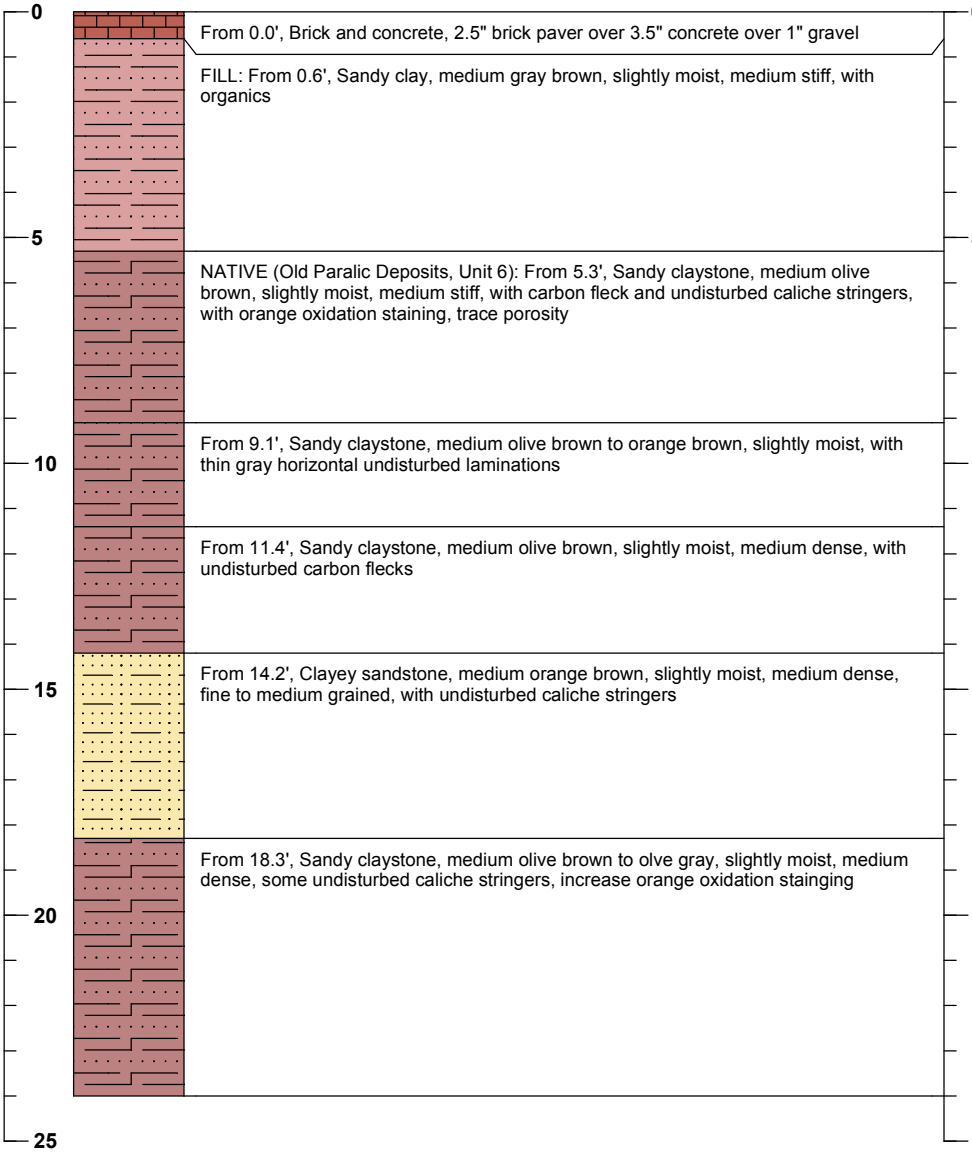
TerraPacific CONSULTANTS INC

Subsurface Boring Log

Boring No: B-2

Project No: 17183
Project Name: Cohen-Price Residence
Location: 2045 Lowry Place
Sample Method: Modified California Sampler
Instrumentation: None installed
Elevation: 52.5'

Date: 1/26/18
Logged By: C. O'Hern
Drilling Company: Baja Exploration
Driller: Otto
Drill Rig Type: CME 75 Track
Hammer Wt. & Drop: 140 lbs. for 30"



Depth (ft)	Lithology	DESCRIPTION & REMARKS	USCS	Sample Type	Blow Counts (6", 12", 18")	Dry Density (pcf)	Moisture (%)
0		From 0.0', Brick and concrete, 2.5" brick paver over 3.5" concrete over 1" gravel					
		FILL: From 0.6', Sandy clay, medium gray brown, slightly moist, medium stiff, with organics		Bulk	--	--	--
				Ring	6/8/11	--	--
				SPT	5/7/9	--	--
5		NATIVE (Old Paralic Deposits, Unit 6): From 5.3', Sandy claystone, medium olive brown, slightly moist, medium stiff, with carbon fleck and undisturbed caliche stringers, with orange oxidation staining, trace porosity		SPT	4/7/8	--	--
				Ring	6/12/15	--	--
				Ring	6/8/15	--	--
10		From 9.1', Sandy claystone, medium olive brown to orange brown, slightly moist, with thin gray horizontal undisturbed laminations		Ring	12/12/16	--	--
		From 11.4', Sandy claystone, medium olive brown, slightly moist, medium dense, with undisturbed carbon flecks		SPT	7/10/12	--	--
				SPT	5/8/11	--	--
15		From 14.2', Clayey sandstone, medium orange brown, slightly moist, medium dense, fine to medium grained, with undisturbed caliche stringers		Ring	9/14	--	--
				SPT	11/15	--	--
		From 18.3', Sandy claystone, medium olive brown to olve gray, slightly moist, medium dense, some undisturbed caliche stringers, increase orange oxidation stainging		SPT	10/12/14	--	--
20				SPT	10/14/16	--	--
				SPT	15/20	--	--
				Ring	14/16/22	21.3	107.0
25							

Total Depth: 24'
Water: No
Caving: No
Hole Diameter: 8"

Boring

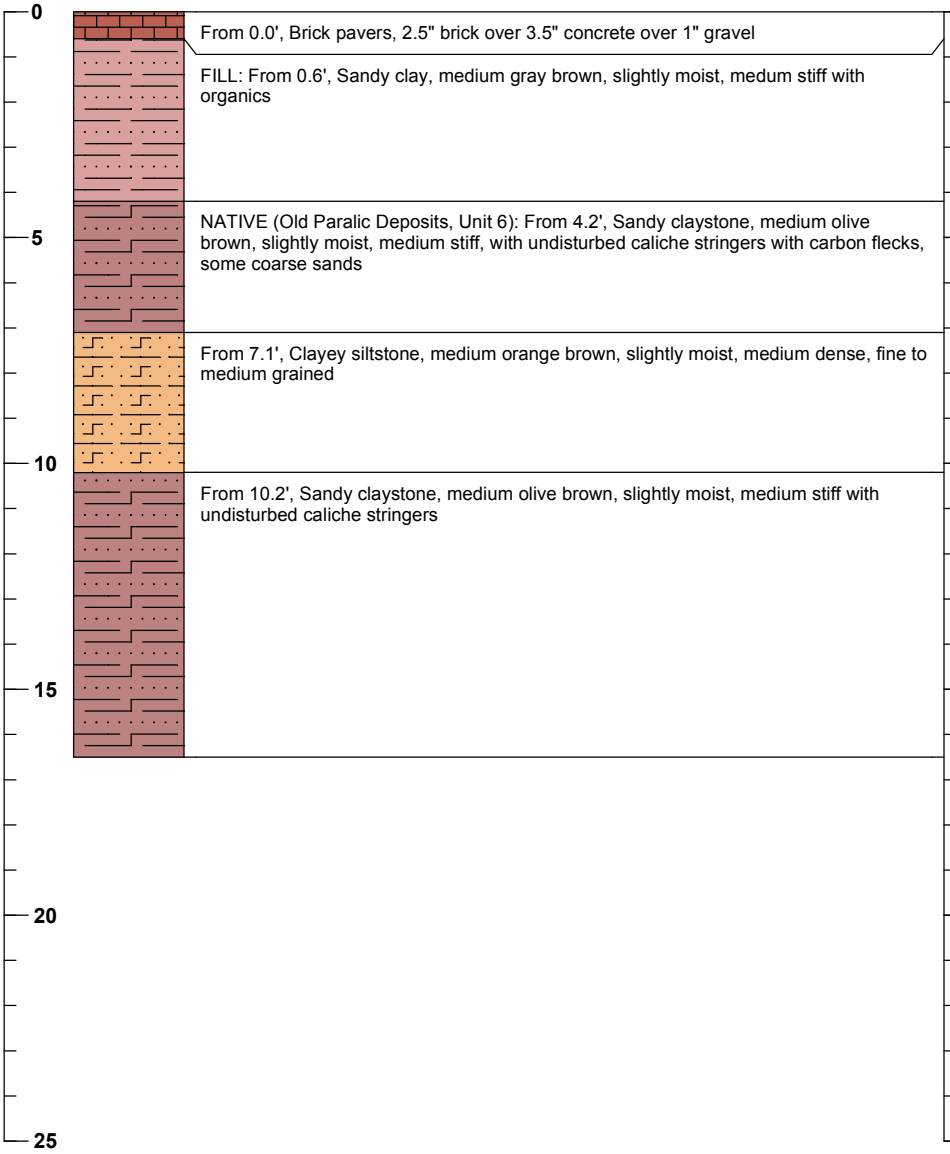
B-2

Subsurface Boring Log

Boring No: B-3

Project No: 17183
Project Name: Cohen-Price Residence
Location: 2045 Lowry Place
Sample Method: Modified California Sampler
Instrumentation: None installed
Elevation: 46'

Date: 1/26/18
Logged By: C. O'Hern
Drilling Company: Baja Exploration
Driller: Otto
Drill Rig Type: CME 75 Track
Hammer Wt. & Drop: 140 lbs. for 30"



Depth (ft)	Lithology	DESCRIPTION & REMARKS	USCS	Sample Type	Blow Counts (6", 12", 18")	Dry Density (pcf)	Moisture (%)
0		From 0.0', Brick pavers, 2.5" brick over 3.5" concrete over 1" gravel					
		FILL: From 0.6', Sandy clay, medium gray brown, slightly moist, medum stiff with organics		Ring	4/7/8	--	--
5		NATIVE (Old Paralic Deposits, Unit 6): From 4.2', Sandy claystone, medium olive brown, slightly moist, medium stiff, with undisturbed caliche stringers with carbon flecks, some coarse sands		Ring	11/12/13	--	--
				SPT	3/6/7	--	--
		From 7.1', Clayey siltstone, medium orange brown, slightly moist, medium dense, fine to medium grained		Ring	7/8/9	17.0	113.7
10				SPT	8/10	--	--
		From 10.2', Sandy claystone, medium olive brown, slightly moist, medium stiff with undisturbed caliche stringers		Ring	12/18	--	--
				SPT	4/6/9	--	--
15				SPT	4/7/9	--	--
				SPT	6/10	--	--
				Ring	10/14/25	--	--
20							
25							

Total Depth: 16.5'
Water: No
Caving: No
Hole Diameter: 8"

Boring

B-3

APPENDIX D

Laboratory Test Results

Price Cohen

Summary of Laboratory Test Results

FN:17183

Sample Location			Corrosivity Series		ASTM D 1557		ASTM D 2937		ASTM D 3080		ASTM D 4829		ASTM D 4546	
			CTM422	CTM 417										
Location	Sample Depth	Sample Type	Chloride Content	Sulfate Content	Maximum Dry Density	Opt. Moist Content	Dry Density	Moisture Content	Peak φ	Peak c	Expansion Index	Expansion Potential	Hydro Response	Normal Stress
B-1	6'	L Bulk	--	--	--	--	99.7	23.4	--	--	--	--	--	--
B-1	7'	Ring	--	--	--	--	--	--	--	--	--	--	--	--
B-2	1'-6'	L Bulk	0.004	0.007	--	--	--	--	--	--	54	Medium	--	--
B-2	2.5'	Ring	--	--	--	--	--	--	--	--	--	--	--	--
B-2	7'	Ring	--	--	--	--	--	--	--	--	--	--	0.22	875
B-2	8.5'	Ring	--	--	--	--	--	--	--	--	--	--	--	--
B-2	14.5'	Ring	--	--	--	--	--	--	--	--	--	--	--	--
B-2	22'	Ring	--	--	--	--	107.0	21.3	--	--	--	--	--	--
B-3	1'-6'	L Bulk	--	--	116	11.5	--	--	28.0	540.0	--	--	--	--
B-3	7.5'	Ring	--	--	--	--	113.7	17.0	--	--	--	--	--	--
B-3	10'	Ring	--	--	--	--	--	--	--	--	--	--	--	--
B-3	15'	Ring	--	--	--	--	--	--	--	--	--	--	--	--
B-3	2.5'	Ring	--	--	--	--	--	--	--	--	--	--	--	--

COMPACTION TEST

ASTM D 1557

Modified Proctor

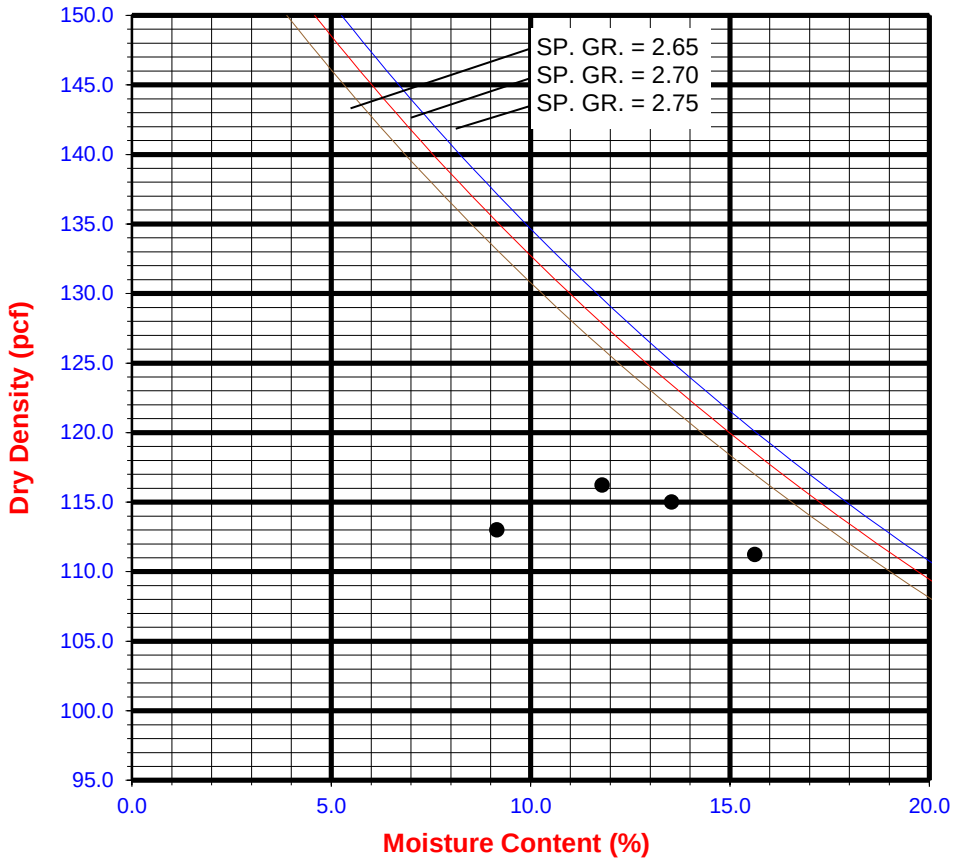
Project Name: Price Cohen
Project No. : 17183
Boring No.: B-3 @ 1-6'
Technician: JS
Date: 2/12/18
Visual Sample Description: Brown Sandy Clay

[X] **Manual Ram**

Ram Weight 10 LBS Drop 18 inches

		TEST NO.	1	2	3	4	5	6
A	Wt. Comp. Soil + Mold (gm.)		3800.00	3810.00	3700.00	3780.00		
B	Wt. of Mold (gm.)		1820.00	1820.00	1820.00	1820.00		
C	Net Wt. of Soil (gm.)	A - B	1980.00	1990.00	1880.00	1960.00		
D	Wet Wt. of Soil + Cont. (gm.)		1121.3	852.3	976.6	1321.1		
E	Dry Wt. of Soil + Cont. (gm.)		1034.7	779.7	913.7	1183.3		
F	Wt. of Container (gm.)		300.4	243.5	226.6	301.2		
G	Moisture Content (%)	[(D-F)-(E-F)]/(E-F)	11.8	13.5	9.2	15.6		
H	Wet Density (pcf)	C*29.76 /453.6	129.9	130.6	123.3	128.6		
I	Dry Density (pcf)	H/(1+G/100)	116.2	115.0	113.0	111.2		

Maximum Dry Density (pcf) 116.0 **Optimum Moisture Content (%)** 11.5



PROCEDURE USED

Procedure A

Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if No.4 retained < 20%

Procedure B

Soil Passing 3/8 in. Sieve
Mold : 4 in. (101.6 mm) diamet
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if No.4 retained > 20%

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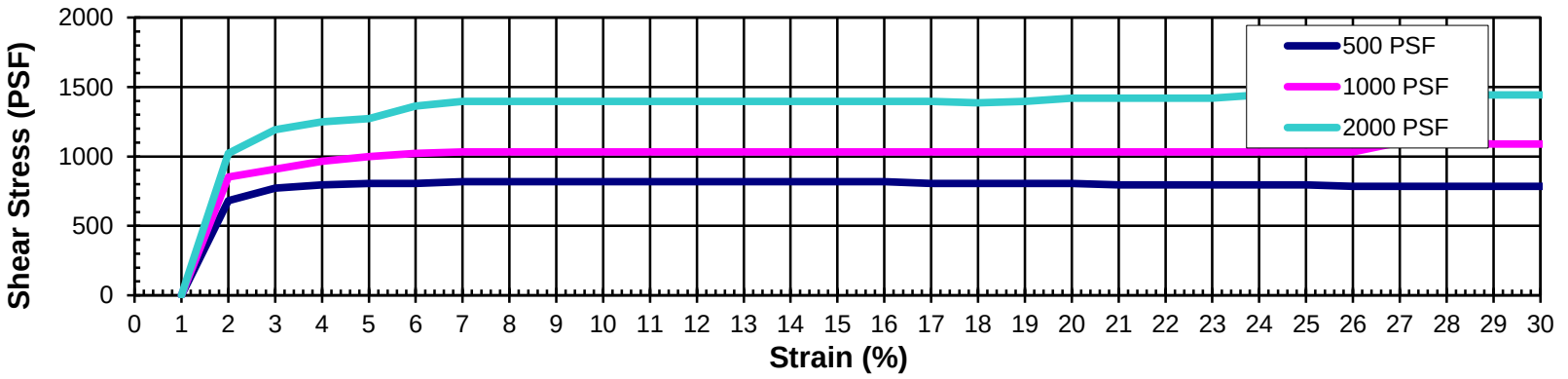
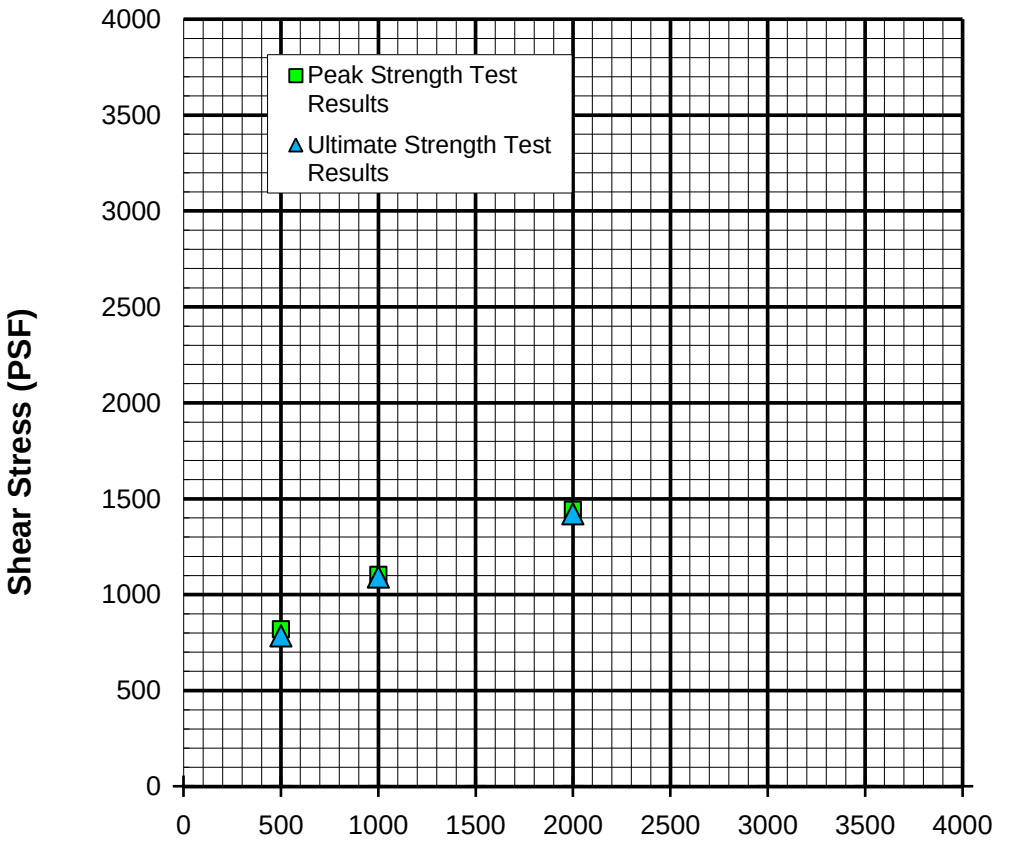
DIRECT SHEAR TEST

Laboratory Report

File Name:	Price Cohen
File No.:	17183
Date:	2/13/2018
Technician:	JS





Sample No.& Location:	B-3 @ 1-6'
Soil Description:	Brown Clay
Sample Type:	Remolded
Specimen Preparation:	Inundated

	Peak	Ultimate
Friction Angle Φ' (deg)	28	27
Cohesion C' (psf)	540	500

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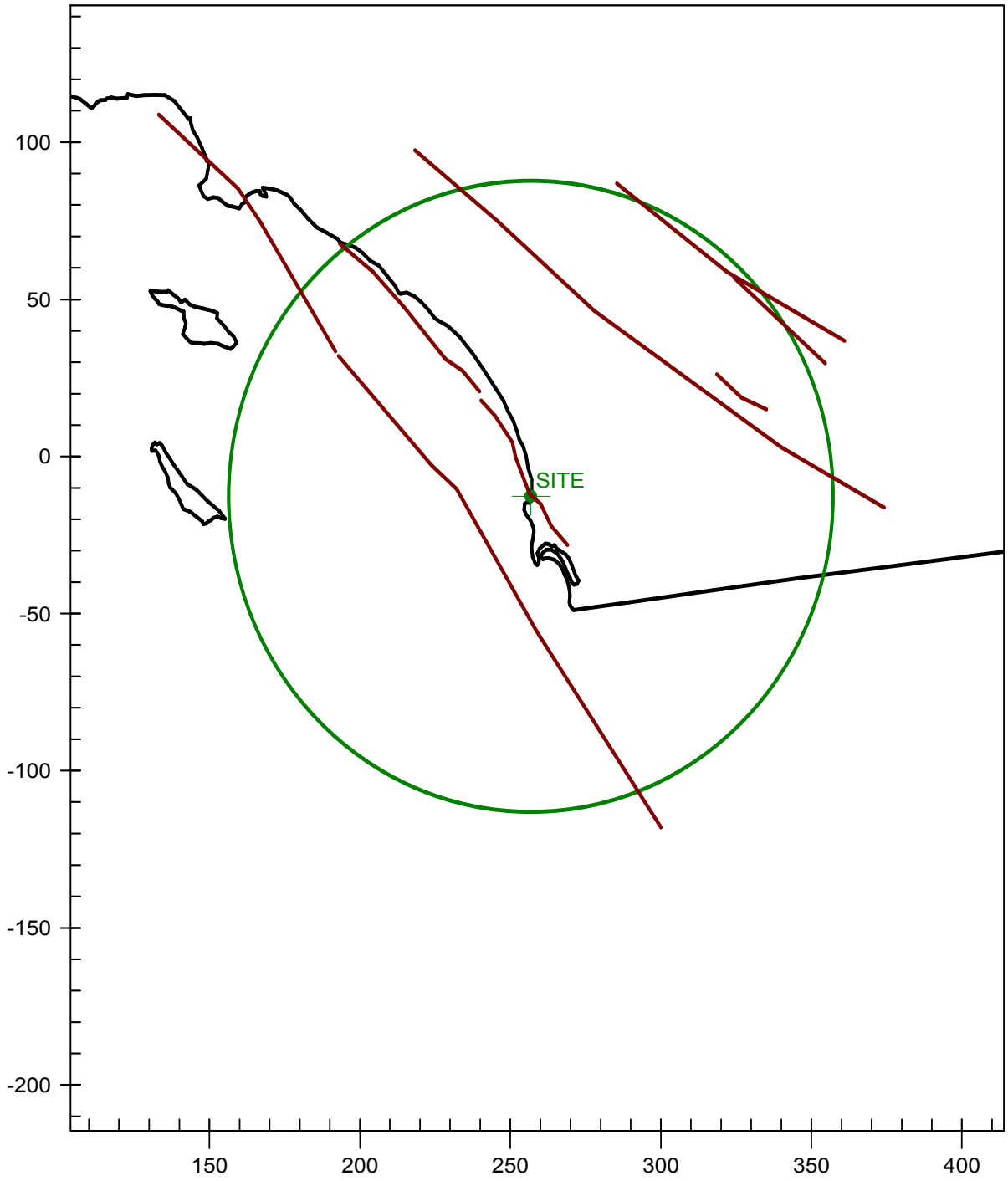
APPENDIX E

Summary of Active Faults

CALIFORNIA FAULT MAP

2045 Lowry Place



```
**********************
*                    *
*    E Q F A U L T   *
*                    *
*    Version 3.00    *
*                    *
**********************
```

DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: 17183

DATE: 02-19-2018

JOB NAME: 2045 Lowry Place

CALCULATION NAME: Price Cohen

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\CDMGFLTE_new.dat

SITE COORDINATES:
SITE LATITUDE: 32.8504
SITE LONGITUDE: 117.2567

SEARCH RADIUS: 62.4 mi

ATTENUATION RELATION: 14) Campbell & Bozorgnia (1997 Rev.) - Alluvium
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
DISTANCE MEASURE: cdist
SCOND: 0
Basement Depth: 5.00 km Campbell SSR: 0 Campbell SHR: 0
COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: C:\Program Files\EQFAULT1\CDMGFLTE_new.dat

MINIMUM DEPTH VALUE (km): 3.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

Page 1

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT MAXIMUM EARTHQUAKE MAG.(Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD.MERC.
ROSE CANYON	0.1(0.2)	7.2	0.516	X
CORONADO BANK	12.6(20.3)	7.6	0.332	IX
NEWPORT-INGLEWOOD (Offshore)	23.4(37.7)	7.1	0.134	VIII
ELSINORE-JULIAN	37.6(60.5)	7.1	0.076	VII
ELSINORE-TEMECULA	39.1(62.9)	6.8	0.056	VI
EARTHQUAKE VALLEY	45.4(73.1)	6.5	0.035	V
PALOS VERDES	49.6(79.9)	7.1	0.053	VI
ELSINORE-COYOTE MOUNTAIN	52.6(84.6)	6.8	0.038	V
ELSINORE-GLEN IVY	55.1(88.6)	6.8	0.036	V
SAN JACINTO-ANZA	60.0(96.6)	7.2	0.045	VI
SAN JACINTO-COYOTE CREEK	60.4(97.2)	6.8	0.032	V

-END OF SEARCH- 11 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE ROSE CANYON FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 0.1 MILES (0.2 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.5161 g

APPENDIX F

Geocon 1993 Report
for 2035 Lowry Place

GEOTECHNICAL INVESTIGATION

FOR

RIZZO RESIDENCE
2035 LOWRY PLACE

LA JOLLA, CALIFORNIA

PREPARED FOR

PERINI BUILDING COMPANY
c/o MR. RICHARD J. RIZZO

PHOENIX, ARIZONA

PREPARED BY

GEOCON INCORPORATED

SAN DIEGO, CALIFORNIA

APRIL 1993

GEOCON
INCORPORATED
Geotechnical Engineers and
Engineering Geologists

Project No. 04992-51-01
April 2, 1993

Perini Building Company
c/o Mr. Richard J. Rizzo
360 East Coronado Road
Post Office Box 33730
Phoenix, Arizona 85067-3370

Subject: RIZZO RESIDENCE
2035 LOWRY PLACE
LA JOLLA, CALIFORNIA
GEOTECHNICAL INVESTIGATION

Dear Mr. Rizzo:

We herewith present the results of our geotechnical investigation [illegible]ubject site. The accompanying report presents results of the investigation[illegible]nclusions and recommendations based on those findings. No soil or geologic co[illegible]re encountered which would preclude the development of the property as presently [illegible]osed, provided the geotechnical recommendations of this report are incorporated into the design and construction of the project. However, it is recommended that a qualified structural design consultant be retained to evaluate the condition of the existing residence, to aid in determining the feasibility of utilizing existing structural elements to support a second story addition.

If you have any questions regarding this report, or if we may be of further service, please do not hesitate to contact the undersigned at your convenience.

Very truly yours,

GEOCON INCORPORATED

John Hoobs
CEG 1524

Brian W. Stafford, Jr.
RCE 66236

Michael E. Embick
Senior Staff Engineer

MEE:BWS:JH:slc

(6) Addressee

6960 Flanders Drive
San Diego, CA 92121-2974
619 558-6900
FAX 619 558-6159

TABLE OF CONTENTS

Project No. 04992-51-01
April 2, 1993

GEOTECHNICAL INVESTIGATION

PURPOSE AND SCOPE

This report presents the results of a geotechnical investigation for the proposed building addition to the existing residence located at 2035 Lowry Place in the La Jolla area of San Diego, California. The purpose of the investigation was to evaluate the soil conditions immediately adjacent to existing foundations in the vicinity of a proposed second story addition. Additionally, the investigation was also performed to evaluate the geologic conditions at the site, and based on the conditions encountered, to provide recommendations pertaining to the geotechnical aspects of constructing the proposed addition.

The scope of our services included of reviewing the following documentation:

1. *Assessors Parcel Map for Pueblo Lands, Lots 1285-1287,* prepared by County of San Diego, undated.
2. *Plot Plan for Residence on Pueblo Lot 1286, Pueblo Lands of San Diego,* Sheet Nos. 1 through 3, prepared by John Corbin General Contractor, dated August 30, 1948.
3. Kennedy, M. P., *Geology of the San Diego Metropolitan Area, California*, La Jolla Quadrangle, Bulletin 200, California Division of Mines and Geology, 1975.
4. *City of San Diego Seismic Safety Element,* updated by Leighton and Associates, June 1983, Sheet(s) 242-1689.
5. *State of California, Special Studies Zones*, (Alquist-Priolo Special Studies Zone Map) November 1, 1991, La Jolla Quadrangle.

The field investigation consisted of the manual excavation of 4 trenches adjacent to existing foundations and one manually excavated trench across the backyard. The site is located on the northern border of an Alquist-Priolo special studies zone. In accordance with the requirements of the City of San Diego, the trench across the backyard was excavated to aid in evaluating the presence of surface fault rupture on the property. Logs of the exploratory trenches and details of the field investigation are presented in Appendix A. A review of aerial photographs and relevant soil and geologic literature concerning the site was also performed.

Laboratory tests were performed on selected soil samples to evaluate pertinent physical properties. Details of laboratory testing performed for the project are presented in Appendix B.

The recommendations presented herein are based on an analysis of the data obtained from the exploratory trenches, laboratory tests, and our experience with similar soil and geologic conditions.

SITE AND PROJECT DESCRIPTION

The property is currently occupied by a one-story single-family residence of wood-frame and concrete construction with a tuck-under garage. The property is located on the south side of Lowry Place (see Figure 1 - Vicinity Map), and slopes from the rear of the lot downward toward the street with an estimated relief on the order of 25 feet.

The tuck under garage is located below the northwestern corner of the residence, thus causing a small portion of the residence to be, in effect, two stories with the southern portion of the garage beneath the northwestern portion of the residence. Immediately south of the garage, the ground surface in the crawl space beneath the structure is approximately one foot higher than the garage floor elevation, and approximately 8 feet beneath the bottom of the raised wood floor of the residence. Further to the south, the ground slopes up to an elevation of approximately 2 feet beneath the bottom of the raised wood floor of the residence. Adjacent to the southeast corner of the garage, an approximately 6-foot-high, near-vertical slope exists, east of which the ground elevation is approximately 2 feet beneath the bottom of the raised wood floor of the residence (see Figure 2 - Site Plan).

It is our understanding that a second-story addition to the residence is planned over the northern portion of the residence and that no grading will be performed. The structural loads from the addition will either be imposed on the existing foundations or transferred to a series of new, isolated column footings by an independent rigid frame.

EXISTING FOUNDATION DESCRIPTIONS

Foundations for the existing residence consist of perimeter continuous footings which are supporting stem walls, and interior 12-inch by 12-inch piers supporting floor joists for the raised wood floor.

During the field investigation, one of the trenches was excavated immediately adjacent to one of the 12-inch-square piers. This pier appeared to be resting on the ground surface with an embedment of approximately 2 inches. It is suspected that the other piers are similarly embedded with the exception of two piers south of the garage located at the top of the previously discussed slope. These two piers likely had a deeper embedment depth when originally constructed, but due to erosion of the slope, are extremely near, or partially exposed in, the slope face. They are labelled *Pier A* and *Pier B* on Figure 2. Pier A is exposed in the slope face, while Pier B is within inches of the slope face. These piers will require remedial work as discussed in the *Conclusions and Recommendations* section of this report. Additionally, three piers are located within two feet of the 6-foot-high near-vertical slope that is south and east of the garage. These piers are labelled *Pier C, D*, and *E* on Figure 2. The piers are also discussed further in the *Conclusions and Recommendations* section of this report. Based upon a review of the referenced plans dated 1948, the original pier plan for the residence was to have two piers equally spaced along the east-west running pier rows where each of Piers C, D, and E are located (see Figure 2). For example, if Pier C is located 6 feet from the garage and 6 feet from the closest pier to the east, thus spanning 12 feet total, the original pier plan had 2 piers depicted, 2 feet on either side of Pier C. This would create three 4-foot spans, totalling 12 feet, rather than two 6-foot spans. If additional loading of these piers is anticipated, a qualified structural design consultant should be retained to evaluate the suitability of these piers and the attached structural elements to sustain higher loading. It was also noted that Pier F (see Figure 2), as well as piers south of the garage, were not in the

location originally designated on the referenced plan. The investigation was limited to areas of the residence anticipated to be influenced by the proposed addition. Therefore, observations of the foundations at the southwest and southeast portions of the residence were cursory in nature and are not depicted in great detail on Figure 2.

Based upon the field investigation, it appears that the perimeter continuous footings are approximately 15 inches wide and embedded into the surrounding soil to depths ranging from 1 to 3 feet. The footings were found to bear on moderately soft to moderately stiff, silty clay and medium dense, clayey sand. Three specific areas of the continuous footings warrant further discussion. These areas are depicted on Figure 2 as *Area A, B* and *C*. All three areas appear to have been undermined by erosional processes to the extent that bearing support is no longer provided to the structure and the footings are suspended above the existing slope surfaces. The three areas are located over the existing, previously discussed, slopes and appear to have been founded within the slopes when originally constructed. It is our understanding that a large percentage of the erosional damage that undermined these portions of the footings may be due to a water line break up-slope (south) of the residence that flooded the area beneath the residence. A perched water condition was encountered in Trench No. 4 and is suspected to have been caused by surface runoff from the recent rains ponding at a localized low point immediately south of the garage. The masonry wall immediately adjacent to Area B has a diagonal crack "stair stepping" through the grout down to the footing. The concrete footing appears to have pulled away from the brick approximately one-half inch. Additionally,

the isolated stem wall immediately east of the brick wall appears to have rotated out at the base slightly.

It was also noted that the existing concrete driveway is approximately 1 to 2 inches higher than the garage floor slab at the driveway/slab interface. With this current condition, the garage door may be closed, but the door is prevented from being easily opened unless it is lifted over the driveway "lip" at the interface.

SOIL AND GEOLOGIC CONDITIONS

As evidenced by our field investigation, the soils underlying the site consist of fill soils, topsoil, and natural soils of the Bay Point Formation. These three units are described below.

Fill Soils (Qaf)

Previously placed fill soils consisting of loose to moderately stiff, sand and clay was encountered in the trench excavated in the rear yard area to a depth of approximately 2 feet below existing grade. In addition, these soils were encountered in the trenches excavated below the existing residence to maximum depth excavated of 4 feet.

Topsoil (Qtp)

Topsoil was encountered underlying the fill soils within the rear yard area as observed within Trench No. T-5. The topsoil consists of a moderately stiff to stiff, sandy clay containing some

carbon flecks and some clay film development. These soils were not observed within the trenches excavated below the existing residence.

Bay Point Formation (Qbp)

Formational soils of the Quaternary-aged Bay Point Formation were encountered underlying the fill soil and topsoil in the trench excavated in the rear yard. This formation consist of variably weathered, medium dense to dense, predominantly red and olive-green, silty, fine to medium sand. The unit appeared massive with no discernable bedding or structure. These soils were observed to a depth of 4 feet, the maximum depth of exploration. These formational soils were not observed within the trenches excavated beneath the existing structure.

GEOLOGIC HAZARDS

General

The results of our field investigation and review of pertinent geologic literature and aerial photographs indicate that there are no known geologic hazards present at the site.

Faulting and Seismicity

Based on a review of geologic literature, the site lies within an *Alquist-Priolo Special Studies Zone* (AP Zone). The Rose Canyon fault has been mapped approximately 420 feet west of the site. This fault has been classified as active by the California Division of Mines and

Geology. Historically, the Rose Canyon fault has exhibited low seismicity with respect to earthquakes in excess of Magnitude 5.0. Based on a "maximum probable" earthquake event along the Rose Canyon Fault of Magnitude 6.5, and attenuation relationships developed by Joyner and Boore (1982), it is estimated the maximum probable site acceleration (based on an approximate 100-year time period) would be on the order of 0.4g to 0.5g.

In accordance with the requirements of the Division of Mines and Geology and the city of San Diego, a roughly east-west trench was excavated across the site in the rear yard area into formational soils to determine if surface fault rupture from an active fault has occurred on the subject site. The approximate location is shown on Figure 2. A detailed trench log is included as Figure A-5 (Appendix A). The trench was placed generally in a N70E direction, roughly perpendicular to the general N50W trend of the Rose Canyon Fault as shown on the AP zone maps. A continuous excavation was made across the property. The length of the trench was excavated into Bay Point Formation. As shown on the trench log (Figure A-5), no fault rupture was observed within the soils of the Bay Point Formation. It is our opinion that surface fault rupture is not present within the subject site.

Principal regional active faults whose activity may also affect the site include the Elsinore fault, which lies approximately 37 miles to the northeast of the site, and the Offshore Zone of Deformation, San Diego Trough and Coronado Banks fault zones, which lie offshore approximately 21, 22, and 14 miles, respectively, to the northwest, west, and southwest of the

property. In the event of a major earthquake on these or other faults in the southern California or northern Baja California region, the site could be subjected to moderate to severe ground shaking. With respect to this hazard, this site is comparable to others in the general vicinity with a similar geologic setting.

Liquefaction

Liquefaction is a condition that can develop in loosely placed or deposited, saturated, relatively cohesionless, silts and fine sands that are subjected to strong ground motion. High pore pressures can develop in these soils, causing a loss of shear strength and, potentially, a "boiling" type behavior in sands that are near the surface. Due to the moderately dense to dense, clayey nature of the underlying soil encountered at the site, the potential for liquefaction at the site is considered low.

Project No. 04992-51-01
April 2, 1993

CONCLUSIONS AND RECOMMENDATIONS

General

1. In our opinion, no soil or geologic conditions exist which would preclude the construction of the proposed addition, provided the foundation recommendations presented below are incorporated into the design of the second story addition. No geologic hazards were observed or are known to exist on the site which would adversely affect the proposed building addition.

2. Portions of the existing perimeter continuous footings are suspended above the existing ground surface and should be extended into a competent bearing strata as discussed below under *Foundation Recommendations*.

3. A qualified structural design consultant should be retained to evaluate the condition of the existing residence, undermined footings, and foundation structural members to aid in determining the feasibility of utilizing existing structural elements to support a second story.

4. The site is underlain by fill soils in excess of 4 feet below the existing structure and to a maximum depth of 2 feet in the rear yard area. The fill soils are underlain by 1 to 2 feet of topsoil overlying natural materials of the Bay Point Formation. The trenches

excavated beneath the existing residence where not extended deep enough to observe the topsoil or Bay Point Formation.

Meetings

5. A meeting with the structural engineer, architect and geotechnical engineer was held at the site on March 19, 1993, to discuss specific issues and recommendations discussed in this report.

6. A preconstruction meeting should be held at the site with the owner, foundation contractor, structural design consultant and geotechnical engineer in attendance. Due to the complex nature of the existing foundation system, it is understood that the above parties may have some specific questions pertaining to geotechnical aspects of site development. These questions could be addressed at that time.

Foundation Recommendations

7. Perimeter continuous footings, where observed, were a minimum of 15-inches wide and had a minimum embedment depth of 1 foot. Existing continuous footings may be analyzed using an allowable bearing capacity of 1,500 psf (dead plus live load). This value may be increased by an additional 500 psf for each additional foot of footing depth added below the existing footing depth and by 400 psf for each additional foot of footing width to a maximum bearing pressure of 2,500 psf. This bearing pressure may

be increased by one-third for transient loads such as wind or seismic forces. New continuous footings may be designed utilizing the same criteria outlined in this paragraph. New continuous footings placed near the top of, and parallel to, descending slopes should be deepened such that the bottom outside edge of the footing is located a minimum of 5 feet horizontally from the face of the slope.

8. New, isolated spread footings should be at least 24 inches wide in both directions and should be founded at least 12 inches below the lowest adjacent grade. Footings so proportioned may be designed using an allowable bearing capacity of 1,500 psf (dead plus live load). This value may be increased by an additional 500 psf for each additional foot of depth and by 400 psf for each additional foot of width to a maximum bearing pressure of 2,500 psf. This bearing pressure may be increased by one-third for transient loads such as wind or seismic forces. Reinforcement for isolated spread footings should be specified by the structural engineer. Isolated spread footings should be deepened such that the bottom outside edge of the footing is located at least 5 feet horizontally from the face of adjacent descending slopes.

9. Suspended footings designated as *Area A*, *Area B*, and *Area C* on Figure 2, regardless of whether or not these footings will be relied upon for support of the second floor addition, will require an excavation beneath the exposed footings and the construction of new footings to which the existing suspended footings may be structurally attached.

Excavations beneath the exposed footings should extend at least 2 feet below the lowest adjacent grade and result in a horizontal bearing surface being provided for the footings. The excavations should be observed by a representative of Geocon Incorporated to verify that a suitable bearing strata is exposed.

10. It is anticipated that some, or all, of the continuous footings will need to be deepened and/or widened to achieve the required bearing capacity. New footing additions should be structurally attached to existing footings by means of reinforcing steel dowels, or other suitable means designed by a qualified structural design consultant.

11. Where existing continuous footing dimensions are to be increased, segments of existing footing no longer than 6 feet should be undermined at any time. This recommendation is provided in order to reduce the potential of distress to the structure due to extensive continuous lengths of footing being undermined during construction. It is recommended that undermined footing Areas A, B, and C be mitigated as recommended previously prior to excavating adjacent to, or beneath, other footing areas.

12. All continuous footings (altered or new) should be reinforced with a minimum of four No. 4 reinforcing bars, two located near the top of the footing and two located near the bottom.

13. The stem wall located east of the brick wall should be observed by a qualified structural design consultant for potential eccentric loading due to its having rotated out of vertical alignment.

14. The brick wall should be observed by a qualified structural design consultant to determine its structural integrity, if it is intended to sustain additional loading.

15. With the exceptions noted below, existing isolated 12-inch-square pier footings may be analyzed using an allowable bearing capacity of 1000 psf (dead plus live load). The allowable bearing capacity may be increased by an additional 500 psf for each additional foot of footing depth below the existing footing depth and by 300 psf for each additional foot of footing width to a maximum bearing pressure of 2000 psf. This bearing pressure may be increased by one-third for transient loads such as wind or seismic forces.

16. Piers A and B are considered unsuitable to provide the intended support due to their close proximity to the existing slope (see Figure 2). It is recommended that these footings be deepened to 3 feet below existing grade or moved to 3 feet behind the existing top of slope. Alternatively, an earth retaining structure could be constructed as close as approximately 12 inches to the piers to reduce the potential for further erosion of the adjacent slope. The earth retaining structure should be designed utilizing

pertinent information from the "Retaining Walls and Lateral Loads" section of this report.

17. Although Piers C, D, and E currently appear stable, their close proximity to the existing 6-foot-high near-vertical slope makes them susceptible to undermining. Therefore, it is recommended that surface drainage be directed and maintained away from the top of the adjacent slope to reduce the potential for erosion.

18. A representative of Geocon Incorporated should observe footing excavations prior to the placement of reinforcing steel and/or concrete.

19. No special subgrade presaturation is deemed necessary prior to placing concrete, however, the exposed foundation subgrade soils should be sprinkled, as necessary, to maintain a moist condition as would be expected in any such concrete placement.

Retaining Walls and Lateral Loads

20. Retaining walls not restrained at the top and having a level backfill surface should be designed for an active soil pressure equivalent to the pressure exerted by a fluid density of 50 pounds per cubic foot (pcf). Where the backfill will be inclined at no steeper than 2.0 to 1.0, an active soil pressure of 65 pcf is recommended. These soil pressures assume that the backfill materials within an area bounded by the wall and a 1:1 plane

extending upward from the base of the wall will possess an Expansion Index of less than 90.

21. Unrestrained walls are those that are allowed to rotate more than 0.001H at the top of the wall. Where walls are restrained from movement at the top, an additional uniform pressure of 7H psf (where H equals the height of the retaining wall portion of the wall in feet) should be added to the above active soil pressure.

22. Retaining walls should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces and should be waterproofed as required by the project architect. The use of drainage openings through the base of the wall (weep holes, etc.) is not recommended where the seepage could be a nuisance or otherwise adversely impact the property adjacent to the base of the wall. The above recommendations assume a properly compacted granular (Expansion Index less than 90) backfill material with no hydrostatic forces or imposed surcharge load. If conditions different than those described are anticipated, or if specific drainage details are desired, Geocon Incorporated should be contacted for additional recommendations.

23. Retaining walls subject to surcharges from sources such as foundations should be designed to accommodate such loading. Figures 3 and 4 provide lateral loading diagrams for retaining walls subject to point and line loads, respectively. Surcharges due

to foundations would be encountered if a retaining wall was constructed adjacent to Piers A and B.

24. Foundations for retaining walls should be at least 18 inches wide and 12 inches deep. Allowable bearing capacity for retaining wall footings is considered the same as that for continuous footings as outlined in Paragraph No. 7. Reinforcement for retaining wall footings should be specified by the structural engineer. The proximity of the foundation to the top of a slope steeper than 3:1 could impact the allowable soil bearing pressure. Therefore, Geocon Incorporated should be consulted where such a condition is anticipated.

25. For resistance to lateral loads, an allowable passive earth pressure equivalent to a fluid density of 200 pcf is recommended for footings or shear keys poured neat against vertical excavations into the existing soils. The allowable passive pressure assumes a horizontal surface extending at least 5 feet or three times the surface generating the passive pressure, whichever is greater. The upper 12 inches of material not protected by floor slabs or pavement should not be included in the design for lateral resistance. An allowable friction coefficient of 0.25 may be used for resistance to sliding between soil and concrete. This friction coefficient may be combined with the allowable passive earth pressure when determining resistance to lateral loads.

26. Existing walls that are not provided with an adequate drainage system should be evaluated by a qualified structural design consultant to determine if the walls can withstand additional lateral loads due to the buildup of hydrostatic forces behind the wall.

Driveway

27. The driveway being 1 to 2 inches higher than the adjacent garage floor slab is potentially due to heaving of the underlying soil.

28. Consideration should be given to removing and replacing the upper portion of the driveway to match the existing garage floor elevation.

Drainage

29. Adequate drainage provisions are imperative. Under no circumstances should water be allowed to pond adjacent to footings. The building pad should be properly finish graded after the addition and other improvements are in place so that drainage water is directed away from foundations, pavements, and slope tops to controlled drainage devices. This may require the addition of area drains in the rear and side yard areas to reduce the potential for surface water to migrate below the structure.

30. Surface drainage in the crawl space south of the garage should be directed to an area drain inlet or sump connected to a suitable outlet. Roof drainage should be provided by gutters and downspouts connected to a subsurface area drain system.

31. It is our understanding that the exploratory trench in the backyard is to be utilized as a subsurface drain. A recommended subsurface drain detail is presented on Figure 5.

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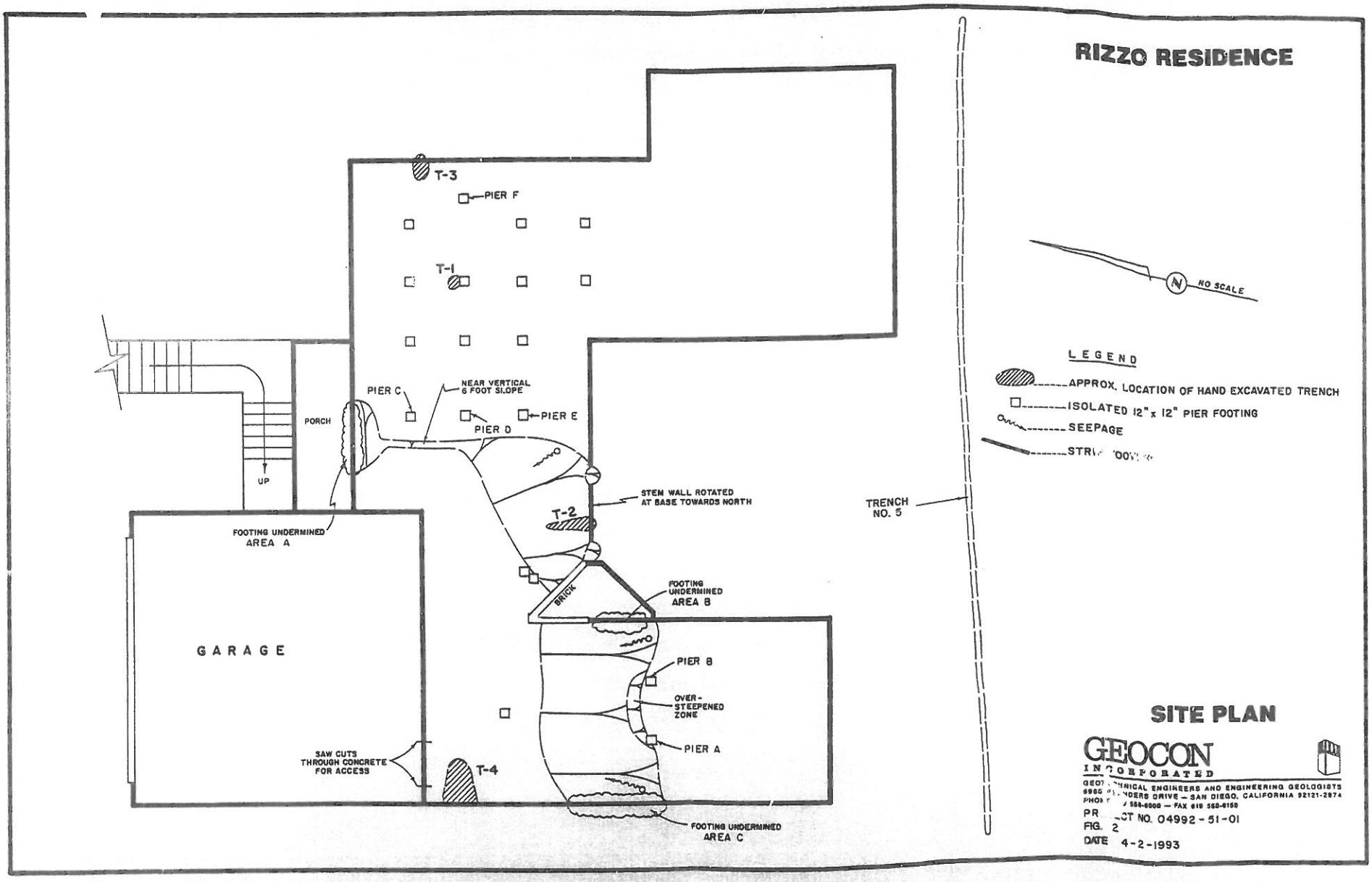
April 2, 1993

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon Incorporated should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon Incorporated.

2. This report is issued with the understanding that it is the responsibility of the owner, or of his representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

3. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.


RIZZO RESIDENCE
T-3
PIER F
T-1
PIER C
NEAR VERTICAL 6 FOOT SLOPE
PIER D
PIER E
PORCH
UP
STEM WALL ROTATED AT BASE TOWARDS NORTH
T-2
FOOTING UNDERMINED AREA A
BRICK
FOOTING UNDERMINED AREA B
GARAGE
PIER B
OVER-STEEPENED ZONE
PIER A
SAW CUTS THROUGH CONCRETE FOR ACCESS
T-4
FOOTING UNDERMINED AREA C
TRENCH NO. 5
N
NO SCALE
LEGEND
APPROX. LOCATION OF HAND EXCAVATED TRENCH
ISOLATED 12" x 12" PIER FOOTING
SEEPAGE
SITE PLAN
GEOCON INCORPORATED
PROJECT NO. 04992-51-01
FIG. 2
DATE 4-2-1993

Project No. 04992-51-01
April 2, 1993

APPENDIX A

FIELD INVESTIGATION

The field investigation was performed on January 29, 1993, and consisted of four hand-excavated trenches, Trench Nos. 1 through 4, adjacent to the existing foundations to determine the width and embedment depth of said foundations. The approximate locations of the trenches are shown on Figure 2. Additionally, due to the site being located in an *Alquist-Priolo Special Studies Zone*, one trench, Trench No. 5, was excavated along the length of the back yard to determine if faulting is present on the site. This trench was observed by a representative of Geocon Incorporated on March 25, 1993, and is depicted on Figure A-5.

As the hand excavated trenching proceeded, relatively undisturbed soil samples were obtained at different elevations within the excavations by driving two sets of three 2⅜-inch-diameter by one-inch-high brass rings, taped together, into the undisturbed soil mass with blows from a 10-pound hammer dropped 18 inches per blow. These rings were then manually excavated to remain relatively undisturbed. Disturbed bulk samples were also obtained.

The soils were visually examined, classified, and logged in general accordance with American Society for Testing and Materials (ASTM) practice for Description and Identification of Soils (Visual-Manual Procedure D2844). Logs of the hand excavated trenches are presented on Figures A-1 through A-4. The elevations shown are elevations, in feet, relative to the garage floor. The hand excavated geologic trench (Trench No. 5) is depicted on Figure A-5. The logs depict the soil and geologic conditions encountered.

PROJECT NO. 04992-51-01

TRENCH T 1

ELEV. +6 DATE COMPLETED 1/29/93

EQUIPMENT HAND EXCAVATION

DEPTH IN INCHES	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2	T1-1			CL	FILL Soft, wet to saturated, brown and gray, Silty CLAY with fine sand			
4								
6	T1-2				-Becomes very moist to wet at 6 inches			
8								
10	T1-3			CL	Medium stiff, very moist to wet, fine Sandy CLAY with silt -Rootlets from 10 to 12 inches			
12								
14	T1-4						108.7	17.9
16					TRENCH TERMINATED AT 16.5 INCHES NOTE: Footing embedment depth: 2 inches Pier footing dimensions: 12 inches square			

Figure A-1, Log of Trench T 1

RER

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ▨ ... DISTURBED OR BAG SAMPLE; ◧ ... STANDARD PENETRATION TEST; ■ ... CHUNK SAMPLE; ■ ... DRIVE SAMPLE (UNDISTURBED); ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

03 08 2003

PROJECT NO. 04992-51-01

TRENCH T 2

ELEV. +4 DATE COMPLETED 1/29/93

EQUIPMENT HAND EXCAVATION

DEPTH IN INCHES	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0–22				CL	FILL Soft, wet to saturated, brown, fine to medium Sandy CLAY with silt			
24–28	T2-1 T2-2			ML/CL	Medium soft, wet, light olive brown and brown mottled, Clayey SILT and fine Sandy SILT and Silty CLAY		107.1	20.9
30					TRENCH TERMINATED AT 30 INCHES NOTE: Footing embedment depth: 24 inches Footing width: 15 inches			

Figure A-2, Log of Trench T 2

RZR

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL ◧ ... STANDARD PENETRATION TEST ■ ... DRIVE SAMPLE (UNDISTURBED)

▨ ... DISTURBED OR BAG SAMPLE ■ ... CHUNK SAMPLE ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. 04992-51-01

TRENCH T 3

ELEV. +6 DATE COMPLETED 1/29/93

EQUIPMENT HAND EXCAVATION

DEPTH IN INCHES	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0								
2				CL	FILL Medium stiff, wet, gray-brown, Silty CLAY with fine sand			
4								
6								
8								
10	T3-1							
12								
14				CL	Medium stiff, moist to wet, very dark brown, fine to medium Sandy CLAY			
				CL	Medium stiff, wet, gray-brown, Silty CLAY with fine sand			

TRENCH TERMINATED AT 15 INCHES

NOTE: Footing embedment depth: 12 inches
Footing width: 15 inches

Figure A-3, Log of Trench T 3

RZR

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ▨ ... DISTURBED OR BAG SAMPLE; ◧ ... STANDARD PENETRATION TEST; ■ ... CHUNK SAMPLE; ■ ... DRIVE SAMPLE (UNDISTURBED); ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

03 08 2003

PROJECT NO. 04992-51-01

TRENCH T 4

ELEV. +1 DATE COMPLETED 1/29/93

EQUIPMENT HAND EXCAVATION

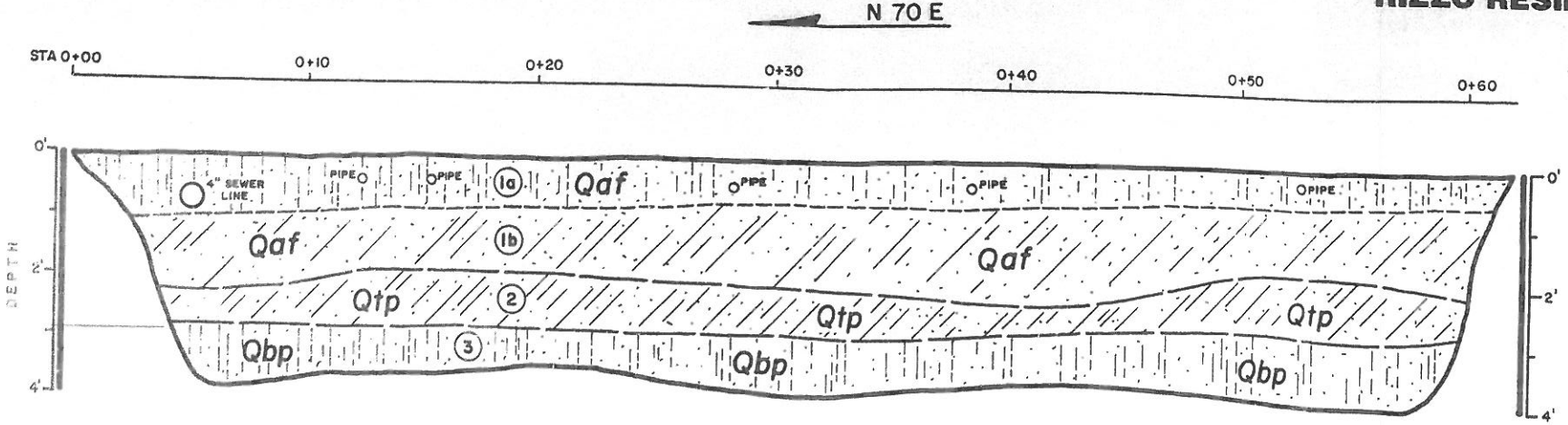
DEPTH IN INCHES	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0–18				SC	FILL Loose, wet, brown, Clayey, fine to medium SAND with silt			
18–38			▽	CL	Soft, wet, light brown, fine Sandy CLAY with silt -Perched water at 36 inches			
38–48	T4-1			SC	Dense, moist, very dark brown, Clayey fine to medium SAND with silt			
48					TRENCH TERMINATED AT 48 INCHES NOTE: Footing embedment depth: 36 inches Footing width: unknown			

Figure A-4, Log of Trench T 4

SAMPLE SYMBOLS: ☐ ... SAMPLING UNSUCCESSFUL; ▨ ... DISTURBED OR BAG SAMPLE; ◧ ... STANDARD PENETRATION TEST; ■ ... CHUNK SAMPLE; ■ ... DRIVE SAMPLE (UNDISTURBED); ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

RIZZO RESIDENCE



LEGEND:

Qaf.....FILL SOILS

(1a).....Loose to slightly dense, damp, red brown, Silty, fine SAND (SM); Some roots and minor pipes.

(1b).....Moderately stiff, moist, olive green, Sandy CLAY (CL); Minor roots

Qtp.....TOPSOIL

(2).....Moderately stiff to stiff, moist, dark brown, slightly Sandy CLAY (CL); contains some carbon flecks localized within nodules of very dark brown clay, some clay film development and minor roots ("C" Horizon)

Qbp.....BAY POINT FORMATION

(3).....Dense, moist, mottled red and olive green, Silty, fine to medium SAND (SM) with minor coarse sand, some manganese staining present

SCALE : 1" = 5' (HORIZ.)
1" = 2' (VERT.)

TRENCH NO. 5

GEOCON
INCORPORATED
GEOTECHNICAL ENGINEERS AND ENGINEERING GEOLOGISTS
6960 FLANDERS DRIVE — SAN DIEGO, CALIFORNIA 92121-2974
PHONE 619 558-6900 — FAX 619 558-6159

PROJECT NO. 04992-51-01
FIG. A-5
DATE 4-2-1993

Project No. 04992-51-01
April 2, 1993

TABLE B-I

SUMMARY OF IN-PLACE MOISTURE-
DENSITY AND DIRECT SHEAR TEST RESULTS

Sample No.	Dry Density (pcf)	Moisture Content (%)	Unit Cohesion (psf)	Angle of Shear Resistance (degrees)
T1-4	108.7	17.9	810	23
T2-1	107.1	20.9	650	26

TABLE B-II

SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS

	Moisture Content			
Sample No.	Before Test (%)	After Test (%)	Dry Density (pcf)	Expansion Index
T4-1	9.2	26.5	112.5	58

APPENDIX G

Standard Grading Guidelines

STANDARD GUIDELINES FOR GRADING PROJECTS

TABLE OF CONTENTS

GENERAL

The guidelines contained herein and the standard details attached hereto represent this firm's standard recommendations for grading and other associated operations on construction projects. These guidelines should be considered a portion of the project specifications.

All plates attached hereto shall be considered as part of these guidelines.

The Contractor should not vary from these guidelines without prior recommendation by the Geotechnical Consultant and the approval of the Client or his authorized representative. Recommendation by the Geotechnical Consultant and/or Client should not be considered to preclude requirements for approval by the controlling agency prior to the execution of any changes.

These Standard Grading Guidelines and Standard Details may be modified and/or superseded by recommendations contained in the text of the preliminary geotechnical report and/or subsequent reports.

If disputes arise out of the interpretation of these grading guidelines or standard details, the Geotechnical Consultant shall provide the governing interpretation.

DEFINITIONS OF TERMS

ALLUVIUM - Unconsolidated soil deposits resulting from flow of water, including sediments deposited in river beds, canyons, flood plains, lakes, fans and estuaries.

AS-GRADED (AS-BUILT) - The surface and subsurface conditions at completion of grading.

BACKCUT - A temporary construction slope at the rear of earth retaining structures such as buttresses, shear keys, stabilization fills or retaining walls.

BACKDRAIN - Generally a pipe and gravel or similar drainage system placed behind earth retaining structures such buttresses, stabilization fills, and retaining walls.

BEDROCK - Relatively undisturbed formational rock, more or less solid, either at the surface or beneath superficial deposits of soil.

BENCH - A relatively level step and near vertical rise excavated into sloping ground on which fill is to be placed.

BORROW (Import) - Any fill material hauled to the project site from off-site areas.

BUTTRESS FILL - A fill mass, the configuration of which is designed by engineering calculations to retain slope conditions containing adverse geologic features. A buttress is generally specified by minimum key width and depth and by maximum backcut angle. A buttress normally contains a back-drainage system.

CIVIL ENGINEER - The Registered Civil Engineer or consulting firm responsible for preparation of the grading plans, surveying and verifying as-graded topographic conditions.

CLIENT - The Developer or his authorized representative who is chiefly in charge of the project. He shall have the responsibility of reviewing the findings and recommendations made by the Geotechnical Consultant and shall authorize the Contractor and/or other consultants to perform work and/or provide services.

COLLUVIUM - Generally loose deposits usually found near the base of slopes and brought there chiefly by gravity through slow continuous downhill creep (also see Slope Wash).

COMPACTION - Densification of man-placed fill by mechanical means.

CONTRACTOR - A person or company under contract or otherwise retained by the Client to perform demolition, grading and other site improvements.

DEBRIS - All products of clearing, grubbing, demolition, contaminated soil materials unsuitable for reuse as compacted fill and/or any other material so designated by the Geotechnical Consultant.

ENGINEERING GEOLOGIST - A Geologist holding a valid certificate of registration in the specialty of Engineering Geology.

ENGINEERED FILL - A fill of which the Geotechnical Consultant or his representative, during grading, has made sufficient tests to enable him to conclude that the fill has been placed in substantial compliance with the recommendations of the Geotechnical Consultant and the governing agency requirements.

EROSION - The wearing away of the ground surface as a result of the movement of wind and/or water.

EXCAVATION - The mechanical removal of earth materials.

EXISTING GRADE - The ground surface configuration prior to grading.

FILL - Any deposits of soil, rock, soil-rock blends or other similar materials placed by man.

FINISH GRADE - The ground surface configuration at which time the surface elevations conform to the approved plan.

GEOFABRIC - Any engineering textile utilized in geotechnical applications including subgrade stabilization and filtering.

GEOLOGIST - A representative of the Geotechnical Consultant educated and trained in the field of geology.

GEOTECHNICAL CONSULTANT - The Geotechnical Engineering and Engineering Geology consulting firm retained to provide technical services for the project. For the purpose of these specifications, observations by the Geotechnical Consultant include observations by the Soil Engineer, Geotechnical Engineer, Engineering Geologist and those performed by persons employed by and responsible to the Geotechnical Consultants.

GEOTECHNICAL ENGINEER - A licensed Geotechnical Engineer or Civil Engineer who applies scientific methods, engineering principles and professional experience to the acquisition, interpretation and use of knowledge of materials of the earth's crust for the evaluation of engineering problems. Geotechnical Engineering encompasses many of the engineering aspects of soil mechanics, rock mechanics, geology, geophysics, hydrology and related sciences.

GRADING - Any operation consisting of excavation, filling or combinations thereof and associated operations.

LANDSLIDE DEBRIS - Material, generally porous and of low density, produced from instability of natural or man-made slopes.

MAXIMUM DENSITY - Standard laboratory test for maximum dry unit weight. Unless otherwise specified, the maximum dry unit weight shall be determined in accordance with ASTM Method of Test D 1557-09.

OPTIMUM MOISTURE - Soil moisture content at the test maximum density.

RELATIVE COMPACTION - The degree of compaction (expressed as a percentage) of dry unit weight of a material as compared to the maximum dry unit weight of the material.

ROUGH GRADE - The ground surface configuration at which time the surface elevations approximately conform to the approved plan.

SITE - The particular parcel of land where grading is being performed.

SHEAR KEY - Similar to buttress, however, it is generally constructed by excavating a slot within a natural slope in order to stabilize the upper portion of the slope without grading encroaching into the lower portion of the slope.

SLOPE - An inclined ground surface the steepness of which is generally specified as a ratio of horizontal:vertical (e.g., 2:1).

SLOPE WASH - Soil and/or rock material that has been transported down a slope by action of gravity assisted by runoff water not confined by channels (also see Colluvium).

SOIL - Naturally occurring deposits of sand, silt, clay, etc., or combinations thereof.

SOIL ENGINEER - Licensed Geotechnical Engineer or Civil Engineer experienced in soil mechanics (also see Geotechnical Engineer).

STABILIZATION FILL - A fill mass, the configuration of which is typically related to slope height and is specified by the standards of practice for enhancing the stability of locally adverse conditions. A stabilization fill is normally specified by minimum key width and depth and by maximum backcut angle. A stabilization fill may or may not have a back drainage system specified.

SUBDRAIN - Generally a pipe and gravel or similar drainage system placed beneath a fill in the alignment of canyons or former drainage channels.

SLOUGH - Loose, non-compacted fill material generated during grading operations.

TAILINGS – Non-engineered fill which accumulates on or adjacent to equipment haul-roads.

TERRACE - Relatively level step constructed in the face of graded slope surface for drainage control and maintenance purposes.

TOPSOIL - The presumable fertile upper zone of soil which is usually darker in color and loose.

WINDROW - A string of large rocks buried within engineered fill in accordance with guidelines set forth by the Geotechnical Consultant.

OBLIGATIONS OF PARTIES

The Geotechnical Consultant should provide observation and testing services and should make evaluations in order to advise the Client on geotechnical matters. The Geotechnical Consultant should report his findings and recommendations to the Client or his authorized representative.

The client should be chiefly responsible for all aspects of the project. He or his authorized representative has the responsibility of reviewing the findings and recommendations of the Geotechnical Consultant. He shall authorize or cause to have authorized the Contractor and/or other consultants to perform work and/or provide services. During grading the Client or his authorized representative should remain on-site or should remain reasonably accessible to all concerned parties in order to make decisions necessary to maintain the flow of the project.

The Contractor should be responsible for the safety of the project and satisfactory completion of all grading and other associated operations on construction projects, including but not limited to, earthwork in accordance with the project plans, specifications and controlling agency requirements. During grading, the Contractor or his authorized representative should remain on-site. Overnight and on days off, the Contractor should remain accessible.

SITE PREPARATION

The Client, prior to any site preparation or grading, should arrange and attend a meeting among the Grading Contractor, the Design Engineer, the Geotechnical Consultant, representatives of the appropriate governing authorities as well an any other concerned parties. All parties should be given at least 48 hours notice.

Clearing and grubbing should consist of the removal of vegetation such as brush, grass, woods, stumps, trees, roots of trees and otherwise deleterious natural materials from the areas to be graded. Clearing and grubbing should extend to the outside of all proposed excavation and fill areas.

Demolition should include removal of buildings, structures, foundations, reservoirs, utilities (including underground pipelines, septic tanks, leach fields, seepage pits, cisterns, mining shafts, tunnels, etc.) and other man-made surface and subsurface improvements from the areas to be graded. Demolition of utilities should include proper capping and/or re-routing pipelines at the project perimeter and cutoff and capping of wells in accordance with the requirements of the governing authorities and the recommendations of the Geotechnical Consultant at the time of demolition.

Trees, plants or man-made improvements not planned to be removed or demolished should be protected by the Contractor from damage or injury.

Debris generated during clearing, grubbing and/or demolition operations should be wasted from areas to be graded and disposed off-site. Clearing, grubbing and demolition operations should be performed under the observation of the Geotechnical Consultant.

The Client or Contractor should obtain the required approvals from the controlling authorities for the project prior, during and/or after demolition, site preparation and removals, etc. The appropriate approvals should be obtained prior to proceeding with grading operations.

SITE PROTECTION

Protection of the site during the period of grading should be the responsibility of the Contractor. Unless other provisions are made in writing and agreed upon among the concerned parties, completion of a portion of the project should not be considered to preclude that portion or adjacent areas from the requirements for site protection until such time as the entire project is complete as identified by the Geotechnical Consultant, the Client and the regulating agencies.

The Contractor should be responsible for the stability of all temporary excavations. Recommendations by the Geotechnical Consultant pertaining to temporary excavations (e.g., backcuts) are made in consideration of stability of the completed project and, therefore, should not be considered to preclude the responsibilities of the Contractor. Recommendations by the Geotechnical Consultant should not be considered to preclude more restrictive requirements by the regulating agencies.

Precautions should be taken during the performance of site clearing, excavations and grading to protect the work site from flooding, ponding, or inundation by poor or improper surface drainage. Temporary provisions should be made during the rainy season to adequately direct surface drainage away from and off the work site. Where low areas can not be avoided, pumps should be kept on hand to continually remove water during periods of rainfall.

During periods of rainfall, plastic sheeting should be kept reasonably accessible to prevent unprotected slopes from becoming saturated. Where necessary during periods of rainfall, the Contractor should install check dams, desilting basins, riprap, sand bags or other devices or methods necessary to control erosion and provide safe conditions.

During periods of rainfall, the Geotechnical Consultant should be kept informed by the Contractor as to the nature of remedial or preventative work being performed (e.g., pumping, placement of sandbags or plastic sheeting, other labor, dozing, etc.).

Following periods of rainfall, the Contractor should contact the Geotechnical Consultant and arrange a walk-over of the site in order to visually assess rain related damage. The Geotechnical Consultant may also recommend excavations and testing in order to aid in his assessments. At the request of the Geotechnical Consultant, the Contractor shall make excavations in order to evaluate the extent of rain related damage.

Rain related damage should be considered to include, but may not be limited to, erosion, silting, saturation, swelling, structural distress and other adverse conditions identified by the Geotechnical Consultant. Soil adversely affected should be classified as Unsuitable Materials and should be subject to over-excavation and replacement with compacted fill or other remedial grading as recommended by the Geotechnical Consultant.

Relatively level areas, where saturated soils and/or erosion gullies exist to depths of greater than 1-foot, should be over-excavated to unaffected, competent material. Where less than 1-foot in depth, unsuitable materials may be processed in-place to achieve near optimum moisture conditions, then thoroughly recompacted in accordance with the applicable specifications. If the desired results are not achieved, the affected materials should be over-excavated, then replaced in accordance with the applicable specifications.

In slope areas, where saturated soil and/or erosion gullies exist to depths of greater than 1 foot, they should be over-excavated and replaced as compacted fill in accordance with the applicable specifications. Where affected materials exist to depths of 1 foot or less below

proposed finished grade, remedial grading by moisture conditioning in-place, followed by thorough recompaction in accordance with the applicable grading guidelines herein may be attempted. If the desired results are not achieved, all affected materials should be over-excavated and replaced as compacted fill in accordance with the slope repair recommendations herein. As field conditions dictate, other slope repair procedures may be recommended by the Geotechnical Consultant.

EXCAVATIONS

Unsuitable Materials

Materials which are unsuitable should be excavated under observation and recommendations of the Geotechnical Consultant. Unsuitable materials include, but may not be limited to, dry, loose, soft, wet, organic compressible natural soils and fractured, weathered, soft bedrock and non-engineered or otherwise deleterious fill materials.

Material identified by the Geotechnical Consultant as unsatisfactory due to its moisture conditions should be over-excavated, watered or dried, as needed, and thoroughly blended to a uniform near optimum moisture condition (per Moisture guidelines presented herein) prior to placement as compacted fill.

Cut Slopes

Unless otherwise recommended by the Geotechnical Consultant and approved by the regulating agencies, permanent cut slopes should not be steeper than 2:1 (horizontal:vertical).

If excavations for cut slopes expose loose, cohesionless, significantly fractured or otherwise unsuitable material, over-excavation and replacement of the unsuitable materials with a compacted stabilization fill should be accomplished as recommended by the Geotechnical Consultant. Unless otherwise specified by the Geotechnical Consultant, stabilization fill construction should conform to the requirements of the Standard Details.

The Geotechnical Consultant should review cut slopes during excavation. The Geotechnical Consultant should be notified by the contractor prior to beginning slope excavations.

If, during the course of grading, adverse or potentially adverse geotechnical conditions are encountered which were not anticipated in the preliminary report, the Geotechnical Consultant should explore, analyze and make recommendations to treat these problems.

When cut slopes are made in the direction of the prevailing drainage, a non-erodible diversion swale (brow ditch) should be provided at the top-of-cut.

Pad Areas

All lot pad areas, including side yard terraces, above stabilization fills or buttresses should be over-excavated to provide for a minimum of 3-feet (refer to Standard Details) of compacted fill over the entire pad area. Pad areas with both fill and cut materials exposed and pad areas containing both very shallow (less than 3-feet) and deeper fill should be over-excavated to provide for a uniform compacted fill blanket with a minimum of 3-feet in thickness (refer to Standard Details).

Cut areas exposing significantly varying material types should also be over-excavated to provide for at least a 3-foot thick compacted fill blanket. Geotechnical conditions may require greater depth of over-excavation. The actual depth should be delineated by the Geotechnical Consultant during grading.

For pad areas created above cut or natural slopes, positive drainage should be established away from the top-of-slope. This may be accomplished utilizing a berm and/or an appropriate pad gradient. A gradient in soil areas away from the top-of-slopes of 2 percent or greater is recommended.

COMPACTED FILL

All fill materials should be compacted as specified below or by other methods specifically recommended by the Geotechnical Consultant. Unless otherwise specified, the minimum degree of compaction (relative compaction) should be 90 percent of the laboratory maximum density.

Placement

Prior to placement of compacted fill, the Contractor should request a review by the Geotechnical Consultant of the exposed ground surface. Unless otherwise recommended, the exposed ground surface should then be scarified (6-inches minimum), watered or dried as needed, thoroughly blended to achieve near optimum moisture conditions, then thoroughly compacted to a minimum of 90 percent of the maximum density. The review by the Geotechnical Consultant should not be considered to preclude requirements of inspection and approval by the governing agency.

Compacted fill should be placed in thin horizontal lifts not exceeding 8-inches in loose thickness prior to compaction. Each lift should be watered or dried as needed, thoroughly blended to achieve near optimum moisture conditions then thoroughly compacted by mechanical methods to a minimum of 90 percent of laboratory maximum dry density. Each lift should be treated in a like manner until the desired finished grades are achieved.

The Contractor should have suitable and sufficient mechanical compaction equipment and watering apparatus on the job site to handle the amount of fill being placed in consideration of moisture retention properties of the materials. If necessary, excavation equipment should be "shut down" temporarily in order to permit proper compaction of fills. Earth moving equipment should only be considered a supplement and not substituted for conventional compaction equipment.

When placing fill in horizontal lifts adjacent to areas sloping steeper than 5:1 (horizontal:vertical), horizontal keys and vertical benches should be excavated into the adjacent slope area. Keying and benching should be sufficient to provide at least 6-foot wide benches and minimum of 4-feet of vertical bench height within the firm natural ground, firm bedrock or engineered compacted fill. No compacted fill should be placed in an area subsequent to keying and benching until the area has been reviewed by the Geotechnical Consultant.

Material generated by the benching operation should be moved sufficiently away from the bench area to allow for the recommended review of the horizontal bench prior to placement of fill. Typical keying and benching details have been included within the accompanying Standard Details.

Within a single fill area where grading procedures dictate two or more separate fills, temporary slopes (false slopes) may be created. When placing fill adjacent to a false slope, benching should be conducted in the same manner as above described. At least a 3-foot vertical bench should be established within the firm core of adjacent approved compacted fill prior to placement of additional fill. Benching should proceed in at least 3-foot vertical increments until the desired finished grades are achieved.

Fill should be tested for compliance with the recommended relative compaction and moisture conditions. Field density testing should conform to ASTM Method of Test D 1556-07, and/or D 6938-10. Tests should be provided for about every 2 vertical feet or 1,000 cubic yards of fill placed. Actual test intervals may vary as field conditions dictate. Fill found not to be in conformance with the grading recommendations should be removed or otherwise handled as recommended by the Geotechnical Consultant.

The Contractor should assist the Geotechnical Consultant and/or his representative by digging test pits for removal determinations and/or for testing compacted fill.

As recommended by the Geotechnical Consultant, the Contractor should "shut down" or remove grading equipment from an area being tested.

The Geotechnical Consultant should maintain a plan with estimated locations of field tests. Unless the client provides for actual surveying of test locations, the estimated locations by the Geotechnical Consultant should only be considered rough estimates and should not be utilized for the purpose of preparing cross sections showing test locations or in any case for the purpose of after-the-fact evaluating of the sequence of fill placement.

Moisture

For field testing purposes, "near optimum" moisture will vary with material type and other factors including compaction procedures. "Near optimum" may be specifically recommended in Preliminary Investigation Reports and/or may be evaluated during grading.

Prior to placement of additional compacted fill following an overnight or other grading delay, the exposed surface or previously compacted fill should be processed by scarification, watered or dried as needed, thoroughly blended to near-optimum moisture conditions, then recompacted to a minimum of 90 percent of laboratory maximum dry density. Where wet or other dry or other unsuitable materials exist to depths of greater than 1 foot, the unsuitable materials should be over-excavated.

Following a period of flooding, rainfall or overwatering by other means, no additional fill should be placed until damage assessments have been made and remedial grading performed as described herein.

Fill Material

Excavated on-site materials which are acceptable to the Geotechnical Consultant may be utilized as compacted fill, provided trash, vegetation and other deleterious materials are removed prior to placement.

Where import materials are required for use on-site, the Geotechnical Consultant should be notified at least 72 hours in advance of importing, in order to sample and test materials from proposed borrow sites. No import materials should be delivered for use on-site without prior sampling and testing by Geotechnical Consultant.

Where oversized rock or similar irreducible material is generated during grading, it is recommended, where practical, to waste such material off-site or on-site in areas designated as "nonstructural rock disposal areas". Rock placed in disposal areas should be placed with sufficient fines to fill voids. The rock should be compacted in lifts to an unyielding condition. The disposal area should be covered with at least 3 feet of compacted fill which is free of oversized material. The upper 3 feet should be placed in accordance with the guidelines for compacted fill herein.

Rocks 8 inches in maximum dimension and smaller may be utilized within the compacted fill, provided they are placed in such a manner that nesting of the rock is avoided. Fill should be placed and thoroughly compacted over and around all rock. The amount of rock should not exceed 40 percent by dry weight passing the $^{3}/_{4}$-inch sieve size. The 12-inch and 40 percent recommendations herein may vary as field conditions dictate.

During the course of grading operations, rocks or similar irreducible materials greater than 8-inches maximum dimension (oversized material) may be generated. These rocks should not be placed within the compacted fill unless placed as recommended by the Geotechnical Consultant.

Where rocks or similar irreducible materials of greater than 8 inches but less than 4 feet of maximum dimension are generated during grading, or otherwise desired to be placed within an engineered fill, special handling in accordance with the accompanying Standard Details is recommended. Rocks greater than 4 feet should be broken down or disposed off-site. Rocks up to 4 feet maximum dimension should be placed below the upper 10 feet of any fill and should not be closer than 20-feet to any slope face. These recommendations could vary as locations of improvements dictate. Where practical, oversized material should not be placed below areas where structures or deep utilities are proposed.

Oversized material should be placed in windrows on a clean, over-excavated or unyielding compacted fill or firm natural ground surface. Select native or imported granular soil (S.E. 30 or higher) should be placed and thoroughly flooded over and around all windrowed rock, such that voids are filled. Windrows of oversized material should be staggered so that successive strata of oversized material are not in the same vertical plane.

It may be possible to dispose of individual larger rock as field conditions dictate and as recommended by the Geotechnical Consultant at the time of placement. Material that is considered unsuitable by the Geotechnical Consultant should not be utilized in the compacted fill.

During grading operations, placing and mixing the materials from the cut and/or borrow areas may result in soil mixtures which possess unique physical properties. Testing may be required of samples obtained directly from the fill areas in order to verify conformance with the specifications. Processing of these additional samples may take two or more working days. The Contractor may elect to move the operation to other areas within the project, or may continue placing compacted fill pending laboratory and field test results. Should he elect the second alternative, fill placed is done so at the Contractor's risk.

Any fill placed in areas not previously reviewed and evaluated by the Geotechnical Consultant, and/or in other areas, without prior notification to the Geotechnical Consultant may require removal and recompaction at the Contractor's expense. Determination of over-excavations should be made upon review of field conditions by the Geotechnical Consultant.

Fill Slopes

Unless otherwise recommended by the Geotechnical Consultant and approved by the regulating agencies, permanent fill slopes should not be steeper than 2:1 (horizontal to vertical).

Except as specifically recommended otherwise or as otherwise provided for in these grading guidelines (Reference Fill Materials), compacted fill slopes should be overbuilt and cut back to grade, exposing the firm, compacted fill inner core. The actual amount of overbuilding may vary as field conditions dictate. If the desired results are not achieved, the existing slopes should be over-excavated and reconstructed under the guidelines of the Geotechnical Consultant. The degree of overbuilding shall be increased until the desired compacted slope surface condition is achieved. Care should be taken by the Contractor to provide thorough mechanical compaction to the outer edge of the overbuilt slope surface.

Although no construction procedure produces a slope free from risk of future movement, overfilling and cutting back of slope to a compacted inner core is, given no other constraints, the most desirable procedure. Other constraints, however, must often be considered. These constraints may include property line situations, access, the critical nature of the development and cost. Where such constraints are identified, slope face compaction may be attempted by conventional construction procedures including back rolling techniques upon specific recommendation by the Geotechnical Consultant.

As a second best alternative for slopes of 2:1 (horizontal to vertical) or flatter, slope construction may be attempted as outlined herein. Fill placement should proceed in thin lifts, (i.e., 6 to 8 inch loose thickness). Each lift should be moisture conditioned and thoroughly compacted. The desired moisture condition should be maintained and/or reestablished, where necessary, during the period between successive lifts. Selected lifts should be tested to ascertain that desired compaction is being achieved. Care should be taken to extend compactive effort to the outer edge of the slope. Each lift should extend horizontally to the desired finished slope surface or more as needed to ultimately establish desired grades. Grade during construction should not be allowed to roll off at the edge of the slope. It may be helpful to elevate slightly the outer edge of the slope.

Slough resulting from the placement of individual lifts should not be allowed to drift down over previous lifts. At intervals not exceeding 4 feet in vertical slope height or the capability of available equipment, whichever is less, fill slopes should be thoroughly backrolled utilizing a conventional sheeps foot-type roller. Care should be taken to maintain the desired moisture conditions and/or reestablishing same as needed prior to backrolling. Upon achieving final grade, the slopes should again be moisture conditioned and thoroughly backrolled. The use of a side-boom roller will probably be necessary and vibratory methods are strongly recommended. Without delay, so as to avoid (if possible) further moisture conditioning, the slopes should then be grid-rolled to achieve a relatively smooth surface and uniformly compact condition.

In order to monitor slope construction procedures, moisture and density tests will be taken at regular intervals. Failure to achieve the desired results will likely result in a recommendation by the Geotechnical Consultant to over-excavate the slope surfaces followed by reconstruction of the slopes utilizing overfilling and cutting back procedures and/or further attempt at the conventional backrolling approach. Other recommendations may also be provided which would be commensurate with field conditions.

Where placement of fill above a natural slope or above a cut slope is proposed, the fill slope

configuration as presented in the accompanying Standard Details should be adopted.

For pad areas above fill slopes, positive drainage should be established away from the top-of-slope. This may be accomplished utilizing a berm and pad gradients of at least 2 percent in soil areas.

Off-Site Fill

Off-site fill should be treated in the same manner as recommended in these specifications for site preparation, excavation, drains, compaction, etc.

Off-site canyon fill should be placed in preparation for future additional fill, as shown in the accompanying Standard Details.

Off-site fill subdrains temporarily terminated (up canyon) should be surveyed for future relocation and connection.

DRAINAGE

Canyon subdrain systems specified by the Geotechnical Consultant should be installed in accordance with the Standard Details.

Typical subdrains for compacted fill buttresses, slope stabilization or sidehill masses, should be installed in accordance with the specifications of the accompanying Standard Details.

Roof, pad and slope drainage should be directed away from slopes and areas of structures to suitable disposal areas via non-erodible devices (i.e., gutters, downspouts, concrete swales).

For drainage over soil areas immediately away from structures (i.e., within 4 feet), a minimum of 5 percent gradient should be maintained. Pad drainage of at least 2 percent should be maintained over soil areas. Pad drainage may be reduced to at least 1 percent for projects where no slopes exist, either natural or man-made, or greater than 10-feet in height and where no slopes are planned, either natural or man-made, steeper than 2:1 (horizontal to vertical slope ratio).

Drainage patterns established at the time of fine grading should be maintained throughout the life of the project. Property owners should be made aware that altering drainage patterns can be detrimental to slope stability and foundation performance.

STAKING

In all fill areas, the fill should be compacted prior to the placement of the stakes. This particularly is important on fill slopes. Slope stakes should not be placed until the slope is thoroughly compacted (backrolled). If stakes must be placed prior to the completion of compaction procedures, it must be recognized that they will be removed and/or demolished at such time as compaction procedures resume.

In order to allow for remedial grading operations, which could include over-excavations or slope stabilization, appropriate staking offsets should be provided. For finished slope and stabilization backcut areas, we recommend at least a 10-feet setback from proposed toes and tops-of-cut.

SLOPE MAINTENANCE

Landscape Plants

In order to enhance surficial slope stability, slope planting should be accomplished at the completion of grading. Slope planting should consist of deep-rooting vegetation requiring little watering. Plants native to the southern California area and plants relative to native plants are generally desirable. Plants native to other semi-arid and arid areas may also be appropriate. A Landscape Architect would be the best party to consult regarding actual types of plants and planting configuration.

Irrigation

Irrigation pipes should be anchored to slope faces, not placed in trenches excavated into slope faces.

Slope irrigation should be minimized. If automatic timing devices are utilized on irrigation systems, provisions should be made for interrupting normal irrigation during periods of rainfall.

Though not a requirement, consideration should be given to the installation of near-surface moisture monitoring control devices. Such devices can aid in the maintenance of relatively uniform and reasonably constant moisture conditions.

Property owners should be made aware that overwatering of slopes is detrimental to slope stability.

Maintenance

Periodic inspections of landscaped slope areas should be planned and appropriate measures should be taken to control weeds and enhance growth of the landscape plants. Some areas may require occasional replanting and/or reseeding.

Terrace drains and down drains should be periodically inspected and maintained free of debris. Damage to drainage improvements should be repaired immediately.

Property owners should be made aware that burrowing animals can be detrimental to slope stability. A preventative program should be established to control burrowing animals.

As a precautionary measure, plastic sheeting should be readily available, or kept on hand, to protect all slope areas from saturation by periods of heavy or prolonged rainfall. This measure is strongly recommended, beginning with the period of time prior to landscape planting.

Repairs

If slope failures occur, the Geotechnical Consultant should be contacted for a field review of site conditions and development of recommendations for evaluation and repair.

If slope failures occur as a result of exposure to periods of heavy rainfall, the failure area and currently unaffected areas should be covered with plastic sheeting to protect against additional saturation.

In the accompanying Standard Details, appropriate repair procedures are illustrated for superficial slope failures (i.e., occurring typically within the outer 1 foot to 3 feet of a slope face).

TRENCH BACKFILL

Utility trench backfill should, unless otherwise recommended, be compacted by mechanical means. Unless otherwise recommended, the degree of compaction should be a minimum of 90 percent of the laboratory maximum density.

Backfill of exterior and interior trenches extending below a 1:1 projection from the outer edge of foundations should be mechanically compacted to a minimum of 90 percent of the laboratory maximum density.

In cases where clean granular materials are proposed for use in lieu of native materials or where flooding or jetting is proposed, the procedures should be considered subject to review by the Geotechnical Consultant.

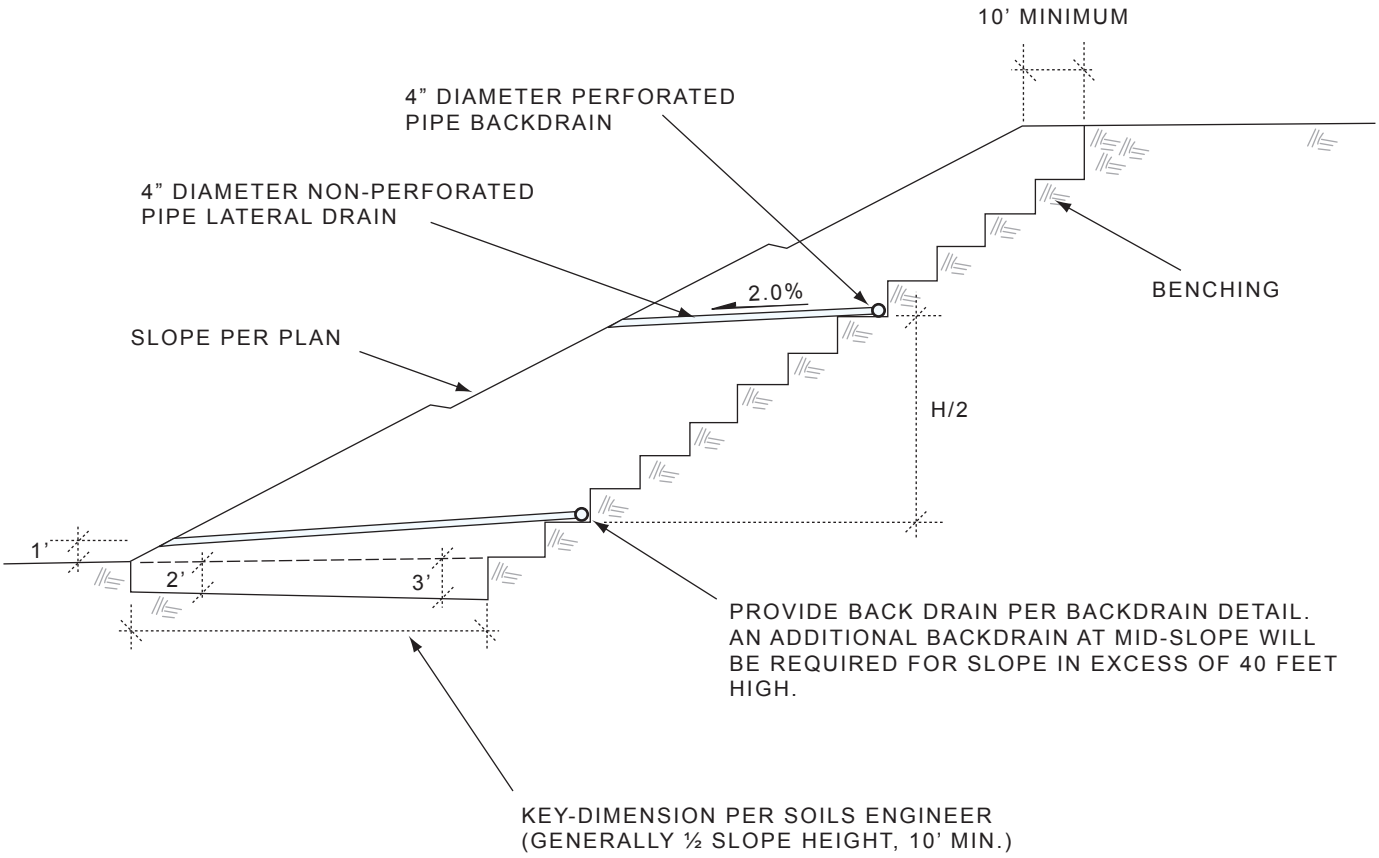
Clean Granular backfill and/or bedding are not recommended in slope areas unless provisions are made for a drainage system to mitigate the potential build-up of seepage forces.

STATUS OF GRADING

Prior of proceeding with any grading operation, the Geotechnical Consultant should be notified at least two working days in advance in order to schedule the necessary observation and testing services.

Prior to any significant expansion or cut back in the grading operation, the Geotechnical Consultant should be provided with adequate notice (i.e., two days) in order to make appropriate adjustments in observation and testing services.

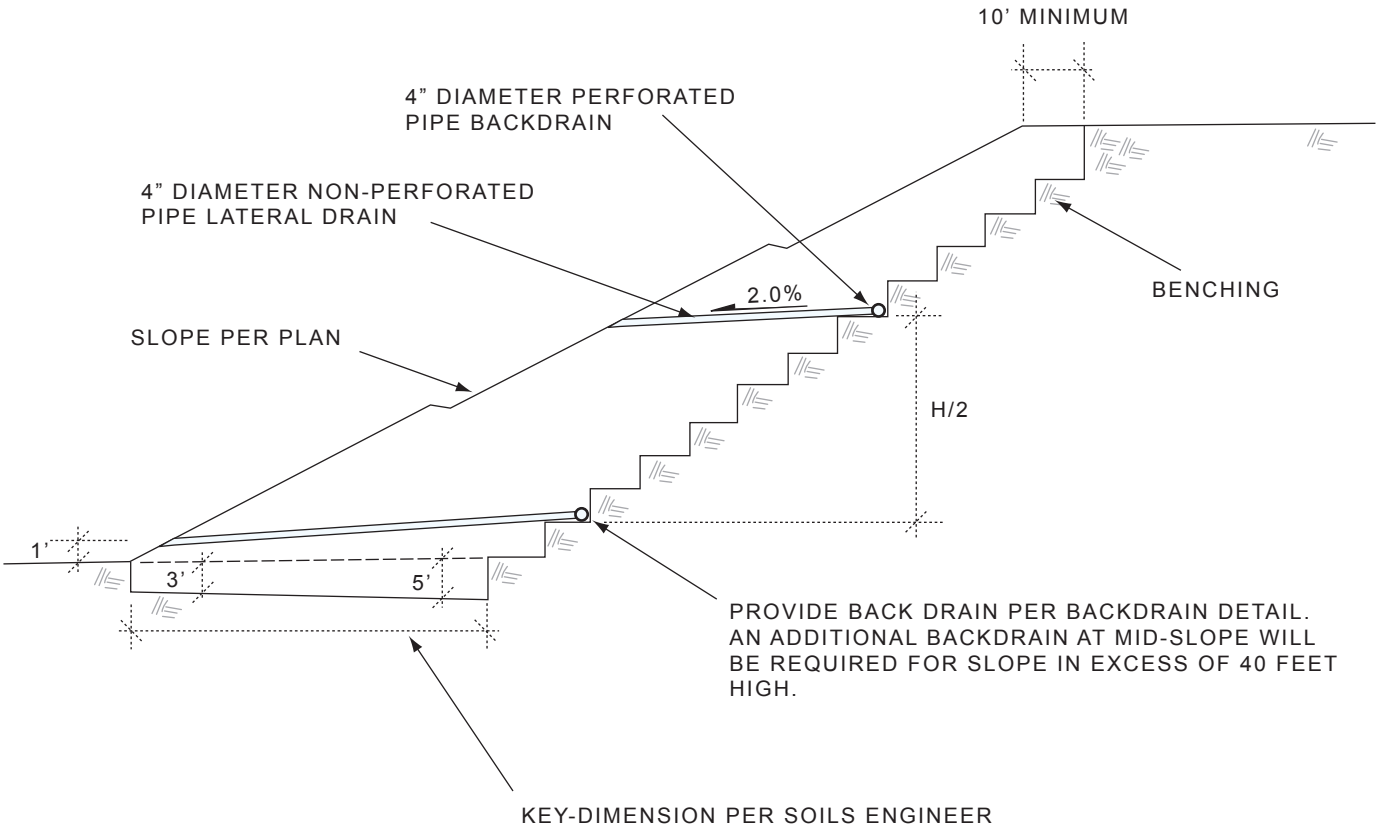
Following completion of grading operations and/or between phases of a grading operation, the Geotechnical Consultant should be provided with at least two working days notice in advance of commencement of additional grading operations.



TYPICAL STABILIZATION FILL DETAIL

NOT TO SCALE

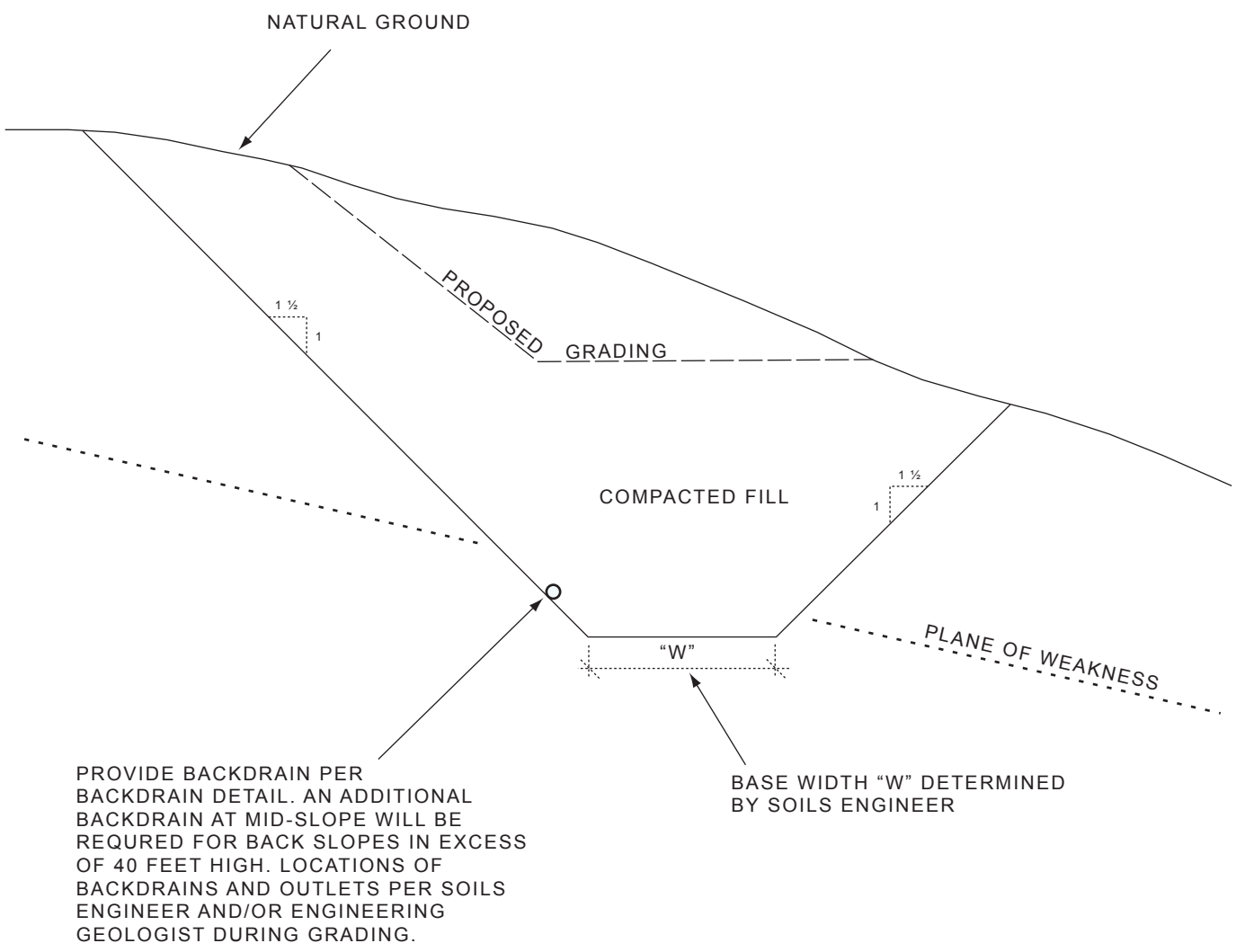
FIGURE 1



TYPICAL BUTTRESS FILL DETAIL

NOT TO SCALE

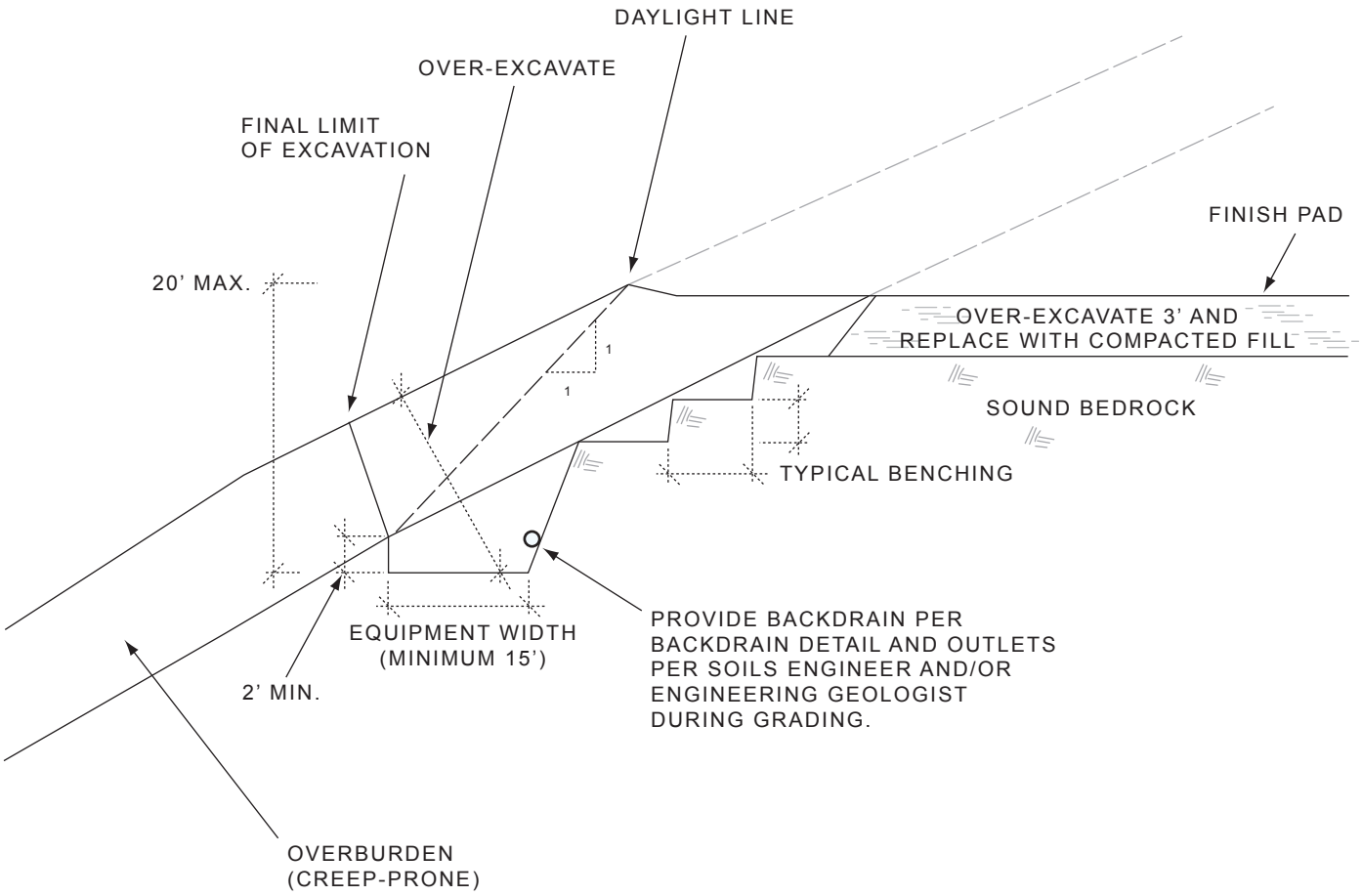
FIGURE 2



TYPICAL SHEAR KEY DETAIL

NOT TO SCALE

FIGURE 3



DAYLIGHT SHEAR KEY DETAIL

NOT TO SCALE

FIGURE 4

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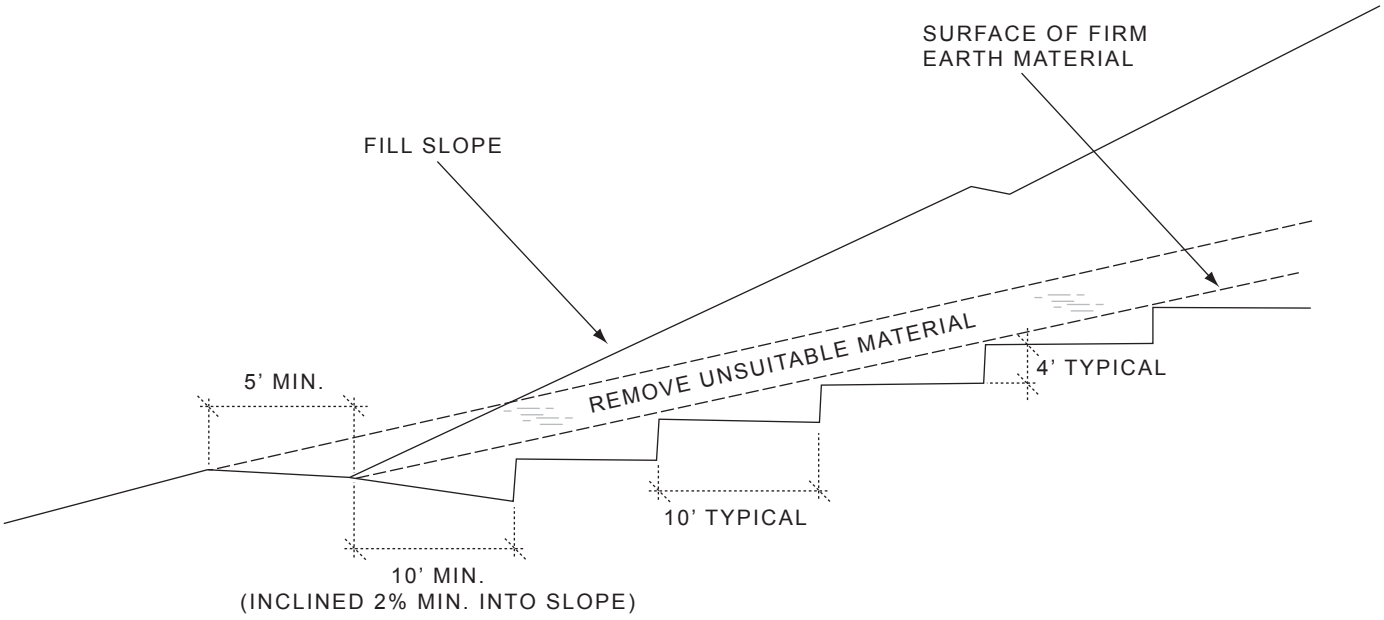
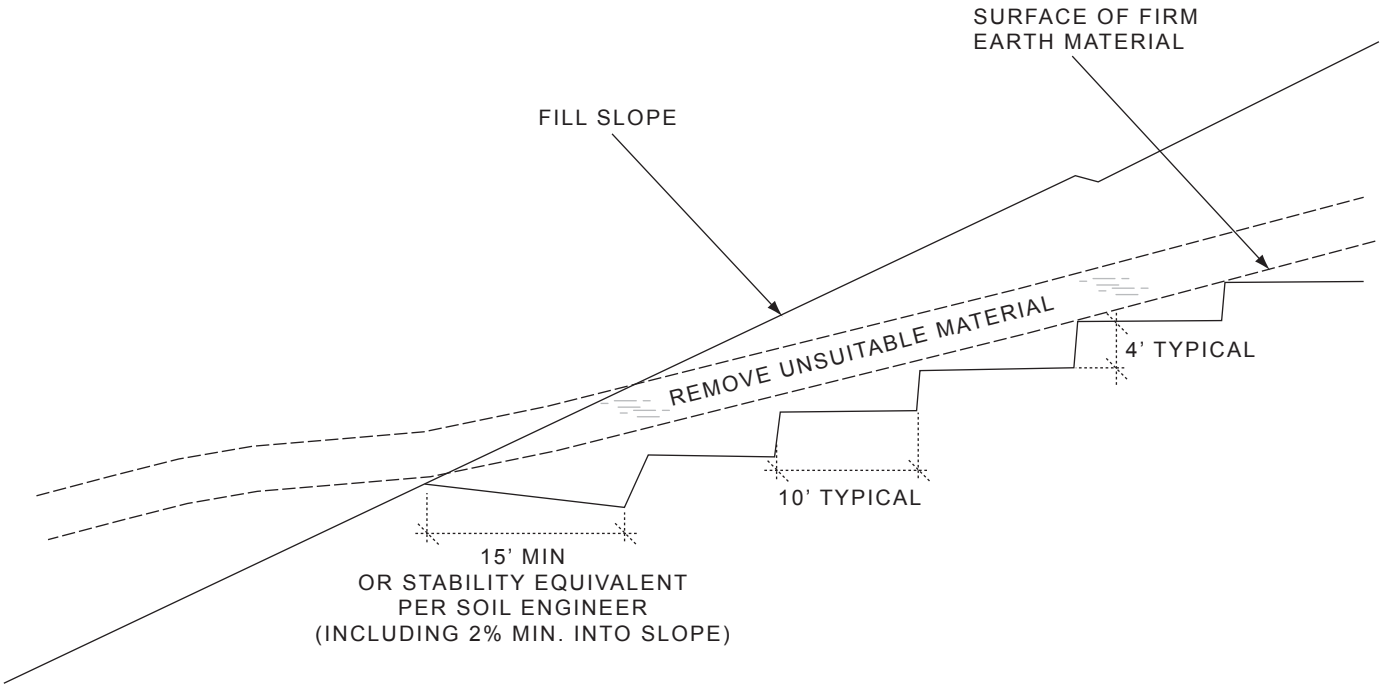
BENCHING FILL OVER NATURAL



BENCHING FILL OVER CUT



BENCHING FOR COMPACTED FILL DETAIL

NOT TO SCALE

FIGURE 5

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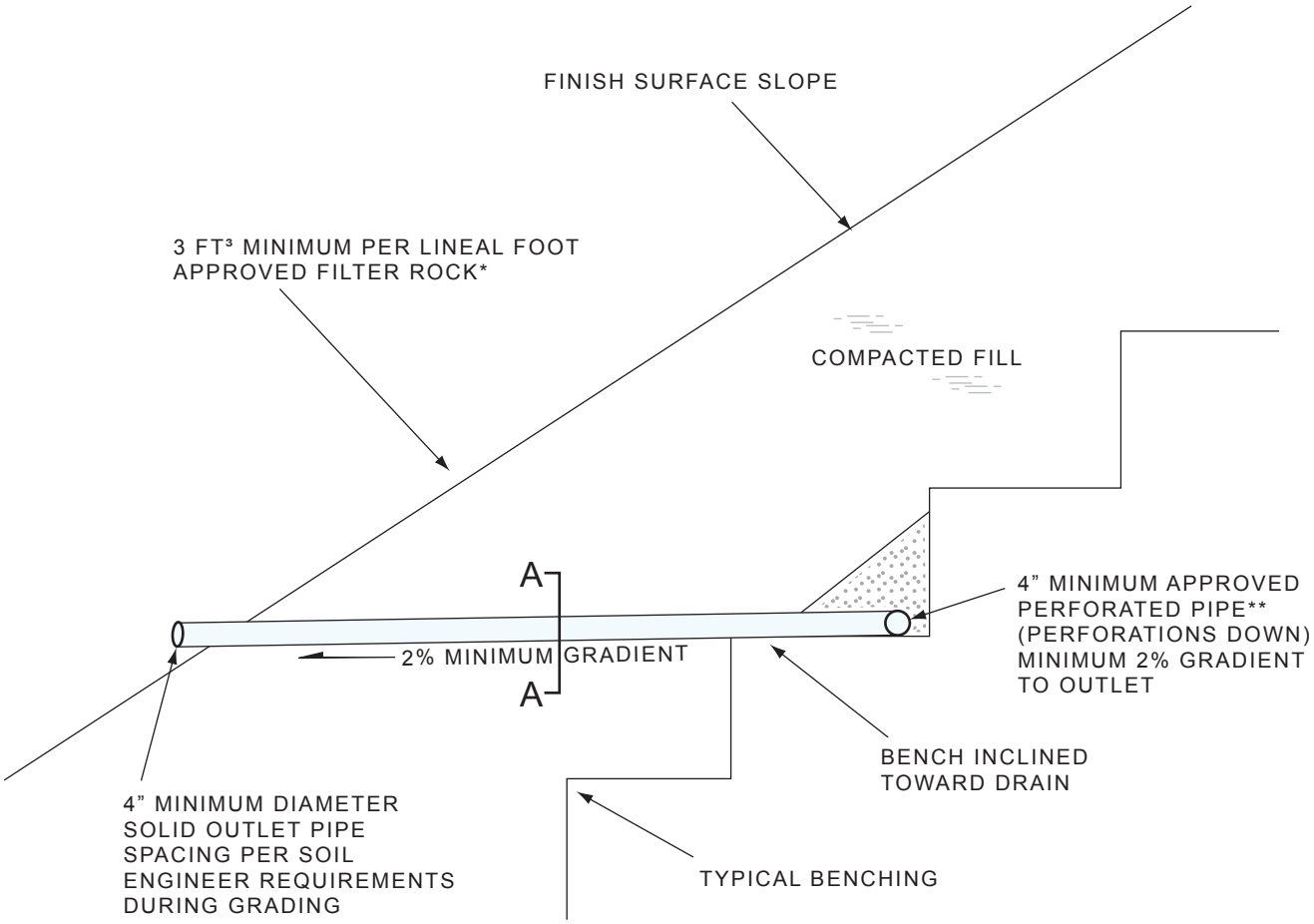
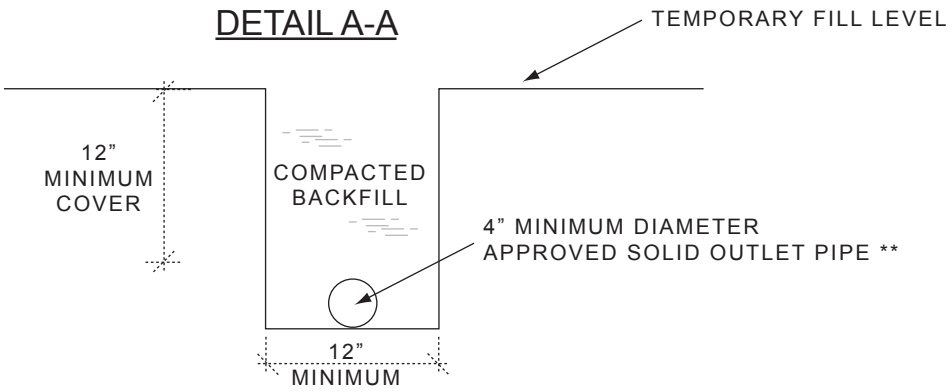


DETAIL A-A



* Filter rock to meet following specifications or approved equal.

Sieve	% Passing
1"	100
3/4"	90-100
3/8"	40-100
No.4	25-40
No.30	5-15
No.50	0-7
No.200	0-3

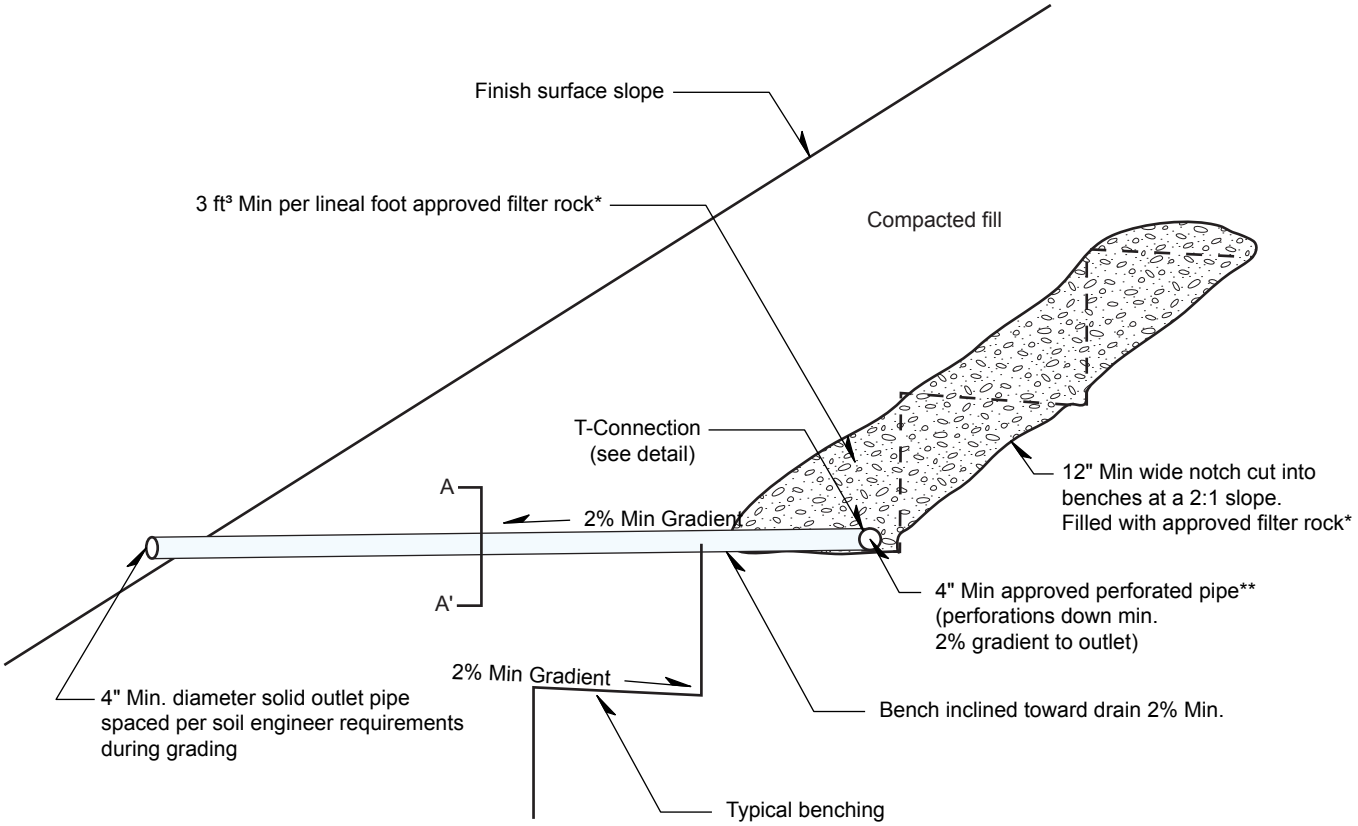
** APPROVED PIPE TYPE

Schedule 40 polyvinyl chloride (P.V.C.) or approved equal.
Min. crush strength 1000 PSI.

TYPICAL BACKDRAIN DETAIL

NOT TO SCALE

FIGURE 6



* Filter rock to meet following specifications or approved equal.

Sieve	% Passing
1"	100
3/4"	90-100
3/8"	40-100
No.4	25-40
No.30	5-15
No.50	0-7
No.200	0-3

** Approved pipe type:
Schedule 40 polyvinyl chloride (P.V.C.) or approved equal.
Min. crush strength 1000 PSI.

BACKDRAIN DETAIL (GEOFABRIC)

FIGURE 7

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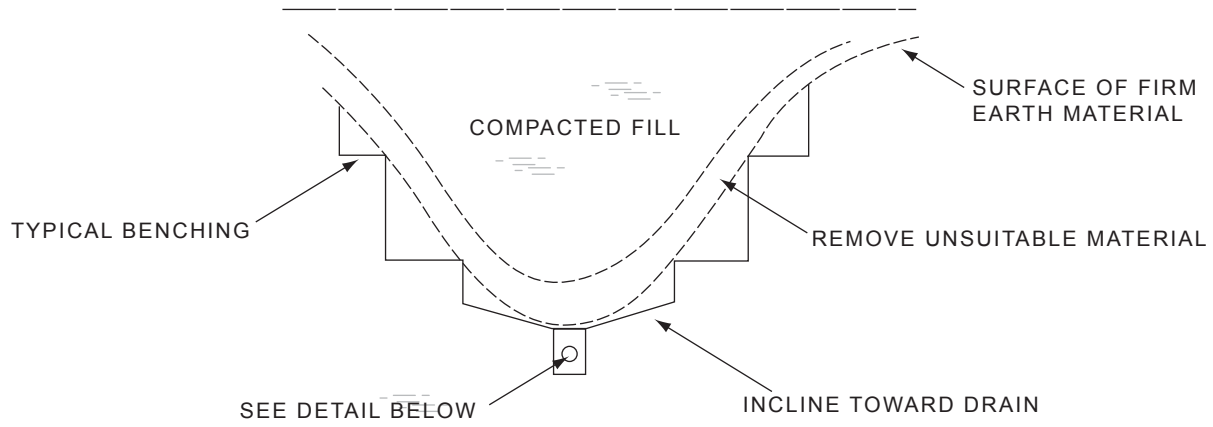
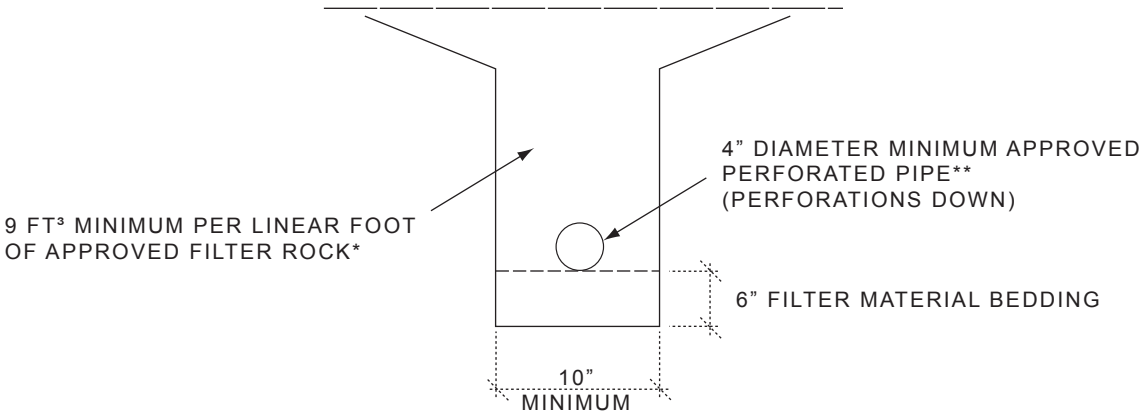


DETAIL



* Filter rock to meet following specifications or approved equal.

Sieve	% Passing
1"	100
3/4"	90-100
3/8"	40-100
No.4	25-40
No.30	5-15
No.50	0-7
No.200	0-3

** APPROVED PIPE TYPE

Schedule 40 polyvinyl chloride (P.V.C.) or approved equal.
Min. crush strength 1000 PSI.

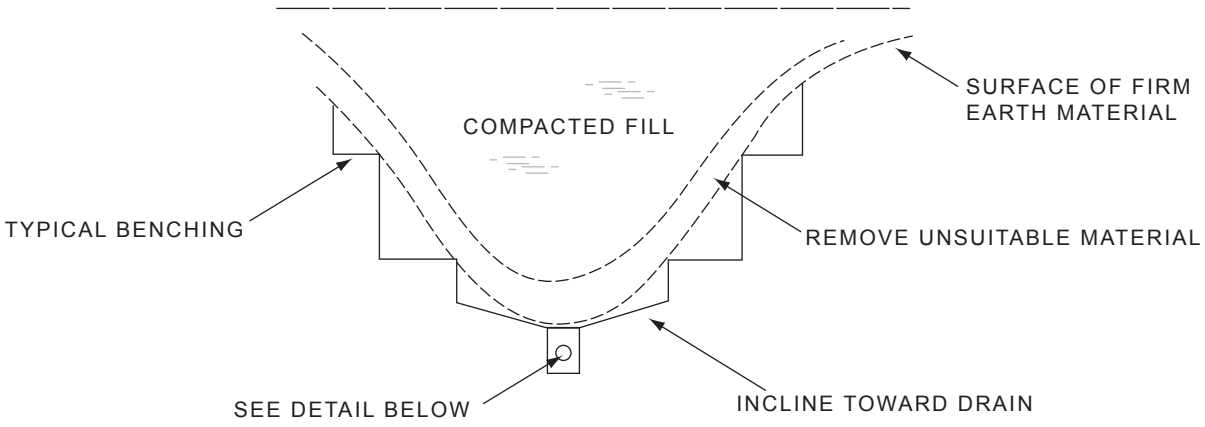
Pipe diameter to meet hte following criteria. Subject to field review based on actual geotechnical conditions encountered during grading.

Length of Run	Pipe Diameter
Upper 500'	4"
Next 1000'	6"
>1500'	8"

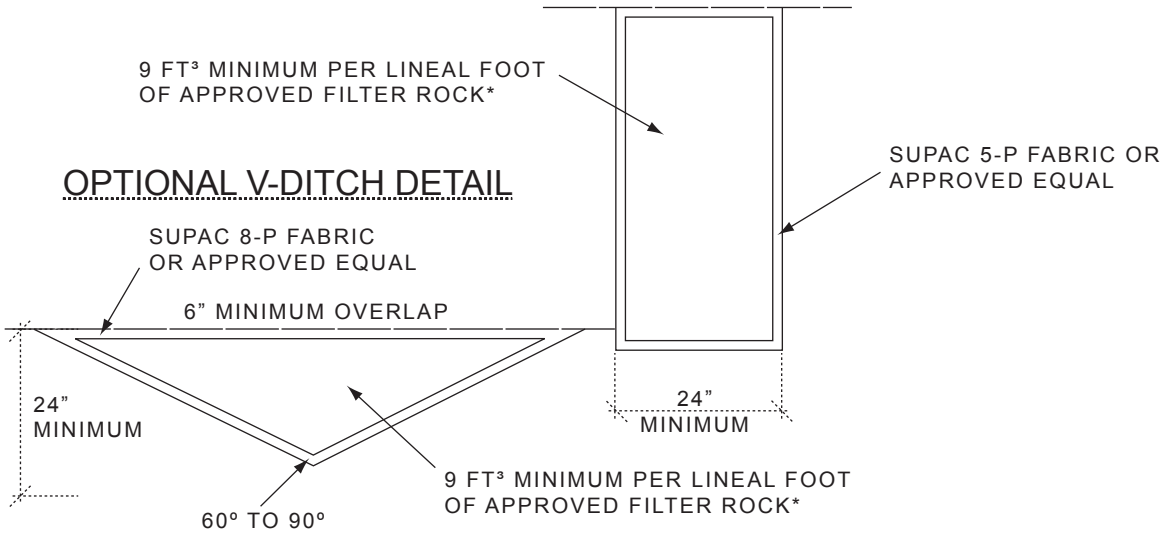
TYPICAL CANYON SUBDRAIN DETAIL

NOT TO SCALE

FIGURE 8



TRENCH DETAIL



* Drainage material to meet following specifications or approved equal.

Sieve	% Passing
1 ½"	88-100
1"	5-40
3/4"	0-17
3/8"	0-7
No.200	0-3

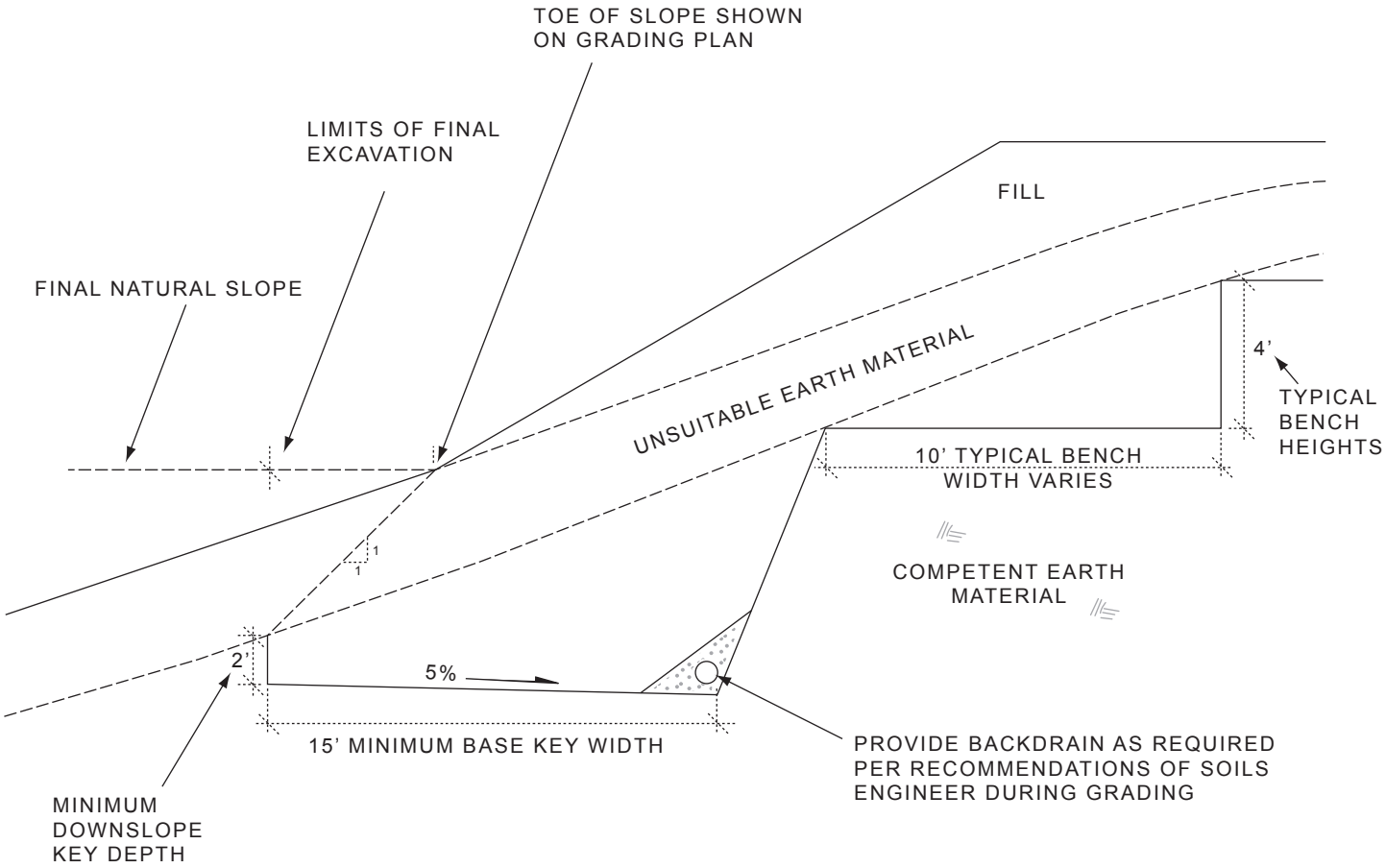
ADD MINIMUM 4" DIAMETER APPROVED PERFORATED PIPE WHEN GRADIENT IS LESS THAN 2%

APPROVED PIPE TO BE SCHEDULE 40 POLY-VINYL-CHLORIDE (P.V.C.) OR APPROVED EQUAL. MINIMUM CRUSH STRENGTH 1000 psi.

GEOFABRIC SUBDRAIN

NOT TO SCALE

FIGURE 9



WHERE NATURAL SLOPE GRADIENT IS 5:1 OR LESS, BENCHING IS NOT NECESSARY. HOWEVER, FILL IS NOT TO BE PLACED ON COMPRESSIBLE OR UNSUITABLE MATERIAL.

FILL SLOPE ABOVE NATURAL GROUND DETAIL

NOT TO SCALE

FIGURE 10

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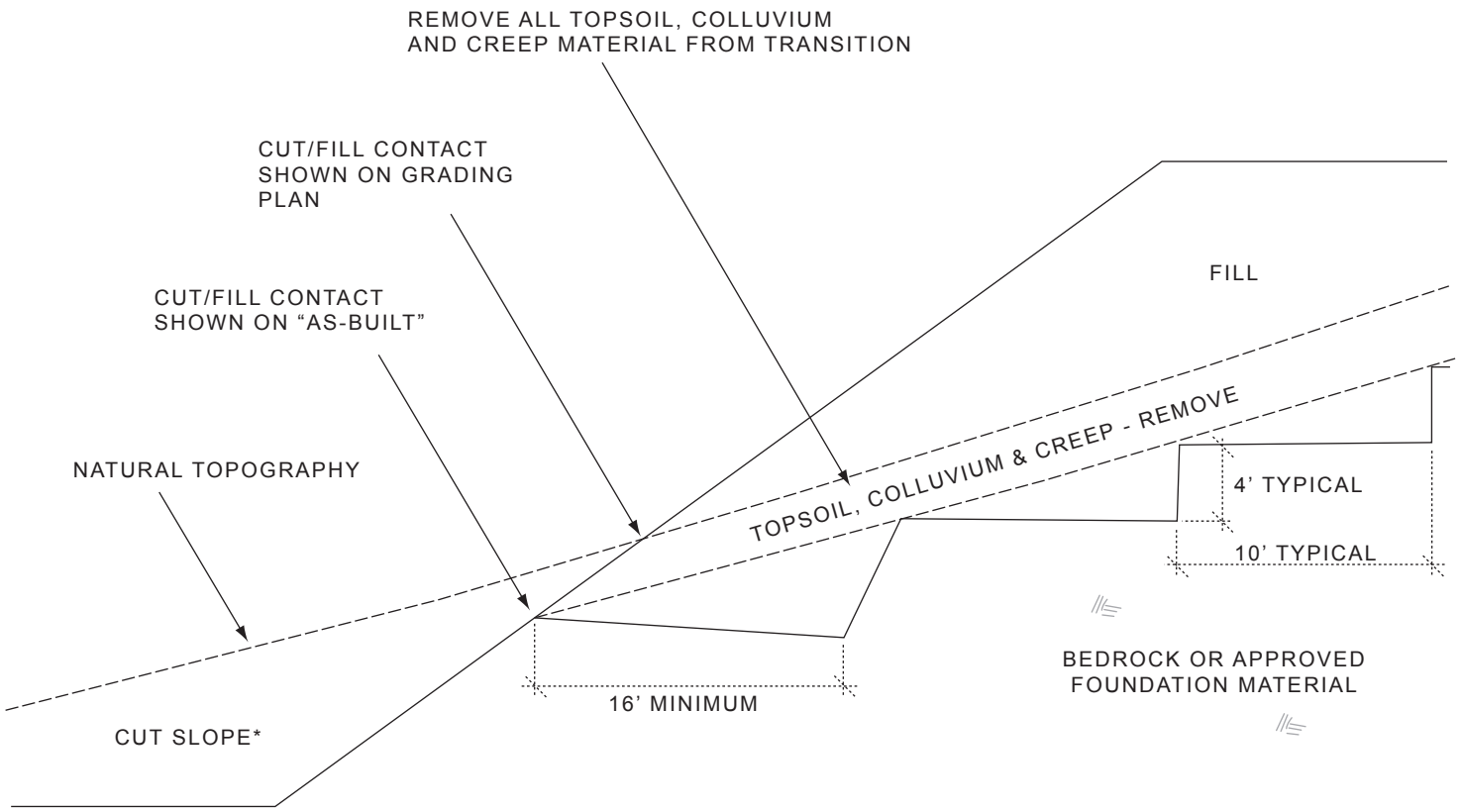


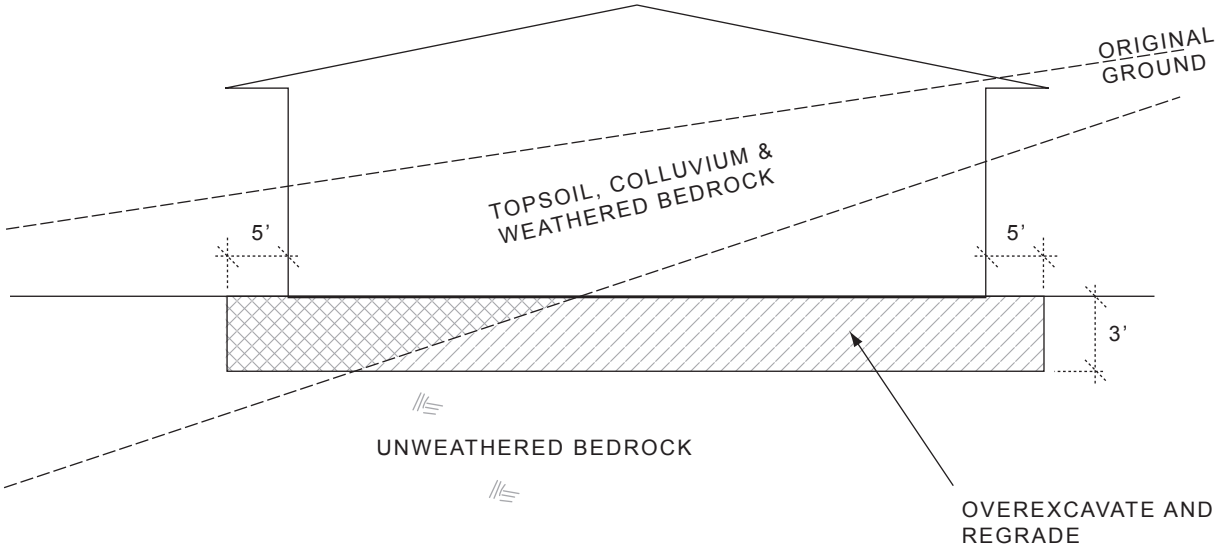
NOTE:
CUT SLOPE PORTION SHALL BE MADE
PRIOR TO PLACEMENT OF FILL

FILL SLOPE ABOVE CUT SLOPE DETAIL

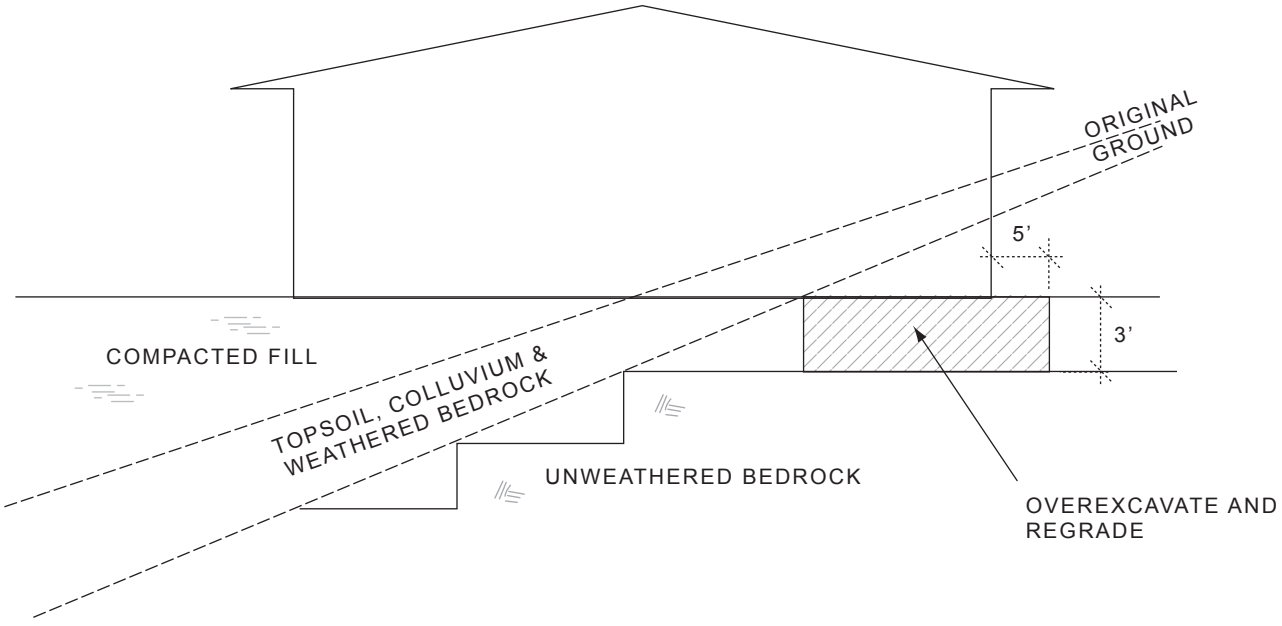
NOT TO SCALE

FIGURE 11

CUT LOT



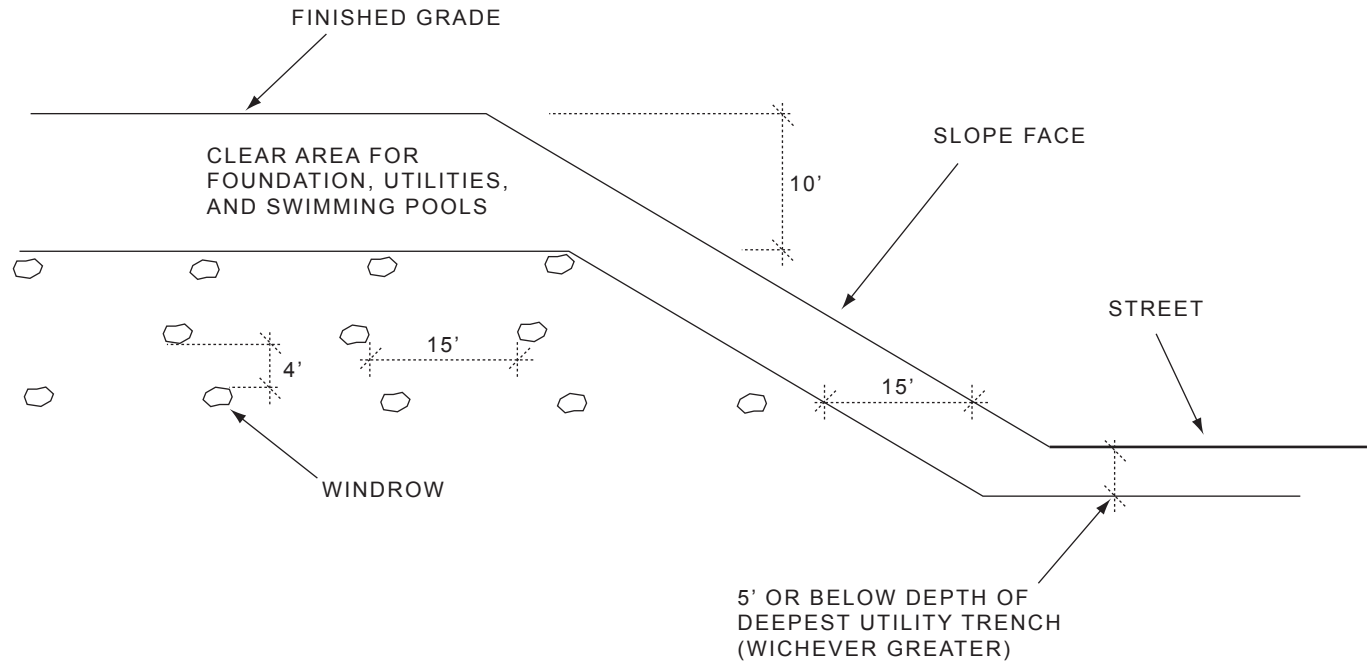
CUT/FILL LOT (TRANSITION)

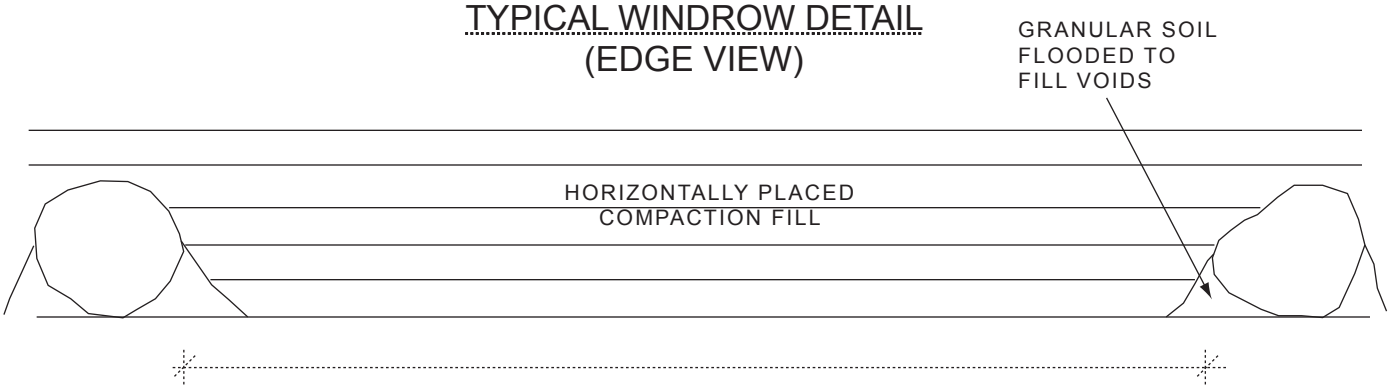


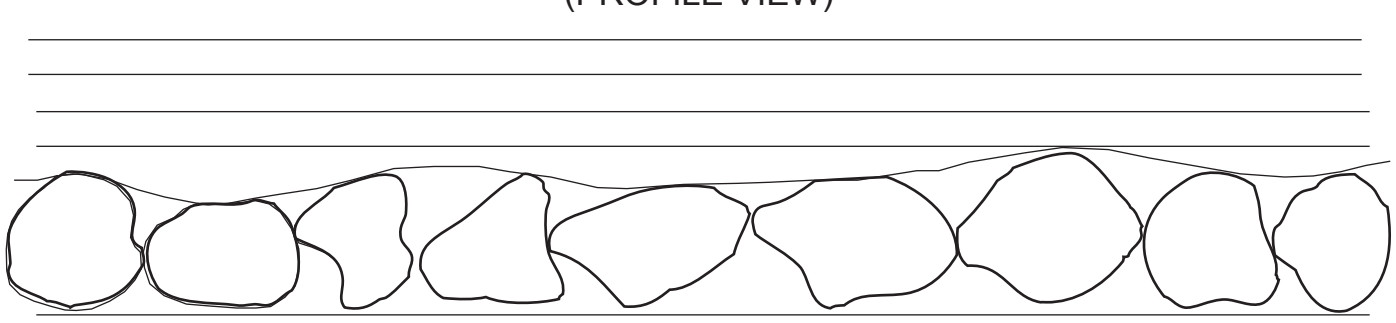
TRANSITION LOT DETAIL

NOT TO SCALE

FIGURE 12







ROCK DISPOSAL DETAIL

NOT TO SCALE

FIGURE 13

Water Pollution Control Plan

for Project: Price-Cohen Residence

Located at:

Address: 2045 Lowry Place, La Jolla CA 92037

WPCP Prepared by:

Company: Coffey Engineering, Inc.

Individual: Michael C. Kinnear

Address: 9666 Businesspark Avenue, Suite 210
San Diego, CA 92131

Preparation Date: 07/20/2018

Prepared for:

City of San Diego

Department: Development Services Department

Address: 1222 First Avenue, MS 301
San Diego, CA 92101

TABLE OF CONTENTS

APPENDICES

A SITE MAP (TO BE COMPLETED BY APPLICANT)
B CERTIFICATION
C CITY OF SAN DIEGO FORM DS-560, STORM WATER REQUIREMENTS APPLICABILITY CHECKLIST
D RELEVANT BMP FACT SHEETS FROM CASQA OR CALTRANS
E BMP INSPECTION CHECKLIST

LIST OF TABLES

1.0 PROJECT INFORMATION

1.1 INTRODUCTION

The San Diego Regional Water Quality Control Board (RWQCB) adopted Order No. R9-2013-0001, *National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region* on May 8, 2013 (MS4 Permit). The MS4 Permit requires the City of San Diego (City) to necessitate implementing effective best management practices (BMPs) to reduce discharges of pollutants in storm water from construction sites to the maximum extent practicable and effectively prohibit non-storm water discharges from construction sites into the MS4. These BMPs must be site specific, seasonally appropriate, and construction phase appropriate. BMPs must be implemented at each construction site year-round. Dry season BMP implementation must plan for and address unseasonal rain events that may occur during the dry season (May 1 through September 30).

Construction projects that result in disturbance of one acre or more of total land area or are part of a larger common plan of development or sale must obtain coverage under the State Water Resource Control Board's (SWRCB's) *NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities Order No. 2009-0009-DWQ* NPDES No. CAS000002 (Construction General Permit). The Construction General Permit requires developing and implementing a Storm Water Pollution Prevention Plan (SWPPP).

A Water Pollution Control Plan (WPCP) must be developed and implemented for construction projects that:

- Result in disturbance of less than one acre of total land area and are not part of a larger common plan of development or sale; and

- Have *Grading*, *Public Right-of-Way*, and *Demolition/Removal* approval types (see the City's Form DS-560) or require submittal for a Drainage and Grades review.

This template may be utilized to meet the City's WPCP requirement.

A Minor Water Pollution Control Plan (MWPCP) (see the City's Form DS-570) may be developed and implemented for projects that disturb less than 5,000 square feet and have less than a 5 foot elevation differential over the entire project area. Some construction project types, such as interior plumbing, electrical and mechanical work, may be considered exempt. The City's Form DS-560, *Storm Water Requirements Applicability Checklist* can be used to determine the storm water requirements for the project (see Appendix C).

NOTE: It is the responsibility of the project owner to ensure that all construction activities comply with local and state regulations, including San Diego Municipal Code Sect. 43.03. The guidance and template provided here is for the applicant's convenience and do not alleviate responsibility on part of the project owner to determine the appropriate level of BMP planning and implementation to prevent pollutant discharges.

1.2 OBJECTIVES

The main objectives of the WPCP are:

- To identify all pollutant sources which may affect the quality of storm water discharges from the site associated with construction activities;

- To identify non-storm water discharges and eliminate unauthorized non-storm water discharges, illicit connections, and dumping;

- To establish, construct, implement, and maintain best management practices (BMPs) to reduce or eliminate pollutants in storm water discharges and authorized non–storm water discharges from the construction site; and

- To develop an inspection program to determine the effectiveness of site BMPs.

1.3 GENERAL PROJECT INFORMATION

This section provides project information relevant to the development of this WPCP.

1.3.1 Project Location

The project location and identifying information are provided in Table 1.

Table 1 **Project Location and Contact Information**

Contact Information			
Applicant Name: **For Private use Owner; For CIP use Asset Department Name**	**Contact Name**: Thomas Cohen /or Lena Price		
Mailing Address: 2045 Lowry Place	**City**: La Jolla	**State**: CA	**Zip Code:** 92037
Telephone No.: (913)-645-8555	**Email address**: rfinal@yahoo.com		
Project Information			
Address: 2045 Lowry Place	**City:** La Jolla	**State:** CA	**Zip Code:** 92037
APN No.: 346-482-04-00	**Permit Application No.For CIP use WBS#**		
Contractor Company Name: TBD		**Contact Name:** TBD	
Address: TBD	**City**:	**State:**	**Zip Code:**
Telephone No.: TBD	**Email address**:		
Qualified Contact Person (QCP): TBD			
Telephone No.: TBD	**Email address**: TBD		

1.3.2 Project Description

The project description is provided in Table 2.

Table 2 **Project Description**

Project Scope:	This project proposes the remodel of an existing single-family residence with new hardscape and landscape features. The new replacement of an existing shared driveway is also part of the project scope.
Land Use Type:	Residential
Watershed:	Mission Bay / La Jolla
Receiving Water Body:	Pacific Ocean Shoreline, Scripps HA, at La Jolla Cove
303(d) Listed Impairments	Total Coliform (Bacteria)
Soil Type:	Undetermined
Slope Inclination:	16%
Slope Aspect:	West
Fill Material and Borrow Area Location(s):	Grading is to take place in the driveway.
Storm Water Conveyance:	On-site storm water will surface drain in the westerly direction towards the fronting street of Lowry Place. A series of on-site landscape drains will convey storm water runoff to a D-27 curb outlet along Lowry Place.
Existing and Planned Storm Water Features:	Existing - storm water sheet flows into Lowry Place Proposed - new on-site landscape drains will intercept storm water runoff before discharging via D-27 curb outlet along Lowry Place.
Sources of Run-on to the Site:	N/A
Discharge Locations:	D-27 curb outlet on Lowry Place, storm water will then be intercepted by public storm drains to discharge into Pacific Ocean Shoreline
Other Site Features:	None

1.3.3 Project Size

The size of the project and disturbed area is described in Table 3, as well as the elevation differential over the project area.

Table 3 **Project Size**

Total Project Size (in ac): 0.13 AC.	**Estimated Amount of Disturbed Area (ac):** 0.13 AC.
Estimated Elevation Differential over Entire Project Area (ft): 13 FT.	

1.3.4 Construction Schedule

The construction schedule is provided in Table 4, including an indication of activities to be performed in the rainy season and the phase of construction (Grading and Land Development, Streets and Utilities, Vertical Construction, or Post-Construction). The rainy season is October 1 through April 30 of each year. The schedule shall include dates for installation and removal of construction BMPs. In addition, the schedule shall identify periods of inactivity exceeding 14 days (Slope stabilization is required on all inactive slopes during the rainy season).

Table 4 **Construction Schedule**

Construction Activity	Start Date	Finish Date	Rainy Season (Y/N)	Phase of Construction
Site Prep.	12/1/18	12/2/18	Y	Construction Prep
Clearing & Grubbing	12/4/18	12/12/18	Y	Construction Prep
Rough Grading	12/15/18	01/2/18	Y	Construction Prep
Building Construction	01/5/18	04/13/18	Y	Vertical Construction
Underground Utility Connections	01/24/18	02/16/18	Y	Streets and utilities
Site Paving	02/19/18	03/13/18	Y	Streets and utilities
Final Stabilization	03/16/18	04/11/18	Y	Post Construction

1.3.5 Site Priority

Select the site priority identified on the City's Form DS-560 (see Appendix C) in Table 5.

Table 5 **Site Priority**

Site Priority	Check One
ASBS: Projects located in the ASBS watershed.	☑
High: Projects 1 acre or more determined to be Risk Level 2 or Risk Level 3 per the Construction General Permit and not located in the ASBS watershed; Projects 1 acre or more determined to be LUP Type 2 or LIP Type 3 per the Construction General Permit and not located in the ASBS watershed.	☐
Medium: Projects 1 acre or more but not subject to an ASBS or high priority designation.	☐
Low: Projects requiring a WPCP, but not subject to an ASBS, medium, or high priority designation.	☐
If "High", is the project covered under an Erosivity Waiver by the RWQCB?	Yes ☐ No ☐
If "Yes", provide WDID# and include a copy of the NOI in the Appendix.	

1.3.6 Site Features, Construction Activities, and Associated Potential Pollutants

Potential pollutant sources may stem from construction materials used on-site that are not designed to be outdoors and exposed to environmental conditions (i.e., are used in the process of construction, but are not the final product). Construction materials have the potential to come into contact with storm water when stored or used outdoors on the site.

Table 6 **Determination of Site Features, Activities, and Potential Pollutants**

No.	Site Feature Question	No	Yes	If *Yes*, Select BMPs from Table:
1	Is there run-on to the site from surrounding areas?	☑	☐	14
2	Are storm drain inlets located within the project boundary and/or will the site discharge storm water to nearby storm drain inlets?	☐	☑	12 and 14
3	Will concentrated flows and/or large accumulations of water occur on-site?	☑	☐	14
4	Is the site adjacent to a waterway or sensitive habitat (i.e., wetland, vernal pool, etc.)? Note: additional permitting may be required.	☑	☐	11
5	Is the site likely to discharge to impaired or sensitive water bodies (tributary to a Clean Water Act Section 303[d]-listed/impaired water body segments), adjacent to or discharging directly to coastal lagoons, or other receiving waters in Environmentally Sensitive Areas (as defined in Attachment C of the San Diego Municipal Storm Water Permit, Order No R9-2013-0001)?	☐	☑	See *Storm Water Standards*
6	Will the site have exposed/disturbed slopes greater than 5 percent?	☐	☑	7, 8, 9, 10, and 12

Table 6 (Continued) Determination of Site Features, Activities, and Potential Pollutants

No.	Site Activity Question	No	Yes	If *Yes*, Select BMPs from Table:	Potential Pollutant Sources (add, if not listed)
7	Will there be soil-disturbance activities (grading, stockpiling, trenching, etc.)?	☐	☑	7, 8, 9, 10, 12, and 13	Sediment
8	Will there be asphalt paving, cutting, and/or patching?	☐	☑	17	Asphalt, aggregate
9	Will there be stockpiling (i.e., soil, concrete, solid waste, etc.) for over 24 hours?	☐	☑	7 and 16	Stockpiled material, *please specify:* concrete, dirt, CMU
10	Will there be slurries from concrete or mortar mixing, coring, or saw cutting?	☐	☑	15, 16, and 17	Concrete materials, aggregate, slurry water
11	Will wash water or liquid waste be generated from this project?	☐	☑	15, 16, and 19	Liquid waste, *please specify:* Paints, solvents, cleaners
12	Will there be dewatering operations?	☑	☐	19	Dewatering water, *please specify:*
13	Will there be on-site storage of construction materials such as mortar mix, raw landscaping and soil stabilization materials, treated lumber, rebar, and plated metal fencing materials?	☐	☑	17	Construction materials, *please specify:* Mortar mix, wood framing, dry wall
14	Will trash or solid wastes (including landscaping wastes) be generated from this project?	☐	☑	16	Solid waste, *please specify:* CMU, trash, etc.
15	Will hazardous materials or wastes, including paint, be stored or handled on-site?	☐	☑	16	Hazardous material, *please specify:* Paints, solvents, cleaners
16	Will construction equipment and/or vehicles be stored, fueled, maintained, or washed on- site?	☑	☐	15, 18, and 19	Engine fluids, fuels, oil, grease, wash water
17	Will portable sanitary facilities (“Porta-potties”) be used on the site?	☐	☑	15 and 16	Sanitary waste
18	Are underlying soils potentially contaminated?	☑	☐	16	Contaminated soil

Table 6 (Continued) Determination of Site Features, Activities, and Potential Pollutants

No.	Site Activity Question	No	Yes	If *Yes*, Select BMPs from Table:	Potential Pollutant Sources (add, if not listed)
19	Will dust (i.e., from grading, driving on unpaved roads, etc.) or particulates (i.e., from sandblasting, concrete cutting, painting, etc.) be generated from this project?	☐	☑	20	Sediment, particulate construction materials, *please specify:* Dirt, drywall dust, saw dust
20	Other activities will be performed that are not described above?	☑	☐	Select applicable BMPs from Tables 7-20	*Please specify:*
21	Final stabilization of the site is required.		☑	21	Not applicable

1.4 RESPONSIBILITY FOR WPCP DEVELOPMENT AND IMPLEMENTATION

This WPCP shall be completed and certified by a Qualified Contact Person (QCP). A QCP will also be responsible for amending this WPCP. The QCP is responsible for WPCP implementation and self-inspections (see Section 3.0).

1.5 AVAILABILITY

This WPCP shall remain on-site at all times during business hours and readily available for review by the U.S. Environmental Protection Agency (EPA), SWRCB, San Diego RWQCB, City of San Diego representatives, and all operating personnel for the duration of the project. Authorized representatives from the U.S. EPA, SWRCB, San Diego RWQCB, and the City of San Diego shall be permitted entry to the site for reviewing this WPCP, inspecting the site, and/or collecting storm water samples.

1.6 AMENDMENTS

This WPCP shall be amended whenever there is a change in construction or operations which may affect the discharge of pollutants to surface waters, groundwater, or to the City's MS4 or are deemed necessary by the Resident Engineer or Building Inspector.

1.7 NON-STORM WATER DISCHARGES

Discharging any material other than storm water to Waters of the State or to the City's MS4 is prohibited. However, certain exceptions apply.

According to the SWRCB ASBS Resolution No. 2012-0031, existing storm water discharges into an ASBS are allowed only under the following conditions:

4. The discharges are authorized by an NPDES permit issued by the SWRCB or Regional Water Board;
5. The discharges comply with all of the applicable terms, prohibitions, and special conditions contained in these Special Protections; and
6. The discharges:
    a. Are essential for flood control or slope stability, including roof, landscape, road, and parking lot drainage;
    b. Are designed to prevent soil erosion;
    c. Occur only during wet weather; and
    d. Are composed of only storm water runoff.

Furthermore, the following non-storm water discharges are allowed, provided that the discharges are essential for emergency response purposes, structural stability, slope stability or occur naturally:

1. Discharges associated with emergency firefighting operations.
2. Foundation and footing drains.
3. Water from crawl space or basement pumps.
4. Hillside dewatering.
5. Naturally occurring groundwater seepage via a storm drain.
6. Non-anthropogenic flows from a naturally occurring stream via a culvert or storm drain, as long as there are no contributions of anthropogenic runoff.

See the City's Storm Water Standards – Construction BMP Standards to determine applicable non-storm water regulations.

1.8 SITE MAP DEVELOPMENT

A Site Map must be developed and included as Appendix A of this WPCP. The site map should be neat and legible. Several sheets may be used to illustrate the phasing of BMP implementation as construction progresses over time. When two or more sheets are used to illustrate the plan view, an index sheet is required. The Site Map must include all of the following, where applicable:

- Legend, north arrow, and scale of the drawing
- The site boundary and limits of construction;
- Key site features such as steep slopes, highly erodible soils, etc., including State and federal wetlands, if any;
- Storm water conveyance features including, but not limited to all streams and drainage ways delineated, all storm drain inlets and outlets, curb and gutter, swales and channels.
- Anticipated discharge points for construction wastewater (i.e. stormwater, groundwater, and construction wastewater such as dewatering byproducts);
- Drainage areas and direction of flow
- Location of nearby water bodies (including Clean Water Act Section 303(d) List of Impaired Segments in the site's vicinity)
- Location of entrance/exits to the project area
- Areas of soil disturbance and potential pollutant sources;
- Material, stockpile, and waste storage areas(e.g., trash, soil, fuel, construction materials);
- Vehicle and equipment fueling, wash and maintenance areas;
- Locations of portable sanitary facilities;
- Locations where underlying soil is potentially contaminated; and
- Locations of all BMP implementation areas (types of erosion and sediment controls, as well as dewatering and soil stabilization controls, where applicable).
- Location of building and activity areas (e.g., fueling islands, garages, waste container area, wash racks, hazardous material storage areas)

2.0 BEST MANAGEMENT PRACTICES

The BMPs listed in this WPCP will be implemented on a year-round basis throughout the project duration, not solely during seasons in which the probability of a rain event is high. All areas not in use for 14 days will be stabilized (i.e., exposed soil will be covered). Sufficient BMP materials will be maintained on-site to allow implementation with this WPCP and emergency installation in the event of a breech. Locations where BMPs will be implemented are to be shown on the Site Map in Appendix A.

BMPs must be implemented on construction sites to reduce pollution to the maximum extent practicable. The City's *Storm Water Standards* outlines the requirements for construction storm water BMPs. The following BMP categories must be addressed:

- Erosion control;
- Sediment control;
- Run-on and site storm water management;
- Materials management;
- Non-storm water management;
- Particulate and dust control; and
- Final stabilization.

BMPs from each of the above categories must be used together as a system in order to prevent potential pollutant discharges. Each category is generally described and applicable BMPs are listed in the following sections. Projects containing site features identified with a "yes" answer in Table 6 must utilize BMPs from the applicable BMP table(s). If no BMPs from a specific table are selected, an explanation must be provided. For BMP implementation details, refer to:

- California Stormwater Quality Association (CASQA) *Construction BMP Handbook Portal*, 2010, online at: http://www.casqa.org/LeftNavigation/ConstructionBMPHandbookPortalSWPPPTemplate/tabid/200/Default.aspx, (subscription required); and
- California Department of Transportation (Caltrans) *Construction Site BMP Handbook*, 2003, online at: http://www.dot.ca.gov/hq/construc/stormwater/CSBMPM_303_Final.pdf.

2.1 EROSION CONTROL

Erosion control, also referred to as soil stabilization, consists of source control measures that are designed to prevent soil particles from detaching and becoming transported in storm water runoff. Erosion control BMPs protect the soil surface by covering and/or binding soil particles and many have the secondary effect of increasing water infiltration. Erosion controls are provided in Table 7–9.

Erosion controls must be used in conjunction with sediment controls. Apply erosion controls as soon as grading and/or excavation are completed for any portion of the site, but no longer than 14 days after activity has ceased. Prior to and during rain events, slopes must be stabilized and erosion control BMPs must be maintained. Loose construction and landscaping materials, including stockpiles, must be covered and bermed at the end of each work day. Plastic sheeting for erosion control should be avoided for long term use, except to cover stockpiles prior to rain events. Exposed areas shall be inspected frequently and if signs of erosion are observed, additional erosion control BMPs shall be implemented.

Scheduling/phasing construction is required on all sites to minimize soil exposure and soil disturbance during the rainy season. When planning grading activities, minimize slope length and gradient to the greatest extent possible to avoid erosion and to promote vegetation establishment. Ensure slopes are set back from the property boundary whenever possible. Inactive stockpiles should be covered and bermed (with jute netting and fiber rolls or similar).

Table 7 **General Erosion Control BMPs**

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Scheduling/Phasing Construction	EC-1	SS-1	☑
Minimize Slope Length and Gradient	-	-	☐
Manage Soil Stockpiles	WM-3	WM-3	☑
If no BMPs were selected, explain the rationale:			
Describe any additional erosion control BMPs to be implemented:			
Describe where erosion and sediment control BMPs will be implemented/installed: Scheduling to be done site wide. Stockpiles will be managed within construction entrance.			

2.1.1 Physical Stabilization

Physical stabilization consists of materials other than vegetation used to temporarily or permanently stabilize exposed areas. Materials used for physical stabilization should be determined based on site conditions. For example, geotextiles are generally installed where runoff is concentrated and are left in place long term. Jute erosion control blankets, hydraulic mulch, and soil binders are usually installed as temporary BMPs. Permanent physical stabilization may be necessary where vegetation cannot establish, such as on steep slopes, where topsoil has been removed, or where there is lack of water. Projects likely to discharge to Environmentally Sensitive Areas shall use high performance erosion control methods, such as bonded fiber matrix or anchored erosion control blankets on all exposed slopes.

Erosion control blankets, which can consist of jute, straw, coconut, and/or wood fiber, are common BMPs for stabilizing slopes. The type of blanket used usually depends on the longevity needed (see BMP references for details). Blankets need to be staked into the soil as specified by the manufacturer, keyed in on the top of the slope, and must have good soil contact to be effective (i.e., generally not suitable for rocky sites). Turf reinforced mats are installed in swales and ditches and are used in conjunction with vegetation (the roots lock the mat into the soil and further reduce erosion from high velocity flows).

Hydraulic mulch usually consists of wood fiber mulch, water, and sometimes soil binder. Bonded fiber matrix is similar, but the mulch material is long strand wood fibers that lock together with a bonding agent and is also applied hydraulically. Soil binders can consist of natural materials, such as guar, or man-made polymers (although some may not function well on sandy soils). The longevity varies with different products; see the BMP references for details.

Straw is generally the material used for mulch; it should be punched into soil or covered with soil binder so that it does not blow or wash away. Chipped brush and trees may also be used as mulch and usually doesn't required application of soil binder. Vegetation grubbed from the site, chipped, and reapplied to exposed soils may also provide a seed bank for vegetation establishment. Mulch used in conjunction with seeding may also enhance vegetation establishment.

A compost blanket (a layer of compost on the soil surface) can be a very effective BMP and can be used on rocky slopes. An added benefit of compost is that can enhance vegetation establishment while protecting again erosion. The thickness of the compost layer needed is dependent upon the slope gradient (see BMP resources for details). Soil binder in conjunction with compost blanket is usually not necessary. Compost can be applied by hand, with a compost blower, or hydraulically (certain proprietary brands are designed to be applied with hydroseeding equipment).

Roughening a slope reduces the slope's erodibility. Although when used alone, soil roughening does not meet final stabilization requirements and, therefore, is generally used to prepare soil for seeding application, as it provides micro-sites for seed germination. This is performed by mechanical methods such as track-walking, sheep's foot rolling, scarifying, etc.

Reapplying topsoil consists of removing and stockpiling topsoil in areas to be graded or cut. Reapplying the topsoil after grading is completed can provide seed, organic matter, symbiotic fungi, and other elements beneficial to vegetation establishment. The topsoil stockpile must be covered if it will be inactive for over 14 days; however, plastic materials should not be used, as they can sterilize the soil. Jute or straw erosion control blankets are recommended.

Permanent stabilization may consist of retaining walls, rock gabions (wire mesh blocks filled with rock that can be stacked), rock, etc. These features are used on or to support steep slopes or where water velocities/wave action is high (i.e., sea walls, etc.)

Table 8 **Physical Stabilization BMPs**

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Erosion Control Blankets and Turf Reinforced Mats	EC-7	SS-7	☑
Hydraulic Mulch and Bonded Fiber Matrix	EC-3, EC-5	SS-3	☐
Soil Binders	EC-5	SS-5	☐
Mulch	EC-6, EC-8, EC-14	SS-6, SS-8	☐
Compost Blankets	EC-14	-	☐
Soil Roughening	EC-15	-	☐

Table 8 (Continued) Physical Stabilization BMPs

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Topsoil Reapplication	-	-	☐
Permanent Stabilization (i.e., retaining walls, rock gabions, rock riprap, etc.)	-	-	☐
Other Material (to be approved by the City)	EC-16	-	☐
If no BMPs were selected, explain the rationale:			
Describe any additional physical stabilization BMPs to be installed:			
Describe where physical stabilization BMPs will be installed: After demolition of the existing driveway, if the driveway is left undisturbed for longer than 1 week, erosion control blankets (per EC-7) shall be implemented at undisturbed portions of driveway since slope is > 5%.			

2.1.2 Vegetation Stabilization

Vegetation must be installed, irrigated, and established (to uniform vegetative coverage with 70 percent coverage) prior to October 1. In the event that stabilizing vegetation has not been established by October 1, other forms of physical stabilization (see previous section) must be employed to prevent erosion until the vegetation is established.

Preserving existing vegetation to the maximum extent possible reduces the need for vegetation re-establishment and is recommended. Areas where vegetation is to be protected need to be clearly marked on the site to avoid accidental removal. Where preservation is not feasible, interim and permanent vegetation/landscaping can be established by seeding; hydroseeding; and installing plugs, sod, or container stock. Begin re-establishing permanent vegetation as early in the project as feasible. The soil should be prepared prior to seeding and the use of compost blankets or straw mulch in conjunction with seeding is recommended. Streambank stabilization is often accomplished with willow staking and live brush mats (see BMP references for details).

Table 9 **Vegetation Stabilization BMPs**

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Preserve Existing Vegetation	EC-2	SS-2	☐
Establish Interim Vegetation	EC-4	SS-4	☐
Establish Permanent Landscaping	-	-	☑

Table 9 (Continued) Vegetation Stabilization BMPs

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Streambank Stabilization	EC-12	SS-12	☐
If no BMPs were selected, explain the rationale:			
Describe any additional vegetation stabilization BMPs to be implemented:			
Describe where vegetation stabilization BMPs will be installed: After construction, permanent landscaping to be established in designated planter areas. Planters are located in various locations on-site, including new tree in ROW.			

2.2 SEDIMENT CONTROL

The goal of sediment control is to capture soil particles which have become detached from disturbed areas by water or wind. Sediment controls, consisting of perimeter control, resource protection, sediment capture, and off-site sediment tracking control (as described below) are required year-round and must be installed and maintained to comply with performance standards of the *Storm Water Standards* (City of San Diego 2012), Section 5.1. Sediment control BMPs are provided in Tables 10–13. They should be used in conjunction with erosion controls.

2.2.1 Perimeter Control

Perimeter control BMPs must be installed and maintained year round and upgraded during the rainy season to comply with performance standards from the *Storm Water Standards* (City of San Diego 2012), Section 5.1. They may consist of silt fencing, gravel bag barriers, fiber rolls (straw wattles), or compost socks/berms. All of the BMPs listed, except gravel bag barriers and compost socks, must be trenched in and backfilled to be effective. Gravel bags and fiber rolls should be stacked if necessary so that storm water cannot flow over the top. Sand bags are not recommended; if the bag is compromised, the sand can be a pollutant source. Certain types of compost socks may also be effective at filtering pollutants other than sediment, including metals and oil/grease.

Table 10 **Perimeter Control BMPs**

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Silt Fencing	SE-1	SC-10	☐
Gravel Bag Barriers	SE-6	SC-6	☑
Fiber Rolls or Straw Wattles	SE-5	SC-5	☐

Table 10 (Continued) Perimeter Control BMPs

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Compost Socks and Berms	SE-13	-	☐
If no BMPs were selected, explain the rationale:			
Describe any additional perimeter control BMPs to be implemented:			
Describe where perimeter control BMPs will be installed: Gravel Bag Barriers (per SE-6) shall be placed where concentrated flows are to be expected on-site, and along Lowry Place.			

2.2.2 Resource Protection

Year-round protection of waterways and sensitive areas is required. Linear protection may be installed using silt fencing, gravel bag barriers, fiber rolls, and/or compost socks/berms. Linear protection should be installed between the construction area and the sensitive area. However, it should not be installed up and down a slope, which can cause erosion.

The City's *Storm Water Standards* requires preserving natural hydraulic features and riparian area buffers where possible. Additionally, BMPs must be implemented for performing demolition adjacent to a water body (such as installing turbidity curtains) and crossing waterways, dry conveyances, or areas where storm water flows.

Table 11

Resource Protection BMPs

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Linear Protection	SE-1, SE-6, SE-5, SE-13	SC-10, SC-6, SC-5	☐
Preserve Natural Hydraulic Features and Riparian Area Buffers	-	-	☐
Demolition Adjacent to Water	NS-15	NS-15	☐

Table 11 (Continued) Resource Protection BMPs

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Temporary Stream Crossing	NS-4	-	☐
If no BMPs were selected, explain the rationale: Existing walls that run along the property boundary will provide linear perimeter protection around the project area, to prevent sediment transport from construction activities traveling to adjacent properties.			
Describe any additional resource protection BMPs to be implemented:			
Describe where resource protection BMPs will be installed:			

2.2.3 Sediment Capture

Sediment in storm water is generally captured by gravity-based (i.e., sediment traps and basins) and passive filtration systems (i.e., silt fence, fiber rolls, etc.). Active treatment systems, which use chemical to flocculate sediments from the water, can be used; however, an additional plan and operator certifications are needed.

Storm drain inlet filters are considered "last resort" BMPs, which are designed to capture only small amounts of sediment. Controlling sediment should begin upstream of the storm drain inlet, via erosion and sediment controls installed at the source. Good housekeeping (i.e., street sweeping and maintaining stabilized entrances/exits) should be performed throughout the life of the project. Check dams may also be installed in the gutter upstream of the drain to slow the velocity of runoff and pre-filter before reaching the drain. Block and gravel filters, which will likely allow higher velocities of runoff to flow through than gravel bags, and compost socks, which allow for moderate runoff flow-through and also may filter metals and oil/grease are recommended.

Sediment basins must be designed in accordance with an industry standard, such as Caltrans's *Construction Site Best Management Practices Manual* (2003). If the project is 1 acre or greater, basins must be designed according to CASQA's *Construction BMP Guidance Handbook*, as per the Construction General Permit. See also, County of San Diego's *Standard Lot Perimeter Protection Design System*, PDS# 659, which allows runoff retention of storm water on flat (less than 3 percent slope) sites, less than an acre in size with applicable perimeter controls, outlet protection, maximum detention time, and inspection/maintenance. If utilizing an active treatment system on-site, refer to Construction General Permit, Attachment F and *Storm Water Standards* (City of San Diego 2012), Section 5.4.2.

Table 12 **Sediment Capture BMPs**

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Storm Drain Inlet Protection	SE-10	SC-10	☐
Sediment Trap	SE-3	SC-3	☐
Sedimentation Basin	SE-2	SC-2	☐
Active Treatment System	SE-11	-	☐
If no BMPs were selected, explain the rationale: The on-site storm drain inlets are not large enough to require inlet protection per SE-10. There are no public storm drains in the immediate vicinity of construction activities (upstream/downstream)			
Describe any additional sediment capture BMPs to be implemented: Gravel Bag Barriers (per SE-6) shall be placed around hardscape/landscape inlets on-site to prevent sediment transport from on-site construction activities.			
Describe where sediment capture BMPs will be implemented/installed:			

2.2.4 Off-Site Sediment Tracking

Off-site sediment tracking BMPs must be installed and maintained year-round at entrances/exits to comply with performance standards from the *Storm Water Standards*. The construction site entrance/exit needs to be stabilized to ensure tracking does not occur. If minimal amounts of sediment tracking are anticipated, shaker plates or similar may be used. However, if larger amounts of sediment tracking or clayey soils are expected, the entrance/exits should be stabilized with 3-6-inch rock overlaying filter fabric, 50 feet by 30 feet minimum, with the length corresponding to the anticipated level of tracking. A tire wash may be installed, if necessary, but must be frequently inspected and maintained to ensure non-storm water discharges to not occur. The entrance/exit should be designed so that vehicles and equipment cannot be driven around the stabilization measures. Construction roads should be stabilized with road base or soil binder to prevent wind and water erosion.

Roads adjacent to the site should be swept or vacuumed when sediment or construction debris has been deposited. Adjacent roads should be inspected daily to ensure tracking is not occurring.

[Select from the off-site sediment tracking BMPs from Table 13.]

Table 13 **Off-Site Sediment Tracking BMPs**

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Construction Entrance/Exit Stabilization	TC-1	TC-1	☑
Construction Road Stabilization	TC-2	-	☐
Tire Wash	TC-3	TC-3	☐

Table 13 (Continued) Off-Site Sediment Tracking BMPs

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Street Sweeping and Vacuuming	SE-7	SC-7	☑
If no BMPs were selected, explain the rationale:			
Describe any additional off-site sediment tracking BMPs to be implemented:			
Describe where off-site sediment tracking BMPs will be implemented/installed: Street sweeping to take place in the fronting streets of Lowry Place & Lowry Terrace. Stabilized Construction Entrance shall be placed in the location of the existing driveway.			

2.3 RUN-ON AND SITE STORM WATER MANAGEMENT CONTROLS

All run-on, runoff within the site, and runoff that discharges off-site, must be managed to prevent erosive flows. Run-on and site storm water management BMPs are provided in Table 14. Runoff from the site must be directed away from all disturbed areas. If runoff or dewatering operation discharges are concentrated, velocity must be controlled using an energy dissipater. Discharge points and discharge flows must be free of pollutants, including sediment.

Run-on to the site should be diverted around the site if possible. Check dams are used to reduce velocity of concentrated flows, limit erosion in channels, and trap sediment. They can be installed in gutter to reduce sediment loading to storm drain inlets. Slope drains and drainage swales should be used to convey runoff downslope without causing erosion. Slope drains and sediment trap/basin outlets require outlet protection to prevent erosion in this area.

Table 14 **Run-On and Site Storm Water Management BMPs**

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Divert Run-on from Surrounding Areas	EC-9, SE-5, SE-6, SE-13	SC-5, SS-9, SC-6, NS-5	☐
Check Dams	SE-4	SC-4	☐
Slope Drains and/or Stabilized Drainage Swales	EC-9, EC-11	SS-9, SS-11	☐
Outlet Protection	EC-10	SS-10	☐
If no BMPs were selected, explain the rationale: There is no expected run-on from surrounding areas.			
Describe any additional run-on and site storm water management BMPs to be implemented: Gravel bag barriers (per SE-6) shall be placed in Lowry Place to provide outlet protection for proposed D-27 outlets.			
Describe where run-on and site storm water management BMPs will be implemented/installed:			

2.4 MATERIALS AND WASTE MANAGEMENT CONTROLS

BMPs must be installed to control all construction and waste materials. Additionally, construction-related materials, spills, and residues must be prevented from entering the MS4. Materials and waste management BMPs are provided in Table 15–18. Keep an inventory of construction materials that will be used outdoors and exposed to precipitation, other than those designed for this purpose (i.e., poles, bricks, etc.). Designate materials loading, unloading, and storage areas. Do not perform activities during a rain

event that may contribute to storm water pollution (i.e., loading/ unloading, etc.) and minimize exposure of construction materials to precipitation.

2.4.1 Spill Control

Post procedures for storage, clean-up, and spill-reporting for hazardous materials and wastes in open, conspicuous, and accessible locations adjacent to storage areas. Ensure all on-site staff receives spill prevention, control, and reporting training. Ample spill controls materials should be stored on-site. Significant spills must be reported to the City Enforcement Agency within 24 hours.

Table 15 **Spill Control BMPs**

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Spill Prevention and Control	WM-4	WM-4	☑
Reporting Significant Spills	-	-	☑
If no BMPs were selected, explain the rationale:			
Describe any additional spill control BMPs to be implemented:			
Describe where spill control BMPs will be implemented/installed: Spill prevention and control to be done site wide for the duration of the project.			

2.4.2 Waste Management

Wastes must be fully managed to prevent discharges to the MS4. Properly designate and protect waste storage areas. Waste disposal containers must be free of leaks and covered at the end of every business day and during rain events.

Liquid waste management includes, but is not limited to, wash water, or accumulated storm water that has come into contact with pollutants. In some cases, a system to collect liquid wastes from the ground (via vacuuming or collecting in a temporary capture device) may be necessary.

Install secondary containment for, and stake down, portable restrooms to prevent leaks and blow-over. Portable restrooms must be located away from storm water conveyance features and vehicle/equipment traffic. Stockpiled waste materials must be secure and protected from wind and rain at all times unless actively being used. Waste stockpiles must be covered and bermed unless actively being used. Remove waste stockpiles from the site as soon as possible.

Table 16 **Waste Management BMPs**

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Solid Waste Management	WM-5	WM-5	☑
Liquid Waste Management	WM-10	WM-10	☑
Contaminated Soil Management	WM-7	WM-7	☐
Sanitary Waste Management	WM-9	WM-9	☑
Concrete Waste Management	WM-8	WM-8	☑
Hazardous Waste Management	WM-6	WM-6	☑
Stockpiled Waste Management	WM-3	WM-3	☑
If no BMPs were selected, explain the rationale:			
Describe any additional waste management BMPs to be implemented:			
Describe where waste management BMPs will be implemented installed: Waste management BMPs to be located throughout the project site (as needed).			

2.4.3 Material Storage and Handling

Manage and store construction materials, chemicals (including paints, solvents, glue/epoxy, primers thinners, liquid asphalts and emulsions, and hazardous materials) so that they will not spill or leak and will not pollute storm water. Cover or store materials indoors and provide secondary containment for materials not designed to come into contact with storm water. Paving and concrete materials should be properly contained and covered if necessary. Slurries from cutting activities should be vacuumed and disposed of off-site. Storm drain inlets downstream of paving and concrete activities should be covered while handling or using materials that could discharge to the storm drain system.

Table 17 **Material Storage and Handling BMPs**

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Material Storage	WM-1	WM-1	☑
Material Handling	WM-2	WM-1	☑

Table 17 (Continued) Material Storage and Handling BMPs

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Paving and Grinding Operations	NS-3	NS-3	☑
Concrete Management	NS-12, NS-13, NS-16	NS-12, NS-14	☐
If no BMPs were selected, explain the rationale:			
Describe any additional material storage and handling BMPs to be implemented:			
Describe where material storage and handling BMPs will be implemented/installed: Paving and grinding operations to take place for replacement of driveway.			

2.4.4 Vehicle and Equipment Management

Vehicle and equipment management BMPs are needed if these will be used, fueled, maintained, and/or parked onsite. Storage, service, cleaning, and maintenance areas for vehicles and equipment shall be identified with signage and fully contained. Spill materials should always be available during fueling and fueling operations should not be left unattended. If fueling or maintaining equipment in the field is performed, drip pans should be used to capture spills. Also utilize drip pans under leaking equipment or vehicles, inspect the pans regularly to prevent overflow, and remove leaking vehicles/ equipment from the site as soon as feasible.

Table 18 **Vehicle and Equipment Management BMPs**

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Vehicle and Equipment Fueling	NS-9	NS-9	☐
Vehicle and Equipment Maintenance	NS-10	NS-10	☐
If no BMPs were selected, explain the rationale: Equipment fueling and maintenance to be handled off site			
Describe any additional vehicle and equipment management BMPs to be implemented:			
Describe where vehicle and equipment management BMPs will be implemented/installed:			

2.5 NON-STORM WATER MANAGEMENT CONTROLS

Non-storm water discharges are defined as any discharges to the storm water conveyance system that is not entirely composed of storm water. Non-storm water management BMPs are provided in Table 19. Non-storm water discharges must be eliminated or controlled to the maximum extent practicable. See Section 1.7 for a list of allowable discharges to the City's MS4. All non-storm water discharges shall be controlled by implementing water conservation practices, implementing good housekeeping techniques, and implementing a program to detect and eliminate illicit discharges.

The site should be inspected frequently for illicit connections and discharges. If observed, action should be taken as soon as possible to halt the connection/discharge. Illicit discharges to the City's MS4 should be reported to the City Enforcement Agency within 24 hours. Overspray and overwatering of vegetation for erosion control and landscaping should be avoided. Water line breaks should be repaired as soon as possible. Vehicle and equipment cleaning should be performed off-site if possible or otherwise in a location where wash water will drain to the sanitary sewer.

Dewatering uncontaminated (i.e., free of sediment or any other pollutant) groundwater is allowable, but may require additional permitting depending on the discharge location (i.e., see the San Diego RWQCB's Order No. R9-2007-0034, Order No. R9-2008-0002 and General Conditional Waiver No. 2). If discharging groundwater to the sanitary sewer, a Request for Authorization must be submitted to the City Public Utilities Department. Dewatering of accumulated, uncontaminated storm water is allowable if the discharges are monitored/visually observed.

Table 19 **Non-Storm Water Management BMPs**

Best Management Practices	References		Check at least one BMP
	CASQA BMP	Caltrans BMP	
Illicit Connection/Discharge Control	NS-6	NS-6	☑
Potable Water/Irrigation	NS-7	NS-7	☑
Vehicle and Equipment/Cleaning	NS-8	NS-8	☐
Water Conservation Practice	NS-1	NS-1	☑
Dewatering Operations	NS-2	NS-2	☐
If no BMPs were selected, explain the rationale:			
Describe any additional non-storm water management BMPs to be implemented:			
Describe where non-storm water management BMPs will be implemented/installed: Temporary construction water connections shall be monitored for illicit connections and discharges.			

2.6 PARTICULATE AND DUST CONTROL

Wind erosion control BMPs are implemented to prevent the air deposition of site materials and site operations. Particulate and dust control BMPs are provided in Table 20. Such particulates can include sediment, nutrients, trash, metals, bacteria, oil/grease, and organics. Ensure a water truck is available while construction activities are being performed, especially when soil and stockpiled material is being handled. Spray exposed soils with water or soil binder via water truck. Ensure construction materials are not discharged through the air. Do not perform activities that may discharge particulates on windy days.

Table 20 **Particulate and Dust Control BMPs**

Best Management Practices	References		Check BMP, if applicable
	CASQA BMP	Caltrans BMP	
Wind Erosion Control	WE-1	WE-1	☑
If no BMPs were selected, explain the rationale:			
Describe any additional particulate and dust control BMPs to be implemented:			
Describe where particulate and dust control BMPs will be implemented: Dust control to take place where areas are cleared and left bare and have the potential for wind to pick up and carry dust.			

2.7 FINAL STABILIZATION

For a construction project to be considered complete, all of the following conditions must be met:

- The site will not pose any additional sediment discharge risk than it did prior to the commencement of construction activity.
- There is no potential for construction-related storm water pollutants to be discharged into site runoff.
- Final stabilization has been reached by one of the following:
  - Attaining 70 percent uniform vegetative cover or equivalent stabilization measures2, such as: erosion control blankets, reinforced channel liners, and geotextiles;
  - Calculating annual average soil loss with the Revised Universal Soil Loss Equation (RUSLE) or RUSLE2 for pre- and post-construction to demonstrate that the site will not yield more sediment than prior to construction; or
  - Otherwise demonstrating that final stabilization has been achieved.
- Construction materials, temporary BMPs, and wastes have been removed from the site.
- Post-construction BMPs, if required, have been effectively implemented.

Final stabilization BMPs are provided in Table 21.

2 Where background native vegetation covers less than 100 percent of the surface, the 70 percent coverage criteria is adjusted as follows: if the native vegetation covers 50 percent of the ground surface, 70 percent of 50 percent (0.70 X 0.50 = 0.35) would require 35 percent total uniform surface coverage.

Table 21 **Final Stabilization BMP**

Best Management Practices	References		Check BMP
	CASQA BMP	Caltrans BMP	
Final Stabilization	-	-	☑
Describe final stabilization BMPs: Final stabilization includes establishing permanent vegetation and hardscape.			
Describe where final stabilization BMPs will be installed: Permanent vegetation to be located at the various planters - rear yard, side yard, front yard, tree in ROW Hardscape to be dispersed throughout various locations within the project site - driveway, paved walkways/patios in the front/rear yard areas.			

3.0 BEST MANAGEMENT PRACTICE MAINTENANCE AND INSPECTION

Construction is a dynamic operation where changes are expected. Construction site activities can damage BMPs. Storm water BMPs for construction sites are typically temporary measures that require frequent maintenance to maintain effectiveness. BMPs facilities may require relocation, revision and re-installation, particularly as project grading progresses.

3.1 BMP MAINTENANCE

Best management practice maintenance requirements are listed in Table 22. The following subsections describe the inspection program responsibilities and requirements.

Table 22 **BMP Maintenance Requirements**

Best Management Practices	Maintenance Requirements
Scheduling/Phasing Construction	Periodically review construction schedule to determine if activity during the rainy season can be minimized.
Minimize Slope Length and Gradient	Not applicable.
Manage Soil Stockpiles	Replace compromised covers and berms. Ensure stockpiled material is within the bermed area. Store ample supplies of cover material and fiber rolls on site.
Erosion Control Blankets and Turf Reinforced Mats	Replace compromised blankets and mats. Ensure good soil contact.
Hydraulic Mulch and Bonded Fiber Matrix	Reapply if signs of erosion are observed.
Soil Binders	Reapply if signs of erosion are observed.
Mulch	Reapply where soil is exposed.
Compost Blankets	Reapply where soil is exposed.
Soil Roughening	Not applicable.
Topsoil Reapplication	Not applicable.
Permanent Stabilization (i.e., retaining walls, rock gabions, rock riprap, etc.)	Remove accumulated sediment and debris.
Other Material (to be approved by the City)	Remove accumulated sediment and debris.
Preserve Existing Vegetation	Ensure protected vegetation is clearly marked.
Establish Interim Vegetation	Reapply seed or replant stock if vegetation does not establish.
Establish Permanent Landscaping	Reapply seed or replant stock if vegetation does not establish.
Streambank Stabilization	Reinstall if stabilization does not establish.

Table 22 (Continued) BMP Maintenance Requirements

Best Management Practices	Maintenance Requirements
Silt Fencing	Replace compromised silt fence. Ensure fence is trenched and backfilled. Removed sediment accumulated to 1/3 the fence height.
Gravel Bag Barriers	Replace every 2-3 months as bags degrade. Remove sediment accumulated to 1/3 the bag height.
Fiber Rolls or Straw Wattles	Replace compromised rolls. Ensure rolls are trenched in and backfilled. Remove sediment accumulated to 1/3 the roll height.
Compost Socks and Berms	Replace compromised socks. Remove sediment accumulated to 1/3 the sock height.
Linear Protection	See applicable BMPs.
Preserve Natural Hydraulic Features and Riparian Area Buffers	Not applicable.
Demolition Adjacent to Water	Empty debris-catching devices daily. Ensure collected debris is stored away from the watercourse.
Temporary Stream Crossing	Repair if signs of erosion are observed. Replace displaced aggregate from culvert inlets and outlets.
Storm Drain Inlet Protection	Repair compromised protection. Remove accumulated sediment and debris.
Sediment Trap	Corrective measures should be taken if the BMP does not dewater completely in 96 hours or less to prevent vector production. Repair if trap is compromised or signs of erosion are noted at the outlet. Remove accumulated sediment when it reaches 1/3 capacity.
Sedimentation Basin	Corrective measures should be taken if the BMP does not dewater completely in 96 hours or less to prevent vector production. Repair if trap is compromised or signs of erosion are noted at the outlet. Remove accumulated sediment when it reaches 1/3 capacity.
Active Treatment System	See manufacturer's recommendations and CASQA guidance.
Construction Entrance/Exit Stabilization	Install prior to construction start; replace gravel when surface voids are visible; remove post-construction.
Construction Road Stabilization	Install prior to construction start; replace gravel when surface voids are visible; remove post-construction.
Tire Wash	Remove accumulated sediment to maintain system performance. Ensure non-storm water discharges are not occurring.
Street Sweeping and Vacuuming	Implement as soon as possible upon sediment deposition.

Table 22 (Continued) BMP Maintenance Requirements

Best Management Practices	Maintenance Requirements
Divert Run-on from Surrounding Areas	Ensure that diversions are effective.
Check Dams	Remove accumulated sediment and debris when it reaches 1/3 the height of the dam.
Slope Drains and/or Stabilized Drainage Swales	Replace/repair if visible signs of erosion are observed.
Outlet Protection	Remove accumulated sediment and debris when observed in protection devices.
Spill Prevention and Control	Ensure that ample supplies of spill cleanup materials are stored onsite and within vehicles and equipment.
Reporting Significant Spills	Ensure that on-site staff receives spill cleanup and reporting training.
Solid Waste Management	Arrange for waste collection as necessary; remove deposited solids in containment areas and collection devices; inspect and repair containment areas and capturing devices.
Liquid Waste Management	Arrange for waste collection as necessary; remove liquid wastes containment areas and collection devices; inspect and repair containment areas and capturing devices.
Contaminated Soil Management	Ensure that contaminated soil stored on-site is covered and bermed at all times and does not have the potential to contact storm water or groundwater.
Sanitary Waste Management	Coordinate with a local contractor for frequent inspection and maintenance.
Concrete Waste Management	Repair concrete washout when compromised. Ensure adequate freeboard prior to rain events. Remove accumulated waste when 1/3 capacity.
Hazardous Waste Management	Keep storage areas clean and organized; store ample cleanup supplies on site; control storage area perimeter; repair containment structures, covers, and liners as necessary.
Stockpiled Waste Management	Ensure that stockpiled waste is covered and bermed at all times, unless actively using.
Material Storage and Handling	Store ample supplies of spill cleanup materials onsite; clean and organize storage areas; repair perimeter controls, containment structures, covers, and liners; spot check materials use throughout the construction period to ensure proper practices are utilized.
Paving and Grinding Operations	Arrange for regular collection of paving wastes. Inspect storm drains near paving to ensure their cover.

Table 22 (Continued) BMP Maintenance Requirements

Best Management Practices	Maintenance Requirements
Concrete Management	Remove and dispose of hardened concrete as needed. Concrete waste facilities must be cleaned, or new facilities must be constructed and ready for use once facilities are 75% full. Inspect concrete waste facilities for damage (e.g. torn liner, evidence of leaks, signage, etc.). Repair all identified damage.
Vehicle and Equipment Fueling	Resupply on-site spill cleanup materials; clean up spills, properly dispose of contaminated soil and clean up materials;
Vehicle and Equipment Maintenance	Inspect vehicles and equipment for leaks; if possible, prohibit washing vehicles on-site; ensure equipment wash water discharges to the sanitary sewer.
Illicit Connection/Discharge Control	Prohibit staff and subcontractors from disposing of debris on site; notify owner/operator of illicit connections or discharge incidents immediately.
Potable Water/Irrigation	Repair broken lines and correct irrigation overspray as soon as possible.
Vehicle and Equipment/Cleaning	Ensure washing discharges to not leave the site.
Water Conservation Practice	Repair water equipment as needed to prevent non-storm water discharges.
Dewatering Operations	Ensure dewatering is not causing erosion, discharges do not contain pollutants, and activities are continuously monitored.
Final Stabilization	Not applicable.

3.2 BMP INSPECTIONS

Routine inspections are necessary to ensure the integrity and effectiveness of BMPs, and helps protect a site from unexpected weather events. Project owners or contractors should perform daily inspections to identify BMPs in need of maintenance. Self-inspections are to be performed by a QCP, as described in the following section. Upon identifying failures or other maintenance items, repairs or design changes to BMPs should be completed as quickly as feasible.

3.2.1 Qualified Contact Person

A QCP, as per the *Storm Water Standards* (City of San Diego 2012) definition, is to be assigned for the project. The QCP is to be specifically trained in storm water pollution prevention, including the installation and maintenance of sediment and erosion control measures. The QCP may designate additional, trained persons to assist with QCP responsibilities. The specific duties of the QCP and persons delegated by the QCP are:

- Coordinating with the appropriate City representatives to ensure the project complies with the WPCP and approved plans at all times;
- Implementing all elements of the WPCP, including prompt and effective erosion, sediment, tracking, and wind erosion control measures and management of non-storm water discharges and construction materials and liquid, solid, and hazardous wastes;
- Assigning authority to mobilize crews in order to conduct immediate and complete BMP repairs and providing storm water pollution prevention training;

- Tracking weather conditions, as reported on the National Weather Service Forecast's website [http://www.noaa.gov/wx.html]);
- Performing self-inspections;
- Informing the proper City representatives of non-compliance, such as unauthorized discharges, illicit connections or dumping activities, and immediately correcting the problems;
- Overseeing site stabilization;
- Ensuring that the WPCP is available onsite at all times during business hours; and
- Ensuring that WPCP records are retained for a minimum of three years

Table 24
Qualified Contact Person and Designees

	Name	Company/ Organization	Phone Number
Qualified Contact Person	TBD	TBD	TBD
Additional Persons Designated by the Qualified Contact Person			

3.2.2 Self-Inspections

The QCP or his/her designees is required to perform self-inspections, as per the *Storm Water Standards.* The objectives are to:

- Demonstrate the site is in compliance with the City's *Storm Water Standards* (2012) and San Diego Municipal Code Sect. 43.03;
- Ensure that storm water BMPs are properly documented, implemented, and effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges;
- Identify BMP maintenance (i.e., sediment removal) and repair needs;
- Ensure that the site-specific WPCP is fully implemented and updated; and
- Ensure final stabilization of the site before demobilization.

The *Storm Water Standards* (City of San Diego 2012) requires performing self-inspections throughout the life of the project (until final stabilization is achieved). Self-inspections are not required during dangerous weather conditions such as flooding and electrical storms or outside of scheduled site business hours. Self-inspections are to be performed:

- At 24-hour intervals during extended rainfall events;
- During the rainy season, daily while grading operations are being conducted; and
- During the dry season, weekly.

During self-inspections, the QCP or designee should identify and record BMPs that are in need of maintenance to operate effectively, have failed, or could fail to operate as intended and if additional BMPs are needed. If additional BMPs are necessary, the WPCP should be revised accordingly. All self-inspections must be documented using a checklist. The self-inspection checklist shall also note the date, time, and weather conditions during the inspection. Completed checklists should be made available upon request. During self- inspections, storm water discharges must be monitored to determine the presence of pollutants. If any failures or deficiencies are identified, repairs or design changes should begin to be implemented within 72 hours and noted on the self-inspection checklist.

3.2.3 Recordkeeping and Reports

Records for the following items should be retained for a minimum of three years:

- Completed site inspection forms;
- Training documentation (if any);
- Discharge reports (if any); and
- WPCP and amendments (if any).

4.0 REFERENCES

California Department of Transportation (Caltrans)
2003 *Storm Water Quality Handbook SWPPP/WPCP Preparation Guide*. February 1.

California Stormwater Quality Association (CASQA)
2003 *Construction Stormwater BMP Handbook*. January.

City of San Diego
2012 *Storm Water Standards*. Available online at: http://www.sandiego.gov/thinkblue/pdf/stormwatermanual.pdf. January 20.

San Diego Regional Water Quality Control Board (RWQCB)
2013 Order No. R9-2013-0001, *National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds within the San Diego Region*. Available online at: http://www.waterboards.ca.gov/rwqcb9/water_issues/programs/stormwater/docs/updates_052313/2013-0523_Order_No._R9-2013-0001_COMPLETE.pdf . May 8.

State Water Resources Control Board (SWRCB)
2009 *National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Water Quality Order 2009-0009-DWQ*, General Permit No. CAS000002. Available online at: http://www.swrcb.ca.gov/water_issues/programs/stormwater/constpermits.shtml

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A SITE MAP

LEGEND

DESCRIPTION	CASQA BMP	SYMBOL
PROPERTY LINE		N45°45'45"W
LIMITS OF CONSTRUCTION		
DIRECTION/COURSE OF FLOW		
GRAVEL BAG BERM/BARRIER	SE-6	
MATERIALS STORAGE AND HANDLING	WM-1	WM-1 WM-2
STOCKPILE MANAGEMENT	WM-3	WM-3
SOLID WASTE MANAGEMENT	WM-5	WM-5
HAZARDOUS/CONCRETE WASTE MANAGEMENT	WM-6,WM-8	WM-6 WM-8
SANITARY WASTE (PORTABLE TOILET)	WM-9	WM-9
LIQUID WASTE MANAGEMENT	WM-10	WM-10
PAVING & GRINDING OPERATIONS	NS-3	NS-3
STREET SWEEPING	SE-7	(NO SYMBOL)
STABILIZED CONSTRUCTION ENTRANCE	TC-1	
EROSION CONTROL BLANKETS	EC-7	(NO SYMBOL)

* STANDARD DRAWINGS (SE-5, WM-5, ETC.) CAN BE FOUND AT THE CALIFORNIA STORMWATER QUALITY ASSOCIATION (CASQA) WEBSITE: https://www.casqa.org/resources/bmp-handbooks

OTHER CONSTRUCTION BMPs:

DESCRIPTION	CASQA BMP
SPILL PREVENTION AND CONTROL	WM-4
REPORTING SIGNIFICANT SPILLS	N/A
WATER CONSERVATION PRACTICE	NS-1
ILLICIT CONNECTION/DISCHARGE CONTROL	NS-6
POTABLE WATER/IRRIGATION	NS-7
WIND EROSION CONTROL	WE-1

** THESE CONSTRUCTION BMPs ARE INTENDED TO BE IMPLEMENTED AS OUTLINED IN THE WATER POLLUTION CONTROL PLAN (WPCP). THESE CONSTRUCTION BMPs ARE NON-PLOTTABLE IN PLAN VIEW. STANDARD DRAWINGS CAN BE FOUND AT THE CALIFORNIA STORMWATER QUALITY ASSOCIATION (CASQA) WEBSITE: https://www.casqa.org/resources/bmp-handbooks

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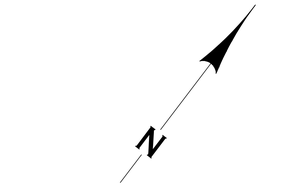

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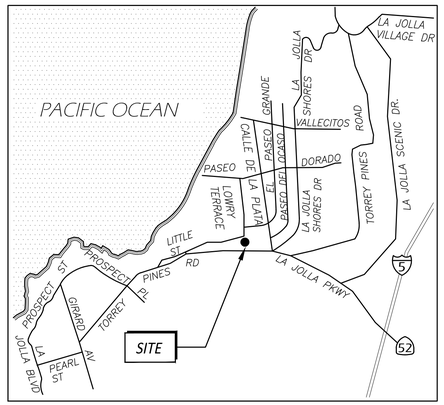
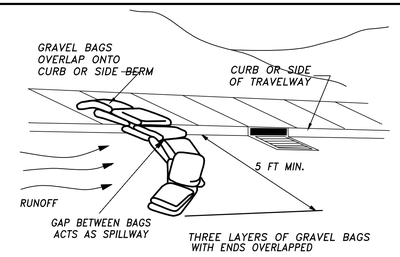


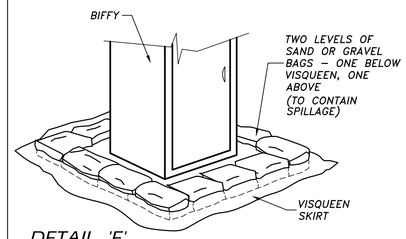
VICINITY MAP

THOMAS BROS. MAP 1227-H6
NO SCALE



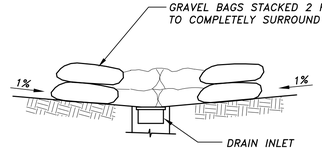
DETAIL 'A'
GRAVEL BAGS ON TRAVELWAYS

NO SCALE



DETAIL 'E'
SANITARY TOILET (BIFFY) PROTECTION

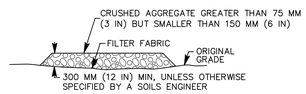
NO SCALE



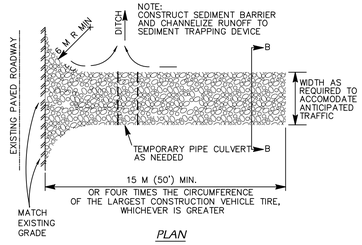
SECTION

DETAIL 'C'
GRAVEL BAGS AT INLET (PVT)

NO SCALE



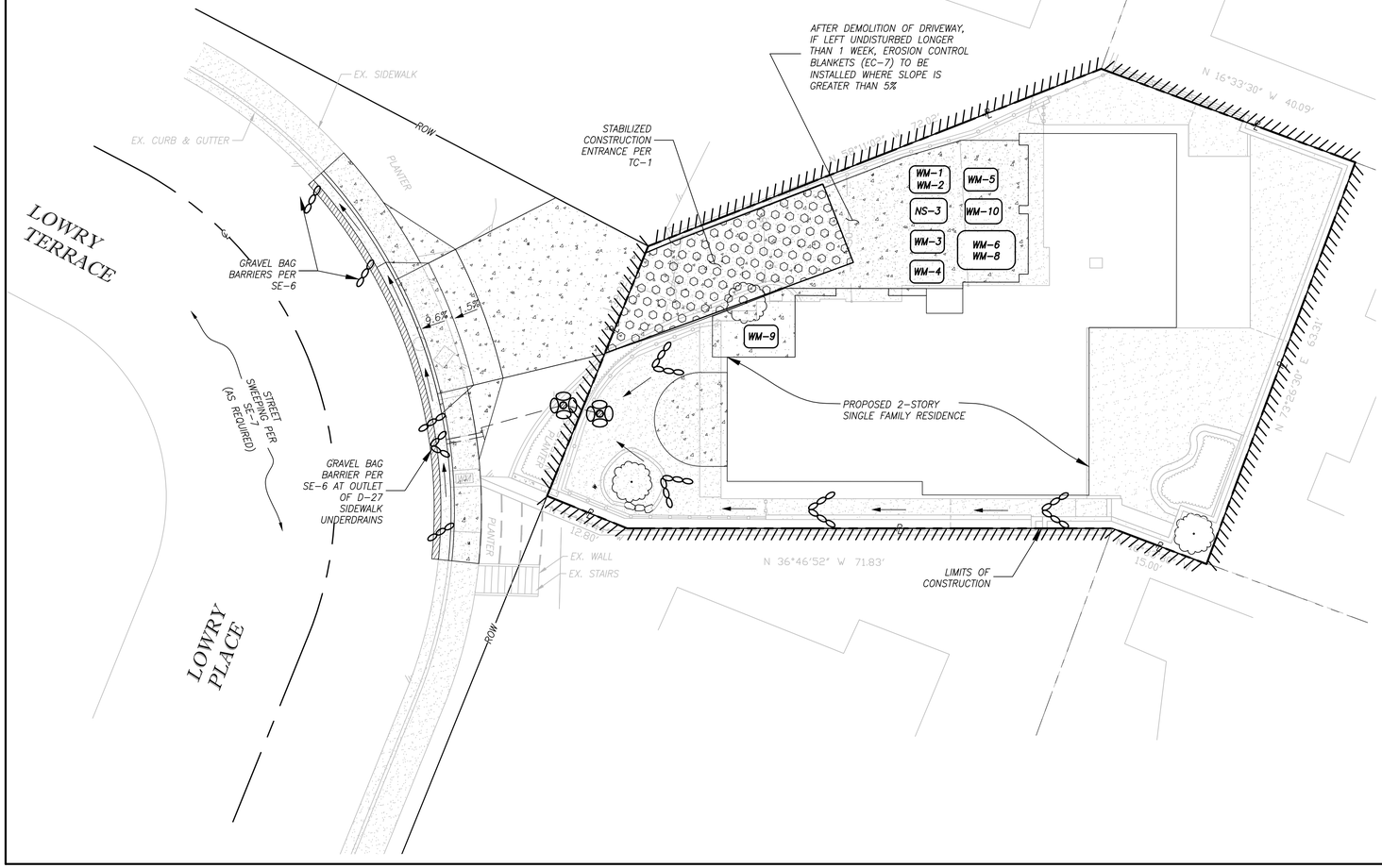
SECTION B-B



PLAN

DETAIL 'F' STABILIZED-ENTRANCE

NO SCALE



COFFEY ENGINEERING, INC.
9666 BUSINESSPARK AVENUE, SUITE 210, SAN DIEGO, CA 92131 PH (858)831-0111 FAX (858)831-0179

REGISTERED PROFESSIONAL ENGINEER MICHAEL C. KEARNEY 76785 CIVIL STATE OF CALIFORNIA

PRELIMINARY

PRICE-COHEN RESIDENCE

2045 LOWRY PLACE
La Jolla, CA 92037

DRAWN BY:	MR
CHECKED BY:	MK
ORIGINAL	7/20/2018
REVISION 1	
REVISION 2	
REVISION 3	
REVISION 4	
REVISION 5	

CONSTRUCTION BMP PLAN

SCALE: 1" = 5'

C.1

SHT 1 OF 2 SHTS

B CERTIFICATION

Appendix B

This WPCP must be certified by the applicant.

The applicant must print and sign the following certification before a permit will be issued.			
I have read and understand that the City of San Diego has adopted minimum requirements for managing urban runoff, including storm water from construction and land development activities. I certify that the BMPs selected on this form will be implemented to minimize the potentially negative impacts of this project's construction and land development activities on water quality. I further agree to install, monitor, maintain, or revise the selected BMPs to ensure their effectiveness. I also understand that non-compliance with the City's Storm Water Standards may result in enforcement by the City, including fines, cease and desist orders, or other actions. I further understand that approval of this WPCP does not relieve me of my responsibility to comply with storm water regulations including the protection of adjacent properties from inundation as a result of my construction activities.			
Applicant Signature:		**Date:**	

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C CITY OF SAN DIEGO FORM DS-560, STORM WATER REQUIREMENTS APPLICABILITY CHECKLIST

City of San Diego
Development Services
1222 First Ave., MS-302
San Diego, CA 92101
(619) 446-5000

Storm Water Requirements Applicability Checklist

FORM DS-560
OCTOBER 2016

Project Address: 2045 Lowry Place, La Jolla CA 92037

Project Number *(for City Use Only)*:

SECTION 1. Construction Storm Water BMP Requirements:

All construction sites are required to implement construction BMPs in accordance with the performance standards in the Storm Water Standards Manual. Some sites are additionally required to obtain coverage under the State Construction General Permit (CGP)[1], which is administered by the State Water Resources Control Board.

For all projects complete PART A: If project is required to submit a SWPPP or WPCP, continue to PART B.

PART A: Determine Construction Phase Storm Water Requirements.

1. Is the project subject to California's statewide General NPDES permit for Storm Water Discharges Associated with Construction Activities, also known as the State Construction General Permit (CGP)? (Typically projects with land disturbance greater than or equal to 1 acre.)

☐ Yes; SWPPP required, skip questions 2-4 ☒ No; next question

2. Does the project propose construction or demolition activity, including but not limited to, clearing, grading, grubbing, excavation, or any other activity resulting in ground disturbance and contact with storm water runoff?

☒ Yes; WPCP required, skip 3-4 ☐ No; next question

3. Does the project propose routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility? (Projects such as pipeline/utility replacement)

☐ Yes; WPCP required, skip 4 ☐ No; next question

4. Does the project only include the following Permit types listed below?

- Electrical Permit, Fire Alarm Permit, Fire Sprinkler Permit, Plumbing Permit, Sign Permit, Mechanical Permit, Spa Permit.
- Individual Right of Way Permits that exclusively include only ONE of the following activities: water service, sewer lateral, or utility service.
- Right of Way Permits with a project footprint less than 150 linear feet that exclusively include only ONE of the following activities: curb ramp, sidewalk and driveway apron replacement, pot holing, curb and gutter replacement, and retaining wall encroachments.

☐ Yes; no document required

Check one of the boxes below, and continue to PART B:

☐ If you checked "Yes" for question 1, **a SWPPP is REQUIRED. Continue to PART B**

☒ If you checked "No" for question 1, and checked "Yes" for question 2 or 3, **a WPCP is REQUIRED.** If the project proposes less than 5,000 square feet of ground disturbance AND has less than a 5-foot elevation change over the entire project area, a Minor WPCP may be required instead. **Continue to PART B.**

☐ If you checked "No" for all questions 1-3, and checked "Yes" for question 4 PART B **does not apply and no document is required. Continue to Section 2.**

1. More information on the City's construction BMP requirements as well as CGP requirements can be found at: www.sandiego.gov/stormwater/regulations/index.shtml

PART B: Determine Construction Site Priority

This prioritization must be completed within this form, noted on the plans, and included in the SWPPP or WPCP. The city reserves the right to adjust the priority of projects both before and after construction. Construction projects are assigned an inspection frequency based on if the project has a "high threat to water quality." The City has aligned the local definition of "high threat to water quality" to the risk determination approach of the State Construction General Permit (CGP). The CGP determines risk level based on project specific sediment risk and receiving water risk. Additional inspection is required for projects within the Areas of Special Biological Significance (ASBS) watershed. **NOTE:** The construction priority does **NOT** change construction BMP requirements that apply to projects; rather, it determines the frequency of inspections that will be conducted by city staff.

Complete PART B and continued to Section 2

1. ☒ **ASBS**
   a. Projects located in the ASBS watershed.

2. ☐ **High Priority**
   a. Projects 1 acre or more determined to be Risk Level 2 or Risk Level 3 per the Construction General Permit and not located in the ASBS watershed.
   b. Projects 1 acre or more determined to be LUP Type 2 or LUP Type 3 per the Construction General Permit and not located in the ASBS watershed.

3. ☐ **Medium Priority**
   a. Projects 1 acre or more but not subject to an ASBS or high priority designation.
   b. Projects determined to be Risk Level 1 or LUP Type 1 per the Construction General Permit and not located in the ASBS watershed.

4. ☐ **Low Priority**
   a. Projects requiring a Water Pollution Control Plan but not subject to ASBS, high, or medium priority designation.

SECTION 2. Permanent Storm Water BMP Requirements.

Additional information for determining the requirements is found in the Storm Water Standards Manual.

PART C: Determine if Not Subject to Permanent Storm Water Requirements.

Projects that are considered maintenance, or otherwise not categorized as "new development projects" or "redevelopment projects" according to the Storm Water Standards Manual are not subject to Permanent Storm Water BMPs.

If "yes" is checked for any number in Part C, proceed to Part F and check "Not Subject to Permanent Storm Water BMP Requirements".

If "no" is checked for all of the numbers in Part C continue to Part D.

1.	Does the project only include interior remodels and/or is the project entirely within an existing enclosed structure and does not have the potential to contact storm water?	☐ Yes ☒ No
2.	Does the project only include the construction of overhead or underground utilities without creating new impervious surfaces?	☐ Yes ☒ No
3.	Does the project fall under routine maintenance? Examples include, but are not limited to: roof or exterior structure surface replacement, resurfacing or reconfiguring surface parking lots or existing roadways without expanding the impervious footprint, and routine replacement of damaged pavement (grinding, overlay, and pothole repair).	☐ Yes ☒ No

PART D: PDP Exempt Requirements.

PDP Exempt projects are required to implement site design and source control BMPs.

If "yes" was checked for any questions in Part D, continue to Part F and check the box labeled "PDP Exempt."

If "no" was checked for all questions in Part D, continue to Part E.

1. **Does the project ONLY include new or retrofit sidewalks, bicycle lanes, or trails that:**
   - **Are designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas? Or;**
   - **Are designed and constructed to be hydraulically disconnected from paved streets and roads? Or;**
   - **Are designed and constructed with permeable pavements or surfaces in accordance with the Green Streets guidance in the City's Storm Water Standards manual?**

   ☐ Yes; PDP exempt requirements apply ☒ No; next question

2. Does the project ONLY include retrofitting or redeveloping existing paved alleys, streets or roads designed and constructed in accordance with the Green Streets guidance in the City's Storm Water Standards Manual?

   ☐ Yes; PDP exempt requirements apply ☒ No; project not exempt.

PART E: Determine if Project is a Priority Development Project (PDP).

Projects that match one of the definitions below are subject to additional requirements including preparation of a Storm Water Quality Management Plan (SWQMP).

If "yes" is checked for any number in PART E, continue to PART F and check the box labeled "Priority Development Project".

If "no" is checked for every number in PART E, continue to PART F and check the box labeled "Standard Development Project".

1. **New Development that creates 10,000 square feet or more of impervious surfaces collectively over the project site.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land. ☐ Yes ☒ No

2. **Redevelopment project that creates and/or replaces 5,000 square feet or more of impervious surfaces on an existing site of 10,000 square feet or more of impervious surfaces.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land. ☐ Yes ☒ No

3. **New development or redevelopment of a restaurant.** Facilities that sell prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC 5812), and where the land development creates and/or replace 5,000 square feet or more of impervious surface. ☐ Yes ☒ No

4. **New development or redevelopment on a hillside.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site) and where the development will grade on any natural slope that is twenty-five percent or greater. ☐ Yes ☒ No

5. **New development or redevelopment of a parking lot that creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).** ☐ Yes ☒ No

6. **New development or redevelopment of streets, roads, highways, freeways, and driveways.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site). ☐ Yes ☒ No

7. **New development or redevelopment discharging directly to an Environmentally Sensitive Area.** The project creates and/or replaces 2,500 square feet of impervious surface (collectively over project site), and discharges directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands). ☐ Yes ☒ No

8. **New development or redevelopment projects of a retail gasoline outlet (RGO) that create and/or replaces 5,000 square feet of impervious surface.** The development project meets the following criteria: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic (ADT) of 100 or more vehicles per day. ☐ Yes ☒ No

9. **New development or redevelopment projects of an automotive repair shops that creates and/or replaces 5,000 square feet or more of impervious surfaces.** Development projects categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539. ☐ Yes ☒ No

10. **Other Pollutant Generating Project.** The project is not covered in the categories above, results in the disturbance of one or more acres of land and is expected to generate pollutants post construction, such as fertilizers and pesticides. This does not include projects creating less than 5,000 sf of impervious surface and where added landscaping does not require regular use of pesticides and fertilizers, such as slope stabilization using native plants. Calculation of the square footage of impervious surface need not include linear pathways that are for infrequent vehicle use, such as emergency maintenance access or bicycle pedestrian use, if they are built with pervious surfaces of if they sheet flow to surrounding pervious surfaces. ☐ Yes ☒ No

PART F: Select the appropriate category based on the outcomes of PART C through PART E.

1. The project is **NOT SUBJECT TO PERMANENT STORM WATER REQUIREMENTS.** ☐
2. The project is a **STANDARD DEVELOPMENT PROJECT.** Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance. ☒
3. The project is **PDP EXEMPT.** Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance. ☐
4. The project is a **PRIORITY DEVELOPMENT PROJECT.** Site design, source control, and structural pollutant control BMP requirements apply. See the Storm Water Standards Manual for guidance on determining if project requires a hydromodification plan management ☐

Michael Rein — Name of Owner or Agent *(Please Print)*

Engineer — Title

Signature

7/20/18 — Date

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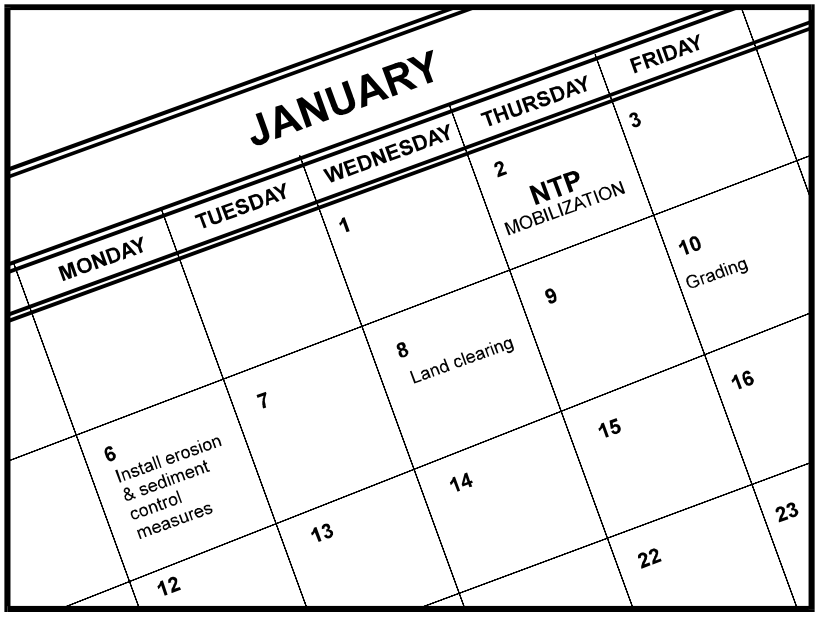
D BMP Data Sheets

Scheduling EC-1



Description and Purpose

Scheduling is the development of a written plan that includes sequencing of construction activities and the implementation of BMPs such as erosion control and sediment control while taking local climate (rainfall, wind, etc.) into consideration. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Suitable Applications

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

Limitations

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

Implementation

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

Categories

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

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

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

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

Costs

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

Inspection and Maintenance

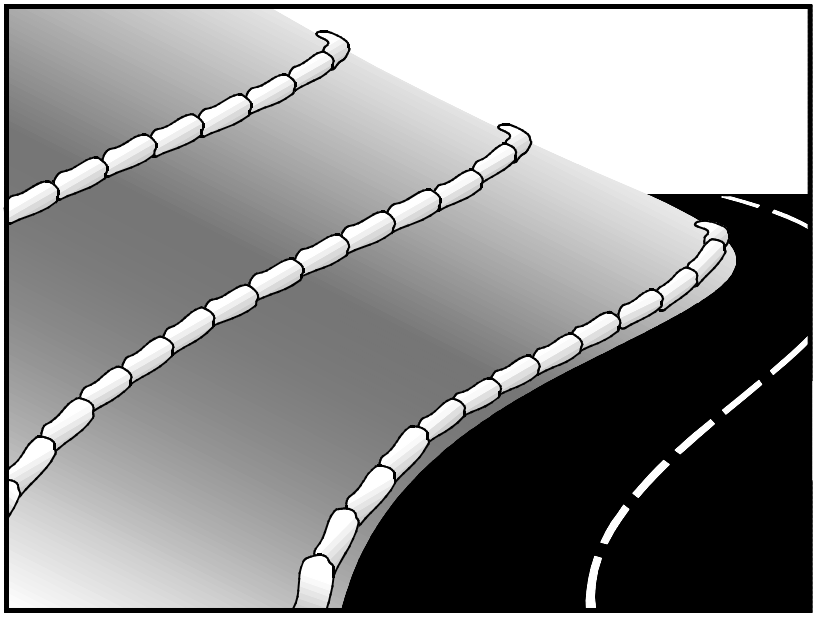
- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Amend the schedule when changes are warranted.
- Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

References

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

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

Gravel Bag Berm SE-6



Description and Purpose

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

Suitable Applications

Gravel bag berms may be suitable:

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

Categories

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

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Roll

SE-8 Sandbag Barrier

SE-12 Temporary Silt Dike

SE-14 Biofilter Bags

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

Limitations

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

Implementation

General

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

Design and Layout

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

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

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

Materials

- ***Bag Material:*** Bags should be woven polypropylene, polyethylene or polyamide fabric or burlap, minimum unit weight of 4 ounces/yd^2, Mullen burst strength exceeding 300 lb/in^2 in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.

- ***Bag Size:*** Each gravel-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal, and may vary based on locally available materials.

- ***Fill Material:*** Fill material should be 0.5 to 1 in. crushed rock, clean and free from clay, organic matter, and other deleterious material, or other suitable open graded, non-cohesive, porous gravel.

Costs

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

Inspection and Maintenance

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

- Gravel bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.

- Reshape or replace gravel bags as needed.

- Repair washouts or other damage as needed.

- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.

- Remove gravel bag berms when no longer needed and recycle gravel fill whenever possible and properly dispose of bag material. Remove sediment accumulation and clean, re-grade, and stabilize the area.

References

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

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

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

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

Street Sweeping and Vacuuming SE-7

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

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

Suitable Applications

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

Limitations

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

Implementation

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

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

Costs

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

Inspection and Maintenance

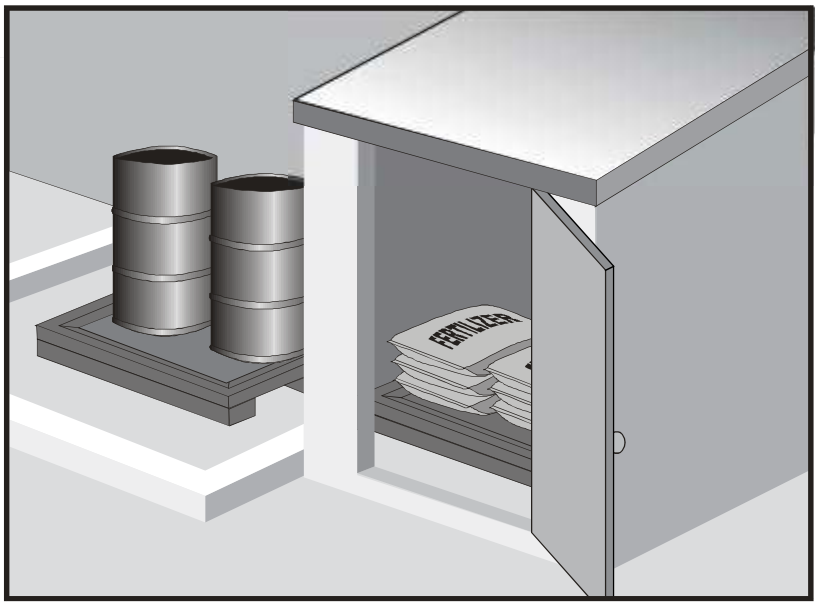
- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- When actively in use, points of ingress and egress must be inspected daily.
- When tracked or spilled sediment is observed outside the construction limits, it must be removed at least daily. More frequent removal, even continuous removal, may be required in some jurisdictions.
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

References

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

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

Material Delivery and Storage WM-1



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

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Description and Purpose

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in watertight containers and/or a completely enclosed designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease

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

Potential Alternatives

None

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- Asphalt and concrete components
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds often must meet building and fire code requirements.

Implementation

The following steps should be taken to minimize risk:

- Chemicals must be stored in water tight containers with appropriate secondary containment or in a storage shed.
- When a material storage area is located on bare soil, the area should be lined and bermed.
- Use containment pallets or other practical and available solutions, such as storing materials within newly constructed buildings or garages, to meet material storage requirements.
- Stack erodible landscape material on pallets and cover when not in use.
- Contain all fertilizers and other landscape materials when not in use.
- Temporary storage areas should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) should be available on-site for all materials stored that have the potential to effect water quality.
- Construction site areas should be designated for material delivery and storage.
- Material delivery and storage areas should be located away from waterways, if possible.
    - Avoid transport near drainage paths or waterways.
    - Surround with earth berms or other appropriate containment BMP. See EC-9, Earth Dikes and Drainage Swales.
    - Place in an area that will be paved.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- An up to date inventory of materials delivered and stored onsite should be kept.

- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- Keep ample spill cleanup supplies appropriate for the materials being stored. Ensure that cleanup supplies are in a conspicuous, labeled area.
- Employees and subcontractors should be trained on the proper material delivery and storage practices.
- Employees trained in emergency spill cleanup procedures must be present when dangerous materials or liquid chemicals are unloaded.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose of materials and any contaminated soil. See WM-7, Contaminated Soil Management. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 should be stored in approved containers and drums and should not be overfilled. Containers and drums should be placed in temporary containment facilities for storage.
- A temporary containment facility should provide for a spill containment volume able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be collected and placed into drums. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids should be sent to an approved disposal site.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Materials should be covered prior to, and during rain events.
- Materials should be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels should be replaced immediately.

- Bagged and boxed materials should be stored on pallets and should not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials should be covered during non-working days and prior to and during rain events.
- Stockpiles should be protected in accordance with WM-3, Stockpile Management.
- Materials should be stored indoors within existing structures or completely enclosed storage sheds when available.
- Proper storage instructions should be posted at all times in an open and conspicuous location.
- An ample supply of appropriate spill clean up material should be kept near storage areas.
- Also see WM-6, Hazardous Waste Management, for storing of hazardous wastes.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored onsite.
- Arrange for employees trained in emergency spill cleanup procedures to be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- Contain and clean up any spill immediately.
- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See WM-7, Contaminated Soil Management.
- See WM-4, Spill Prevention and Control, for spills of chemicals and/or hazardous materials.
- If spills or leaks of materials occur that are not contained and could discharge to surface waters, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

Cost

- The largest cost of implementation may be in the construction of a materials storage area that is covered and provides secondary containment.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Keep storage areas clean and well organized, including a current list of all materials onsite.
- Inspect labels on containers for legibility and accuracy.

- Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

References

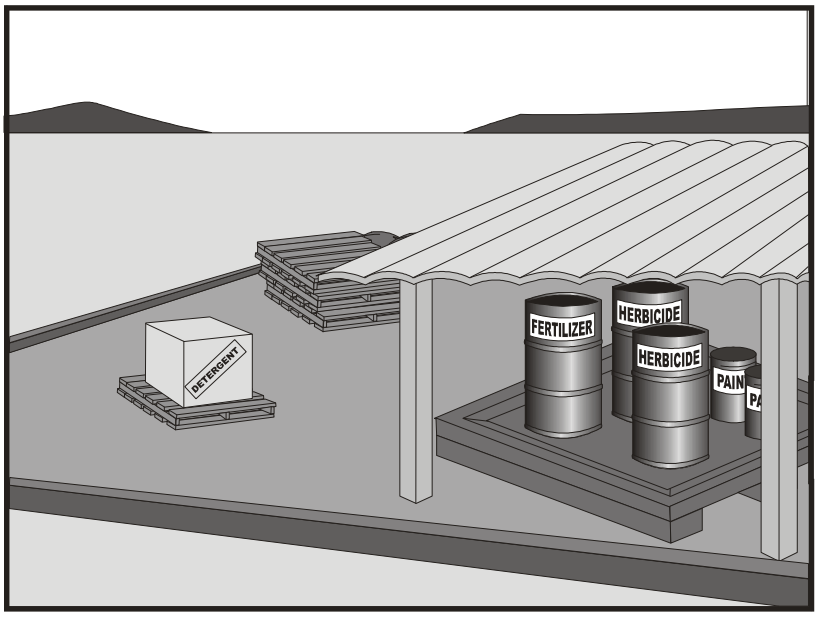
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

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

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

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

Material Use WM-2



Categories

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

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Targeted Constituents

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

Potential Alternatives

None

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Description and Purpose

Prevent or reduce the discharge of pollutants to the storm drain system or watercourses from material use by using alternative products, minimizing hazardous material use onsite, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for use at all construction projects. These procedures apply when the following materials are used or prepared onsite:

- Pesticides and herbicides
- Fertilizers
- Detergents
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete components
- Other hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Other materials that may be detrimental if released to the environment

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Limitations

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

Implementation

The following steps should be taken to minimize risk:

- Minimize use of hazardous materials onsite.
- Follow manufacturer instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- Train personnel who use pesticides. The California Department of Pesticide Regulation and county agricultural commissioners license pesticide dealers, certify pesticide applicators, and conduct onsite inspections.
- The preferred method of termiticide application is soil injection near the existing or proposed structure foundation/slab; however, if not feasible, soil drench application of termiticides should follow EPA label guidelines and the following recommendations (most of which are applicable to most pesticide applications):
  - Do not treat soil that is water-saturated or frozen.
  - Application shall not commence within 24-hours of a predicted precipitation event with a 40% or greater probability. Weather tracking must be performed on a daily basis prior to termiticide application and during the period of termiticide application.
  - Do not allow treatment chemicals to runoff from the target area. Apply proper quantity to prevent excess runoff. Provide containment for and divert stormwater from application areas using berms or diversion ditches during application.
  - Dry season: Do not apply within 10 feet of storm drains. Do not apply within 25 feet of aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds).
  - Wet season: Do not apply within 50 feet of storm drains or aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds) unless a vegetative buffer is present (if so, refer to dry season requirements).
  - Do not make on-grade applications when sustained wind speeds are above 10 mph (at application site) at nozzle end height.
  - Cover treatment site prior to a rain event in order to prevent run-off of the pesticide into non-target areas. The treated area should be limited to a size that can be backfilled and/or covered by the end of the work shift. Backfilling or covering of the treated area shall be done by the end of the same work shift in which the application is made.
  - The applicator must either cover the soil him/herself or provide written notification of the above requirement to the contractor on site and to the person commissioning the

application (if different than the contractor). If notice is provided to the contractor or the person commissioning the application, then they are responsible under the Federal Insecticide Fungicide, and Rodenticide Act (FIFRA) to ensure that: 1) if the concrete slab cannot be poured over the treated soil within 24 hours of application, the treated soil is covered with a waterproof covering (such as polyethylene sheeting), and 2) the treated soil is covered if precipitation is predicted to occur before the concrete slab is scheduled to be poured.

- Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Unless on steep slopes, till fertilizers into the soil rather than hydraulic application. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried offsite by runoff. Do not apply these chemicals before predicted rainfall.
- Train employees and subcontractors in proper material use.
- Supply Material Safety Data Sheets (MSDS) for all materials.
- Dispose of latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, with other construction debris.
- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain, or watercourse. Dispose of any paint thinners, residue, and sludge(s) that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practicable, and rinse to a drain leading to a sanitary sewer where permitted, or contain for proper disposal off site. For oil-based paints, clean brushes to the extent practicable, and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials onsite when practical.
- Document the location, time, chemicals applied, and applicator's name and qualifications.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.
- Discontinue use of erodible landscape material within 2 days prior to a forecasted rain event and materials should be covered and/or bermed.

- Provide containment for material use areas such as masons' areas or paint mixing/preparation areas to prevent materials/pollutants from entering stormwater.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Ensure employees and subcontractors throughout the job are using appropriate practices.

References

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

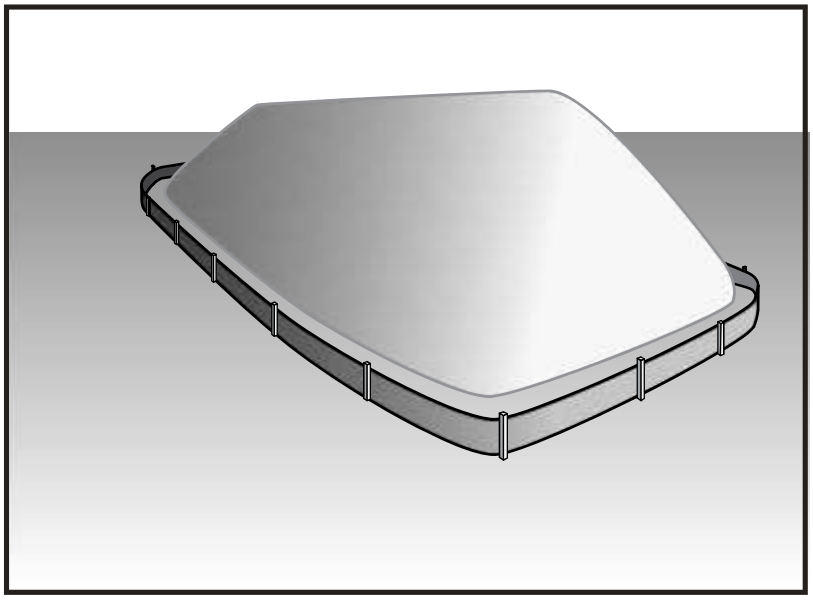
Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Comments on Risk Assessments Risk Reduction Options for Cypermethrin: Docket No. OPP–2005–0293; California Stormwater Quality Association (CASQA) letter to USEPA, 2006.Environmental Hazard and General Labeling for Pyrethroid Non-Agricultural Outdoor Products, EPA-HQ-OPP-2008-0331-0021; USEPA, 2008.

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

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

Stockpile Management WM-3



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

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Description and Purpose

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:

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

Potential Alternatives

None

- On larger sites, a minimum of 50 ft separation from concentrated flows of stormwater, drainage courses, and inlets is recommended.
- After 14 days of inactivity, a stockpile is non-active and requires further protection described below. All stockpiles are required to be protected as non-active stockpiles immediately if they are not scheduled to be used within 14 days.
- Protect all stockpiles from stormwater runon using temporary perimeter sediment barriers such as compost berms (SE-13), temporary silt dikes (SE-12), fiber rolls (SE-5), silt fences (SE-1), sandbags (SE-8), gravel bags (SE-6), or biofilter bags (SE-14). Refer to the individual fact sheet for each of these controls for installation information.
- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-1, Wind Erosion Control.
- Manage stockpiles of contaminated soil in accordance with WM-7, Contaminated Soil Management.
- Place bagged materials on pallets and under cover.
- Ensure that stockpile coverings are installed securely to protect from wind and rain.
- Some plastic covers withstand weather and sunlight better than others. Select cover materials or methods based on anticipated duration of use.

Protection of Non-Active Stockpiles

A stockpile is considered non-active if it either is not used for 14 days or if it is scheduled not to be used for 14 days or more. Stockpiles need to be protected immediately if they are not scheduled to be used within 14 days. Non-active stockpiles of the identified materials should be protected as follows:

Soil stockpiles

- Soil stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.
- Temporary vegetation should be considered for topsoil piles that will be stockpiled for extended periods.

Stockpiles of Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate sub base

- Stockpiles should be covered and protected with a temporary perimeter sediment barrier at all times.

Stockpiles of "cold mix"

- Cold mix stockpiles should be placed on and covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Stockpiles of fly ash, stucco, hydrated lime

- Stockpiles of materials that may raise the pH of runoff (i.e., basic materials) should be covered with plastic and surrounded by a berm.

Stockpiles/Storage of wood (Pressure treated with chromated copper arsenate or ammoniacal copper zinc arsenate

- Treated wood should be covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Protection of Active Stockpiles

A stockpile is active when it is being used or is scheduled to be used within 14 days of the previous use. Active stockpiles of the identified materials should be protected as follows:

- All stockpiles should be covered and protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of "cold mix" and treated wood, and basic materials should be placed on and covered with plastic sheeting or comparable material and surrounded by a berm prior to the onset of precipitation.
- The downstream perimeter of an active stockpile should be protected with a linear sediment barrier or berm and runoff should be diverted around or away from the stockpile on the upstream perimeter.

Costs

For cost information associated with stockpile protection refer to the individual erosion or sediment control BMP fact sheet considered for implementation (For example, refer to SE-1 Silt Fence for installation of silt fence around the perimeter of a stockpile.)

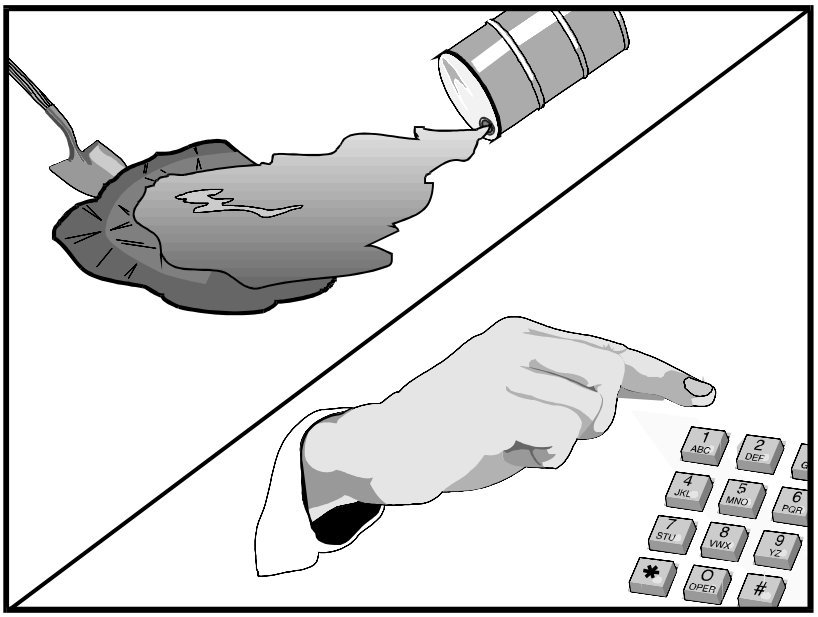
Inspection and Maintenance

- Stockpiles must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- It may be necessary to inspect stockpiles covered with plastic sheeting more frequently during certain conditions (for example, high winds or extreme heat).
- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.
- Sediment shall be removed when it reaches one-third of the barrier height.

References

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

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

- Fuels
- Lubricants
- Other petroleum distillates

Limitations

- In some cases it may be necessary to use a private spill cleanup company.
- This BMP applies to spills caused by the contractor and subcontractors.
- Procedures and practices presented in this BMP are general. Contractor should identify appropriate practices for the specific materials used or stored onsite

Implementation

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

- Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.
- Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

- To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.
- Designate responsible individuals to oversee and enforce control measures.
- Spills should be covered and protected from stormwater runon during rainfall to the extent that it doesn't compromise clean up activities.
- Do not bury or wash spills with water.

- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.
- Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with WM-10, Liquid Waste Management.
- Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.
- Place proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.
- Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

- Clean up leaks and spills immediately.
- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.
- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

- Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.
- Use absorbent materials on small spills rather than hosing down or burying the spill.
- Absorbent materials should be promptly removed and disposed of properly.
- Follow the practice below for a minor spill:
  - Contain the spread of the spill.
  - Recover spilled materials.
  - Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

- Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

- Spills should be cleaned up immediately:
  - Contain spread of the spill.
  - Notify the project foreman immediately.
  - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
  - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
  - If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps should be taken:
  - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
  - Notify the Governor's Office of Emergency Services Warning Center, (916) 845-8911.
  - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.
  - Notification should first be made by telephone and followed up with a written report.
  - The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
  - Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

Reporting

- Report significant spills to local agencies, such as the Fire Department; they can assist in cleanup.
- Federal regulations require that any significant oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hours).

Use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Regularly inspect onsite vehicles and equipment for leaks and repair immediately
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under paving equipment when not in use.
- Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around
- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- If fueling must occur onsite, use designate areas, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Discourage "topping off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

Costs

Prevention of leaks and spills is inexpensive. Treatment and/ or disposal of contaminated soil or water can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Keep ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.
- Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite.

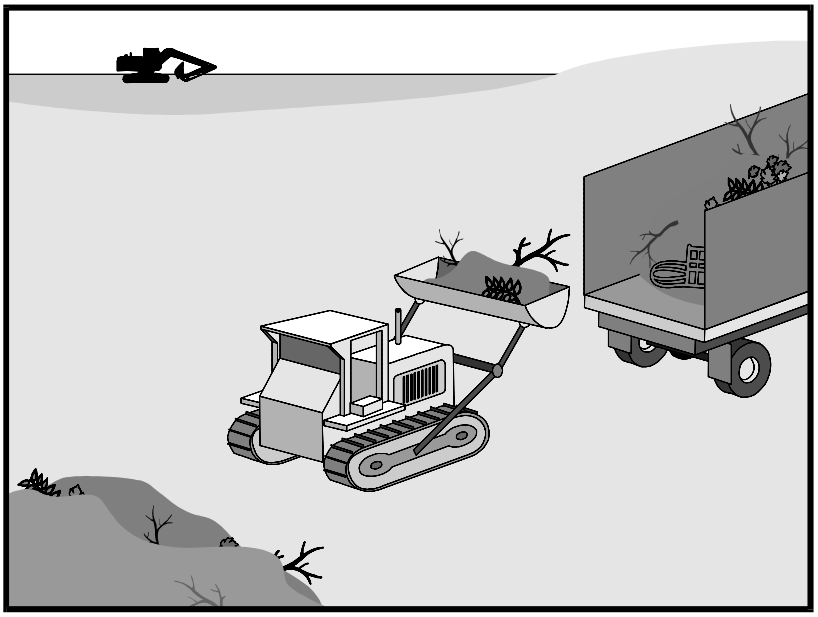
References

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

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

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

Solid Waste Management WM-5



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

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- Highway planting wastes, including vegetative material, plant containers, and packaging materials

Limitations

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Implementation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Locate containers in a covered area or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Cover waste containers at the end of each work day and when it is raining.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Remove this solid waste promptly since erosion and sediment control devices tend to collect litter.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

Education

- Have the contractor's superintendent or representative oversee and enforce proper solid waste management procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.

- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Minimize production of solid waste materials wherever possible.

Collection, Storage, and Disposal

- Littering on the project site should be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater 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.

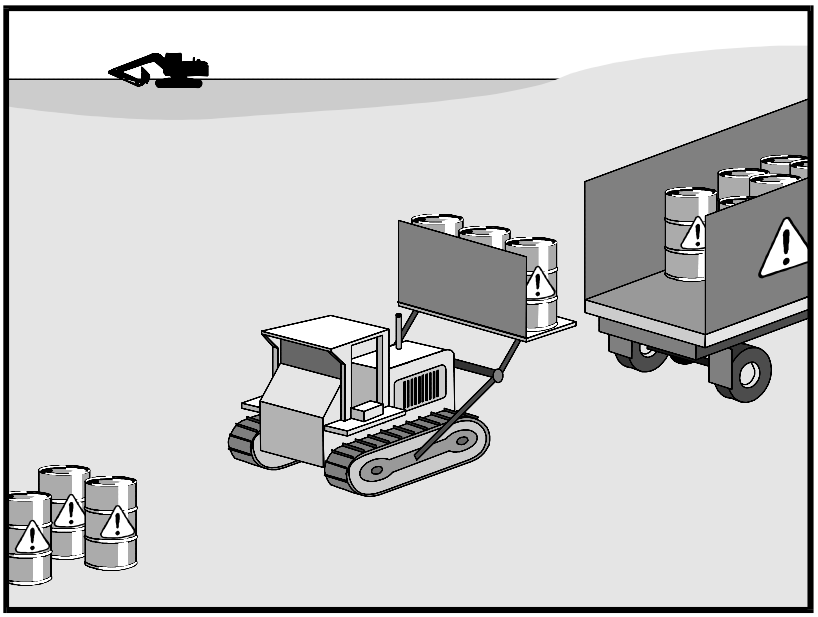
References

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

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

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

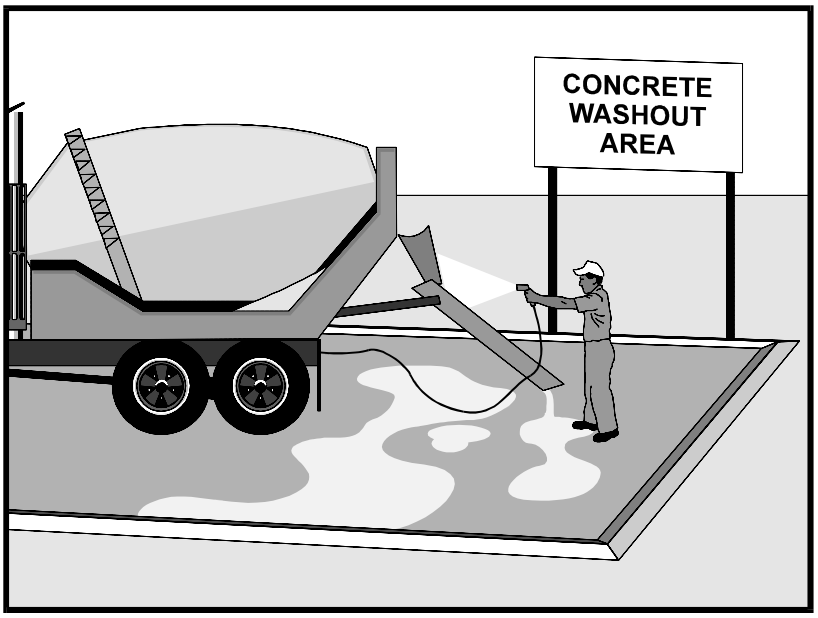
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

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.

Concrete Waste Management WM-8



Categories

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

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Prevent the discharge of pollutants to stormwater from concrete waste by conducting washout onsite or offsite in a designated area, and by employee and subcontractor training.

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

Many types of construction materials, including mortar, concrete, stucco, cement and block and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows and raising pH to levels outside the accepted range.

Suitable Applications

Concrete waste management procedures and practices are implemented on construction projects where:

- Concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Slurries containing portland cement concrete (PCC) are generated, such as from saw cutting, coring, grinding, grooving, and hydro-concrete demolition.
- Concrete trucks and other concrete-coated equipment are washed onsite.

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

Limitations

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

Implementation

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

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

Education

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

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

Concrete Demolition Wastes

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

Concrete Slurry Wastes

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

Onsite Temporary Concrete Washout Facility, Transit Truck Washout Procedures

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

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

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

Removal of Temporary Concrete Washout Facilities

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

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

Costs

All of the above are low cost measures. Roll-0ff concrete washout facilities can be more costly than other measures due to removal and replacement; however, provide a cleaner alternative to traditional washouts. The type of washout facility, size, and availability of materials will determine the cost of the washout.

Inspection and Maintenance

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

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

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

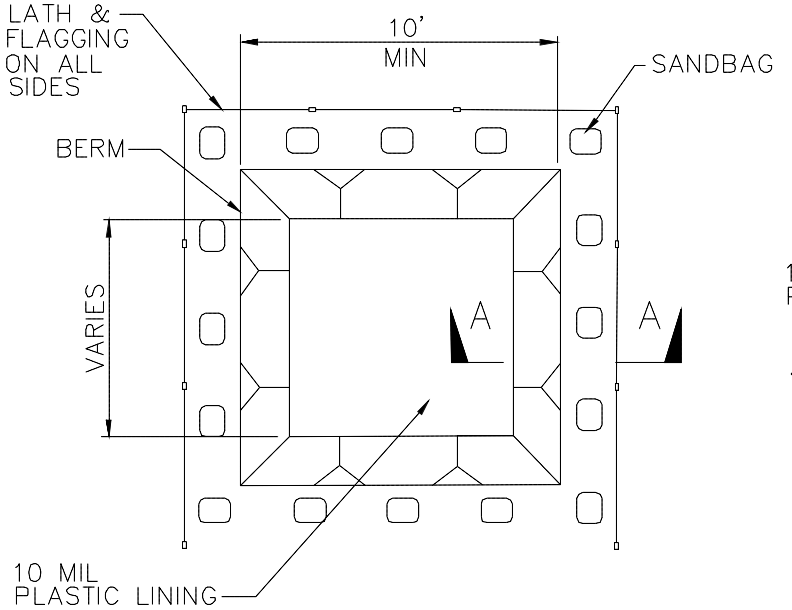
- Inspect washout facilities for damage (e.g. torn liner, evidence of leaks, signage, etc.). Repair all identified damage.

References

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

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

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



PLAN
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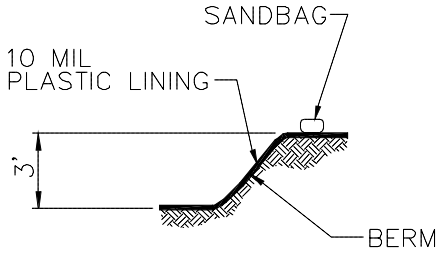
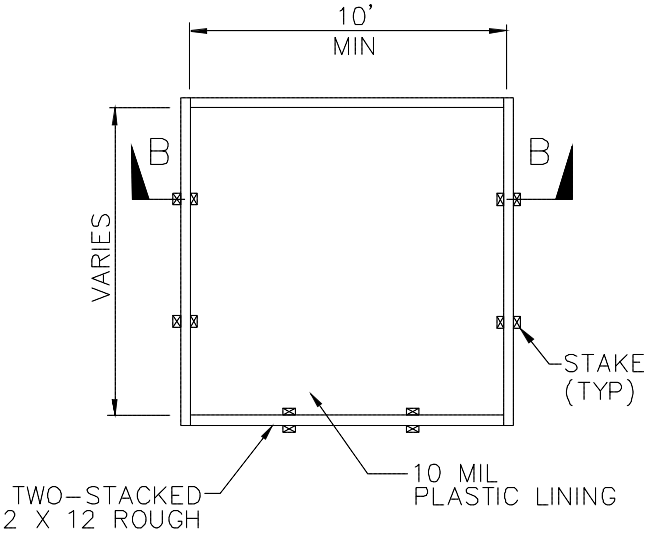


SECTION A–A
NOT TO SCALE



PLAN
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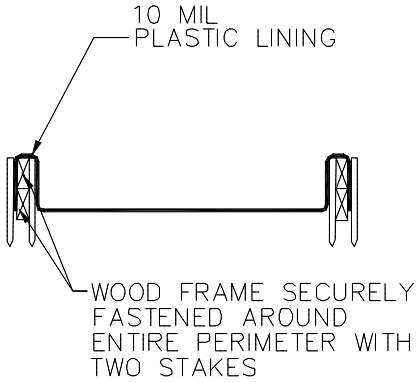
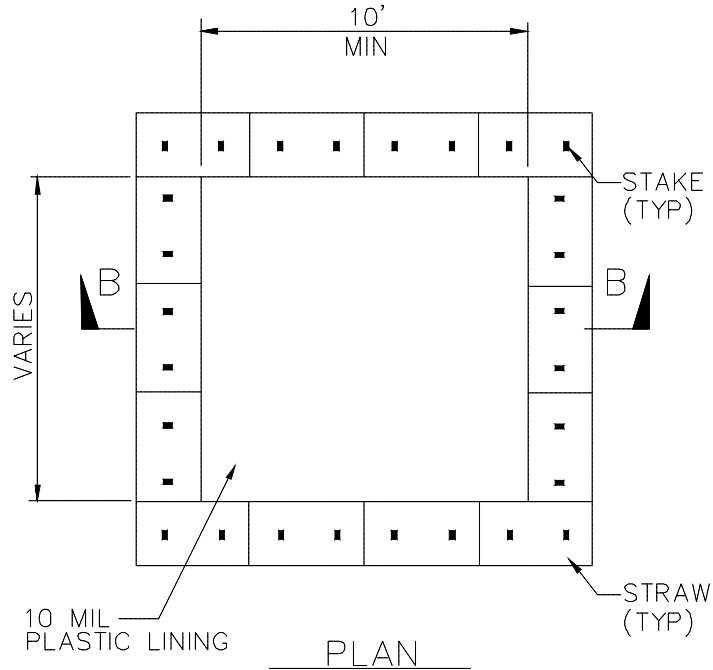
TYPE "ABOVE GRADE"



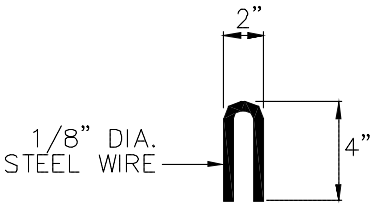
SECTION B–B
NOT TO SCALE

NOTES

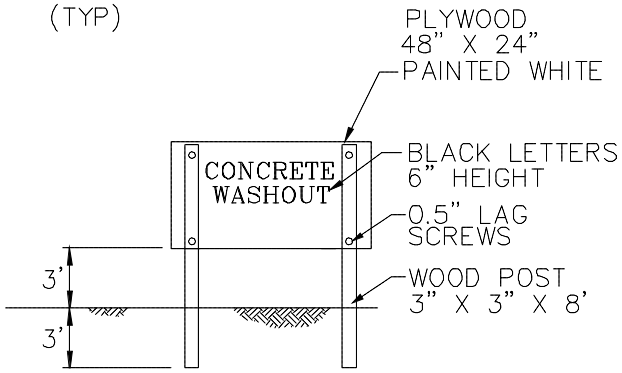
1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.



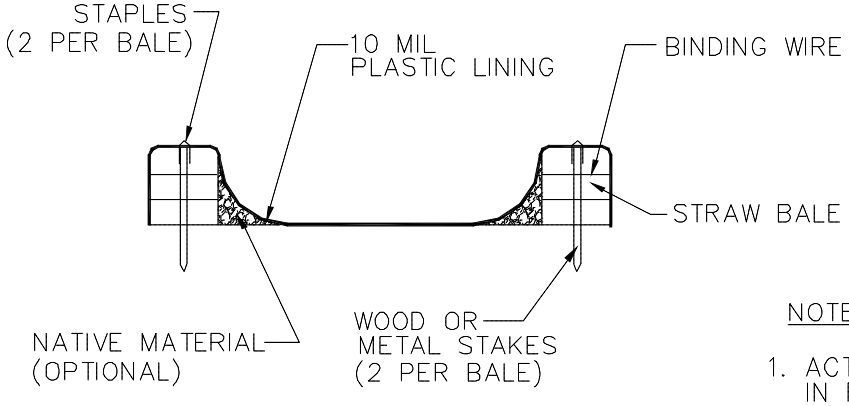
PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"
WITH STRAW BALES



STAPLE DETAIL



CONCRETE WASHOUT
SIGN DETAIL
(OR EQUIVALENT)

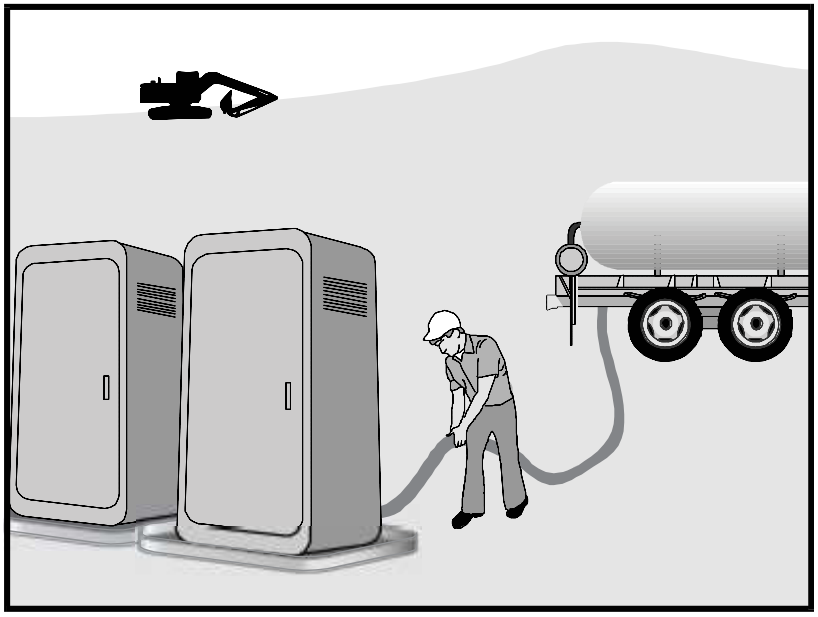


SECTION B–B
NOT TO SCALE

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

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

Proper sanitary and septic waste management prevent the discharge of pollutants to stormwater from sanitary and septic waste by providing convenient, well-maintained facilities, and arranging for regular service and disposal.

Suitable Applications

Sanitary septic waste management practices are suitable for use at all construction sites that use temporary or portable sanitary and septic waste systems.

Limitations

None identified.

Implementation

Sanitary or septic wastes should be treated or disposed of in accordance with state and local requirements. In many cases, one contract with a local facility supplier will be all that it takes to make sure sanitary wastes are properly disposed.

Storage and Disposal Procedures

- Temporary sanitary facilities should be located away from drainage facilities, watercourses, and from traffic circulation. If site conditions allow, place portable facilities a minimum of 50 feet from drainage conveyances and traffic areas. When subjected to high winds or risk of high winds, temporary sanitary facilities should be secured to prevent overturning.

- Temporary sanitary facilities must be equipped with containment to prevent discharge of pollutants to the stormwater drainage system of the receiving water.
- Consider safety as well as environmental implications before placing temporary sanitary facilities.
- Wastewater should not be discharged or buried within the project site.
- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, should comply with the local health agency, city, county, and sewer district requirements.
- Only reputable, licensed sanitary and septic waste haulers should be used.
- Sanitary facilities should be located in a convenient location.
- Temporary septic systems should treat wastes to appropriate levels before discharging.
- If using an onsite disposal system (OSDS), such as a septic system, local health agency requirements must be followed.
- Temporary sanitary facilities that discharge to the sanitary sewer system should be properly connected to avoid illicit discharges.
- Sanitary and septic facilities should be maintained in good working order by a licensed service.
- Regular waste collection by a licensed hauler should be arranged before facilities overflow.
- If a spill does occur from a temporary sanitary facility, follow federal, state and local regulations for containment and clean-up.

Education

- Educate employees, subcontractors, and suppliers on sanitary and septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary and septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary and septic waste.
- Hold regular meetings to discuss and reinforce the use of sanitary facilities (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

Costs

All of the above are low cost measures.

Inspection and Maintenance

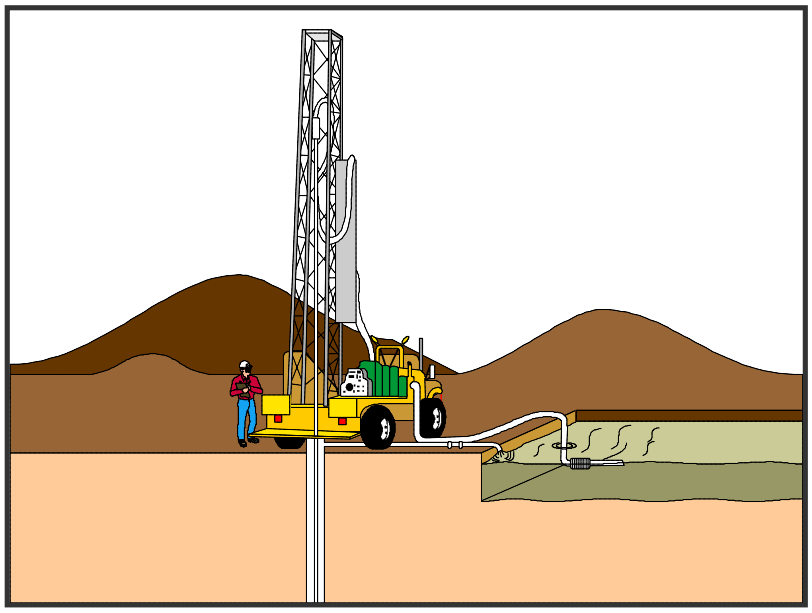
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Arrange for regular waste collection.
- If high winds are expected, portable sanitary facilities must be secured with spikes or weighed down to prevent over turning.
- If spills or leaks from sanitary or septic facilities occur that are not contained and discharge from the site, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

References

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

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

Liquid Waste Management WM-10



Categories

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

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

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

Potential Alternatives

None

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.

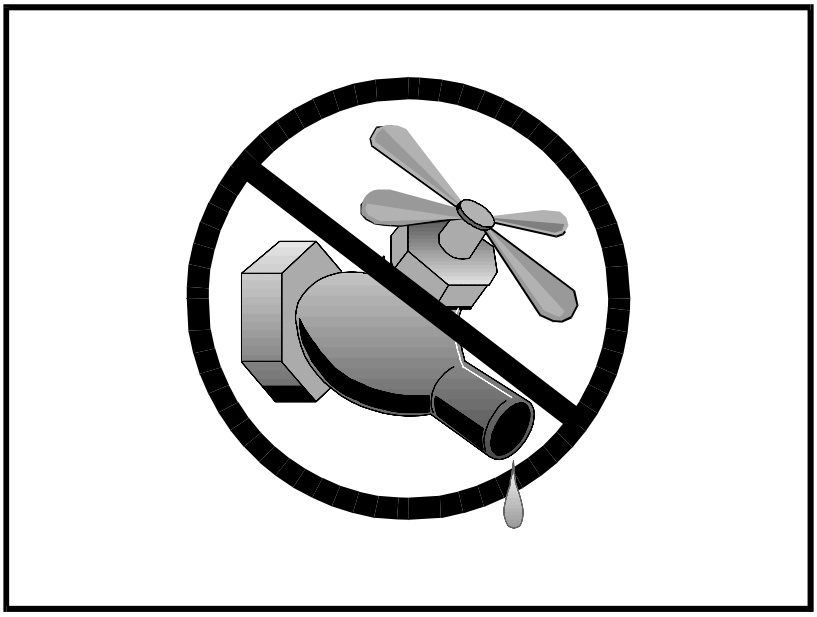
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

- 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.

Water Conservation Practices NS-1



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

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

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

Potential Alternatives

None

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Description and Purpose

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 reused.
- Authorized non-stormwater discharges to the storm drain system, channels, or receiving waters are acceptable with the implementation of appropriate BMPs.
- Lock water tank valves to prevent unauthorized use.

Costs

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

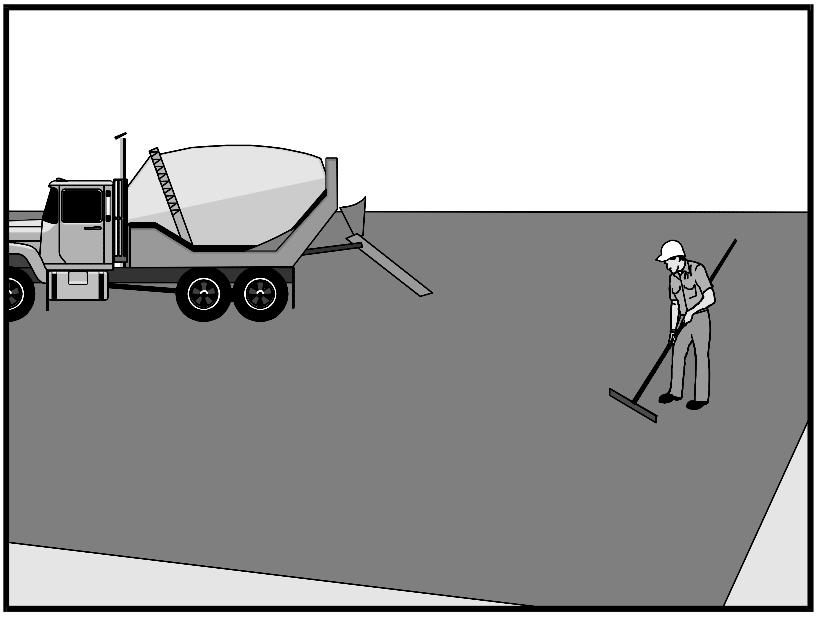
Inspection and Maintenance

- Inspect and verify that activity based BMPs are in place prior to the commencement of authorized non-stormwater discharges.
- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges are occuring.
- Repair water equipment as needed to prevent unintended discharges.
  - Water trucks
  - Water reservoirs (water buffalos)
  - Irrigation systems
  - Hydrant connections

References

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

Paving and Grinding Operations NS-3



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

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

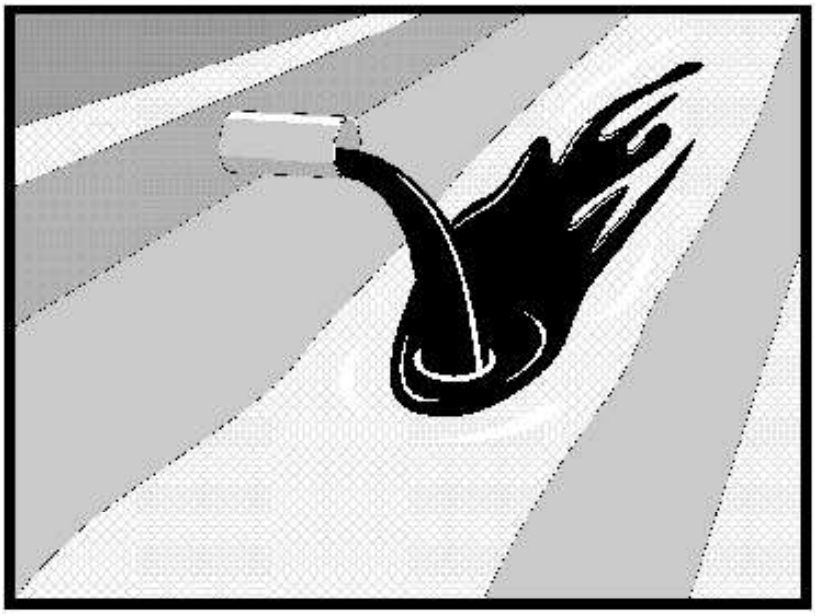
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

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

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

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.

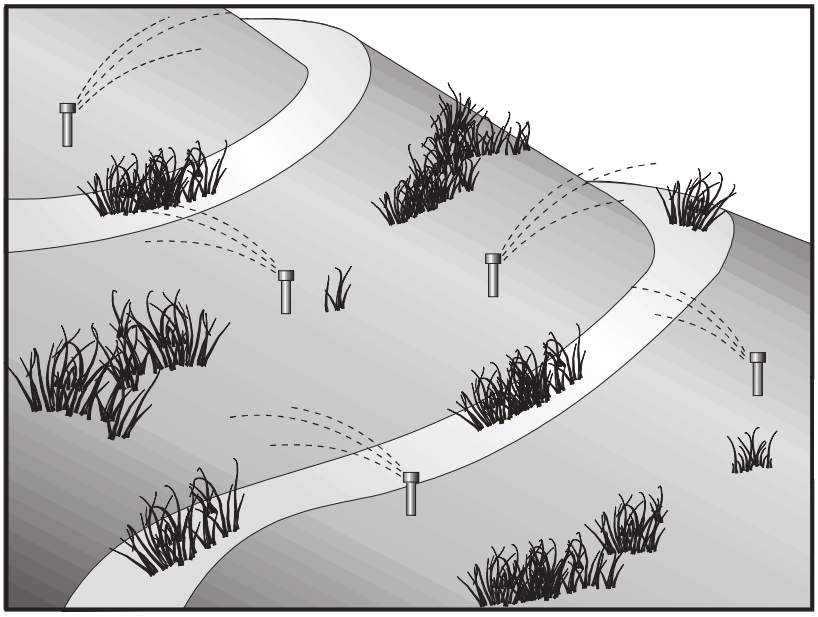
References

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



Description and Purpose

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

Suitable Applications

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

Limitations

None identified.

Implementation

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

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
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

- 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.

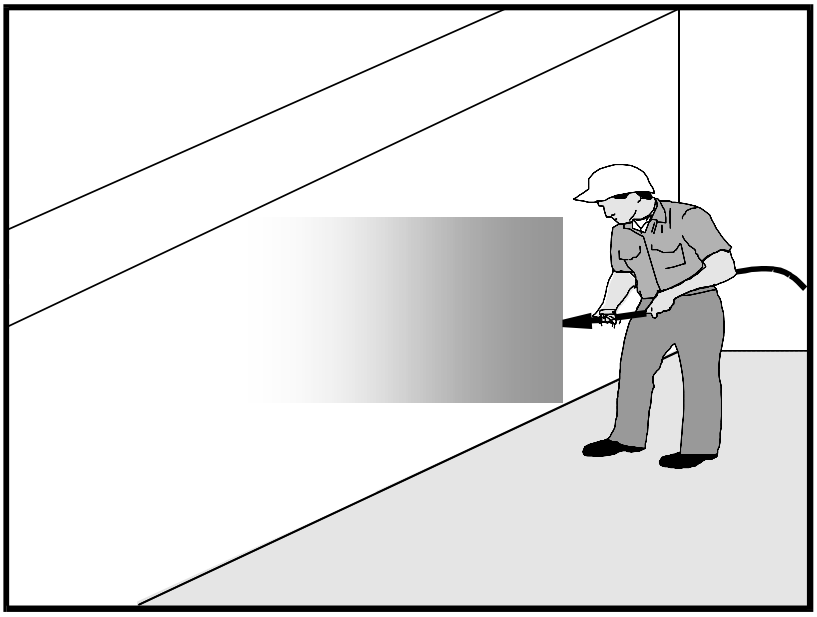
References

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.

Concrete Curing NS-12



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

Legend:
☑ **Primary Category**
☒ **Secondary Category**

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

Potential Alternatives

None

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

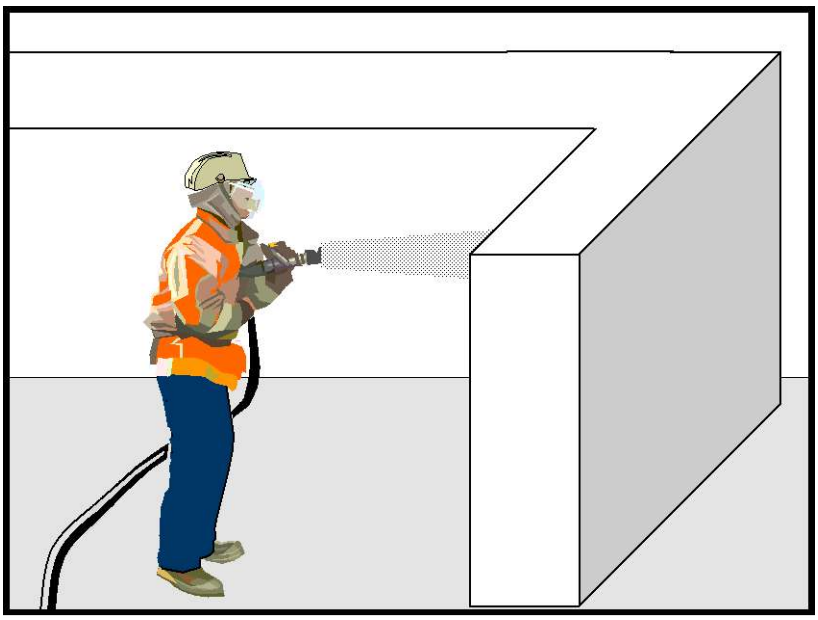
Blue Print for a Clean Bay-Construction-Related Industries: Best Management Practices for Stormwater Pollution Prevention; Santa Clara Valley Non Point Source Pollution Control Program, 1992.

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

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.

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.

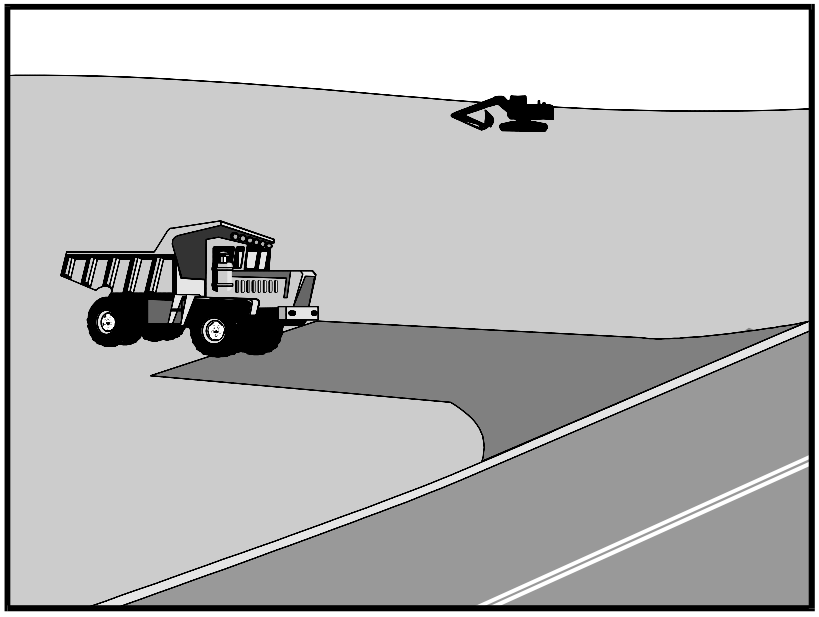
References

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.

Stabilized Construction Entrance/Exit TC-1



Description and Purpose

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

Suitable Applications

Use at construction sites:

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

Limitations

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

Categories

EC	Erosion Control	☒
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

Stabilized Construction Entrance/Exit TC-1

Implementation

General

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

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

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

Design and Layout

- Construct on level ground where possible.
- Select 3 to 6 in. diameter stones.
- Use minimum depth of stones of 12 in. or as recommended by soils engineer.
- Construct length of 50 ft or maximum site will allow, and 10 ft minimum width or to accommodate traffic.
- Rumble racks constructed of steel panels with ridges and installed in the stabilized entrance/exit will help remove additional sediment and to keep adjacent streets clean.
- Provide ample turning radii as part of the entrance.
- Limit the points of entrance/exit to the construction site.
- Limit speed of vehicles to control dust.
- Properly grade each construction entrance/exit to prevent runoff from leaving the construction site.
- Route runoff from stabilized entrances/exits through a sediment trapping device before discharge.
- Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.

Stabilized Construction Entrance/Exit TC-1

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

Inspection and Maintenance

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

Costs

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

References

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

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.

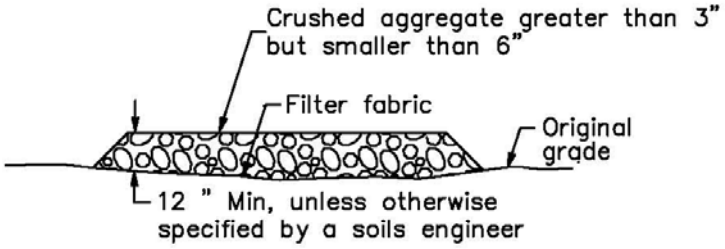
Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

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

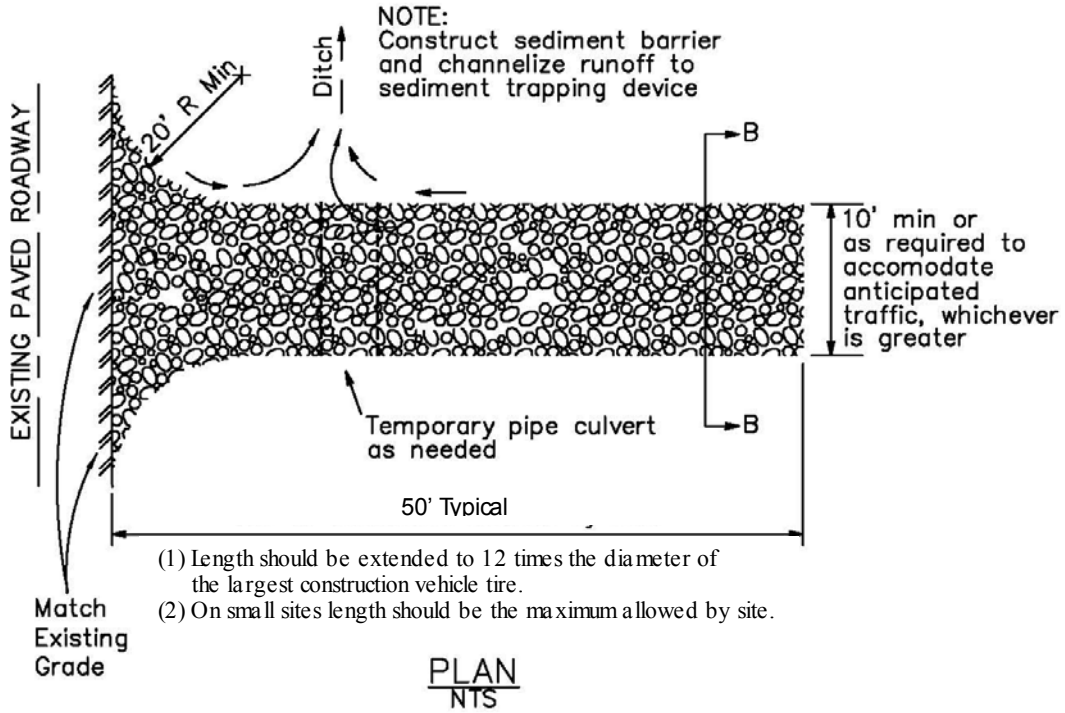
Guidance Specifying Management Measures for Nonpoint Pollution in Coastal Waters, EPA 840-B-9-002, USEPA, Office of Water, Washington, DC, 1993.

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

Stabilized Construction Entrance/Exit TC-1



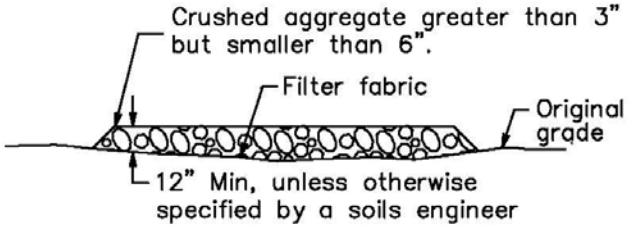
SECTION B–B
NTS



(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

Stabilized Construction Entrance/Exit TC-1



SECTION B–B
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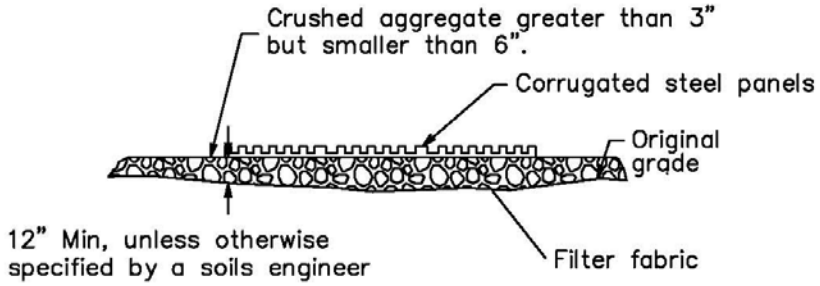
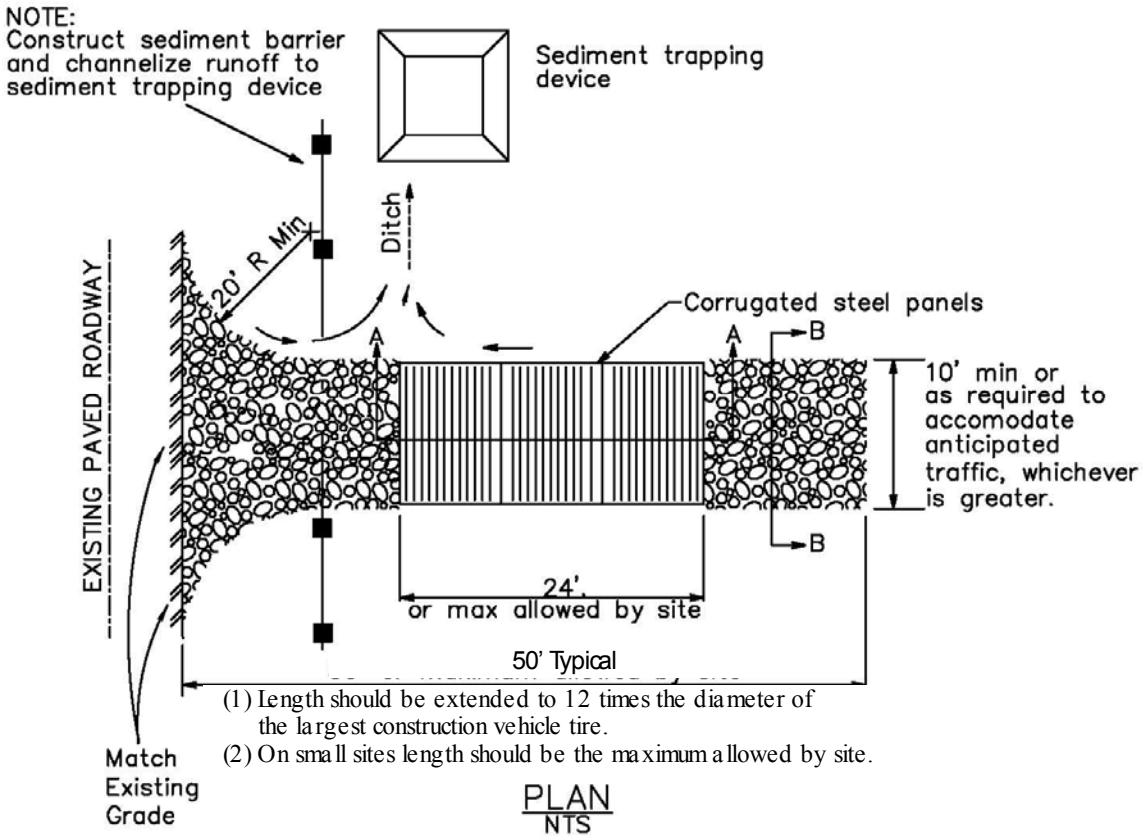


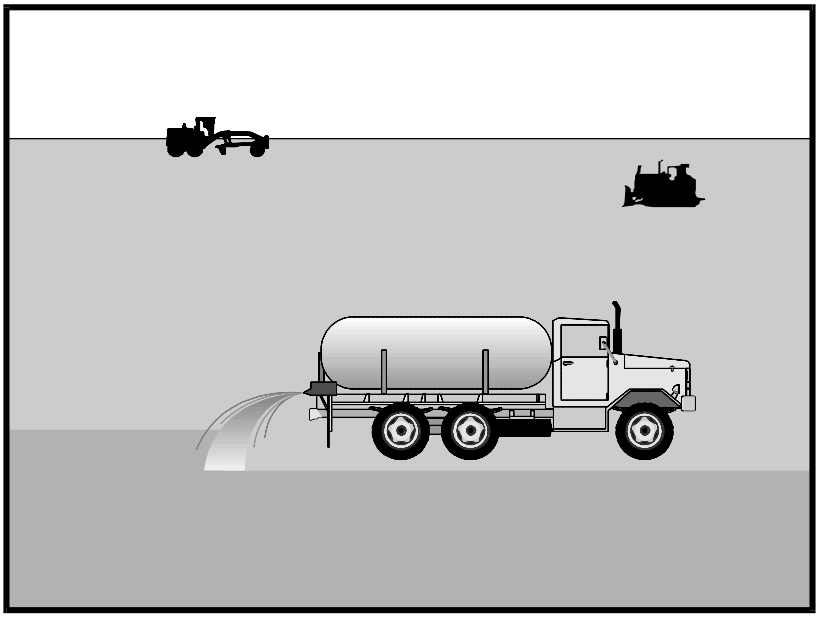
SECTION A–A
NOT TO SCALE



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

PLAN
NTS

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

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, vinyls, acrylic), clay additives (e.g. bentonite, montimorillonite) and electrochemical products (e.g. enzymes, ionic products).

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

Additional preventive measures include:

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

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

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

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

Costs

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

Inspection and Maintenance

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

References

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

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

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

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

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

E Self Inspection Form

BMP INSPECTION REPORT

Date and Time of Inspection:	Date Report Written:

Inspection Type: (Circle one)	Weekly *Complete Parts I,II,III and VII*	Pre-Storm *Complete Parts I,II,III,IV and VII*	During Rain Event *Complete Parts I, II, III, V, and VII*	Post-Storm *Complete Parts I,II,III,VI and VII*

Part I. General Information

Site Information

Construction Site Name:	
Construction stage and completed activities:	Approximate area of site that is exposed:

Photos Taken: (Circle one)	Yes	No	Photo Reference IDs:

Weather

Estimate storm beginning: (date and time)	Estimate storm duration: (hours)
Estimate time since last storm: (days or hours)	Rain gauge reading and location: (in)

Is a "Qualifying Event" predicted or did one occur (i.e., 0.5" rain with 48-hrs or greater between events)? (Y/N)
If yes, summarize forecast:

Exemption Documentation (explanation required if inspection could not be conducted).

Visual inspections are not required outside of business hours or during dangerous weather conditions such as flooding or electrical storms.

Inspector Information

Inspector Name:	Inspector Title:
Signature:	Date:

Part II. BMP Observations. Describe deficiencies in Part III.			
Minimum BMPs for Risk Level _____ Sites	Failures or other short comings (yes, no, N/A)	Action Required (yes/no)	Action Implemented (Date)
Good Housekeeping for Construction Materials			
Inventory of products (excluding materials designed to be outdoors)			
Stockpiled construction materials not actively in use are covered and bermed			
All chemicals are stored in watertight containers with appropriate secondary containment, or in a completely enclosed storage shed			
Construction materials are minimally exposed to precipitation			
BMPs preventing the off-site tracking of materials are implemented and properly effective			
Good Housekeeping for Waste Management			
Wash/rinse water and materials are prevented from being disposed into the storm drain system			
Portable toilets are contained to prevent discharges of waste			
Sanitation facilities are clean and with no apparent for leaks and spills			
Equipment is in place to cover waste disposal containers at the end of business day and during rain events			
Discharges from waste disposal containers are prevented from discharging to the storm drain system / receiving water			
Stockpiled waste material is securely protected from wind and rain if not actively in use			
Procedures are in place for addressing hazardous and non-hazardous spills			
Appropriate spill response personnel are assigned and trained			
Equipment and materials for cleanup of spills is available onsite			
Washout areas (e.g., concrete) are contained appropriately to prevent discharge or infiltration into the underlying soil			
Good Housekeeping for Vehicle Storage and Maintenance			
Measures are in place to prevent oil, grease, or fuel from leaking into the ground, storm drains, or surface waters			
All equipment or vehicles are fueled, maintained, and stored in a designated area with appropriate BMPs			
Vehicle and equipment leaks are cleaned immediately and disposed of properly			

Part II. BMP Observations Continued. Describe deficiencies in Part III.			
Minimum BMPs for Risk Level _____ Sites	Adequately designed, implemented and effective (yes, no, N/A)	Action Required (yes/no)	Action Implemented (Date)
Good Housekeeping for Landscape Materials			
Stockpiled landscape materials such as mulches and topsoil are contained and covered when not actively in use			
Erodible landscape material has not been applied 2 days before a forecasted rain event or during an event			
Erodible landscape materials are applied at quantities and rates in accordance with manufacturer recommendations			
Bagged erodible landscape materials are stored on pallets and covered			
Good Housekeeping for Air Deposition of Site Materials			
Good housekeeping measures are implemented onsite to control the air deposition of site materials and from site operations			
Non-Stormwater Management			
Non-Stormwater discharges are properly controlled			
Vehicles are washed in a manner to prevent non-stormwater discharges to surface waters or drainage systems			
Streets are cleaned in a manner to prevent unauthorized non-stormwater discharges to surface waters or drainage systems.			
Erosion Controls			
Wind erosion controls are effectively implemented			
Effective soil cover is provided for disturbed areas inactive (i.e., not scheduled to be disturbed for 14 days) as well as finished slopes, open space, utility backfill, and completed lots			
The use of plastic materials is limited in cases when a more sustainable, environmentally friendly alternative exists.			
Sediment Controls			
Perimeter controls are established and effective at controlling erosion and sediment discharges from the site			
Entrances and exits are stabilized to control erosion and sediment discharges from the site			
Sediment basins are properly maintained			
Linear sediment control along toe of slope, face of slope an at grade breaks (Risk Level 2 & 3 Only)			
Limit construction activity to and from site to entrances and exits that employ effective controls to prevent offsite tracking (Risk Level 2 & 3 Only)			

Ensure all storm, drain inlets and perimeter controls, runoff control BMPs and pollutants controls at entrances and exits are maintained and protected from activities the reduce their effectiveness (Risk Level 2 & 3 Only)			
Inspect all immediate access roads daily (Risk Level 2 & 3 Only)			
Run-On and Run-Off Controls			
Run-on to the site is effectively managed and directed away from all disturbed areas.			
Other			
Are the project SWPPP and BMP plan up to date, available on-site and being properly implemented?			

Part III. Descriptions of BMP Deficiencies

Deficiency	Repairs Implemented: Note - Repairs must begin within 72 hours of identification and, complete repairs as soon as possible.	
	Start Date	Action
1.		
2.		
3.		
4.		

Part IV. Additional Pre-Storm Observations. Note the presence or absence of floating and suspended materials, sheen, discoloration, turbidity, odors, and source(s) of pollutants(s).

	Yes, No, N/A
Do stormwater storage and containment areas have adequate freeboard? If no, complete Part III.	
Are drainage areas free of spills, leaks, or uncontrolled pollutant sources? If no, complete Part VII and describe below.	
Notes:	
Are stormwater storage and containment areas free of leaks? If no, complete Parts III and/or VII and describe below.	

Notes:	

Part V. Additional During Storm Observations. If BMPs cannot be inspected during inclement weather, list the results of visual inspections at all relevant outfalls, discharge points, and downstream locations. Note odors or visible sheen on the surface of discharges. Complete Part VII (Corrective Actions) as needed.	
Outfall, Discharge Point, or Other Downstream Location	
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description

Part VI. Additional Post-Storm Observations. Visually observe (inspect) stormwater discharges at all discharge locations within two business days (48 hours) after each qualifying rain event, and observe (inspect) the discharge of stored or contained stormwater that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Complete Part VII (Corrective Actions) as needed.	
Discharge Location, Storage or Containment Area	**Visual Observation**

Part VII. Additional Corrective Actions Required. Identify additional corrective actions not included with BMP Deficiencies (Part III) above. Note if SWPPP change is required.	
Required Actions	**Implementation Date**