# Priority Development Project (PDP)
# Storm Water Quality Management Plan (SWQMP)

## Lot 31 Rancho Del Sol

SDP/CDP Permit

[Insert Drawing Number (if applicable) and Internal Order Number (if applicable)]

☐ Check if electing for offsite alternative compliance

**Engineer of Work:**

Sergio Salinas, RCE 81026
Provide Wet Signature and Stamp Above Line

**Prepared For:**

Robert D. Barczewski
82229 Ramona Road
Spokane, WA 99224
(509) 449-1747

**Prepared By:**

ARC Construction & Engineering, Inc.
10948 Elderwood Lane
San Diego, CA 92131
(858) 722-7785

**Date:**
Revised 6/28/2021

REGISTERED PROFESSIONAL ENGINEER
SERGIO SALINAS
C81026
EXP. 9/30/21
CIVIL
STATE OF CALIFORNIA

Approved by: City of San Diego Date

The City of SAN DIEGO

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Project Name: **Lot 31 Rancho Del Sol**

# Table of Contents

- Attachment 3: Structural BMP Maintenance Plan
    - Maintenance Agreement (Form DS-3247) (when applicable)
- Attachment 4: Copy of Plan Sheets Showing Permanent Storm Water BMPs
- Attachment 5: Project's Drainage Report
- Attachment 6: Project's Geotechnical and Groundwater Investigation Report

# Acronyms

| | |
|---|---|
| APN | Assessor's Parcel Number |
| ASBS | Area of Special Biological Significance |
| BMP | Best Management Practice |
| CEQA | California Environmental Quality Act |
| CGP | Construction General Permit |
| DCV | Design Capture Volume |
| DMA | Drainage Management Areas |
| ESA | Environmentally Sensitive Area |
| GLU | Geomorphic Landscape Unit |
| GW | Ground Water |
| HMP | Hydromodification Management Plan |
| HSG | Hydrologic Soil Group |
| HU | Harvest and Use |
| INF | Infiltration |
| LID | Low Impact Development |
| LUP | Linear Underground/Overhead Projects |
| MS4 | Municipal Separate Storm Sewer System |
| N/A | Not Applicable |
| NPDES | National Pollutant Discharge Elimination System |
| NRCS | Natural Resources Conservation Service |
| PDP | Priority Development Project |
| PE | Professional Engineer |
| POC | Pollutant of Concern |
| SC | Source Control |
| SD | Site Design |
| SDRWQCB | San Diego Regional Water Quality Control Board |
| SIC | Standard Industrial Classification |
| SWPPP | Stormwater Pollutant Protection Plan |
| SWQMP | Storm Water Quality Management Plan |
| TMDL | Total Maximum Daily Load |
| WMAA | Watershed Management Area Analysis |
| WPCP | Water Pollution Control Program |
| WQIP | Water Quality Improvement Plan |

# Certification Page

**Project Name:**
**Permit Application**

I hereby declare that I am the Engineer in Responsible Charge of design of storm water BMPs for this project, and that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the requirements of the Storm Water Standards, which is based on the requirements of SDRWQCB Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 (MS4 Permit).

I have read and understand that the City Engineer has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the Storm Water Standards. I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable source control and site design BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP SWQMP by the City Engineer is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

Engineer of Work's Signature

81026 — PE#

09/30/2021 — Expiration Date

Sergio Salinas

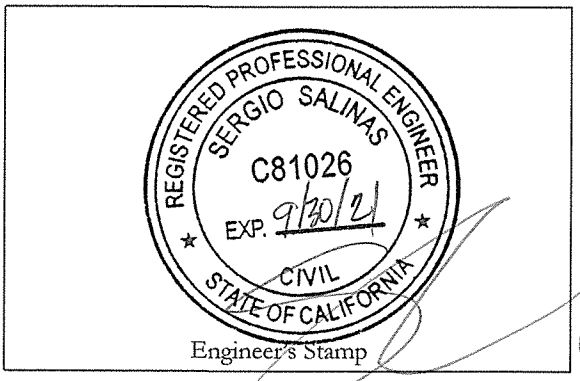
Print Name

ARC Construction & Engineering, Inc.

Company

6/21/2021

Date




Engineer's Stamp

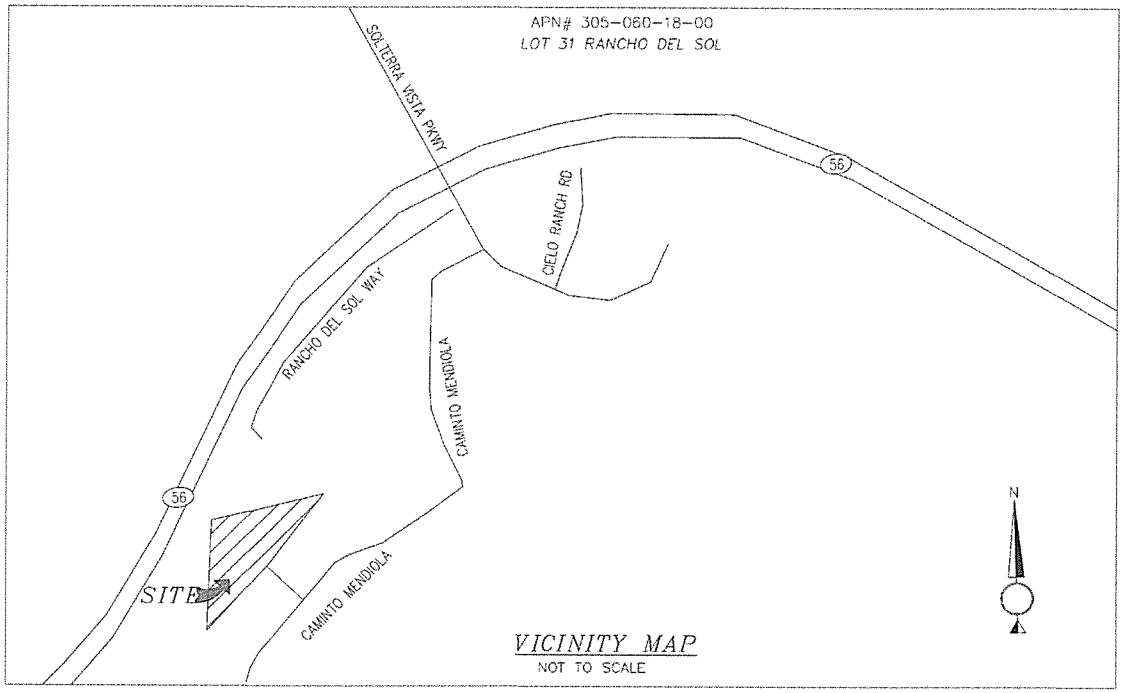
# Submittal Record

Use this Table to keep a record of submittals of this PDP SWQMP. Each time the PDP SWQMP is re-submitted, provide the date and status of the project. In last column indicate changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck comments.

| Submittal Number | Date | Project Status | Changes |
|---|---|---|---|
| 1 | 5-20-20 | ☑ **Preliminary Design/Planning/CEQA**<br>☐ **Final Design** | **Initial Submittal** |
| 2 | 12-20-20 | ☑ **Preliminary Design/Planning/CEQA**<br>☐ **Final Design** | second submittal |
| 3 | 6-28-21 | ☑ **Preliminary Design/Planning/CEQA**<br>☐ **Final Design** | third submittal |
| 4 | | ☐ **Preliminary Design/Planning/CEQA**<br>☐ **Final Design** | |

# Project Vicinity Map

**Project Name:** Lot 31 Rancho Del Sol
**Permit Application**



# City of San Diego Form DS-560 Storm Water Requirements Applicability Checklist

Attach DS-560 form.

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**
November 2018

Project Address: Rancho Del Sol Lot 31

Project Number:

## 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 Regional Water Quality 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/or contact with storm water?

   ☐ Yes; WPCP required, skip questions 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 question 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 that qualify as Risk Level 2 or Risk Level 3 per the Construction General Permit (CGP) and not located in the ASBS watershed.
   b. Projects that qualify as LUP Type 2 or LUP Type 3 per the CGP and not located in the ASBS watershed.

3. ☐ **Medium Priority**
   a. Projects that are not located in an ASBS watershed or designated as a High priority site.
   b. Projects that qualify as Risk Level 1 or LUP Type 1 per the CGP and not located in an ASBS watershed.
   c. WPCP projects (>5,000sf of ground disturbance) located within the Los Penasquitos watershed management area.

4. ☐ **Low Priority**
   a. Projects not subject to a Medium or High site priority designation and are not located in an ASBS watershed.

## 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 ☒

sergio salinas — Name of Owner or Agent *(Please Print)*

Civil Engineer — Title

Signature

04/16/2019 — Date

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Project Name: **Lot 31 Rancho Del Sol**

| Applicability of Permanent, Post-Construction Storm Water BMP Requirements | Form I-1 |
|---|---|
| **Project Identification** | |
| Project Name: Lot 31 Rancho Del Sol | |
| Permit Application Number: | Date: 6-28-2021 |
| **Determination of Requirements** | |
| The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements.<br><br>Answer each step below, starting with **Step 1** and progressing through each step until reaching "Stop". Refer to the manual sections and/or separate forms referenced in each step below. | |

| Step | Answer | Progression |
|---|---|---|
| **Step 1:** Is the project a "development project"? See Section 1.3 of the manual (Part 1 of Storm Water Standards) for guidance. | ☑ Yes | Go to **Step 2.** |
| | ☐ No | **Stop.** Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below. |
| Discussion / justification if the project is not a "development project" (e.g., the project includes *only* interior remodels within an existing building): | | |
| **Step 2:** Is the project a Standard Project, PDP, or PDP Exempt?<br>To answer this item, see Section 1.4 of the manual in its entirety for guidance AND complete Form DS-560, Storm Water Requirements Applicability Checklist. | ☐ Standard Project | **Stop.** Standard Project requirements apply |
| | ☑ PDP | PDP requirements apply, including PDP SWQMP. Go to **Step 3.** |
| | ☐ PDP Exempt | **Stop.** Standard Project requirements apply. Provide discussion and list any additional requirements below. |
| Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable: | | |

Project Name: Lot 31 Rancho Del Sol

| Form I-1 Page 2 of 2 | | |
|---|---|---|
| **Step** | **Answer** | **Progression** |
| **Step 3.** Is the project subject to earlier PDP requirements due to a prior lawful approval? See Section 1.10 of the manual (Part 1 of Storm Water Standards) for guidance. | ☐ Yes | Consult the City Engineer to determine requirements. Provide discussion and identify requirements below. Go to **Step 4.** |
| | ☑ No | BMP Design Manual PDP requirements apply. Go to **Step 4.** |
| Discussion / justification of prior lawful approval, and identify requirements (not required if prior lawful approval does not apply): | | |
| **Step 4.** Do hydromodification control requirements apply? See Section 1.6 of the manual (Part 1 of Storm Water Standards) for guidance. | ☑ Yes | PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6). Go to **Step 5.** |
| | ☐ No | **Stop.** PDP structural BMPs required for pollutant control (Chapter 5) only. Provide brief discussion of exemption to hydromodification control below. |
| Discussion / justification if hydromodification control requirements do not apply: | | |
| **Step 5.** Does protection of critical coarse sediment yield areas apply? See Section 6.2 of the manual (Part 1 of Storm Water Standards) for guidance. | ☐ Yes | Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). **Stop.** |
| | ☑ No | Management measures not required for protection of critical coarse sediment yield areas. Provide brief discussion below. **Stop.** |
| Discussion / justification if protection of critical coarse sediment yield areas does not apply: The project is not located within the critical course sediment areas (see attached map). | | |

# HMP Exemption Exhibit

Attach a HMP Exemption Exhibit that shows direct storm water runoff discharge from the project site to HMP exempt area. Include project area, applicable underground storm drain line and/or concrete lined channels, outfall information and exempt waterbody. Reference applicable drawing number(s).

**Exhibit must be provided on 11"x17" or larger paper.**

Does not apply. HMP required.

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Project Name: **Lot 31 Rancho Del Sol**

| Site Information Checklist For PDPs | Form I-3B |
|---|---|
| **Project Summary Information** | |
| Project Name | Lot 31 Rancho Del Sol |
| Project Address | Caminito Mendiola<br>San Diego, CA 92130 |
| Assessor's Parcel Number(s) (APN(s)) | 305-060-18 |
| Permit Application Number | |
| Project Watershed | Select One:<br>☐ San Dieguito River<br>☑ Penasquitos<br>☐ Mission Bay<br>☐ San Diego River<br>☐ San Diego Bay<br>☐ Tijuana River |
| Hydrologic subarea name with Numeric Identifier up to two decimal places (9XX.XX) | PENASQUITOS LAGOOON HA 906.10 |
| Project Area<br>(total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way) | 10.2 Acres (444,312.00 Square Feet) |
| Area to be disturbed by the project<br>(Project Footprint) | 1.82 Acres (79,093 Square Feet) |
| Project Proposed Impervious Area<br>(subset of Project Footprint) | 0.73 Acres (25,981 Square Feet) |
| Project Proposed Pervious Area<br>(subset of Project Footprint) | 1.98 Acres (53,112 Square Feet) |
| Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Project Area. | |
| The proposed increase or decrease in impervious area in the proposed condition as compared to the pre-project condition | 5.85 % Increase |

Form I-3B Page 2 of 11

**Description of Existing Site Condition and Drainage Patterns**

Current Status of the Site (select all that apply):

- ☐ Existing development
- ☐ Previously graded but not built out
- ☐ Agricultural or other non-impervious use
- ☑ Vacant, undeveloped/natural

Description / Additional Information:

Site is a vacant residential lot.

Existing Land Cover Includes (select all that apply):

- ☑ Vegetative Cover
- ☑ Non-Vegetated Pervious Areas
- ☐ Impervious Areas

Description / Additional Information:

The site is pervious with some vegetation.

Underlying Soil belongs to Hydrologic Soil Group (select all that apply):

- ☐ NRCS Type A
- ☐ NRCS Type B
- ☐ NRCS Type C
- ☑ NRCS Type D

Approximate Depth to Groundwater:

- ☐ Groundwater Depth < 5 feet
- ☐ 5 feet < Groundwater Depth < 10 feet
- ☐ 10 feet < Groundwater Depth < 20 feet
- ☑ Groundwater Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):

- ☐ Watercourses
- ☐ Seeps
- ☐ Springs
- ☐ Wetlands
- ☑ None

Description / Additional Information:

The site has no hydrologic features.

**Description of Existing Site Topography and Drainage**

How is storm water runoff conveyed from the site? At a minimum, this description should answer:

1. Whether existing drainage conveyance is natural or urban;
2. If runoff from offsite is conveyed through the site? If yes, quantification of all offsite drainage areas, design flows, and locations where offsite flows enter the project site and summarize how such flows are conveyed through the site;
3. Provide details regarding existing project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, and natural and constructed channels;
4. Identify all discharge locations from the existing project along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations.

**Descriptions/Additional Information**

Under existing conditions,
The existing site is vacant with some vegetation, it sheet flow from north to south. The site is located within a developed subdivision . Therefore the drainage is considered to urban.
Runoff from the northeastern and northwestern sheet flow to an existing brow ditch that is located behind the existing homes and eventually discharges to an existing stormdrain inlet located in Caminito Mendiola

For the proposed development the runoff will sheet flow and discharge points will remain the same.
The proposed single residential home will sheet flow to a new driveway and discharge to a proposed biofiltration basin located within the driveway. The basin will attenuate peak flows and eventually discharge to a proposed 18 inch storm drain that connect to the existing street inlet. The lower pad and horse stable/ barn will also sheet flow to a proposed biofiltration basin and eventually discharge to and existing brow ditch that discharges to the existing inlet at Caminito Mendiola

There is no offsite runoff tributary to the site, all runoff from open space will be capture by a proposed brow ditch and convayed via storm drain pipe to an existing inlet located at the street.

Form I-3B Page 4 of 11

**Description of Proposed Site Development and Drainage Patterns**

Project Description / Proposed Land Use and/or Activities:

The existing site is a vacated lot with some vegetation .

List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features):

The proposed project will have the following impervious features, new house, access driveway and new barn.

List/describe proposed pervious features of the project (e.g., landscape areas):

The proposed project will have the following pervious features, pavers and landscape.

Does the project include grading and changes to site topography?

☑ Yes

☐ No

Description / Additional Information:

The project will rough grade the existing site to create two flat pads. One for a single family home and the other for a horse stable.

Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)?

☑ Yes

☐ No

If yes, provide details regarding the proposed project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural and constructed channels, and the method for conveying offsite flows through or around the proposed project site. Identify all discharge locations from the proposed project site along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide a summary of pre and post-project drainage areas and design flows to each of the runoff discharge locations. Reference the drainage study for detailed calculations.

Description / Additional Information:

Site drainage will be altered with the new residential development . After development, storm water runoff from the majority of the project will be conveyed via private storm drain system and discharge to the existing public storm drain. A brow ditch will capture runoff from the open space. The proposed home and barn areas will discharge to a biofiltration bain.
The existing brow ditches located behind the existing house will not be altered and will remain the same.

Form I-3B Page 6 of 11

Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply):

- [x] Onsite storm drain inlets
- [ ] Interior floor drains and elevator shaft sump pumps
- [ ] Interior parking garages
- [ ] Need for future indoor & structural pest control
- [x] Landscape/outdoor pesticide use
- [ ] Pools, spas, ponds, decorative fountains, and other water features
- [ ] Food service
- [ ] Refuse areas
- [ ] Industrial processes
- [ ] Outdoor storage of equipment or materials
- [ ] Vehicle and equipment cleaning
- [ ] Vehicle/equipment repair and maintenance
- [ ] Fuel dispensing areas
- [ ] Loading docks
- [ ] Fire sprinkler test water
- [ ] Miscellaneous drain or wash water
- [ ] Plazas, sidewalks, and parking lots

Description/Additional Information:

The site will install multiple onsite storm drain inlets to collect all stormwater runoff.

| Form I-3B Page 7 of 11 |
|---|
| **Identification and Narrative of Receiving Water** |
| Narrative describing flow path from discharge location(s), through urban storm conveyance system, to receiving creeks, rivers, and lagoons and ultimate discharge location to Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable)<br>The site discharges to an existing storm drain located in the street (Caminito Mendiola) . The existing storm drain system flows to the penasquitos creek and eventually discharges to to Los Penasquitos Lagoon. |
| Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations<br>The beneficial uses for Penasquitos Creek are as follows: uses of water for farming, horticulture, or ranching; water for industrial activities ; non-contract water recreation; warm freshwater habitat;wildlife habitat |
| Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations<br>None |
| Provide distance from project outfall location to impaired or sensitive receiving waters<br>outfall location will be approximately 10 miles. |
| Summarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands<br>They are located in the existing and proposed slopes. No MHPA is present. |

**Identification of Receiving Water Pollutants of Concern**

List any 303(d) impaired water bodies within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs and/or Highest Priority Pollutants from the WQIP for the impaired water bodies:

| 303(d) Impaired Water Body (Refer to Appendix K) | Pollutant(s)/Stressor(s) (Refer to Appendix K) | TMDLs/WQIP Highest Priority Pollutant (Refer to Table 1-4 in Chapter 1) |
|---|---|---|
| Los Penasquitos lagoon | sediment, Heavy Metals Organic Compounds | Sediment |
| | | |
| | | |
| | | |
| | | |
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| | | |
| | | |
| | | |
| | | |

**Identification of Project Site Pollutants***

*Identification of project site pollutants is only required if flow-thru treatment BMPs are implemented onsite in lieu of retention or biofiltration BMPs (note the project must also participate in an alternative compliance program unless prior lawful approval to meet earlier PDP requirements is demonstrated)

Identify pollutants anticipated from the project site based on all proposed use(s) of the site (see Appendix B.6):

| Pollutant | Not Applicable to the Project Site | Anticipated from the Project Site | Also a Receiving Water Pollutant of Concern |
|---|---|---|---|
| Sediment | ☐ | ☐ | ☐ |
| Nutrients | ☐ | ☐ | ☐ |
| Heavy Metals | ☐ | ☐ | ☐ |
| Organic Compounds | ☐ | ☐ | ☐ |
| Trash & Debris | ☐ | ☐ | ☐ |
| Oxygen Demanding Substances | ☐ | ☐ | ☐ |
| Oil & Grease | ☐ | ☐ | ☐ |
| Bacteria & Viruses | ☐ | ☐ | ☐ |
| Pesticides | ☐ | ☐ | ☐ |

Form I-3B Page 9 of 11

**Hydromodification Management Requirements**

Do hydromodification management requirements apply (see Section 1.6)?

☑ Yes, hydromodification management flow control structural BMPs required.

☐ No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐ No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐ No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA for the watershed in which the project resides.

Description / Additional Information (to be provided if a 'No' answer has been selected above):

Note: If "No" answer has been selected the SWQMP must include an exhibit that shows the storm water conveyance system from the project site to an exempt water body. The exhibit should include details about the conveyance system and the outfall to the exempt water body.

**Critical Coarse Sediment Yield Areas***

***This Section only required if hydromodification management requirements apply**

Based on Section 6.2 and Appendix H does CCSYA exist on the project footprint or in the upstream area draining through the project footprint?

☐ Yes

☑ No

Discussion / Additional Information:

See attached CCSYA exhibit.

Form I-3B Page 10 of 11

**Flow Control for Post-Project Runoff***

***This Section only required if hydromodification management requirements apply**

List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit.

P.O.C. NO.1 point will be located at bio-basin 1.
P.O.C. NO. 2 point will be located at bio-basin 2.

Has a geomorphic assessment been performed for the receiving channel(s)?

☑ No, the low flow threshold is $0.1Q_2$ (default low flow threshold)

☐ Yes, the result is the low flow threshold is $0.1Q_2$

☐ Yes, the result is the low flow threshold is $0.3Q_2$

☐ Yes, the result is the low flow threshold is $0.5Q_2$

If a geomorphic assessment has been performed, provide title, date, and preparer:

No geomorphic assessment was prepared.

Discussion / Additional Information: (optional)

Form I-3B Page 11 of 11

**Other Site Requirements and Constraints**

When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements.

There are no constraints at this time.

**Optional Additional Information or Continuation of Previous Sections As Needed**

This space provided for additional information or continuation of information from previous sections as needed.

| Source Control BMP Checklist for PDPs | Form I-4B |
|---|---|

**Source Control BMPs**

All development projects must implement source control BMPs where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of the Storm Water Standards) for information to implement source control BMPs shown in this checklist.

Answer each category below pursuant to the following.

- "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification may be provided.

| Source Control Requirement | Applied? | | |
|---|---|---|---|
| 4.2.1 Prevention of Illicit Discharges into the MS4 | ☑ Yes | ☐ No | ☐ N/A |
| Discussion / justification if 4.2.1 not implemented: | | | |
| 4.2.2 Storm Drain Stenciling or Signage | ☑ Yes | ☐ No | ☐ N/A |
| Discussion / justification if 4.2.2 not implemented: | | | |
| 4.2.3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal | ☑ Yes | ☐ No | ☐ N/A |
| Discussion / justification if 4.2.3 not implemented: | | | |
| 4.2.4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal | ☑ Yes | ☐ No | ☐ N/A |
| Discussion / justification if 4.2.4 not implemented: | | | |
| 4.2.5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal | ☑ Yes | ☐ No | ☐ N/A |
| Discussion / justification if 4.2.5 not implemented: | | | |

Project Name: Lot 31 Rancho Del Sol

| Form I-4B Page 2 of 2 | | | |
|---|---|---|---|
| **Source Control Requirement** | **Applied?** | | |
| 4.2.6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below) | | | |
| On-site storm drain inlets | ☑ Yes | ☐ No | ☐ N/A |
| Interior floor drains and elevator shaft sump pumps | ☐ Yes | ☐ No | ☑ N/A |
| Interior parking garages | ☐ Yes | ☐ No | ☑ N/A |
| Need for future indoor & structural pest control | ☐ Yes | ☐ No | ☑ N/A |
| Landscape/Outdoor Pesticide Use | ☑ Yes | ☐ No | ☐ N/A |
| Pools, spas, ponds, decorative fountains, and other water features | ☐ Yes | ☐ No | ☑ N/A |
| Food service | ☐ Yes | ☐ No | ☑ N/A |
| Refuse areas | ☐ Yes | ☐ No | ☑ N/A |
| Industrial processes | ☐ Yes | ☐ No | ☑ N/A |
| Outdoor storage of equipment or materials | ☐ Yes | ☐ No | ☑ N/A |
| Vehicle/Equipment Repair and Maintenance | ☐ Yes | ☐ No | ☑ N/A |
| Fuel Dispensing Areas | ☐ Yes | ☐ No | ☑ N/A |
| Loading Docks | ☐ Yes | ☐ No | ☑ N/A |
| Fire Sprinkler Test Water | ☐ Yes | ☐ No | ☑ N/A |
| Miscellaneous Drain or Wash Water | ☐ Yes | ☐ No | ☑ N/A |
| Plazas, sidewalks, and parking lots | ☐ Yes | ☐ No | ☑ N/A |
| SC-6A: Large Trash Generating Facilities | ☐ Yes | ☐ No | ☑ N/A |
| SC-6B: Animal Facilities | ☐ Yes | ☐ No | ☑ N/A |
| SC-6C: Plant Nurseries and Garden Centers | ☐ Yes | ☐ No | ☑ N/A |
| SC-6D: Automotive Facilities | ☐ Yes | ☐ No | ☑ N/A |
| Discussion / justification if 4.2.6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for all "No" answers shown above. | | | |

Project Name: **Lot 31 Rancho Del Sol**

| Site Design BMP Checklist for PDPs | Form I-5B |
|---|---|

**Site Design BMPs**

All development projects must implement site design BMPs where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of Storm Water Standards) for information to implement site design BMPs shown in this checklist.

Answer each category below pursuant to the following.

- "Yes" means the project will implement the site design BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification may be provided.

A site map with implemented site design BMPs must be included at the end of this checklist.

| Site Design Requirement | Applied? | | |
|---|---|---|---|
| 4.3.1 Maintain Natural Drainage Pathways and Hydrologic Features | ☑ Yes | ☐ No | ☐ N/A |
| Discussion / justification if 4.3.1 not implemented:<br>Site does not contains any Natural Drainage Pathways and Hydrologic Features. | | | |
| 1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map? | ☑ Yes | ☐ No | ☐ N/A |
| 1-2 Are trees implemented? If yes, are they shown on the site map? | ☐ Yes | ☐ No | ☑ N/A |
| 1-3 Implemented trees meet the design criteria in 4.3.1 Fact Sheet (e.g. soil volume, maximum credit, etc.)? | ☐ Yes | ☐ No | ☑ N/A |
| 1-4 Is tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E? | ☐ Yes | ☐ No | ☑ N/A |
| 4.3.2 Have natural areas, soils and vegetation been conserved? | ☑ Yes | ☐ No | ☐ N/A |
| Discussion / justification if 4.3.2 not implemented: | | | |

| Form I-5B Page 2 of 4 | | | |
|---|---|---|---|
| **Site Design Requirement** | **Applied?** | | |
| 4.3.3 Minimize Impervious Area | ☑ Yes | ☐ No | ☐ N/A |
| Discussion / justification if 4.3.3 not implemented: | | | |
| 4.3.4 Minimize Soil Compaction | ☑ Yes | ☐ No | ☐ N/A |
| Discussion / justification if 4.3.4 not implemented: | | | |
| 4.3.5 Impervious Area Dispersion | ☑ Yes | ☐ No | ☐ N/A |
| Discussion / justification if 4.3.5 not implemented: | | | |
| 5-1 Is the pervious area receiving runon from impervious area identified on the site map? | ☐ Yes | ☑ No | ☐ N/A |
| 5-2 Does the pervious area satisfy the design criteria in 4.3.5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.) | ☑ Yes | ☐ No | ☐ N/A |
| 5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and 4.3.5 Fact Sheet in Appendix E? | ☑ Yes | ☐ No | ☐ N/A |

Project Name: Lot 31 Rancho Del Sol

| Form I-5B Page 3 of 4 | | | |
|---|---|---|---|
| **Site Design Requirement** | **Applied?** | | |
| 4.3.6 Runoff Collection | ☑ Yes | ☐ No | ☐ N/A |
| Discussion / justification if 4.3.6 not implemented: | | | |
| 6a-1 Are green roofs implemented in accordance with design criteria in 4.3.6A Fact Sheet? If yes, are they shown on the site map? | ☐ Yes | ☐ No | ☑ N/A |
| 6a-2 Is the green roof credit volume calculated using Appendix B.2.1.2 and 4.3.6A Fact Sheet in Appendix E? | ☐ Yes | ☐ No | ☑ N/A |
| 6b-1 Are permeable pavements implemented in accordance with design criteria in 4.3.6B Fact Sheet? If yes, are they shown on the site map? | ☑ Yes | ☐ No | ☐ N/A |
| 6b-2 Is the permeable pavement credit volume calculated using Appendix B.2.1.3 and 4.3.6B Fact Sheet in Appendix E? | ☑ Yes | ☐ No | ☐ N/A |
| 4.3.7 Landscaping with Native or Drought Tolerant Species | ☑ Yes | ☐ No | ☐ N/A |
| Discussion / justification if 4.3.7 not implemented:<br>the project does not proposes green roofs. | | | |
| 4.3.8 Harvest and Use Precipitation | ☐ Yes | ☑ No | ☐ N/A |
| Discussion / justification if 4.3.8 not implemented:<br>Harvesting was not feasible | | | |
| 8-1 Are rain barrels implemented in accordance with design criteria in 4.3.8 Fact Sheet? If yes, are they shown on the site map? | ☐ Yes | ☑ No | ☐ N/A |
| 8-2 Is the rain barrel credit volume calculated using Appendix B.2.2.2 and 4.3.8 Fact Sheet in Appendix E? | ☐ Yes | ☑ No | ☐ N/A |

Project Name: **Lot 31 Rancho Del Sol**

| Form I-5B Page 4 of 4 |
| --- |
| Insert Site Map with all site design BMPs identified: |
| |

| Summary of PDP Structural BMPs | Form I-6 |
|---|---|

**PDP Structural BMPs**

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual, Part 1 of Storm Water Standards). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).

PDP structural BMPs must be verified by the City at the completion of construction. This includes requiring the project owner or project owner's representative to certify construction of the structural BMPs (complete Form DS-563). PDP structural BMPs must be maintained into perpetuity (see Chapter 7 of the BMP Design Manual).

Use this form to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (page 3 of this form) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).

Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the BMP Design Manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate.

The project must meet pollutant control and hydromodification control requirements. The City Stormwater Design Manual outlines steps in selecting structural BMPs. Harvest and use is considered first. As discussed in the feasibility analysis, harvest and use is not feasible for the site because the demand compared to the design capture volume does not meet the requirements.
Infiltration is considered next. Based on the existing soil "D" the property offers no opportunity for infiltration. Therefore, Biorfiltration basins(BF-1) were selected to meet both the pollutant and hydromod control requirements. The biofiltration basins contain overflow catch basins set at 12 inches above the basin floor to convey the flow rates in excess of the water quality flows. To reduce the imperious area we selected to use permeable pavement on the driveway.

(Continue on page 2 as necessary.)

Project Name: **Lot 31 Rancho Del Sol**

Form I-6 Page 2 of

(Continued from page 1)

| Form I-6 Page of (Copy as many as needed) | |
|---|---|
| **Structural BMP Summary Information** | |
| Structural BMP ID No. P.O.C. 1 | |
| Construction Plan Sheet No. Site Development - sheet 3 | |
| Type of Structural BMP:<br>☐ Retention by harvest and use (e.g. HU-1, cistern)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☐ Partial retention by biofiltration with partial retention (PR-1)<br>☐ Biofiltration (BF-1)<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)<br>☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)<br>☐ Detention pond or vault for hydromodification management<br>☐ Other (describe in discussion section below) | |
| Purpose:<br>☐ Pollutant control only<br>☐ Hydromodification control only<br>☐ Combined pollutant control and hydromodification control<br>☐ Pre-treatment/forebay for another structural BMP<br>☐ Other (describe in discussion section below) | |
| Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563 | Arc Construction& Engineering Inc.<br>Sergio Salinas<br>10948 Elderwood Lane CA 92131 |
| Who will be the final owner of this BMP? | Robert D. Barczewski |
| Who will maintain this BMP into perpetuity? | Robert D. Barczewski |
| What is the funding mechanism for maintenance? | Private Funds |

| Form I-6 Page of (Copy as many as needed) |
|---|
| Structural BMP ID No. P.O.C. 1 |
| Construction Plan Sheet No. Site Development - sheet 3 |
| Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): |

| Form I-6 Page of (Copy as many as needed) | |
|---|---|
| **Structural BMP Summary Information** | |
| Structural BMP ID No. P.O.C. -2 | |
| Construction Plan Sheet No. Site Development - sheet 3 | |
| Type of Structural BMP:<br>☐ Retention by harvest and use (e.g. HU-1, cistern)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☐ Partial retention by biofiltration with partial retention (PR-1)<br>☑ Biofiltration (BF-1)<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)<br>☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)<br>☐ Detention pond or vault for hydromodification management<br>☐ Other (describe in discussion section below) | |
| Purpose:<br>☐ Pollutant control only<br>☐ Hydromodification control only<br>☑ Combined pollutant control and hydromodification control<br>☐ Pre-treatment/forebay for another structural BMP<br>☐ Other (describe in discussion section below) | |
| Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563 | Arc Construction& Engineering Inc.<br>Sergio Salinas<br>10948 Elderwood Lane CA 92131 |
| Who will be the final owner of this BMP? | Robert D. Barczewski |
| Who will maintain this BMP into perpetuity? | Robert D. Barczewski |
| What is the funding mechanism for maintenance? | Private Funds |

Project Name: Lot 31 Rancho Del Sol

| Form I-6 Page of (Copy as many as needed) |
|---|
| Structural BMP ID No. P.O.C. -2 |
| Construction Plan Sheet No. Site Development - sheet 3 |
| Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): |

Project Name: Lot 31 Rancho Del Sol

| Form I-6 Page of (Copy as many as needed) | |
|---|---|
| **Structural BMP Summary Information** | |
| Structural BMP ID No. P.O.C -3 | |
| Construction Plan Sheet No. Site Development- sheet-3 | |
| Type of Structural BMP:<br>☐ Retention by harvest and use (e.g. HU-1, cistern)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☐ Partial retention by biofiltration with partial retention (PR-1)<br>☐ Biofiltration (BF-1)<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)<br>☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)<br>☐ Detention pond or vault for hydromodification management<br>☐ Other (describe in discussion section below) | |
| Purpose:<br>☐ Pollutant control only<br>☐ Hydromodification control only<br>☐ Combined pollutant control and hydromodification control<br>☐ Pre-treatment/forebay for another structural BMP<br>☐ Other (describe in discussion section below) | |
| Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563 | Arc Construction& Engineering Inc.<br>Sergio Salinas<br>10948 Elderwood Lane CA 92131 |
| Who will be the final owner of this BMP? | Robert D. Barczewski |
| Who will maintain this BMP into perpetuity? | Robert D. Barczewski |
| What is the funding mechanism for maintenance? | Private funds |

Project Name: **Lot 31 Rancho Del Sol**

| Form I-6 Page of (Copy as many as needed) |
|---|
| Structural BMP ID No. P.O.C -3 |
| Construction Plan Sheet No. Site Development- sheet-3 |
| Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): |

Project Name: **Lot 31 Rancho Del Sol**

| Form I-6 Page of (Copy as many as needed) | |
|---|---|
| **Structural BMP Summary Information** | |
| Structural BMP ID No. | |
| Construction Plan Sheet No. | |
| Type of Structural BMP:<br>☐ Retention by harvest and use (e.g. HU-1, cistern)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☐ Partial retention by biofiltration with partial retention (PR-1)<br>☐ Biofiltration (BF-1)<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)<br>☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)<br>☐ Detention pond or vault for hydromodification management<br>☐ Other (describe in discussion section below) | |
| Purpose:<br>☐ Pollutant control only<br>☐ Hydromodification control only<br>☐ Combined pollutant control and hydromodification control<br>☐ Pre-treatment/forebay for another structural BMP<br>☐ Other (describe in discussion section below) | |
| Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563 | Arc Construction& Engineering Inc.<br>Sergio Salinas<br>10948 Elderwood Lane CA 92131 |
| Who will be the final owner of this BMP? | |
| Who will maintain this BMP into perpetuity? | |
| What is the funding mechanism for maintenance? | |

| Form I-6 Page of (Copy as many as needed) |
|---|
| Structural BMP ID No. |
| Construction Plan Sheet No. |
| Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): |

Project Name: Lot 31 Rancho Del Sol

| Form I-6 Page of (Copy as many as needed) | |
|---|---|
| **Structural BMP Summary Information** | |
| Structural BMP ID No. | |
| Construction Plan Sheet No. | |
| Type of Structural BMP:<br>☐ Retention by harvest and use (e.g. HU-1, cistern)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☐ Partial retention by biofiltration with partial retention (PR-1)<br>☐ Biofiltration (BF-1)<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)<br>☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)<br>☐ Detention pond or vault for hydromodification management<br>☐ Other (describe in discussion section below) | |
| Purpose:<br>☐ Pollutant control only<br>☐ Hydromodification control only<br>☐ Combined pollutant control and hydromodification control<br>☐ Pre-treatment/forebay for another structural BMP<br>☐ Other (describe in discussion section below) | |
| Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563 | Arc Construction& Engineering Inc.<br>Sergio Salinas<br>10948 Elderwood Lane CA 92131 |
| Who will be the final owner of this BMP? | |
| Who will maintain this BMP into perpetuity? | |
| What is the funding mechanism for maintenance? | |

| Form I-6 Page of (Copy as many as needed) |
|---|
| Structural BMP ID No. |
| Construction Plan Sheet No. |
| Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): |

Project Name: **Lot 31 Rancho Del Sol**

| Form I-6 Page of (Copy as many as needed) | |
|---|---|
| **Structural BMP Summary Information** | |
| Structural BMP ID No. | |
| Construction Plan Sheet No. | |
| Type of Structural BMP:<br>☐ Retention by harvest and use (e.g. HU-1, cistern)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☐ Partial retention by biofiltration with partial retention (PR-1)<br>☐ Biofiltration (BF-1)<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)<br>☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)<br>☐ Detention pond or vault for hydromodification management<br>☐ Other (describe in discussion section below) | |
| Purpose:<br>☐ Pollutant control only<br>☐ Hydromodification control only<br>☐ Combined pollutant control and hydromodification control<br>☐ Pre-treatment/forebay for another structural BMP<br>☐ Other (describe in discussion section below) | |
| Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563 | Arc Construction& Engineering Inc.<br>Sergio Salinas<br>10948 Elderwood Lane CA 92131 |
| Who will be the final owner of this BMP? | |
| Who will maintain this BMP into perpetuity? | |
| What is the funding mechanism for maintenance? | |

| Form I-6 Page of (Copy as many as needed) |
|---|
| Structural BMP ID No. |
| Construction Plan Sheet No. |
| Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): |

Project Name: **Lot 31 Rancho Del Sol**

| Form I-6 Page of (Copy as many as needed) | |
|---|---|
| **Structural BMP Summary Information** | |
| Structural BMP ID No. | |
| Construction Plan Sheet No. | |
| Type of Structural BMP:<br>☐ Retention by harvest and use (e.g. HU-1, cistern)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☐ Partial retention by biofiltration with partial retention (PR-1)<br>☐ Biofiltration (BF-1)<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)<br>☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)<br>☐ Detention pond or vault for hydromodification management<br>☐ Other (describe in discussion section below) | |
| Purpose:<br>☐ Pollutant control only<br>☐ Hydromodification control only<br>☐ Combined pollutant control and hydromodification control<br>☐ Pre-treatment/forebay for another structural BMP<br>☐ Other (describe in discussion section below) | |
| Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563 | |
| Who will be the final owner of this BMP? | |
| Who will maintain this BMP into perpetuity? | |
| What is the funding mechanism for maintenance? | |

| Form I-6 Page of (Copy as many as needed) |
|---|
| Structural BMP ID No. |
| Construction Plan Sheet No. |
| Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): |

Project Name: Lot 31 Rancho Del Sol

| Form I-6 Page of (Copy as many as needed) | |
|---|---|
| **Structural BMP Summary Information** | |
| Structural BMP ID No. | |
| Construction Plan Sheet No. | |
| Type of Structural BMP:<br>☐ Retention by harvest and use (e.g. HU-1, cistern)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☐ Partial retention by biofiltration with partial retention (PR-1)<br>☐ Biofiltration (BF-1)<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)<br>☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)<br>☐ Detention pond or vault for hydromodification management<br>☐ Other (describe in discussion section below) | |
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| Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563 | |
| Who will be the final owner of this BMP? | |
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| Form I-6 Page of (Copy as many as needed) |
|---|
| Structural BMP ID No. |
| Construction Plan Sheet No. |
| Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): |

| Form I-6 Page of (Copy as many as needed) | |
|---|---|
| **Structural BMP Summary Information** | |
| Structural BMP ID No. | |
| Construction Plan Sheet No. | |
| Type of Structural BMP:<br>☐ Retention by harvest and use (e.g. HU-1, cistern)<br>☐ Retention by infiltration basin (INF-1)<br>☐ Retention by bioretention (INF-2)<br>☐ Retention by permeable pavement (INF-3)<br>☐ Partial retention by biofiltration with partial retention (PR-1)<br>☐ Biofiltration (BF-1)<br>☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below)<br>☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below)<br>☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below)<br>☐ Detention pond or vault for hydromodification management<br>☐ Other (describe in discussion section below) | |
| Purpose:<br>☐ Pollutant control only<br>☐ Hydromodification control only<br>☐ Combined pollutant control and hydromodification control<br>☐ Pre-treatment/forebay for another structural BMP<br>☐ Other (describe in discussion section below) | |
| Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563 | |
| Who will be the final owner of this BMP? | |
| Who will maintain this BMP into perpetuity? | |
| What is the funding mechanism for maintenance? | |

| Form I-6 Page of (Copy as many as needed) |
|---|
| Structural BMP ID No. |
| Construction Plan Sheet No. |
| Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): |

Project Name: **Lot 31 Rancho Del Sol**

| Form I-6 Page of (Copy as many as needed) |
|---|
| Structural BMP ID No. |
| Construction Plan Sheet No. |
| Discussion (as needed; must include worksheets showing BMP sizing calculations in the SWQMPs): |

**Note: If additional copies of Form I-6 are needed to list all BMPs, insert extra sheets in Attachment 1**

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**Attachment 1**

# Attachment 1
# Backup For PDP Pollutant Control BMPs

This is the cover sheet for Attachment 1.

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Project Name: Lot 31 Rancho Del Sol

**Indicate which Items are Included:**

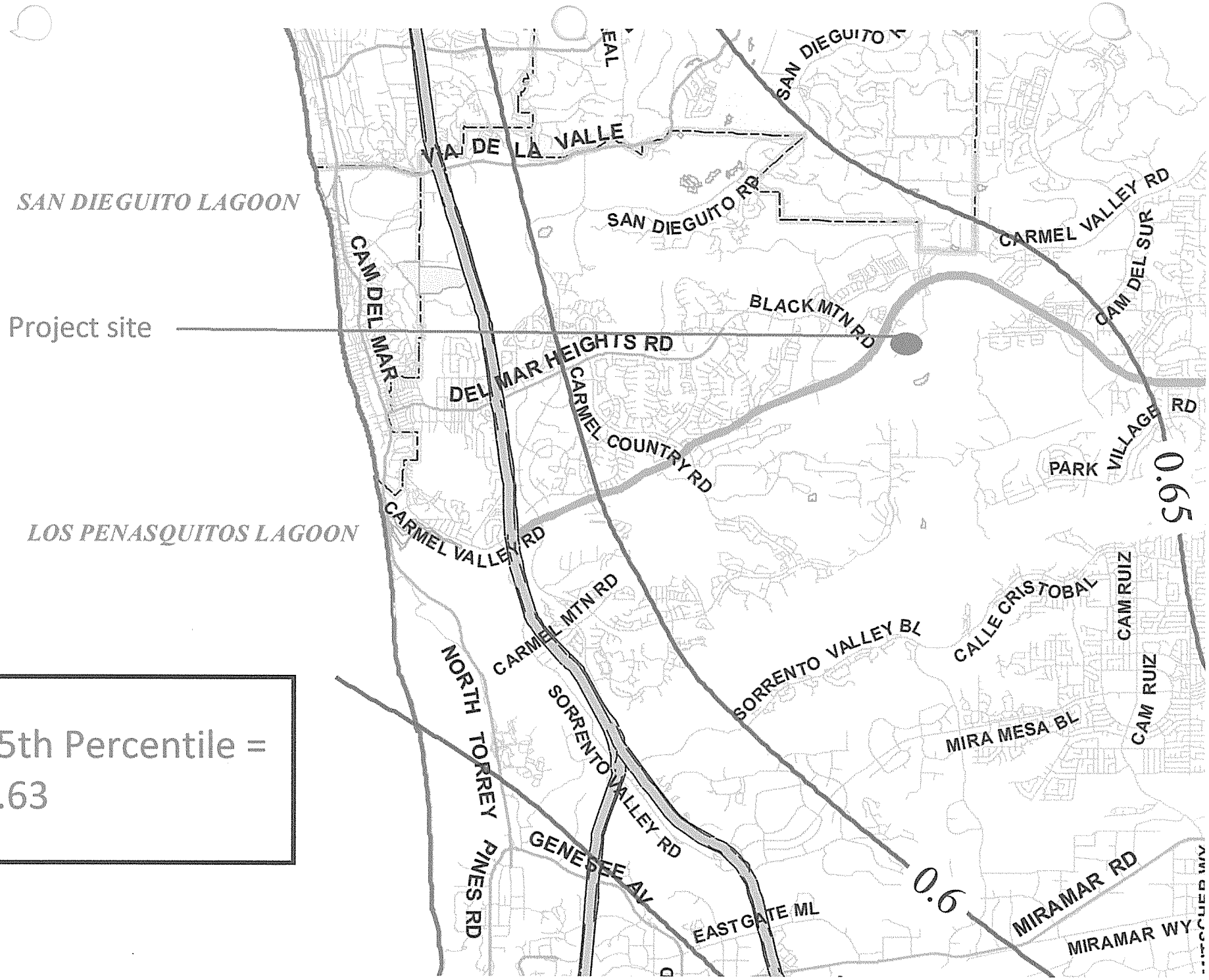
| Attachment Sequence | Contents | Checklist |
|---|---|---|
| **Attachment 1a** | DMA Exhibit (Required) See<br>DMA Exhibit Checklist. | ☐ Included |
| **Attachment 1b** | Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)*<br>*Provide table in this Attachment OR on DMA Exhibit in Attachment 1a | ☑ Included on DMA Exhibit in Attachment 1a<br>☑ Included as Attachment 1b, separate from DMA Exhibit |
| **Attachment 1c** | Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs)<br>Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7. | ☑ Included<br>☐ Not included because the entire project will use infiltration BMPs |
| **Attachment 1d** | Infiltration Feasibility Information. Contents of Attachment 1d depend on the infiltration condition:<br>• No Infiltration Condition:<br>o Infiltration Feasibility Condition Letter (*Note: must be stamped and signed by licensed geotechnical engineer*)<br>o Form I-8A (optional)<br>o Form I-8B (optional)<br>• Partial Infiltration Condition:<br>o Infiltration Feasibility Condition Letter (*Note: must be stamped and signed by licensed geotechnical engineer*)<br>o Form I-8A<br>o Form I-8B<br>• Full Infiltration Condition:<br>o Form I-8A<br>o Form I-8B<br>o Worksheet C.4-3<br>o Form I-9<br>Refer to Appendices C and D of the BMP Design Manual for guidance. | ☑ Included<br>☐ Not included because the entire project will use harvest and use BMPs |
| **Attachment 1e** | Pollutant Control BMP Design Worksheets / Calculations (Required)<br>Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines and site design credit calculations | ☑ Included |

Project Name: Lot 31 Rancho Del Sol

**Use this checklist to ensure the required information has been included on the DMA Exhibit:**

The DMA Exhibit must identify:

- [x] Underlying hydrologic soil group
- [x] Approximate depth to groundwater
- [ ] Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- [ ] Critical coarse sediment yield areas to be protected
- [x] Existing topography and impervious areas
- [ ] Existing and proposed site drainage network and connections to drainage offsite
- [x] Proposed grading
- [x] Proposed impervious features
- [x] Proposed design features and surface treatments used to minimize imperviousness
- [x] Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
- [ ] Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Form I-3B)
- [x] Structural BMPs (identify location, type of BMP, size/detail, and include cross-section)


SAN DIEGUITO LAGOON
Project site
LOS PENASQUITOS LAGOON
VIA DE LA VALLE
SAN DIEGUITO RD
CARMEL VALLEY RD
CAM DEL SUR
CAM DEL MAR
BLACK MTN RD
DEL MAR HEIGHTS RD
CARMEL COUNTRY RD
PARK VILLAGE RD
0.65
CARMEL VALLEY RD
CARMEL MTN RD
NORTH TORREY PINES RD
SORRENTO VALLEY RD
SORRENTO VALLEY BL
CALLE CRISTOBAL
CAM RUIZ
MIRA MESA BL
GENESEE AV
EASTGATE ML
0.6
MIRAMAR RD
MIRAMAR WY
85th Percentile = 0.63

Soil Map—San Diego County Area, California


Map Scale: 1:2,500 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

## MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

**Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

**Water Features**
- Streams and Canals

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

**Background**
- Aerial Photography

## MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 13, Sep 12, 2018

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

Date(s) aerial images were photographed: Nov 3, 2014—Jan 4, 2015

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

# Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| LeC2 | Las Flores loamy fine sand, 5 to 9 percent slopes, eroded | 0.0 | 0.2% |
| OhE | Olivenhain cobbly loam, 9 to 30 percent slopes | 11.6 | 99.8% |
| **Totals for Area of Interest** | | **11.6** | **100.0%** |

# San Diego County Area, California

## OhE—Olivenhain cobbly loam, 9 to 30 percent slopes

### Map Unit Setting

*National map unit symbol:* hbfc
*Elevation:* 100 to 600 feet
*Mean annual precipitation:* 14 inches
*Mean annual air temperature:* 63 degrees F
*Frost-free period:* 290 to 330 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Olivenhain and similar soils:* 85 percent
*Minor components:* 10 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Olivenhain

#### Setting

*Landform:* Marine terraces
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Parent material:* Gravelly alluvium derived from mixed sources

#### Typical profile

*H1 - 0 to 10 inches:* cobbly loam
*H2 - 10 to 27 inches:* very cobbly clay, very cobbly clay loam
*H2 - 10 to 27 inches:* cobbly loam, cobbly clay loam
*H3 - 27 to 45 inches:*
*H3 - 27 to 45 inches:*

#### Properties and qualities

*Slope:* 9 to 30 percent
*Depth to restrictive feature:* About 10 inches to abrupt textural change
*Natural drainage class:* Well drained
*Runoff class:* Very high
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* Very low (about 1.3 inches)

#### Interpretive groups

*Land capability classification (irrigated):* 6e
*Land capability classification (nonirrigated):* 6e
*Hydrologic Soil Group:* D
*Ecological site:* CLAYPAN (1975) (R019XD061CA)

*Hydric soil rating:* No

**Minor Components**

**Diablo**

*Percent of map unit:* 4 percent
*Hydric soil rating:* No

**Linne**

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

**Unnamed, ponded**

*Percent of map unit:* 2 percent
*Landform:* Depressions
*Hydric soil rating:* Yes

**Huerhuero**

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

## Data Source Information

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 13, Sep 12, 2018


Map Scale: 1:2,500 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

## MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

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- Soil Map Unit Points

**Special Point Features**
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- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
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- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
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- Stony Spot
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- Wet Spot
- Other
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**Water Features**
- Streams and Canals

**Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
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**Background**
- Aerial Photography

## MAP INFORMATION

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

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

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

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

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Date(s) aerial images were photographed: Nov 3, 2014—Jan 4, 2015

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# Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
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| LeC2 | Las Flores loamy fine sand, 5 to 9 percent slopes, eroded | 0.0 | 0.2% |
| OhE | Olivenhain cobbly loam, 9 to 30 percent slopes | 11.6 | 99.8% |
| **Totals for Area of Interest** | | **11.6** | **100.0%** |

| Harvest and Use Feasibility Checklist | Worksheet B.3-1 : Form I-7 |
|---|---|

1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season?
☑ Toilet and urinal flushing
☐ Landscape irrigation
☐ Other:_____

2. If there is a demand; estimate the anticipated average wet season demand over a period of 36 hours. Guidance for planning level demand calculations for toilet/urinal flushing and landscape irrigation is provided in Section B.3.2.
[Provide a summary of calculations here]
This project is a single residential house- per B.3.-1 (9.3 gal per person X 4 persons =37.2gal/cubic feet

3. Calculate the DCV using worksheet B-2.1.
DCV = 1454 (cubic feet)
[Provide a summary of calculations here]

0.25x 1454= 363.5

| 3a. Is the 36-hour demand greater than or equal to the DCV? | 3b. Is the 36-hour demand greater than 0.25DCV but less than the full DCV? | 3c. Is the 36-hour demand less than 0.25DCV? |
|---|---|---|
| ☐ Yes ⇩ / ☑ No ⇨ | ☐ Yes ⇩ / ☑ No ⇨ | ☑ Yes ⇩ |
| Harvest and use appears to be feasible. Conduct more detailed evaluation and sizing calculations to confirm that DCV can be used at an adequate rate to meet drawdown criteria. | Harvest and use may be feasible. Conduct more detailed evaluation and sizing calculations to determine feasibility. Harvest and use may only be able to be used for a portion of the site, or (optionally) the storage may need to be upsized to meet long term capture targets while draining in longer than 36 hours. | Harvest and use is considered to be infeasible. |

Is harvest and use feasible based on further evaluation?
☐ Yes, refer to Appendix E to select and size harvest and use BMPs.
☐ No, select alternate BMPs.

**Table B.3-2. Planning Level Plant Factor Recommendations**

| Plant Water Use | Plant Factor | Also Includes |
|---|---|---|
| Low | < 0.1 – 0.2 | Artificial Turf |
| Moderate | 0.3 – 0.7 | |
| High | 0.8 and greater | Water features |
| Special Landscape Area | 1.0 | |

HA = Hydrozone Area (sq-ft); A section or zone of the landscaped area having plants with similar water needs.
Σ(PF x HA) = The sum of PF x HA for each individual Hydrozone (accounts for different landscaping zones).
IE = Irrigation Efficiency (assume 90 percent for demand calculations)
SLA = Special Landscape Area (sq-ft); Areas used for active and passive recreation areas, areas solely dedicated to the production of fruits and vegetables, and areas irrigated with reclaimed water.

In this equation, the coefficient (0.015) accounts for unit conversions and shut down of irrigation during and for the three days following a significant precipitation event:

0.015 = (1 mo./30 days)×(1 ft./12 in)×(7.48 gal/cu-ft.)×(approximately 7 out of 10 days with irrigation demand from October through April)

### B.3.2.2.2 Planning Level Irrigation Demands

To simplify the planning process, the method described above has been used to develop daily average wet season demands for a one-acre irrigated area based on the plant/landscape type. These demand estimates can be used to calculate the drawdown of harvest and use systems for the purpose of LID BMP sizing calculations.

**Table B.3-3. Planning Level Irrigation Demand by Plant Factor and Landscape Type**

| General Landscape Type | 36-Hour Planning Level Irrigation Demand (gallons per irrigated acre per 36 hour period) |
|---|---|
| Hydrozone – Low Plant Water Use | 390 |
| Hydrozone – Moderate Plant Water Use | 1,470 |
| Hydrozone – High Plant Water Use | 2,640 |
| Special Landscape Area | 2,640 |

**Table B.3-1. Toilet and Urinal Water Usage per Resident or Employee**

| Land Use Type | Toilet User Unit of Normalization | Per Capita Use per Day | | Visitor Factor[4] | Water Efficiency Factor | Total Use per Resident or Employee |
|---|---|---|---|---|---|---|
| | | Toilet Flushing[1,2] | Urinals[3] | | | |
| Residential | Resident | 18.5 | NA | NA | 0.5 | 9.3 |
| Office | Employee (non-visitor) | 9.0 | 2.27 | 1.1 | 0.5 | 7 (avg) |
| Retail | Employee (non-visitor) | 9.0 | 2.11 | 1.4 | 0.5 | |
| Schools | Employee (non-student) | 6.7 | 3.5 | 6.4 | 0.5 | 33 |
| Various Industrial Uses (excludes process water) | Employee (non-visitor) | 9.0 | 2 | 1 | 0.5 | 5.5 |

1- Based on American Waterworks Association Research Foundation,1999. Residential End Uses of Water. Denver, CO: AWWARF

2 - Based on use of 3.45 gallons per flush and average number of per employee flushes per subsector, Table D-1 for MWD (Pacific Institute, 2003)

3 - Based on use of 1.6 gallons per flush, Table D-4 and average number of per employee flushes per subsector, Appendix D (Pacific Institute, 2003)

4 - Multiplied by the demand for toilet and urinal flushing for the project to account for visitors. Based on proportion of annual use allocated to visitors and others (includes students for schools; about 5 students per employee) for each subsector in Table D-1 and D-4 (Pacific Institute, 2003)

5 – Accounts for requirements to use ultra-low flush toilets in new development projects; assumed that requirements will reduce toilet and urinal flushing demand by half on average compared to literature estimates. Ultra-low flush toilets are required in all new construction in California as of January 1, 1992. Ultra-low flush toilets must use no more than 1.6 gallons per flush and Ultra low flush urinals must use no more than 1 gallon per flush. Note: If zero flush urinals are being used, adjust accordingly.

### B.3.2.2 General Requirements for Irrigation Demand Calculations

The following guidelines should be followed for computing harvested water demand from landscape irrigation:

- If reclaimed water is planned for use for landscape irrigation, then the demand for harvested storm water should be reduced by the amount of reclaimed water that is available during the wet season.
- Irrigation rates should be based on the irrigation demand exerted by the types of landscaping that are proposed for the project, with consideration for water conservation requirements.
- Irrigation rates should be estimated to reflect the average wet season rates (defined as October through April) accounting for the effect of storm events in offsetting harvested water demand. In the absence of a detailed demand study, it should be assumed that irrigation demand is not present during days with greater than 0.1 inches of rain and the subsequent 3-day period. This irrigation shutdown period is consistent with standard practice in land application of wastewater and is applicable to storm water to prevent irrigation from resulting in dry weather

Geotechnical Exploration, Inc.
SOIL AND FOUNDATION ENGINEERING ● GROUNDWATER ● ENGINEERING GEOLOGY

28 June 2021

Barczewski Family Trust
4208 Lakeway Boulevard
Lakeway, TX 78734
Attn: Mr. Robert D. Barczewski, Trustee

**Job No. 19-12420**

Subject: **Infiltration Feasibility Conditions**
Lot 31, Rancho del Sol
APN 305-060-18-00
San Diego, California

Dear Mr. Barczewski:

As required by the City, we are providing this letter regarding infiltration feasibility conditions at the subject site. We previously performed a preliminary geotechnical investigation for the project, the results of which were presented in our report dated October 16, 2019.

Based on the results of our investigation, the site is underlain at shallow depth by the Friars Formation consisting of very dense silty and clayey sands and very stiff to hard sandy clays. The upper weathered portion of the Friars Formation consists of very dense clayey sand and very stiff sandy clays that possess a high to very high potential for expansion. The mapped materials at the site are assigned to hydrologic soil Group D, which indicates a very low potential for infiltration. In addition to the preceding, the proposed grading at the site will result in fills up to about 11 feet deep and the project is bounded on the southeast by existing residences at a lower elevation.

Based on the preceding it is our opinion that any attempted infiltration within the project limits would result in the development of a perched water table on the contact with the very dense formational materials and result in unmitigateable geotechnical hazards including potential post construction differential settlement of any fill soils including the existing residences to the southeast, water introduced into utility trenches that could result in settlement of trench backfills and damage to the utilities, and damaging expansion in the more clayey materials at the site.

Based on the preceding, it is our opinion that the site conditions are not suitable for full or partial infiltration.

If you have any questions regarding this matter, please do not hesitate to contact our office. Reference to our **Job No. 19-12420** will help to expedite a response to your inquiries.

Respectfully submitted,

**GEOTECHNICAL EXPLORATION, INC.**

Wm. D. Hespeler, G.E. 396
Senior Geotechnical Engineer

**Worksheet C.4-1: Categorization of Infiltration Feasibility Condition Based on Geotechnical Conditions[9]**

| Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions | Worksheet C.4-1: Form 1-8A[10] |
|---|---|
| Part 1 - Full Infiltration Feasibility Screening Criteria | |
| DMA(s) Being Analyzed: | Project Phase: |
| All | Planning and Design |
| Criteria 1: Infiltration Rate Screening | |
| 1A | Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper Type A or B and corroborated by available site soil data[11]?<br>☐ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result or continue to Step 1B if the applicant elects to perform infiltration testing.<br>☐ No; the mapped soil types are A or B but is not corroborated by available site soil data (continue to Step 1B).<br>☒ No; the mapped soil types are C, D, or "urban/unclassified" and is corroborated by available site soil data. Answer "No" to Criteria 1 Result.<br>☐ No; the mapped soil types are C, D, or "urban/unclassified" but is not corroborated by available site soil data (continue to Step 1B). |
| 1B | Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1?<br>☐ Yes; Continue to Step 1C.<br>☐ No; Skip to Step 1D. |
| 1C | Is the reliable infiltration rate calculated using planning phase methods from Table D.3-1 greater than 0.5 inches per hour?<br>☐ Yes; the DMA may feasibly support full infiltration. Answer "Yes" to Criteria 1 Result.<br>☐ No; full infiltration is not required. Answer "No" to Criteria 1 Result. |
| 1D | **Infiltration Testing Method.** Is the selected infiltration testing method suitable during the design phase (see Appendix D.3)? Note: Alternative testing standards may be allowed with appropriate rationales and documentation.<br>☐ Yes; continue to Step 1E.<br>☐ No; select an appropriate infiltration testing method. |

[9] Note that it is not required to investigate each and every criterion in the worksheet, a single "no" answer in Part 1, Part 2, Part 3, or Part 4 determines a full, partial, or no infiltration condition.

[10] This form must be completed each time there is a change to the site layout that would affect the infiltration feasibility condition. Previously completed forms shall be retained to document the evolution of the site storm water design.

[11] Available data includes site-specific sampling or observation of soil types or texture classes, such as obtained from borings or test pits necessary to support other design elements.

| Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions | Worksheet C.4-1: Form I-8A[1] |
|---|---|
| 1E | **Number of Percolation/Infiltration Tests.** Does the infiltration testing method performed satisfy the minimum number of tests specified in Table D.3-2?<br>☐ Yes; continue to Step 1F.<br>☐ No; conduct appropriate number of tests. |
| 1F | **Factor of Safety.** Is the suitable Factor of Safety selected for full infiltration design? See guidance in D.5; Tables D.5-1 and D.5-2; and Worksheet D.5-1 (Form I-9).<br>☐ Yes; continue to Step 1G.<br>☐ No; select appropriate factor of safety. |
| 1G | **Full Infiltration Feasibility.** Is the average measured infiltration rate divided by the Factor of Safety greater than 0.5 inches per hour?<br>☐ Yes; answer "Yes" to Criteria 1 Result.<br>☐ No; answer "No" to Criteria 1 Result. |
| Criteria 1 Result | Is the estimated reliable infiltration rate greater than 0.5 inches per hour within the DMA where runoff can reasonably be routed to a BMP?<br>☐ Yes; the DMA may feasibly support full infiltration. Continue to Criteria 2.<br>☒ No; full infiltration is not required. Skip to Part 1 Result. |
| Summarize infiltration testing methods, testing locations, replicates, and results and summarize estimates of reliable infiltration rates according to procedures outlined in D.5. Documentation should be included in project geotechnical report. | |

| Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions | | Worksheet C.4-1: Form I-8A[1] | |
|---|---|---|---|
| Criteria 2: Geologic/Geotechnical Screening | | | |
| 2A | If all questions in Step 2A are answered "Yes," continue to Step 2B.<br><br>For any "No" answer in Step 2A answer "No" to Criteria 2, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP. | | |
| 2A-1 | Can the proposed full infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick below the infiltrating surface? | ☐ Yes | ☐ No |
| 2A-2 | Can the proposed full infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls? | ☐ Yes | ☐ No |
| 2A-3 | Can the proposed full infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope? | ☐ Yes | ☐ No |
| 2B | When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1.<br><br>If all questions in Step 2B are answered "Yes," then answer "Yes" to Criteria 2 Result.<br>If there are "No" answers continue to Step 2C. | | |
| 2B-1 | **Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP.<br>Can full infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks? | ☐ Yes | ☐ No |
| 2B-2 | **Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs.<br>Can full infiltration BMPs be proposed within the DMA without increasing expansive soil risks? | ☐ Yes | ☐ No |

| Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions | | Worksheet C.4-1 Form 1-8A[1] | |
|---|---|---|---|
| 2B-3 | **Liquefaction.** If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011 or most recent edition). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities.<br>Can full infiltration BMPs be proposed within the DMA without increasing liquefaction risks? | ☐ Yes | ☐ No |
| 2B-4 | **Slope Stability.** If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required.<br>Can full infiltration BMPs be proposed within the DMA without increasing slope stability risks? | ☐ Yes | ☐ No |
| 2B-5 | **Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1).<br>Can full infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned? | ☐ Yes | ☐ No |
| 2B-6 | **Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report.<br>Can full infiltration BMPs be proposed within the DMA using established setbacks from underground utilities, structures, and/or retaining walls? | ☐ Yes | ☐ No |

| Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions | | Worksheet C.4-1 Form 1-&A[12] | |
|---|---|---|---|
| 2C | **Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 2B. Provide a discussion of geologic/geotechnical hazards that would prevent full infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures.<br><br>Can mitigation measures be proposed to allow for full infiltration BMPs? If the question in Step 2 is answered "Yes," then answer "Yes" to Criteria 2 Result.<br>If the question in Step 2C is answered "No," then answer "No" to Criteria 2 Result. | ☐ Yes | ☐ No |
| Criteria 2 Result | Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level? | ☐ Yes | ☐ No |
| Summarize findings and basis; provide references to related reports or exhibits. | | | |

| Part 1 Result – Full Infiltration Geotechnical Screening [12] | Result |
|---|---|
| If answers to both Criteria 1 and Criteria 2 are "Yes", a full infiltration design is potentially feasible based on Geotechnical conditions only.<br><br>If either answer to Criteria 1 or Criteria 2 is "No", a full infiltration design is not required. | ☐ Full infiltration Condition<br><br>☒ Complete Part 2 |

[12] To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

| Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions | Worksheet C.4-1: Form 1-8A[1] |
|---|---|
| Part 2 – Partial vs. No Infiltration Feasibility Screening Criteria | |
| DMA(s) Being Analyzed: | Project Phase: |
| All | Planning and Design |
| Criteria 3 : Infiltration Rate Screening | |
| 3A | **NRCS Type C, D, or "urban/unclassified":** Is the mapped hydrologic soil group according to the NRCS Web Soil Survey or UC Davis Soil Web Mapper is Type C, D, or "urban/unclassified" and corroborated by available site soil data?<br>☐ Yes; the site is mapped as C soils and a reliable infiltration rate of 0.15 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result.<br>☐ Yes; the site is mapped as D soils or "urban/unclassified" and a reliable infiltration rate of 0.05 in/hr. is used to size partial infiltration BMPS. Answer "Yes" to Criteria 3 Result.<br>☐ No; infiltration testing is conducted (refer to Table D.3-1), continue to Step 3B. |
| 3B | **Infiltration Testing Result:** Is the reliable infiltration rate (i.e. average measured infiltration rate/2) greater than 0.05 in/hr. and less than or equal to 0.5 in/hr?<br>☐ Yes; the site may support partial infiltration. Answer "Yes" to Criteria 3 Result.<br>☐ No; the reliable infiltration rate (i.e. average measured rate/2) is less than 0.05 in/hr., partial infiltration is not required. Answer "No" to Criteria 3 Result. |
| Criteria 3 Result | Is the estimated reliable infiltration rate (i.e., average measured infiltration rate/2) greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour at any location within each DMA where runoff can reasonably be routed to a BMP?<br>☐ Yes; Continue to Criteria 4.<br>☒ No: Skip to Part 2 Result. |
| Summarize infiltration testing and/or mapping results (i.e. soil maps and series description used for infiltration rate).<br>Based on review of our "Report of Preliminary Geotechnical Investigation" for the subject site, review of the geologic map for the area of the subject site, and review of the USDA Web Soil Survey, as well as our past experience with materials similar to those encountered at the site, it is our professional opinion that the Friars formational materials underlying the sitw at shallow depth do not allow for the design of full or partial storm water infiltration BMPs and infiltration is not considered feasible on the subject site.<br>lease refer to our "Report of Preliminary Geotechnical Investigation" dated October 16, 2019. | |

| Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions | | Worksheet C.4-1: Form I-8A[6] | |
|---|---|---|---|
| Criteria 4: Geologic/Geotechnical Screening | | | |
| 4A | If all questions in Step 4A are answered "Yes," continue to Step 2B.<br><br>For any "No" answer in Step 4A answer "No" to Criteria 4 Result, and submit an "Infiltration Feasibility Condition Letter" that meets the requirements in Appendix C.1.1. The geologic/geotechnical analyses listed in Appendix C.2.1 do not apply to the DMA because one of the following setbacks cannot be avoided and therefore result in the DMA being in a no infiltration condition. The setbacks must be the closest horizontal radial distance from the surface edge (at the overflow elevation) of the BMP. | | |
| 4A-1 | Can the proposed partial infiltration BMP(s) avoid areas with existing fill materials greater than 5 feet thick? | ☐ Yes | ☐ No |
| 4A-2 | Can the proposed partial infiltration BMP(s) avoid placement within 10 feet of existing underground utilities, structures, or retaining walls? | ☐ Yes | ☒ No |
| 4A-3 | Can the proposed partial infiltration BMP(s) avoid placement within 50 feet of a natural slope (>25%) or within a distance of 1.5H from fill slopes where H is the height of the fill slope? | ☐ Yes | ☒ No |
| 4B | When full infiltration is determined to be feasible, a geotechnical investigation report must be prepared that considers the relevant factors identified in Appendix C.2.1<br><br>If all questions in Step 4B are answered "Yes," then answer "Yes" to Criteria 4 Result.<br>If there are any "No" answers continue to Step 4C. | | |
| 4B-1 | **Hydroconsolidation.** Analyze hydroconsolidation potential per approved ASTM standard due to a proposed full infiltration BMP.<br>Can partial infiltration BMPs be proposed within the DMA without increasing hydroconsolidation risks? | ☐ Yes | ☐ No |
| 4B-2 | **Expansive Soils.** Identify expansive soils (soils with an expansion index greater than 20) and the extent of such soils due to proposed full infiltration BMPs.<br>Can partial infiltration BMPs be proposed within the DMA without increasing expansive soil risks? | ☐ Yes | ☐ No |

| Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions | | Worksheet C.4-1: Form I-8A[1] | |
|---|---|---|---|
| 4B-3 | **Liquefaction.** If applicable, identify mapped liquefaction areas. Evaluate liquefaction hazards in accordance with Section 6.4.2 of the City of San Diego's Guidelines for Geotechnical Reports (2011). Liquefaction hazard assessment shall take into account any increase in groundwater elevation or groundwater mounding that could occur as a result of proposed infiltration or percolation facilities.<br>Can partial infiltration BMPs be proposed within the DMA without increasing liquefaction risks? | ☐ Yes | ☐ No |
| 4B-4 | **Slope Stability.** If applicable, perform a slope stability analysis in accordance with the ASCE and Southern California Earthquake Center (2002) Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California to determine minimum slope setbacks for full infiltration BMPs. See the City of San Diego's Guidelines for Geotechnical Reports (2011) to determine which type of slope stability analysis is required.<br>Can partial infiltration BMPs be proposed within the DMA without increasing slope stability risks? | ☐ Yes | ☐ No |
| 4B-5 | **Other Geotechnical Hazards.** Identify site-specific geotechnical hazards not already mentioned (refer to Appendix C.2.1).<br>Can partial infiltration BMPs be proposed within the DMA without increasing risk of geologic or geotechnical hazards not already mentioned? | ☐ Yes | ☐ No |
| 4B-6 | **Setbacks.** Establish setbacks from underground utilities, structures, and/or retaining walls. Reference applicable ASTM or other recognized standard in the geotechnical report.<br>Can partial infiltration BMPs be proposed within the DMA using recommended setbacks from underground utilities, structures, and/or retaining walls? | ☐ Yes | ☐ No |
| 4C | **Mitigation Measures.** Propose mitigation measures for each geologic/geotechnical hazard identified in Step 4B. Provide a discussion on geologic/geotechnical hazards that would prevent partial infiltration BMPs that cannot be reasonably mitigated in the geotechnical report. See Appendix C.2.1.8 for a list of typically reasonable and typically unreasonable mitigation measures.<br>Can mitigation measures be proposed to allow for partial infiltration BMPs? If the question in Step 4C is answered "Yes," then answer "Yes" to Criteria 4 Result.<br>If the question in Step 4C is answered "No," then answer "No" to Criteria 4 Result. | ☐ Yes | ☒ No |

| Categorization of Infiltration Feasibility Condition based on Geotechnical Conditions | | Worksheet C.4-1: Form I-8A[10] | |
|---|---|---|---|
| Criteria 4 Result | Can infiltration of greater than or equal to 0.05 inches/hour and less than or equal to 0.5 inches/hour be allowed without increasing the risk of geologic or geotechnical hazards that cannot be reasonably mitigated to an acceptable level? | ☐ Yes | ☒ No |

Summarize findings and basis; provide references to related reports or exhibits.

Based on review of our "Report of Preliminary Geotechnical Investigation" for the subject site, review of the geologic map for the area of the subject site, and review of the USDA Web Soil Survey, as well as our past experience with materials similar to those encountered at the site, it is our professional opinion that the Friars formational materials underlying the sitw at shallow depth do not allow for the design of full or partial storm water infiltration BMPs and infiltration is not considered feasible on the subject site.
lease refer to our "Report of Preliminary Geotechnical Investigation" dated October 16, 2019.

| Part 2 – Partial Infiltration Geotechnical Screening Result[13] | Result |
|---|---|
| If answers to both Criteria 3 and Criteria 4 are "Yes", a partial infiltration design is potentially feasible based on geotechnical conditions only.<br><br>If answers to either Criteria 3 or Criteria 4 is "No", then infiltration of any volume is considered to be infeasible within the site. | ☐ Partial Infiltration Condition<br><br>☒ No Infiltration Condition |

[13] To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

| The City of SAN DIEGO | Project Name | Lot 31 Rancho Del Sol | |
|---|---|---|---|
| | BMP ID | DMA-1 | |
| **Sizing Method for Pollutant Removal Criteria** | | **Worksheet B.5-1** | |
| 1 | Area draining to the BMP | 32357 | sq. ft. |
| 2 | Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2) | 0.65 | |
| 3 | 85th percentile 24-hour rainfall depth | 0.63 | inches |
| 4 | Design capture volume [Line 1 x Line 2 x (Line 3/12)] | 1104 | cu. ft. |
| **BMP Parameters** | | | |
| 5 | Surface ponding [6 inch minimum, 12 inch maximum] | 6 | inches |
| 6 | Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations | 18 | inches |
| 7 | Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area | 0 | inches |
| 8 | Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area | 3 | inches |
| 9 | Freely drained pore storage of the media | 0.2 | in/in |
| 10 | Porosity of aggregate storage | 0.4 | in/in |
| 11 | Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.) | 1 | in/hr. |
| **Baseline Calculations** | | | |
| 12 | Allowable routing time for sizing | 6 | hours |
| 13 | Depth filtered during storm [ Line 11 x Line 12] | 6 | inches |
| 14 | Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)] | 10.8 | inches |
| 15 | Total Depth Treated [Line 13 + Line 14] | 16.8 | inches |
| **Option 1 – Biofilter 1.5 times the DCV** | | | |
| 16 | Required biofiltered volume [1.5 x Line 4] | 1656 | cu. ft. |
| 17 | Required Footprint [Line 16/ Line 15] x 12 | 1183 | sq. ft. |
| **Option 2 - Store 0.75 of remaining DCV in pores and ponding** | | | |
| 18 | Required Storage (surface + pores) Volume [0.75 x Line 4] | 828 | cu. ft. |
| 19 | Required Footprint [Line 18/ Line 14] x 12 | 920 | sq. ft. |
| **Footprint of the BMP** | | | |
| 20 | BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4) | 0.03 | |
| 21 | Minimum BMP Footprint [Line 1 x Line 2 x Line 20] | 631 | sq. ft. |
| 22 | Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21) | 920 | sq. ft. |
| 23 | Provided BMP Footprint | 1657 | sq. ft. |
| 24 | Is Line 23 ≥ Line 22? | **Yes, Performance Standard is Met** | |

| Storm Water Pollutant Control Hydrologic Calculations and Sizing Methods | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | DMA-1 | | | | | |
| Worksheet B.2.1. DCV | | | | | | | |
| BMP #A | | | | | | | |
| Design Capture Volume | | | Worksheet B-2.1 | | | | |
| 1 | 85th Percentile 24-hr storm depth from Figure B.1-1 | | d= | 0.63 | inches | | |
| 2 | Area Tributary to BMP(s) | | A= | 0.84 | acres | | |
| 3 | Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1) | | C= | 0.65 | unitless | | |
| 4 | Street tress volume reduction | | TCV= | 0 | cubic-feet | | |
| 5 | Rain barrels volume reduction | | RCV= | 0 | cubic-feet | | |
| 6 | Calculate DCV = (3630 x C x d x A) - TCV - RCV | | DCV= | 1248.647 | cubic-feet | | |
| | | | | | | | |

| Area Weighted Runoff Factor (C) | | | | |
|---|---|---|---|---|
| **Surface Type** | **Area - A (sf)** | **C - Factor** | **C X A** | **Weighted C - Factor** |
| Concrete/Asphalt | 13900 | 0.9 | 12510 | |
| Roof | 8400 | 0.9 | 7560 | |
| Roof | 0 | 0.9 | 0 | |
| Roof | 0 | 0.9 | 0 | |
| Landscape | 8400 | 0.1 | 840 | |
| Landscape | 1657 | 0.1 | 165.7 | |
| | | | | |
| | | | | |
| | | | | |
| **Total** | 32357 | | 21075.7 | |
| | | | | |
| | | | **C-Factor=** | 0.65 |
| | | | | |
| | | | | |

| The City of SAN DIEGO | Project Name | Lot 31 Rancho Del Sol | |
|---|---|---|---|
| | BMP ID | DMA-5 | |
| **Sizing Method for Pollutant Removal Criteria** | | **Worksheet B.5-1** | |
| 1 | Area draining to the BMP | 8440 | sq. ft. |
| 2 | Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2) | 0.45 | |
| 3 | 85th percentile 24-hour rainfall depth | 0.63 | inches |
| 4 | Design capture volume [Line 1 x Line 2 x (Line 3/12)] | 199 | cu. ft. |
| **BMP Parameters** | | | |
| 5 | Surface ponding [6 inch minimum, 12 inch maximum] | 6 | inches |
| 6 | Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations | 18 | inches |
| 7 | Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area | 0 | inches |
| 8 | Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area | 3 | inches |
| 9 | Freely drained pore storage of the media | 0.2 | in/in |
| 10 | Porosity of aggregate storage | 0.4 | in/in |
| 11 | Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.) | 1 | in/hr. |
| **Baseline Calculations** | | | |
| 12 | Allowable routing time for sizing | 6 | hours |
| 13 | Depth filtered during storm [ Line 11 x Line 12] | 6 | inches |
| 14 | Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)] | 10.8 | inches |
| 15 | Total Depth Treated [Line 13 + Line 14] | 16.8 | inches |
| **Option 1 – Biofilter 1.5 times the DCV** | | | |
| 16 | Required biofiltered volume [1.5 x Line 4] | 299 | cu. ft. |
| 17 | Required Footprint [Line 16/ Line 15] x 12 | 214 | sq. ft. |
| **Option 2 - Store 0.75 of remaining DCV in pores and ponding** | | | |
| 18 | Required Storage (surface + pores) Volume [0.75 x Line 4] | 150 | cu. ft. |
| 19 | Required Footprint [Line 18/ Line 14] x 12 | 166 | sq. ft. |
| **Footprint of the BMP** | | | |
| 20 | BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-4) | 0.03 | |
| 21 | Minimum BMP Footprint [Line 1 x Line 2 x Line 20] | 114 | sq. ft. |
| 22 | Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21) | 166 | sq. ft. |
| 23 | Provided BMP Footprint | 310 | sq. ft. |
| 24 | Is Line 23 ≥ Line 22? | **Yes, Performance Standard is Met** | |

| Storm Water Pollutant Control Hydrologic Calculations and Sizing Methods | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | DMA-2 | | | | | |
| Worksheet B.2.1. DCV | | | | | | | |
| BMP #A | | | | | | | |
| Design Capture Volume | | | Worksheet B-2.1 | | | | |
| 1 | 85th Percentile 24-hr storm depth from Figure B.1-1 | | d= | 0.63 | inches | | |
| 2 | Area Tributary to BMP(s) | | A= | 0.2 | acres | | |
| 3 | Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1) | | C= | 0.45 | unitless | | |
| 4 | Street tress volume reduction | | TCV= | 0 | cubic-feet | | |
| 5 | Rain barrels volume reduction | | RCV= | 0 | cubic-feet | | |
| 6 | Calculate DCV = (3630 x C x d x A) - TCV - RCV | | DCV= | 205.821 | cubic-feet | | |
| | | | | | | | |

| Area Weighted Runoff Factor (C) | | | | |
|---|---|---|---|---|
| **Surface Type** | **Area - A (sf)** | **C - Factor** | **C X A** | **Weighted C - Factor** |
| Concrete/Asphalt | 0 | 0.9 | 0 | |
| Roof | 3681 | 0.9 | 3312.9 | |
| Roof | 0 | 0.9 | 0 | |
| Roof | 0 | 0.9 | 0 | |
| Landscape | 3681 | 0.1 | 368.1 | |
| Landscape | 1078 | 0.1 | 107.8 | |
| | | | | |
| | | | | |
| | | | | |
| **Total** | 8440 | | 3788.8 | |
| | | | | |
| | | | **C-Factor=** | 0.45 |
| | | | | |
| | | | | |

Project Name: Lot 31 Rancho Del Sol

| Tabular Summary of DMAs | | | | | | | | Worksheet B-1 | |
|---|---|---|---|---|---|---|---|---|---|
| DMA Unique Identifier | Area (acres) | Impervious Area (acres) | % Imp | HSG | Area Weighted Runoff Coefficient | DCV (cubic feet) | Treated By (BMP ID) | Pollutant Control Type | Drains to (POC ID) |
| DMA-1 | 0.84 | 0.51 AC | 61% | D | 0.65 | 1248.64 | BASIN-1 | BIOFILTRATION | POC-1 |
| DMA-2 | 0.20 | 0.085AC | 42.5% | D | 0.45 | 205.82 | BASIN-2 | BIOFILTRATION | POC-2 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

| Summary of DMA Information (Must match project description and SWQMP Narrative) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| No. of DMAs | Total DMA Area (acres) | Total Impervious Area (acres) | % Imp | | Area Weighted Runoff Coefficient | Total DCV (cubic feet) | Total Area Treated (acres) | | No. of POCs |
| 2 | 1.04 AC | .595 | 57% | | 0.55 | 1454.46 | 1.04 AC | | 2 |

Where: DMA = Drainage Management Area; Imp = Imperviousness; HSG = Hydrologic Soil Group; DCV= Design Capture Volume; BMP = Best Management Practice; POC = Point of Compliance; ID = identifier; No. = Number

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**Attachment 2**

# Attachment 2
# Backup for PDP Hydromodification Control Measures

This is the cover sheet for Attachment 2.

☐ Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

Project Name: Lot 31 Rancho Del Sol

**Indicate which Items are Included:**

| Attachment Sequence | Contents | Checklist |
|---|---|---|
| **Attachment 2a** | Hydromodification Management Exhibit (Required) | ☐ Included<br>See Hydromodification Management Exhibit Checklist. |
| **Attachment 2b** | Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional)<br><br>See Section 6.2 of the BMP Design Manual. | ☐ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required)<br><br>Optional analyses for Critical Coarse Sediment Yield Area Determination<br>☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite<br>☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment<br>☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite |
| **Attachment 2c** | Geomorphic Assessment of Receiving Channels (Optional)<br><br>See Section 6.3.4 of the BMP Design Manual. | ☐ Not Performed<br>☐ Included<br>☐ Submitted as separate stand-alone document |
| **Attachment 2d** | Flow Control Facility Design and Structural BMP Drawdown Calculations (Required)<br><br>Overflow Design Summary for each structural BMP<br><br>See Chapter 6 and Appendix G of the BMP Design Manual | ☐ Included<br>☐ Submitted as separate stand-alone document |

Project Name: Lot 31 Rancho Del Sol

**Use this checklist to ensure the required information has been included on the Hydromodification Management Exhibit:**

The Hydromodification Management Exhibit must identify:

- [x] Underlying hydrologic soil group
- [x] Approximate depth to groundwater
- [x] Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- [ ] Critical coarse sediment yield areas to be protected OR provide a separate map showing that the project site is outside of any critical coarse sediment yield areas
- [x] Existing topography
- [x] Existing and proposed site drainage network and connections to drainage offsite
- [x] Proposed grading
- [ ] Proposed impervious features
- [ ] Proposed design features and surface treatments used to minimize imperviousness
- [ ] Point(s) of Compliance (POC) for Hydromodification Management
  Existing and proposed drainage boundary and drainage area to each POC (when necessary, create separate exhibits for pre-development and post-project conditions)
- [ ] Structural BMPs for hydromodification management (identify location, type of BMP, and size/detail).

BMP Sizing Spreadsheet V3.0

| | |
|---|---|
| Project Name: | Rancho Del Sol Lot 31 |
| Project Applicant: | Paul Metcalf |
| Jurisdiction: | City of San Diego |
| Parcel (APN): | 305-060-18-00 |
| Hydrologic Unit: | 906.1 |
| Rain Gauge: | Oceanside |
| Total Project Area (sf): | 239,416 |
| Channel Susceptibility: | High |

BASIN 1

| BMP Sizing Spreadsheet V3.0 | | | |
|---|---|---|---|
| Project Name: | Rancho Del Sol Lot 31 | Hydrologic Unit: | 906.1 |
| Project Applicant: | Paul Metcalf | Rain Gauge: | Oceanside |
| Jurisdiction: | City of San Diego | Total Project Area: | 239,416 |
| Parcel (APN): | 305-060-18-00 | Low Flow Threshold: | 0.1Q2 |
| BMP Name: | Basin-1-driveway | BMP Type: | Biofiltration |
| BMP Native Soil Type: | D | BMP Infiltration Rate (in/hr): | 0.025 |

| Areas Draining to BMP | | | | | | HMP Sizing Factors | Minimum BMP Size |
|---|---|---|---|---|---|---|---|
| DMA Name | Area (sf) | Pre Project Soil Type | Pre-Project Slope | Post Project Surface Type | Area Weighted Runoff Factor (Table G.2-1)[1] | Surface Area | Surface Area (SF) |
| Dma-1-50% pad | 8,400 | D | Flat | Concrete | 1.0 | 0.07 | 588 |
| Dma-2- concrete | 13,900 | D | Moderate | Concrete | 1.0 | 0.07 | 973 |
| Dma-3-Landscape | 4,264 | D | Moderate | Landscape | 0.1 | 0.07 | 30 |
| DMA-4-landscape | 8,400 | D | Flat | Landscape | 0.1 | 0.07 | 59 |
| | | | | | | 0 | 0 |
| | | | | | | 0 | 0 |
| | | | | | | 0 | 0 |
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| | | | | | | 0 | 0 |
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| | | | | | | 0 | 0 |
| | | | | | | 0 | 0 |
| | | | | | | 0 | 0 |
| | | | | | | 0 | 0 |
| BMP Tributary Area | 34,964 | | | | | Minimum BMP Size | 1650 |
| | | | | | | Proposed BMP Size* | 1657 |

* Assumes standard configuration

| | | |
|---|---|---|
| Surface Ponding Depth | 6.00 | in |
| Bioretention Soil Media Depth | 18.00 | in |
| Filter Coarse | 6.00 | in |
| Gravel Storage Layer Depth | 12 | in |
| Underdrain Offset | 3.0 | in |
| | | |
| | | |

Notes:

1. Runoff factors which are used for hydromodification management flow control (Table G.2-1) are different from the runoff factors used for pollutant control BMP sizing (Table B.1-1). Table references are taken from the San Diego Region Model BMP Design Manual,

Describe the BMP's in sufficient detail in your PDP SWQMP to demonstrate the area, volume, and other criteria can be met within the constraints of the site.

BMP's must be adapted and applied to the conditions specific to the development project such as unstable slopes or the lack of available head.
Designated Staff have final review and approval authority over the project design.

This BMP Sizing Spreadsheet has been updated in conformance with the San Diego Region Model BMP Design Manual, April 2018. For questions or concerns please contact the jurisdiction in which your project is located.

| BMP Sizing Spreadsheet V3.0 | | | |
|---|---|---|---|
| Project Name: | Rancho Del Sol Lot 31 | Hydrologic Unit: | 906.1 |
| Project Applicant: | Paul Metcalf | Rain Gauge: | Oceanside |
| Jurisdiction: | City of San Diego | Total Project Area: | 239,416 |
| Parcel (APN): | 305-060-18-00 | Low Flow Threshold: | 0.1Q2 |
| BMP Name | Basin-1-driveway | BMP Type: | Biofiltration |

| DMA Name | Rain Gauge | Pre-developed Condition | | Unit Runoff Ratio (cfs/ac) | DMA Area (ac) | Orifice Flow - $\%Q_2$ (cfs) | Orifice Area ($in^2$) |
|---|---|---|---|---|---|---|---|
| | | Soil Type | Slope | | | | |
| Dma-1-50% pad | Oceanside | D | Flat | 0.571 | 0.193 | 0.011 | **0.17** |
| Dma-2- concrete | Oceanside | D | Moderate | 0.575 | 0.319 | 0.018 | **0.28** |
| Dma-3-Landscape | Oceanside | D | Moderate | 0.575 | 0.098 | 0.006 | **0.09** |
| DMA-4-landscape | Oceanside | D | Flat | 0.571 | 0.193 | 0.011 | **0.17** |
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| **3.25** | **0.046** | **0.70** | **0.95** |
|---|---|---|---|
| **Max Orifice Head (feet)** | **Max Tot. Allowable Orifice Flow (cfs)** | **Max Tot. Allowable Orifice Area ($in^2$)** | **Max Orifice Diameter (in)** |

| **0.040** | **0.042** | **0.64** | **0.900** |
|---|---|---|---|
| Average outflow during surface drawdown (cfs) | Max Orifice Outflow (cfs) | Actual Orifice Area ($in^2$) | Selected Orifice Diameter (in) |

| Drawdown (Hrs) | 5.8 |
|---|---|

BMP Sizing Spreadsheet V3.0

| | |
|---|---|
| Project Name: | Rancho Del Sol Lot 31 |
| Project Applicant: | Paul Metcalf |
| Jurisdiction: | City of San Diego |
| Parcel (APN): | 305-060-18-00 |
| Hydrologic Unit: | 906.1 |
| Rain Gauge: | Oceanside |
| Total Project Area (sf): | 239,416 |
| Channel Susceptibility: | High |

BASIN 2

| BMP Sizing Spreadsheet V3.0 | | | |
|---|---|---|---|
| Project Name: | Rancho Del Sol Lot 31 | Hydrologic Unit: | 906.1 |
| Project Applicant: | Paul Metcalf | Rain Gauge: | Oceanside |
| Jurisdiction: | City of San Diego | Total Project Area: | 239,416 |
| Parcel (APN): | 305-060-18-00 | Low Flow Threshold: | 0.1Q2 |
| BMP Name: | Basin-2- | BMP Type: | Biofiltration |
| BMP Native Soil Type: | D | BMP Infiltration Rate (in/hr): | 0.025 |

| Areas Draining to BMP | | | | | | HMP Sizing Factors | Minimum BMP Size |
|---|---|---|---|---|---|---|---|
| DMA Name | Area (sf) | Pre Project Soil Type | Pre-Project Slope | Post Project Surface Type | Area Weighted Runoff Factor (Table G.2-1)[1] | Surface Area | Surface Area (SF) |
| Dma-5-50% pad | 3,681 | D | Moderate | Concrete | 1.0 | 0.07 | 258 |
| Dma-6-landscape | 1,078 | D | Moderate | Landscape | 0.1 | 0.07 | 8 |
| | | | | | | 0 | 0 |
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| | | | | | | 0 | 0 |
| | | | | | | 0 | 0 |
| BMP Tributary Area | 4,759 | | | | | Minimum BMP Size | 265 |
| | | | | | | Proposed BMP Size* | 310 |

* Assumes standard configuration

| | | |
|---|---|---|
| Surface Ponding Depth | 6.00 | in |
| Bioretention Soil Media Depth | 18.00 | in |
| Filter Coarse | 6.00 | in |
| Gravel Storage Layer Depth | 12 | in |
| Underdrain Offset | 3.0 | in |
| | | |
| | | |

Notes:

1. Runoff factors which are used for hydromodification management flow control (Table G.2-1) are different from the runoff factors used for pollutant control BMP sizing (Table B.1-1). Table references are taken from the San Diego Region Model BMP Design Manual,

Describe the BMP's in sufficient detail in your PDP SWQMP to demonstrate the area, volume, and other criteria can be met within the constraints of the site.

BMP's must be adapted and applied to the conditions specific to the development project such as unstable slopes or the lack of available head.
Designated Staff have final review and approval authority over the project design.

This BMP Sizing Spreadsheet has been updated in conformance with the San Diego Region Model BMP Design Manual, April 2018. For questions or concerns please contact the jurisdiction in which your project is located.

| BMP Sizing Spreadsheet V3.0 | | | |
|---|---|---|---|
| Project Name: | Rancho Del Sol Lot 31 | Hydrologic Unit: | 906.1 |
| Project Applicant: | Paul Metcalf | Rain Gauge: | Oceanside |
| Jurisdiction: | City of San Diego | Total Project Area: | 239,416 |
| Parcel (APN): | 305-060-18-00 | Low Flow Threshold: | 0.1Q2 |
| BMP Name | Basin-2- | BMP Type: | Biofiltration |

| DMA Name | Rain Gauge | Pre-developed Condition | | Unit Runoff Ratio (cfs/ac) | DMA Area (ac) | Orifice Flow - $\%Q_2$ (cfs) | Orifice Area ($in^2$) |
|---|---|---|---|---|---|---|---|
| | | Soil Type | Slope | | | | |
| Dma-5-50% pad | Oceanside | D | Moderate | 0.575 | 0.085 | 0.005 | **0.07** |
| Dma-6-landscape | Oceanside | D | Moderate | 0.575 | 0.025 | 0.001 | **0.02** |
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| **3.25** | **0.006** | **0.10** | **0.35** |
|---|---|---|---|
| **Max Orifice Head (feet)** | **Max Tot. Allowable Orifice Flow (cfs)** | **Max Tot. Allowable Orifice Area ($in^2$)** | **Max Orifice Diameter (in)** |

| **0.006** | **0.006** | **0.10** | **0.350** |
|---|---|---|---|
| Average outflow during surface drawdown (cfs) | Max Orifice Outflow (cfs) | Actual Orifice Area ($in^2$) | Selected Orifice Diameter (in) |

| Drawdown (Hrs) | 7.1 |
|---|---|

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# Attachment 3

# Attachment 3
# Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

# EXHIBIT "A"

# OPERATION AND MAINTENANCE PLAN FOR: LOT 31 Rancho Del Sol

**DATE: April 20, 2020**

# TABLE OF CONTENTS

# INTRODUCTION

The purpose of the Operations and Maintenance Plan is to describe the procedures necessary to maintain the storm water Best Management Practices (BMP's) and Integrated Management Practices (IMP's) outlined in the County BMP Design Manual.

### Responsible Parties

The property owner or lessee will be required to maintain the BMP's and IMP's described herein, in perpetuity. Such responsibilities shall be transferred fully to any and all successors in interest. Therefore, the party responsible for overall maintenance is listed below:

**TABLE 1**
**OWNERSHIP AND MAINTENANCE**

| | Name | Address | Phone / Email |
|---|---|---|---|
| Responsible BMP Party (if different than above) | Robert Barczewski | 82229 Ramona Road Spokane,WA 99224 | (509)449-1747 |
| Employees reporting to Responsible BMP Party | Robert Barczewski | 82229 Ramona Road Spokane,WA 99224 | (509)449-1747 |
| Duly Authorized Representative | Robert Barczewski | 82229 Ramona Road Spokane,WA 99224 | (509)449-1747 |
| Designated Emergency Respondent[1] | Robert Barczewski | 82229 Ramona Road Spokane,WA 99224 | (509)449-1747 |

The party listed above shall document all maintenance requirements and shall retain records for at least five years. These documents shall be made available to the County inspection department upon request at any time.

### Post-Construction BMP/IMP's

- Bioretention Basin

## EMPLOYEE TRAINING PROGRAM

The maintenance supervisor/ homeowner will be responsible for conducting an employee training program for maintenance personnel. This program will ensure that workers will maintain the site BMP's and IMP's properly and frequently. Duties of the maintenance workers consist of the maintenance of landscaping, mowing of lawns, picking up trash, sweeping parking areas and ensuring trash is collected in a timely manner. In addition to these standard duties, workers will be required to maintain the Bio-retention Basin area(s) to maintain the water quality effects.

### Training Frequency

Training will be conducted upon hire of new maintenance employees/company. Continued training may be conducted on an "as-needed" basis if the Supervisor/homeowner deems it necessary.

## Facility Source Control Measures

Facility Source Control Measures: regularly practiced and implemented to prevent contaminants and/or non-stormwater intrusion into existing on-site and off-site systems

1. Maintenance staff/homeowner should be train to Integrated Pest Management (IPM) practices and incorporate selection of pest-resistant and native plant varieties.
2. IPM education materials addressing methods of pest deterrent, physical pest elimination techniques, and proper use of pesticides should be distributed to all site maintenance personnel.
3. Irrigation systems should be specific to each area's water requirements.
4. Maintenance staff should be train to prohibit Car / Truck washing on any pavement areas to avoid pollutants reaching any storm drain system.
5. The parking areas should be swept by maintenance staff; wash down of parking areas is prohibited.

## ACCESS FOR COUNTY INSPECTION OF BMP/IMP'S

All BMP's and IMP's may be accessed through proposed on-site private parking and along existing County Right-of-Way.

# BIO-RETENTION BASIN MAINTENANCE

**Plant Care:**

### *1.1 Trimming, Pruning and Thinning*

Trimming and pruning of excess vegetation will occasionally be necessary. Dead, dying, diseased, or hazardous branches should be trimmed and removed as they occur. Trees and shrubs may also be pruned for shape or to maximize fruit production. Trees, shrubs, and flowers may be pinched, pruned, thinned or dead-headed during the growing season to encourage more flowering, a bushier plant, or a fresh set of leaves. Pruning of trees should occur before bud-break (usually by mid-March). Pruning of flowering shrubs should be performed immediately after the plants have finished blooming.

### *1.2 Mowing*

Mowing is recommended for grassed areas (e.g., dry swales) where turf grass is the only plant-type. Minimal grass height should not be shorter than 4" for turf grasses and 8" for native grasses. Mowing should be scheduled so as to maintain a neat, trim appearance. High-use areas should be mowed at a frequency of once a week during the peak growing season (late spring and early fall). However, these areas should be mowed less frequently during early spring, mid-summer and late fall when blade growth is much slower. Lowuse areas should be mowed less frequently, perhaps as infrequently as once a year, as dictated by on-site needs and landowner preference.

Mowing of infiltration basin areas is not necessary or recommended. By design, plants in infiltration basin areas are meant to flourish throughout the growing season, leaving dry standing stalks during the dormant months. When mowing near infiltration basin areas, either use a mulching blade, or point the mower away from the infiltration basin area. Fresh grass clippings are high in nitrogen and should not be applied to infiltration basin areas, as they will compromise the facility's pollutant reduction effectiveness.

### *1.3 Weeding*

Weeding should be limited to invasive and exotic species, which can overwhelm the desired plant community. However, native non-invasive volunteer species are often desirable, as they add to the diversity of the plant community. Weeding should occur once a week during the summer and at least once a month during the remainder of the growing season. Non-chemical methods (hand pulling and hoeing) are preferable. Chemical herbicides should be avoided.

### *1.4 Watering*

Watering is most critical during the first few weeks after planting, and less critical yet important, during the first three years after planting. During the first three years, plants should be watered whenever the soil is dry at a minimum depth of 4". After the first three years, once plants are established, watering should only

be necessary during drought conditions. During drought conditions, plants should be watered a minimum of every seven to ten days.

To conserve water, reduce the potential for immediate evaporation, disease and fungal infestation, and improve the potential for infiltration, watering should be performed from sunset to sunrise, roughly from 8:00pm to 8:00am.

A general rule of thumb when monitoring plant success is: if plants wilt during the day but recover in the evening, watering is not necessary. If plants do not recover in the evening, then watering is likely to be necessary. Another rule of thumb is to stick a pencil or screwdriver about 4" into the soil. If the soil is moist at that depth, watering is not needed.

In addition, although plantings have been selected for their ability to withstand both dry and wet conditions, care should be taken to not over-water. Signs of stress associated with over-watering include: wilting of leaves or petals, yellowing of leaves, ringed spots on leaves, and soft or rotting plant base.

### *1.5 Fertilizing*

By design, infiltration basin facilities are located in areas where nutrients, (especially nitrogen), are typically elevated above natural levels. Therefore, it is unlikely that soil fertilization will be necessary. Excess fertilization compromises the facility's pollutant reduction effectiveness, leads to weak plant growth, promotes disease and pest outbreaks, and inhibits soil life. If soil fertility is in doubt, call a local home and garden information center. If fertilization is necessary, only organic fertilizers should be used.

### *1.6 Pest Management*

Trees and shrubs should be monitored for the appearance of, or damage to plants by pests and disease. Monitoring should occur once a week during the growing season. It is important to keep in mind that insects and soil microorganisms perform a vital role in maintaining soil structure. Therefore, the use of pesticides should be avoided so as not to harm beneficial organisms. An alternative to pesticide use is to adopt an Integrated Pest Management (IPM) approach. This involves reducing pests to acceptable levels using a combination of biological, physical, mechanical, cultural, and chemical controls.

### *1.7 Plant Replacement*

In the event that plant mortality occurs, dead plants should be removed and replaced with healthy new plants. When replacing a plant, place the new plant in the same location as the old plant, or as close as possible to the old location. The exception to this recommendation is if plant mortality is due to initial improper placement of the plant (i.e. in an area that is too wet or too dry) or if diseased/infected plant material was used and there is risk of persistence of the disease or fungus in the soil.

The best time to plant is in early to mid-fall or early to mid-spring. Trees can be planted as long as the soil temperature remains above 32 degrees Fahrenheit at a depth of 6". Plants should be planted as soon as possible after purchase to ensure the best chance of survival. If possible, new plants should be approximately the same size as those that are being replaced. If surrounding plants have already become well established, care may need to be given to the new plants to ensure successful growth. Use native species where possible, and avoid exotic or invasive species.

### *2.1 Ponding and Drainage Problems*

Bio-Retention Basin are designed to have water standing for up to half hour at a time. If this water period is routinely exceeded, the facility may not be functioning properly. Excessive pooling of water is usually a result of clogging or blockage of the filtration layer (in some cases, the pea gravel layer). If clogging of the pea gravel layer has occurred, use lengths of small reinforcing bar (2'-3' #4 rebar) to puncture the layer with holes every 1' on center. Another maintenance alternative is to remove the mulch layer and rake the sediment on top of the pea gravel. This will loosen some of the fine-grained sediments that may be filling the pore spaces. After raking has been conducted, the mulch layer should be returned. Care should be given to not disturb the existing, well established plants.

### *2.2 Trash and Debris Removal*

Runoff flowing into Bio-Retention Basin facilities may carry trash and debris. Trash and debris should be removed weekly to ensure that inlets do not become blocked and to keep the area from becoming unsightly. Inspect infiltration basin areas after rainstorms to ensure drainage paths are free from blockages. Curb cuts in parking areas will need to periodically be cleared of accumulated sediment and debris.

### *2.3 Composting*

Plant waste (e.g., fallen branches and leaves) should be collected from paved surfaces and lawn areas and composted on site. Composted material can be used to amend the soil in mown grass areas and in tree and shrub beds, saving the cost of both waste disposal and soil amendments. Composting should be established in a location with limited public access, yet close enough for easy access by maintenance staff. Invasive plant species, weeds with ripe seed heads, diseased plants, or unshredded woody debris larger than ¼" diameter should not be composted. Note that composted material should NOT be applied to infiltration basin areas.

### *2.4 Mulching*

Mulch has many benefits: it reduces competition by grass roots with tree and plant roots; controls weeds; prevents and reduces soil compaction; preserves soil moisture; and discourages potentially injurious practices like mowing and string trimming near tree trunks or woody stems. Bio-Retention Basin areas should

receive a protective layer of mulch over root areas, similar to that provided by leaf litter in a natural forest. Mulch layers should not exceed 3" in depth around trees and shrubs, and should be limited to 1-2" in depth around perennials. Avoid blocking inflow entrance points with mounded mulch or raised plantings. To avoid bark rot and subsequent infestation by pests, mulch should not be mounded around the base of woody plants. Mulch material should be re-applied once every 6 months during the first three growing seasons. The use of aged mulch is recommended and should consist of the shredded type rather than the chip type, to minimize floating. The mulch materials placed in the facility will decompose and blend with the soil medium over time. Once a full groundcover is established, mulching may not be necessary.

The following materials may be used as mulch in Bio-Retention Basin areas:

- Shredded bark mulch
- Decayed grass clippings
- Buckwheat
- Pine needles
- Cocoa shells
- Shredded leaf mold
- Compost

The following materials should NOT be used as mulch in Bio-Retention Basin areas:

- Fresh grass clippings
- Animal waste

### *2.5 Pet Waste Removal*

Pet waste should not be left to decay in infiltration basin facilities because of the danger of disease-causing organisms.

Bioretention areas require regular plant, soil, and mulch layer maintenance to ensure optimum infiltration, storage, and pollutant-removal capabilities. In general, bioretention maintenance requirements are typical landscape care procedures and consist of the following:

1. Erosion control: Inspect flow entrances, ponding area, and surface overflow areas periodically during the rainy season, and replace soil, plant material, or mulch layer in areas if erosion has occurred (for a bioretention inspection and maintenance checklist, see Appendix F). Properly designed facilities with appropriate flow velocities should not have erosion problems except perhaps in extreme events. If erosion problems occur, the following must be reassessed: (1) flow velocities and gradients within the cell, and (2) flow dissipation and erosion protection strategies in the pretreatment area and flow entrance. If sediment is deposited in the bioretention area, immediately determine the source within the contributing area, stabilize, and remove excess surface deposits.

2. Inlet: The inlet of the bioretention area should be inspected after the first storm of the season, then monthly during the rainy season to check for sediment accumulation and erosion. Sediment can accumulate especially at inlets where curb cuts or bypass structures are used and should be inspected regularly. Any accumulated sediment that impedes flow into the bioretention area should be removed and properly disposed of.

3. Overflow and underdrains: Sediment accumulation in the overflow device or underdrain system can cause prolonged ponding and potential flooding. Excess ponding can have adverse effects on vegetation and vector control. Overflow and underdrain systems should be inspected after the first storm of the season, then monthly during the rainy season to remove sediment and prevent mulch accumulation around the overflow. The underdrain system should be designed so that it can be flushed and cleaned as needed. If water is ponded in the bioretention area for more than 72 hours, the underdrain system should be flushed with clean water until proper infiltration is restored.

4. Nutrient and pesticides: The soil mix and plants are selected for optimum fertility, plant establishment, and growth. Nutrient and pesticide inputs should not be required and can degrade the pollutant processing capability of the bioretention area and contribute pollutant loads to receiving waters. By design, bioretention areas are located in areas where phosphorous and nitrogen levels are often elevated, and they should not be limiting nutrients. If in question, have the soil analyzed for fertility.

5. Soil: Soil mixes for bioretention areas are designed to maintain long-term fertility and pollutant processing capability. Estimates from metal attenuation research suggest that metal accumulation should not present an environmental concern for at least 20 years in bioretention systems.

Replacing mulch in bioretention areas where heavy metal deposition is likely, provides an additional level of protection for prolonged performance. If in question, have the soil analyzed for fertility and pollutant levels.

## BIO-RETENTION BASIN MAINTENANCE FREQUENCY

| Task | Frequency | Maintenance Notes |
|---|---|---|
| Pruning | 1-2 times/year | Nutrients in runoff often cause bioretention vegetation to flourish. |
| Mowing | 2-12 times/year | Frequency depends on location and desired aesthetic appeal. |
| Mulching | 1-2 times/year | |
| Mulch Removal | 1 time/2-3 years | Mulch accumulation reduces available water storage volume. Removal of mulch also increases surface infiltration rate of fill soil. |
| Watering | 1 time/2-3 days for first 1-2 months. Sporadically after establishment | If droughty, watering after the initial year might be required. |
| Fertilization | 1 time initially | One-time spot fertilization for *first year* vegetation. |
| Remove and replace dead plants | 1 time/year | Within the first year, 10 percent of plants can die. Survival rates increase with time. |
| Inlet inspection | Once after first rain of the season, then monthly during the rainy season | Check for sediment accumulation to ensure that flow into the bioretention is as designed. Remove any accumulated sediment. |
| Outlet inspection | Once after first rain of the season, then monthly during the rainy season | Check for erosion at the outlet and remove any accumulated mulch or sediment. |
| Miscellaneous upkeep | 12 times/year | Tasks include trash collection, plant health, spot weeding, removing invasive species, and removing mulch from the overflow device. |

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**Indicate which Items are Included:**

| Attachment Sequence | Contents | Checklist |
|---|---|---|
| **Attachment 3** | Maintenance Agreement (Form DS-3247) (when applicable) | ☑ Included<br>☐ Not applicable |

**Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:**

**Attachment 3**: For private entity operation and maintenance, Attachment 3 must include a Storm Water Management and Discharge Control Maintenance Agreement (Form DS-3247). The following information must be included in the exhibits attached to the maintenance agreement:

- ☐ Vicinity map
- ☐ Site design BMPs for which DCV reduction is claimed for meeting the pollutant control obligations.
- ☐ BMP and HMP location and dimensions
- ☐ BMP and HMP specifications/cross section/model
- ☐ Maintenance recommendations and frequency
- ☐ LID features such as (permeable paver and LS location, dim, SF).

THE CITY OF SAN DIEGO

RECORDING REQUESTED BY:
**THE CITY OF SAN DIEGO**
AND WHEN RECORDED MAIL TO:

_____

_____

_____

(THIS SPACE IS FOR RECORDER'S USE ONLY)

# STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT

| APPROVAL NUMBER: | ASSESSOR'S PARCEL NUMBER: | PROJECT NUMBER: |
|---|---|---|
| _____ | _____ | _____ |

This agreement is made by and between the City of San Diego, a municipal corporation [City] and

_____;

the owner or duly authorized representative of the owner [Property Owner] of property located at

_____
(PROPERTY ADDRESS)

and more particularly described as:

_____
(LEGAL DESCRIPTION OF PROPERTY)

in the City of San Diego, County of San Diego, State of California.

Property Owner is required pursuant to the City of San Diego Municipal Code, Chapter 4, Article 3, Division 3, Chapter 14, Article 2, Division 2, and the Land Development Manual, Storm Water Standards, to enter into a Storm Water Management and Discharge Control Maintenance Agreement [Maintenance Agreement] for the installation and maintenance of Permanent Storm Water Best Management Practices [Permanent Storm Water BMPs] prior to the issuance of construction/grading permits. The Maintenance Agreement is intended to ensure the establishment and maintenance of Permanent Storm Water BMPs on site, as described in the attached exhibit(s), the project's Storm Water Quality Management Plan [SWQMP] and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): _____.

Property Owner wishes to obtain a building/engineering/grading permit according to the Grading and/or Improvement Plan Drawing No(s) or Building Plan Project No(s): _____.

**Continued on Page 2**

NOW, THEREFORE, the parties agree as follows:

1. Property Owner shall have prepared, or if qualified, shall prepare an Operation and Maintenance Procedure [OMP] for Permanent Storm Water BMPs, satisfactory to the City, according to the attached exhibit(s), consistent with the Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s): _____.

2. Property Owner shall install, maintain, and repair or replace all Permanent Storm Water BMPs within the property, according to the OMP guidelines as described in the attached exhibit(s), the project's SWQMP, and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s) _____.

3. Property Owner shall maintain operation and maintenance records for at least five (5) years. These records shall be made available to the City for inspection upon request at any time.

This Maintenance Agreement shall commence upon execution of this document by all parties named hereon, and shall run with the land.

Executed by the City of San Diego and by Property Owner in San Diego, California.

See Attached Exhibit(s): _____

_____
(PROPERTY OWNER SIGNATURE)

_____
(PRINT NAME AND TITLE)

_____
(COMPANY/ORGANIZATION NAME)

_____
(DATE)

**THE CITY OF SAN DIEGO**

APPROVED:

_____
(DEPUTY CITY ENGINEER SIGNATURE)

_____
(PRINT NAME)

_____
(DATE)

**NOTE: ALL SIGNATURES MUST INCLUDE NOTARY ACKNOWLEDGEMENT PER CIVIL CODE SEC. 1180 ET.SEQ.**

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Project Name: Lot 31 Rancho Del Sol

**Indicate which Items are Included:**

| Attachment Sequence | Contents | Checklist |
|---|---|---|
| **Attachment 3** | Maintenance Agreement (Form DS-3247) (when applicable) | ☐ Included<br>☐ Not applicable |

Project Name: Lot 31 Rancho Del Sol

**Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:**

**Attachment 3**: For private entity operation and maintenance, Attachment 3 must include a Storm Water Management and Discharge Control Maintenance Agreement (Form DS-3247). The following information must be included in the exhibits attached to the maintenance agreement:

- ☐ Vicinity map
- ☐ Site design BMPs for which DCV reduction is claimed for meeting the pollutant control obligations.
- ☐ BMP and HMP location and dimensions
- ☐ BMP and HMP specifications/cross section/model
- ☐ Maintenance recommendations and frequency
- ☐ LID features such as (permeable paver and LS location, dim, SF).

**Attachment 4**

# Attachment 4
# Copy of Plan Sheets Showing Permanent Storm Water BMPs

This is the cover sheet for Attachment 4.

Project Name: Lot 31 Rancho Del Sol

**Use this checklist to ensure the required information has been included on the plans:**

The plans must identify:

- ☐ Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- ☐ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- ☐ Details and specifications for construction of structural BMP(s)
- ☐ Signage indicating the location and boundary of structural BMP(s) as required by the City Engineer
- ☐ How to access the structural BMP(s) to inspect and perform maintenance
- ☐ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☐ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☐ Recommended equipment to perform maintenance
- ☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- ☐ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- ☐ All BMPs must be fully dimensioned on the plans
- ☐ When proprietary BMPs are used, site specific cross section with outflow, inflow and model number shall be provided. Broucher photocopies are not allowed.

# Attachment 5
# Drainage Report

Attach project's drainage report. Refer to Drainage Design Manual to determine the reporting requirements.

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**Attachment 6**

# Attachment 6
# Geotechnical and Groundwater Investigation Report

Attach project's geotechnical and groundwater investigation report. Refer to Appendix C.4 to determine the reporting requirements.

# REPORT OF PRELIMINARY GEOTECHNICAL INVESTIGATION

Lot 31, Rancho del Sol
APN 305-060-18-00
San Diego, California

**JOB NO. 19-12420**
16 October 2019

Prepared for:

***Barczewski Family Trust***

Geotechnical Exploration, Inc.
SOIL AND FOUNDATION ENGINEERING ● GROUNDWATER ● ENGINEERING GEOLOGY

16 October 2019

Barczewski Family Trust
4208 Lakeway Boulevard
Lakeway, TX 78734
Attn: Mr. Robert D. Barczewski, Trustee

**Job No. 19-12420**

Subject: **Report of Preliminary Geotechnical Investigation**
Lot 31, Rancho del Sol
APN 305-060-18-00
San Diego, California

Dear Mr. Barczewski:

In accordance with your request, and our proposal dated July 23, 2019, ***Geotechnical Exploration, Inc***. has performed a preliminary geotechnical investigation for the subject property. The field work was performed on September 6, 2019.

If the conclusions and recommendations presented in this report are incorporated into the design and construction of the proposed residences, it is our opinion that the site is suitable for the project.

This opportunity to be of service is sincerely appreciated. Should you have any questions concerning the following report, please do not hesitate to contact us. Reference to our **Job No. 19-12420** will expedite a response to your inquiries.

Respectfully submitted,

**GEOTECHNICAL EXPLORATION, INC.**

Wm. D. Hespeler, G.E. 396
Senior Geotechnical Engineer

Jonathan A. Browning
P.G. 9012/C.E.G. 2615
Senior Project Geologist

7420 TRADE STREET ● SAN DIEGO, CA. 92121 ● (858) 549-7222 ● FAX: (858) 549-1604 ● EMAIL: geotech@gei-sd.com

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**REPORT OF PRELIMINARY GEOTECHNICAL INVESTIGATION**
Lot 31 Rancho del Sol
APN 305-060-18-00
San Diego, California

**JOB NO. 19-12420**

The following report presents the findings and recommendations of ***Geotechnical Exploration, Inc.*** for the subject proposed residential development.

## *I. PROJECT SUMMARY AND SCOPE OF SERVICES*

It is our understanding that the currently undeveloped lot will be developed to receive an access driveway extending northwest of Caminito Mendiola between Lots 15 and 16, forking into two driveways and ascending upslope to two separate proposed building pads located on the southwest and northeast portions of the subject lot. We anticipate that the proposed residences will be constructed with one- and/or two-story residential structures with slab on-grade floors. Preliminary grading plans by Farrington Engineering Consultants, Inc., dated June 20, 2019, were provided for use in the preparation of this report.

Final construction plans have not been provided to us during the preparation of this report. When completed, however, they should be made available for our review. Additional or modified recommendations may be provided as warranted. Based on the preliminary grading plans provided, we anticipate earthwork for the project to be moderate with cuts and fills of up to 15 feet in height.

Based on the preceding, the scope of work performed for this investigation included a site reconnaissance and subsurface exploration program, laboratory testing, geotechnical engineering analysis of the field and laboratory data, and the preparation of this report. The data obtained and the analyses performed were for

the purpose of providing design and construction criteria for the project earthwork, building foundations, slab on-grade floors, retaining/basement walls, and driveways.

## *II. SITE DESCRIPTION AND HISTORY*

The subject site is known as Assessor's Parcel No. 305-060-18-00, lot 31, located in the Rancho del Sol Unit 1 subdivision, according to Recorded Map No. 12477, in the City and County of San Diego, State of California. For the location of the subject site, refer to the Vicinity Map (Figure No. I).

Although the triangular-shaped, approximately 10.24-acre lot is currently undeveloped, there are signs of minor anthropologic disturbance in the area of each proposed building pad location, with a southwest-northeast trending access road running through the lot. The property is bordered on the north by a southeast descending, relatively undisturbed hillside with five residential properties bordering a small portion of the very northwest property boundary; on the west by a relatively undisturbed southerly descending hillside; and on the southeast by existing residential properties lower in elevation. Vegetation across the site consists primarily of thick to sparse native chaparral shrubs.

Elevations across the property range from approximately 297 feet above Mean Sea Level (MSL) along the northwest property boundary to 195 feet above MSL along the southwest property boundary. Information concerning approximate elevations across the site were obtained from a *"Preliminary Grading Plan"* with topographic data prepared by Farrington Engineering Consultants, Inc., dated June 19, 2019.

## *III. FIELD INVESTIGATION*

The field investigation consisted of a surface reconnaissance and a subsurface exploration program using a rubber-tire backhoe to investigate and sample the subsurface soils. Seven exploratory trenches were excavated in the area of the proposed new building pads on September 6, 2019, to a maximum depth of 11 feet. The soils encountered in the trenches were continuously logged in the field by our geologist and described in accordance with the Unified Soil Classification System (Appendix A). The approximate locations of the exploratory trenches are shown on the Plot Plan (Figure No. II). Exploratory trench logs have been prepared on the basis of our observations and laboratory test results. Refer to Figure Nos. IIIa-g for details.

Representative samples were obtained from the exploratory trenches at selected depths appropriate to the investigation. All samples were returned to our laboratory for evaluation and testing.

## *IV. LABORATORY TESTS AND SOIL INFORMATION*

Laboratory tests were performed on disturbed bulk samples of the soils encountered in order to evaluate their index, strength, expansion, and compressibility properties. Refer to Figures Nos. IIIa-g and IV for laboratory results and data. The following tests were conducted on the sampled soils:

1. *Determination of Percentage of Particles Smaller than No. 200 Sieve (ASTM D1140-17)*
2. *Laboratory Compaction Characteristics (ASTM D1557-12)*
3. *Expansion Index (ASTM D4829-11)*
4. *Direct Shear Test (ASTM D3080-11)*
5. *Atterberg Limits (D 4318-05)*

The particle size smaller than a No. 200 sieve analysis aids in classifying the tested soils in accordance with the Unified Soil Classification System and provides qualitative information related to engineering characteristics such as expansion potential, permeability, and shear strength. The test results are presented on the trench logs at the appropriate sample depths.

Laboratory compaction tests establish the laboratory maximum dry density and optimum moisture content of the tested soils and are also used to aid in evaluating the strength characteristics of the soils. The test results are presented on the trench logs at the appropriate sample depths.

The expansion potential of soils is determined, when necessary, utilizing the Standard Test Method for Expansion Index of Soils ASTM D4829. In accordance with the Standard (Table 5.3), potentially expansive soils are classified as follows:

| ***EXPANSION INDEX*** | ***EXPANSION POTENTIAL*** |
|---|---|
| 0 to 20 | Very low |
| 21 to 50 | Low |
| 51 to 90 | Medium |
| 91 to 130 | High |
| Above 130 | Very high |

The expansion potential of the surficial, clayey sand and sandy clay weathered formational materials encountered was determined utilizing the procedures specified in (ASTM D4829-11). The measured Expansion Index values are 112 and 168, respectively. Based on the test results, the classification tests, and our past experience with similar materials, it is our opinion that the surficial, weathered Friars Formation materials encountered possess a ***high*** to ***very high expansion potential***. The test results are presented on the trench logs at the appropriate sample depths. Based on the particle size passing the No. 200 sieve, our classification, and our past experience with similar materials in San Diego, the sampled surficial topsoil/fill soils and the lower profile of the Friars Formation materials possess a ***very low*** to ***low expansion potential***.

A direct shear test *(ASTM D3080)* was performed on a remolded sample of the retrieved formational materials in order to evaluate their strength characteristics. The shear test was performed with a constant strain rate direct shear machine. The specimens tested were saturated, then sheared under various normal loads under drained conditions. Refer to Figure No. IV for the shear test results.

The Atterberg Limits (ASTM D 4318-05) are used to aid in classification of soils in accordance with the Unified Soil Classification System (ASTM D 2487). The Liquid Limit, Plastic Limit and Plasticity Index are also utilized, with other soil properties and published correlations, to aid in evaluating engineering properties such as compressibility, expansion potential, shear strength and permeability.

## ***V. REGIONAL GEOLOGIC DESCRIPTION***

San Diego County has been divided into three major geomorphic provinces: the Coastal Plain, Peninsular Ranges and Salton Trough. The Coastal Plain exists west of

the Peninsular Ranges. The Salton Trough is east of the Peninsular Ranges. These divisions are the result of the basic geologic distinctions between the areas. Mesozoic metavolcanic, metasedimentary and plutonic rocks predominate in the Peninsular Ranges with primarily Cenozoic sedimentary rocks to the west and east of this central mountain range (Demere, 1997).

In the Coastal Plain region, the "basement" consists of Mesozoic crystalline rocks. Basement rocks are also exposed as high relief areas (e.g., Black Mountain northeast of the subject property and Cowles Mountain near the San Carlos area of San Diego). Younger Cretaceous and Tertiary sediments lap up against these older features to the west. These sediments form a "layer cake" sequence of marine and non-marine sedimentary rock units, with some formations up to 140 million years old. Faulting related to the La Nacion and Rose Canyon Fault zones has broken up this sequence into a number of distinct fault blocks in the southwestern part of the county. Northwestern portions of the county are relatively undeformed by faulting (Demere, 1997).

The Peninsular Ranges form the granitic spine of San Diego County. The property is located in this physiographic province. These rocks are primarily plutonic, forming at depth beneath the earth's crust 140 to 90 million years ago as the result of the subduction of an oceanic crustal plate beneath the North American continent. These rocks formed the much larger Southern California batholith. Metamorphism associated with the intrusion of these great granitic masses affected the much older sediments that existed near the surface over that period of time. These metasedimentary rocks remain as roof pendants of marble, schist, slate, quartzite and gneiss throughout the Peninsular Ranges.

Locally, Miocene-age volcanic rocks and flows have also accumulated within these mountains (e.g., Jacumba Valley). Regional tectonic forces and erosion over time have uplifted and unroofed these granitic rocks to expose them at the surface (Demere, 1997).

The Salton Trough is the northerly extension of the Gulf of California. This zone is undergoing active deformation related to faulting along the Elsinore and San Jacinto Fault Zones, which are part of the major regional tectonic feature in the southwestern portion of California, the San Andreas Fault Zone. Translational movement along these fault zones has resulted in crustal rifting and subsidence. The Salton Trough, also referred to as the Colorado Desert, has been filled with sediments to a depth of approximately 5 miles since the movement began in the early Miocene, 24 million years ago. The source of these sediments has been the local mountains as well as the ancestral and modern Colorado River (Demere, 1997).

As indicated previously, the San Diego area is part of a seismically active region of California. It is on the eastern boundary of the Southern California Continental Borderland, part of the Peninsular Ranges Geomorphic Province. This region is part of a broad tectonic boundary between the North American and Pacific Plates. The actual plate boundary is characterized by a complex system of active, major, right-lateral strike-slip faults, trending northwest/southeast. This fault system extends eastward to the San Andreas Fault (approximately 70 miles from San Diego) and westward to the San Clemente Fault (approximately 50 miles off-shore from San Diego) (Berger and Schug, 1991).

During recent history, the San Diego County area has been relatively quiet seismically. No fault ruptures or major earthquakes have been experienced in historic time within the San Diego area. Since earthquakes have been recorded by

instruments (since the 1930s), the San Diego area has experienced scattered seismic events with Richter magnitudes (M) generally less than M4.0. During June 1985, a series of small earthquakes occurred beneath San Diego Bay, three of which had recorded magnitudes of M4.0 to M4.2. In addition, the Oceanside earthquake of July 13, 1986, located approximately 26 miles offshore of the City of Oceanside, had a magnitude of M5.3 (Hauksson and Jones, 1988). On June 15, 2004, a M5.3 earthquake occurred approximately 45 miles southwest of downtown San Diego (26 miles west of Rosarito, Mexico). Although this earthquake was widely felt, no significant damage was reported. A widely felt earthquake on a distant southern California fault was a M5.4 event that took place on July 29, 2008, west southwest of the Chino Hills area of Riverside County. The most recent widely felt earthquake in San Diego County occurred July 20, 2009. No significant damage was reported for the San Diego area.

On April 4, 2010, a large earthquake occurred in Baja California, Mexico. It was widely felt throughout the southwest including southwestern Arizona and southern California. This M7.2 event, the Sierra El Mayor earthquake, occurred in northern Baja California approximately 40 miles south of the Mexico-USA border at shallow depth along the principal plate boundary between the North American and Pacific plates. According to the U. S. Geological Survey this is an area with a high level of historical seismicity, and it has recently also been seismically active, though this is the largest event to strike in this area since 1892. The April 4, 2010, earthquake appears to have been larger than the M6.9 earthquake in 1940 or any of the early 20$^{th}$ century events (e.g., 1915 and 1934) in this region of northern Baja California.

This event's aftershock zone extends significantly to the northwest, overlapping with the portion of the fault system that is thought to have ruptured in 1892. Some structures in the San Diego area experienced minor damage and there were some

injuries. Ground motions for the April 4, 2010, main event, recorded at stations in San Diego and reported by the California Strong Motion Instrumentation Program (CSMIP), ranged up to 0.058g.

In California, major earthquakes can generally be correlated with movement on active faults. As defined by the California Division of Mines and Geology (Hart, E.W., 1980), an "active" fault is one that has had ground surface displacement within Holocene time (about the last 11,000 years). Additionally, faults along which major historical earthquakes have occurred (about the last 210 years in California) are also considered to be active (Association of Engineering Geologists, 1973). The California Division of Mines and Geology defines a "potentially active" fault as one that has had ground surface displacement during Quaternary time, that is, between 11,000 and 1.6 million years (Hart, E.W., 1980).

## ***VI. SITE-SPECIFIC SOIL & GEOLOGIC DESCRIPTION***

Our field work, reconnaissance and review of the geologic map by Kennedy and Tan, 2008, *"Geologic Map of San Diego, 30'x60' Quadrangle, CA,"* indicates that the site is underlain by Tertiary-age Mission Valley Formation which is underlain by Tertiary-age Stadium Conglomerate which is underlain by Friars formation (Tf). Only the Friars Formation materials, however, were encountered during our field exploration and were encountered in all the exploratory trenches to the maximum depth of exploration on the lower portion of the site where the site development is proposed.

The Friars Formation is capped by a moderate to highly weathered profile with thicknesses ranging from approximately 1 to 3 feet, at depths ranging from 2 to 4 feet in all exploratory trenches. The weathered profile is overlain by approximately 1 to 2 feet of topsoil and fill soil. The topsoil was encountered in all the exploratory

trenches. Fill soil, however, was only encountered in exploratory trenches T-2, T-3, and T-4 located on the southeastern portion of the site. Figure No. V presents a geologic map (Kennedy and Tan, 2008) of the general area of the site. Refer to Figure Nos. IIIa-g for details concerning description, depths, and thickness of these materials/soils.

## *A. Stratigraphy*

*Topsoil/Fill Soil (Qts/Qaf):* The encountered topsoil consists of loose to medium dense, fine- to medium-grained silty sand. These relatively shallow, surficial soils are generally dry and brown. The fill soil encountered consists of disturbed sections of the topsoil. These soils are not considered suitable in their current condition for support of new fills or any improvements. Refer to Figure Nos. IIIa-g for details.

*Weathered Friars Formation (Tf):* The upper weathered profile of the formational materials encountered consist of very dense/very stiff, fine- to medium-grained clayey sand and sandy clay. The weathered formational materials are generally slightly moist to very moist, reddish brown with abundant iron oxide staining and were encountered in all the exploratory trenches. These materials possess a high to very high expansion for potential and are only considered adequate for support of new fills. Refer to Figure Nos. IIIa-g for details.

*Friars Formation (Tf):* The formational materials encountered consist of very dense, fine- to medium-grained silty sand. The formational materials are predominantly slightly moist, yellowish-pale-gray and were encountered to the maximum depth of exploration in all the exploratory trenches. An isolated pocket of the mudstone facies of the Friars Formation, however, was encountered at depth in exploratory trench T-2 only, located in the far southeast corner of the site. The mudstone formational

materials consist of hard, fine-grained silty lean clay and are generally moist and pale olive gray. These materials are considered adequate for support of new fills or any improvements and, with the exception of the mudstone pocket encountered in T-2, possess a very low to low potential for expansion. Refer to Figure Nos. IIIa-g for details.

### *B. Structure*

*Friars Formation (Tf) (Sandstone):* These formational sandstone materials, as exposed in our exploratory trenches, were observed to be homogenous sandstone deposits with no obvious visible bedding planes.

*Friars Formation (Tf) (Mudstone):* These formational mudstone materials, as exposed in exploratory trench T-2, located in the far southeast corner of the site, were observed to be thinly bedded and fissile. The observed mudstone unit is considered to be discontinuous across the site. A bedding attitude was measured within the mudstone materials and indicated a strike of N9°W with a dip of 5° to the northeast. The mudstone beds are dipping to the northeast, predominantly perpendicular and slightly into the slope face. The direction of dip indicates neutral to favorable geologic structure, with respect to slope instability.

Reference to the local geologic map, Figure No. V (Kennedy and Tan, 2008), displays a mapped bedding attitude within the Friars Formation, in relatively close proximity to the northeast of the subject site, indicating a measured bedding attitude of N7°W at a dip of 6° to the northeast.

Our measured bedding attitude along with the mapped bedding attitude display neutral to favorable conditions across the predominantly southerly to southeasterly descending natural hillside.

### *C. Limitations*

The exploratory trench logs and related information depict subsurface conditions only at the specific locations shown on the Plot Plan and on the particular date designated on the logs. Subsurface conditions at other locations may differ from conditions occurring at these exploratory trench locations. Also, the passage of time may result in changes in the subsurface conditions due to environmental changes.

## *VII. GROUNDWATER*

Free groundwater was not encountered in any of the exploratory trenches at the time of excavation. It must be noted, however, that fluctuations in the level of groundwater may occur due to variations in ground surface topography, subsurface stratification, rainfall, and other possible factors that may not have been evident at the time of our field investigation. It should be kept in mind that grading operations can change surface drainage patterns and/or reduce permeabilities due to the densification of compacted soils. Such changes of surface and subsurface hydrologic conditions, plus irrigation of landscaping or significant increases in rainfall, may result in the appearance of surface or near-surface water at locations where none existed previously. The appearance of such water is expected to be localized and cosmetic in nature, if good positive drainage is implemented, as recommended in this report, during and at the completion of construction.

It must be understood that unless discovered during initial site exploration or encountered during site grading operations, it is extremely difficult to predict if or where perched or true groundwater conditions may appear in the future. When site fill or formational soils are fine-grained and of low permeability, water problems may not become apparent for extended periods of time.

Water conditions, where suspected or encountered during construction, should be evaluated and remedied by the project civil and geotechnical consultants. The project developer and property owner, however, must realize that post-construction appearances of groundwater may have to be dealt with on a site-specific basis.

## ***VIII. GEOLOGIC HAZARDS***

Our review of some available published information including the City of San Diego Seismic Safety Study, Geologic Hazards and Faults Map Sheet No. 39, Figure No. VI, indicates that the site is located in two low to moderate risk, geologic hazard areas designated as Categories 53 and 23. Category 53 denotes the subject site's underlying formational materials as *"Variable Stability; Level or sloping terrain, unfavorable geologic structure; Low to moderate risk."* Category 23 denotes the subject site's underlying formational materials as *"Potential Slope Instability; Slide-Prone Formations; Friars: Neutral or favorable geologic structure."* Our findings, analysis, and conclusions address these Geologic Hazard Categories in Section VIII.B, "Slope Stability." Based on the *"Geologic Map of San Diego, 30'x60' Quadrangle,* (Kennedy and Tan, 2008), Figure No. V, and the City of San Diego Seismic Safety Study, Geologic Hazards and Faults Map No. 39, there are no faults mapped on the subject site. In our explicit professional opinion, neither an active fault nor a potentially active fault underlies the subject site.

The following is a discussion of the geologic conditions and hazards common to this area of San Diego County, as well as project-specific geologic information relating to development of the subject property.

## *A. Local and Regional Faults*

*Rose Canyon Fault*: The Rose Canyon Fault Zone (Mount Soledad and Rose Canyon Faults) is located approximately 7 miles southwest of the subject site. The Rose Canyon Fault is mapped trending north-south from Oceanside to downtown San Diego, from where it appears to head southward into San Diego Bay, through Coronado and offshore. The Rose Canyon Fault Zone is considered to be a complex zone of onshore and offshore, en echelon strike slip, oblique reverse, and oblique normal faults. The Rose Canyon Fault is considered to be capable of generating an M7.2 earthquake and is considered microseismically active, although no significant recent earthquakes are known to have occurred on the fault.

Investigative work on faults that are part of the Rose Canyon Fault Zone at the Police Administration and Technical Center in downtown San Diego, at the SDG&E facility in Rose Canyon, and within San Diego Bay and elsewhere within downtown San Diego, has encountered offsets in Holocene (geologically recent) sediments. These findings confirm Holocene displacement on the Rose Canyon Fault, which was designated an *"active"* fault in November 1991 (Hart, E.W. and W.A. Bryant, 2007, Fault-Rupture Hazard Zones in California, California Geological Survey Special Publication 42).

*Coronado Bank Fault*: The Coronado Bank Fault is located approximately 20 miles southwest of the site. Evidence for this fault is based upon geophysical data (acoustic profiles) and the general alignment of epicenters of recorded seismic activity (Greene, 1979). The Oceanside earthquake of M5.3 recorded July 13, 1986, is known to have

been centered on the fault or within the Coronado Bank Fault Zone. Although this fault is considered active, due to the seismicity within the fault zone, it is significantly less active seismically than the Elsinore Fault (Hileman, 1973). It is postulated that the Coronado Bank Fault is capable of generating a M7.6 earthquake and is of great interest due to its close proximity to the greater San Diego metropolitan area.

*Newport-Inglewood Fault:* The Newport-Inglewood Fault Zone is located approximately 20 miles northwest of the site. A significant earthquake (M6.4) occurred along this fault on March 10, 1933. Since then no additional significant events have occurred. The fault is believed to have a slip rate of approximately 0.6 mm/yr with an unknown recurrence interval. This fault is believed capable of producing an earthquake of M6.0 to M7.4 (SCEC, 2004).

*Elsinore Fault*: The Elsinore Fault is located approximately 29 miles northeast of the site. The fault extends approximately 200 kilometers (125 miles) from the Mexican border to the northern end of the Santa Ana Mountains. The Elsinore Fault zone is a 1- to 4-mile-wide, northwest-southeast-trending zone of discontinuous and en echelon faults extending through portions of Orange, Riverside, San Diego, and Imperial Counties. Individual faults within the Elsinore Fault Zone range from less than 1 mile to 16 miles in length. The trend, length and geomorphic expression of the Elsinore Fault Zone identify it as being a part of the highly active San Andreas Fault system.

Like the other faults in the San Andreas system, the Elsinore Fault is a transverse fault showing predominantly right-lateral movement. According to Hart, et al. (1979), this movement averages less than 1 centimeter per year. Along most of its length, the Elsinore Fault Zone is marked by a bold topographic expression consisting of linearly aligned ridges, swales and hallows. Faulted Holocene alluvial deposits

(believed to be less than 11,000 years old) found along several segments of the fault zone suggest that at least part of the zone is currently active.

Although the Elsinore Fault Zone belongs to the San Andreas set of active, northwest-trending, right-slip faults in the southern California area (Crowell, 1962), it has not been the site of a major earthquake in historic time, other than a M6.0 earthquake near the town of Elsinore in 1910 (Richter, 1958; Toppozada and Parke, 1982). However, based on length and evidence of late-Pleistocene or Holocene displacement, Greensfelder (1974) has estimated that the Elsinore Fault Zone is reasonably capable of generating an earthquake ranging from M6.8 to M7.1. Faulting evidence exposed in trenches placed in Glen Ivy Marsh across the Glen Ivy North Fault (a strand of the Elsinore Fault Zone between Corona and Lake Elsinore), suggest a maximum earthquake recurrence interval of 300 years, and when combined with previous estimates of the long-term horizontal slip rate of 0.8 to 7.0 mm/year, suggest typical earthquakes of M6.0 to M7.0 (Rockwell, 1985).

*San Jacinto Fault*: The San Jacinto Fault is located 52 miles to the northeast of the site. The San Jacinto Fault Zone consists of a series of closely spaced faults, including the Coyote Creek Fault, that form the western margin of the San Jacinto Mountains. The fault zone extends from its junction with the San Andreas Fault in San Bernardino, southeasterly toward the Brawley area, where it continues south of the international border as the Imperial Transform Fault (Earth Consultants International [ECI], 2009).

The San Jacinto Fault zone has a high level of historical seismic activity, with at least 10 damaging earthquakes (M6.0 to M7.0) having occurred on this fault zone between 1890 and 1986. Earthquakes on the San Jacinto Fault in 1899 and 1918 caused fatalities in the Riverside County area. Offset across this fault is predominantly right-

lateral, similar to the San Andreas Fault, although some investigators have suggested that dip-slip motion contributes up to 10% of the net slip (ECI, 2009).

The segments of the San Jacinto Fault that are of most concern to major metropolitan areas are the San Bernardino, San Jacinto Valley and Anza segments. Fault slip rates on the various segments of the San Jacinto are less well constrained than for the San Andreas Fault, but the available data suggest slip rates of 12 ±6 mm/year for the northern segments of the fault, and slip rates of 4 ±2 mm/year for the southern segments. For large ground-rupturing earthquakes on the San Jacinto fault, various investigators have suggested a recurrence interval of 150 to 300 years. The Working Group on California Earthquake Probabilities (WGCEP, 2008) has estimated that there is a 31 percent probability that an earthquake of M6.7 or greater will occur within 30 years on this fault. Maximum credible earthquakes of M6.7, M6.9, and M7.2 are expected on the San Bernardino, San Jacinto Valley and Anza segments, respectively, capable of generating peak horizontal ground accelerations of 0.48g to 0.53g in the County of Riverside, (ECI, 2009). A M5.4 earthquake occurred on the San Jacinto Fault on July 7, 2010.

The United States Geological Survey has issued the following statements with respect to the recent seismic activity on southern California faults:

> The San Jacinto fault, along with the Elsinore, San Andreas, and other faults, is part of the plate boundary that accommodates about 2 inches/year of motion as the Pacific plate moves northwest relative to the North American plate. The largest recent earthquake on the San Jacinto fault, near this location, the M6.5 1968 Borrego Mountain earthquake April 8, 1968, occurred about 25 miles southeast of the July 7, 2010, M5.4 earthquake.
>
> This M5.4 earthquake follows the 4th of April 2010, Easter Sunday, M7.2 earthquake, located about 125 miles to the south, well south of the US Mexico international border. A M4.9 earthquake occurred in the same

area on June 12th at 8:08 pm (Pacific Time). Thus, this section of the San Jacinto fault remains active.

Seismologists are watching two major earthquake faults in southern California. The San Jacinto fault, the most active earthquake fault in southern California, extends for more than 100 miles from the international border into San Bernardino and Riverside, a major metropolitan area often called the Inland Empire. The Elsinore fault is more than 110 miles long, and extends into the Orange County and Los Angeles area as the Whittier fault. The Elsinore fault is capable of a major earthquake that would significantly affect the large metropolitan areas of southern California. The Elsinore fault has not hosted a major earthquake in more than 100 years. The occurrence of these earthquakes along the San Jacinto fault and continued aftershocks demonstrates that the earthquake activity in the region remains at an elevated level. The San Jacinto fault is known as the most active earthquake fault in southern California. Caltech and USGS seismologist continue to monitor the ongoing earthquake activity using the Caltech/USGS Southern California Seismic Network and a GPS network of more than 100 stations.

## *B. Other Geologic Hazards*

*Ground Rupture*: Ground rupture is characterized by bedrock slippage along an established fault and may result in displacement of the ground surface. For ground rupture to occur along a fault, an earthquake usually exceeds M5.0. If a M5.0 earthquake was to take place on a local fault, an estimated surface-rupture length 1 mile long could be expected (Greensfelder, 1974). Our investigation indicates that the subject site is not directly on a known active fault trace and, therefore, the risk of ground rupture is remote.

*Ground Shaking*: Structural damage caused by seismically induced ground shaking is a detrimental effect directly related to faulting and earthquake activity. Ground shaking is considered to be the greatest seismic hazard in San Diego County. The intensity of ground shaking is dependent on the magnitude of the earthquake, the

distance from the earthquake, and the seismic response characteristics of underlying soils and geologic units. Earthquakes of M5.0 or greater are generally associated with significant damage. It is our opinion that the most serious damage to the site would be caused by a large earthquake originating on a nearby strand of the Rose Canyon Fault Zone. Although the chance of such an event is remote, it could occur within the useful life of the structures.

*Landslides*: Based upon our geotechnical investigation, review of the geologic map (Kennedy and Tan, 2008), review of the referenced City of San Diego Seismic Safety Study -- Geologic Hazards Map Sheet 39 and stereo-pair aerial photographs (3-31-53, AXN-4M-13 and 14), there are no known or suspected ancient landslides located on the site.

*Liquefaction*: The liquefaction of saturated sands during earthquakes can be a major cause of damage to buildings. Liquefaction is the process by which soils are transformed into a viscous fluid that will flow as a liquid when unconfined. It occurs primarily in loose, saturated sands and silts when they are sufficiently shaken by an earthquake.

On this site, the risk of liquefaction of foundation materials due to seismic shaking is considered to be very low due to the dense natural-ground material and the lack of a shallow, static groundwater surface under the site. The groundwater surface is at a minimum of over 50 feet below the ground surface. The site does not have a potential for soil strength loss to occur due to a seismic event.

*Slope Stability:* Slope stability calculations were performed for the proposed cut slopes along geologic cross sections A-A' and B-B' (Figure Nos. VIIa-b) using the Janbu method of analysis and the computer program *XSTABL* Version 5.2. The

results of our stability analyses are presented in Appendix B and indicate a factor of safety of greater than 1.5 against mass and surficial instability.

### *C. Geologic Hazards Summary*

It is our opinion, based upon a review of available maps, our research, and our site investigation, that the site is underlain by relatively stable formational materials and is suitable for the proposed new residential development and associated improvements provided the recommendations presented herein are implemented.

No significant geologic hazards are known to exist on the site that would prevent the proposed construction. Ground shaking from earthquakes on active southern California faults and active faults in northwestern Mexico is the greatest geologic hazard at the property. Design of building structures in accordance with the current building codes would reduce the potential for injury or loss of human life. Buildings constructed in accordance with current building codes may suffer significant damage but should not undergo total collapse.

In our explicit professional opinion, no *"active"* or *"potentially active"* faults underlie the project site.

## *IX. CONCLUSIONS AND RECOMMENDATIONS*

The following conclusions and recommendations are based on our evaluation and analysis of the field investigation conducted by our firm, our laboratory test results, and our experience with similar soils and formational materials. The opinions, conclusions, and recommendations presented in this report are contingent upon ***Geotechnical Exploration, Inc.*** being retained to review the final plans and

specifications as they are developed and to observe the site earthwork and installation of foundations. Accordingly, we recommend that the following paragraph be included on the grading and foundation plans for the project.

> If the geotechnical consultant of record is changed for the project, the work shall be stopped until the replacement has agreed in writing to accept the responsibility within their area of technical competence for approval upon completion of the work. It shall be the responsibility of the permittee to notify the City Engineer in writing of such change prior to the recommencement of grading and/or foundation installation work.

The primary feature of concern at the site is the high to very high expansion potential of the weathered, surficial formational materials covering the site. In order to minimize possible damage to the on-grade structures and associated on-grade improvements, such as flatwork, resulting from swelling and shrinkage of these materials, we recommend that they be completely removed in the areas of all on-grade improvements and buried at depth in landscape areas during the grading operations.

## *A. Preparation of Soils for Site Development*

1. *Clearing and Stripping:* The areas of new construction should be cleared of any miscellaneous debris that may be present at the time of construction. After clearing, the ground surface should be stripped of surface vegetation as well as associated root systems. Holes resulting from the removal of buried obstructions, including tree roots, that extend below the proposed finished site grades should be cleared and backfilled with suitable material compacted to the requirements provided under Recommendation Nos. 4 and 5 below. Prior to any filling operations, the cleared and stripped materials should be disposed of off-site.

2. *Removal and Treatment of Expansive Materials:* In order to preclude damage to the proposed new on-grade improvements from swelling and shrinkage of the high to very high expansion potential weathered formational materials, we recommend that these surficial, relatively shallow materials be completely removed and only be reused as fill at a depth of at least 2 feet and at a lateral distance of at least 2 feet from the face of fill slopes in planned designated landscape areas. The limits of removal should extend 10 feet beyond the perimeter limits of all new on-grade improvements.

***A representative of our firm should be present at the start of grading operations to verify the depths and areal extent of these expansive soil removals and their subsequent placement.***

3. *Subgrade Preparation:* After the site has been cleared, stripped, and the required excavations made, the exposed subgrade soils should be scarified to a depth of 6 inches, moisture conditioned to at least 2 percent above the laboratory optimum, and compacted to the requirements for structural fill.

4. *Material for Fill:* All on-site soils with an organic content of less than 3 percent by volume are in general suitable for reuse as fill except as noted in Recommendation No. 2 above. In addition, we recommend that only the silty sand low to very low expansion potential soils be used for trench and wall backfill material. Any needed imported fill material should be a low-expansion potential granular soil containing no rocks or lumps over 1 inch in greatest dimension and not more than 10 percent larger than ½-inch. No more than 15 percent of the fill should be larger than ¼-inch. All materials for use as fill should be approved by our representative prior to filling.

5. *Fill Compaction:* All soils, in general, should be compacted to a minimum degree of compaction of 90 percent at a moisture content at least 2 percent above the optimum based upon ASTM D1557-12. Fill materials should be spread and compacted in uniform horizontal lifts not exceeding 8 inches in uncompacted thickness. Before compaction begins, the fill should be brought to the recommended moisture content by either: (1) aerating and drying the fill if it is too wet, or (2) watering the fill if it is too dry. Each lift should be thoroughly mixed before compaction to ensure a uniform distribution of moisture.

6. *Permanent Slopes:* We recommend that any required permanent cut and fill slopes be constructed to an inclination no steeper than 2.0:1.0 (horizontal to vertical). The project plans and specifications should contain all necessary design features and construction requirements to prevent erosion of the on-site soils both during and after construction. Slopes and other exposed ground surfaces should be appropriately planted with a protective groundcover.

   Fill slopes should be constructed so as to assure that the recommended minimum degree of compaction is attained out to the finished slope face. This may be accomplished by "backrolling" with a sheepsfoot roller or other suitable equipment as the fill is raised. Placement of fill near the tops of slopes should be carried out in such a manner as to assure that loose, uncompacted soils are not sloughed over the tops and allowed to accumulate on the slope. Fills constructed on sloping ground having an inclination steeper than 5:1 (horizontal: vertical) ratio should be keyed and benched into competent formational material as illustrated on Figure No. XIII. The actual width of the toe keys and extent of removal of any existing loose surface soil or weathered formational materials should be determined by our representative in the field

during construction. In addition, toe key excavations should be inspected by our representative prior to placing fill.

7. *Trench and Retaining/Basement Wall Backfill:* All backfill soils placed in utility trenches or behind retaining/basement walls should consist of low expansion potential soils and be compacted to a minimum degree of 90 percent relative compaction. Backfill material should be placed in lift thicknesses appropriate to the type of compaction equipment utilized and compacted to a minimum degree of 90 percent by mechanical means.

   Our experience has shown that even shallow, narrow trenches, such as for irrigation and electrical lines, that are not properly compacted can result in problems, particularly with respect to shallow groundwater accumulation and migration.

8. *Surface Drainage:* Positive surface gradients should be provided adjacent to any proposed new structures. Roof gutters and downspouts should be installed on the structures so as to direct water away from foundations and slabs toward suitable discharge facilities. Ponding of surface water should not be allowed anywhere on the site.

## B. ***Foundation Recommendations***

9. *Footings:* We recommend that the proposed new residential structures be supported on conventional, individual-spread and/or continuous footing foundations bearing on undisturbed formational materials and/or properly compacted fill soils prepared as recommended above in Recommendation No.

5. All footings should be founded at least 18 inches below the lowest adjacent finished grade.

At the recommended depth, footings may be designed for allowable bearing pressures of 2,000 pounds per square foot (psf) for combined dead and live loads and 2,700 psf for all loads, including wind or seismic. All footings should, however, have a minimum width of 12 inches.

10. *General Criteria for All Footings*: Footings located adjacent to the tops of slopes should be extended sufficiently deep so as to provide at least 10 feet of horizontal cover or 1½ times the width of the footing, whichever is greater, between the slope face and outside edge of the footing at the footing bearing level. Footings located adjacent to utility trenches should have their bearing surfaces situated below an imaginary 1.5 to 1.0 plane projected upward from the bottom edge of the adjacent utility trench.

All continuous footings should contain top and bottom reinforcement to provide structural continuity and to permit spanning of local irregularities. We recommend that a minimum of four No. 5 reinforcing bars be provided in the footings – two near the top and two near the bottom. A minimum clearance of 3 inches should be maintained between steel reinforcement and the bottom or sides of the footing. In order for us to offer an opinion as to whether the footings are founded on materials of sufficient load bearing capacity, it is essential that our representative inspect the footing excavations prior to the placement of reinforcing steel or concrete.

*NOTE: The project Civil/Structural Engineer should review all reinforcing schedules. The reinforcing minimums recommended herein are not to be*

*construed as structural designs, but merely as minimum reinforcement to reduce the potential for cracking and separations.*

11. *Seismic Design Criteria:* Site-specific seismic design criteria for the proposed structure are presented in the following table in accordance with Section 1613 of the 2016 CBC, which incorporates by reference ASCE 7-10 for seismic design. We have determined the mapped spectral acceleration values for the site, based on a latitude of 32.9582 degrees and longitude of -117.1816 degrees, utilizing a third-party tool provided by the USGS, which provides a solution for ASCE 7-10 (Section 1613 of the 2016 CBC) utilizing digitized files for the Spectral Acceleration maps. Based on our past experience with similar conditions, we have assigned a Site Soil Classification of D.

**TABLE I**
***Mapped Spectral Acceleration Values and Design Parameters***

| $S_s$ | $S_1$ | $F_a$ | $F_v$ | $S_{ms}$ | $S_{m1}$ | $S_{ds}$ | $S_{d1}$ |
|---|---|---|---|---|---|---|---|
| 0.973g | 0.377g | 1.111 | 1.646 | 1.081g | 0.620g | 0.721g | 0.414g |

12. *Lateral Loads:* Lateral load resistance for the structures supported on footing foundations may be developed in friction between the foundation bottoms and the supporting subgrade. An allowable friction coefficient of 0.30 is considered applicable. An additional allowable passive resistance equal to an equivalent fluid weight of 300 pounds per cubic foot (pcf) acting against the foundations may be used in design provided the footings are poured neat against the adjacent undisturbed formational or compacted fill materials. These lateral resistance values assume a level surface in front of the footing for a minimum distance of three times the embedment depth of the footing and any shear keys.

13. *Settlement:* Settlements under building loads are expected to be within tolerable limits for the proposed structures. For footings designed in accordance with the recommendations presented in the preceding paragraphs, we anticipate that total settlements should not exceed 1 inch and that post-construction differential settlements should be less than ¼-inch in 25 feet.

14. *Retaining/Basement Walls:* Retaining and basement walls must be designed to resist lateral earth pressures and any additional lateral pressures caused by surcharge loads on the adjoining retained surface. We recommend that unrestrained (cantilever) walls with level backfill be designed for an equivalent fluid pressure of 35 pcf. We recommend that restrained walls (i.e., basement walls or any walls with angle points or are curvilinear that restrain them from rotation) with level backfill be designed for an equivalent fluid pressure of 35 pcf plus an additional uniform lateral pressure of 8H pounds per square foot where H is equal to the height of backfill above the top of the wall footing in feet. Wherever walls will be subjected to surcharge loads, they should also be designed for an additional uniform lateral pressure equal to one-third the anticipated surcharge pressure in the case of unrestrained walls and one-half the anticipated surcharge pressure in the case of restrained walls.

    For seismic design of unrestrained walls, we recommend that the seismic pressure increment be taken as a fluid pressure distribution utilizing an equivalent fluid weight of 11 pcf. For restrained walls we recommend that the seismic pressure increment be taken as a fluid pressure distribution utilizing an equivalent fluid weight of 17 pcf added to the active static fluid pressure utilizing an equivalent fluid weight of 35 pcf.

    The preceding design pressures assume that the walls are backfilled with low expansion potential materials (Expansion Index less than 50) and that there is

sufficient drainage behind the walls to prevent the build-up of hydrostatic pressures from surface water infiltration. We recommend that wall drainage be provided using J-Drain 200/220 and J-Drain SWD. No gravel or pipe is used with the J-Drain system. The drain material should terminate 12 inches below the finish surface where the surface is covered by slabs or 18 inches below the finish surface in landscape areas.

Backfill placed behind the walls should be compacted to a minimum degree of 90 percent relative compaction using light compaction equipment. If heavy equipment is used, the walls should be appropriately temporarily braced.

## *C. Concrete Slab on-grade Criteria*

15. *Minimum Floor Slab Thickness and Reinforcement:* Based on our experience, we have found that, for various reasons, floor slabs occasionally crack, causing brittle surfaces such as ceramic tiles to become damaged. Therefore, we recommend that all slabs on-grade contain at least a minimum amount of reinforcing steel to reduce the separation of cracks, should they occur.

15.1 Interior floor slabs should be a minimum of 5 inches actual thickness and be reinforced with No. 4 bars on 18-inch centers, both ways, placed at midheight in the slab. Slab subgrade soil should be verified by a ***Geotechnical Exploration, Inc.*** representative to have the proper moisture content within 48 hours prior to placement of the vapor barrier and pouring of concrete.

15.2 Following placement of any concrete floor slabs, sufficient drying time must be allowed prior to placement of floor coverings. Premature

placement of floor coverings may result in degradation of adhesive materials and loosening of the finish floor materials.

16. *Concrete Isolation Joints:* We recommend the project Civil/Structural Engineer incorporate isolation joints and sawcuts to at least one-fourth the thickness of the slab in any floor designs. The joints and cuts, if properly placed, should reduce the potential for and help control floor slab cracking. We recommend that concrete shrinkage joints be spaced no farther than approximately 20 feet apart, and also at re-entrant corners. However, due to a number of reasons (such as base preparation, construction techniques, curing procedures, and normal shrinkage of concrete), some cracking of slabs can be expected.

17. *Slab Moisture Protection and Vapor Barrier Membrane:* Although it is not the responsibility of geotechnical engineering firms to provide moisture protection recommendations, as a service to our clients we provide the following discussion and suggested minimum protection criteria. Actual recommendations should be provided by the architect and waterproofing consultants.

Soil moisture vapor can result in damage to moisture-sensitive floors, some floor sealers, or sensitive equipment in direct contact with the floor, in addition to mold and staining on slabs, walls and carpets. The common practice in Southern California is to place vapor retarders made of PVC, or of polyethylene. PVC retarders are made in thickness ranging from 10- to 60-mil. Polyethylene retarders, called visqueen, range from 5 to 10 mil in thickness. These products are no longer considered adequate for moisture protection and can actually deteriorate over time.

Specialty vapor retarding products possess higher tensile strength and are more specifically designed for and intended to retard moisture transmission

into and through concrete slabs. The use of such products is highly recommended for reduction of floor slab moisture emission.

The following American Society for Testing and Materials (ASTM) and American Concrete Institute (ACI) sections address the issue of moisture transmission into and through concrete slabs: ASTM E1745-97 (2009) Standard Specification for Plastic Water Vapor Retarders Used in Contact Concrete Slabs; ASTM E154-88 (2005) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth; ASTM E96-95 Standard Test Methods for Water Vapor Transmission of Materials; ASTM E1643-98 (2009) Standard Practice for Installation of Water Vapor Retarders Used in Contact Under Concrete Slabs; and ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

17.1 Based on the above, we recommend that the vapor barrier consist of a minimum 15-mil extruded polyolefin plastic (no recycled content or woven materials permitted). Permeance as tested before and after mandatory conditioning (ASTM E1745 Section 7.1 and sub-paragraphs 7.1.1-7.1.5) should be less than 0.01 perms (grains/square foot/hour in Hg) and comply with the ASTM E1745 Class A requirements. Installation of vapor barriers should be in accordance with ASTM E1643. The basis of design is 15-mil StegoWrap vapor barrier placed per the manufacturer's guidelines. Reef Industries Vapor Guard membrane has also been shown to achieve a permeance of less than 0.01 perms. We recommend that the slab be poured directly on the vapor barrier, which is placed directly on the prepared subgrade soil; no sand or gravel layers are used.

17.2 Common to all acceptable products, vapor retarder/barrier joints must be lapped and sealed with mastic or the manufacturer's recommended tape or sealing products. In actual practice, stakes are often driven through the retarder material, equipment is dragged or rolled across the retarder, overlapping or jointing is not properly implemented, etc. All these construction deficiencies reduce the retarder's effectiveness. In no case should retarder/barrier products be punctured or gaps be allowed to form prior to or during concrete placement.

17.3 Vapor retarders/barriers do not provide full waterproofing for structures constructed below free water surfaces. They are intended to help reduce or prevent vapor transmission and/or capillary migration through the soil and through the concrete slabs. Waterproofing systems must be designed and properly constructed if full waterproofing is desired. The owner and project designers should be consulted to determine the specific level of protection required.

17.4 Following placement of concrete floor slabs, sufficient drying time must be allowed prior to placement of any floor coverings. Premature placement of floor coverings may result in degradation of adhesive materials and loosening of the finish floor materials.

18. *Exterior Slab Thickness and Reinforcement:* As a minimum for protection of on-site improvements, we recommend that all exterior pedestrian concrete slabs be 4½ inches thick and be founded on properly compacted and tested fill, with No. 4 bars at 24-inch centers, both ways, at the center of the slab, and contain adequate isolation and control joints. The performance of on-site improvements can be greatly affected by soil base preparation and the quality

of construction. It is therefore important that all improvements are properly designed and constructed for the existing soil conditions. The improvements should not be built on loose soils or fills placed without our observation and testing.

For exterior slabs with the minimum shrinkage reinforcement, control joints should be placed at spaces no farther than 15 feet apart or the width of the slab, whichever is less, and also at re-entrant corners. Control joints in exterior slabs should be sealed with elastomeric joint sealant. The sealant should be inspected every 6 months and be properly maintained.

## *D. Pavement*

19. *Concrete Pavement:* We recommend that concrete pavement, including garage slabs, as well as the drive and parking areas adjacent to the residences subject only to automobile and light truck traffic, be 5½ inches thick and be supported directly on properly prepared on-site subgrade soils. We recommend that the thickness be increased to 7 inches for driveways subject to occasional heavy truck traffic. The concrete should conform to Section 201 of The Standard Specifications for Public Works Construction, 2000 Edition, for Class 560-C-3250.

In order to control shrinkage cracking, we recommend that saw-cut, weakened-plane joints be provided at about 15-foot centers both ways. The pavement slabs should be saw-cut as soon as practical but no more than 24 hours after the placement of the concrete. The depth of the joint should be one-quarter of the slab thickness and its width should not exceed 0.02-foot. Reinforcing steel is not necessary unless it is desired to increase the joint

spacing recommended above. In lieu of jointing for the garage slabs, they may be reinforced with No. 4 bars at 18-inch centers both ways.

### *E. General Recommendations*

20. *Project Start Up Notification:* In order to minimize any work delays during site development, this firm should be contacted 24 hours prior to any need for observation of footing excavations or field density testing of compacted fill soils. If possible, placement of formwork and steel reinforcement in footing excavations should not occur prior to observing the excavations; in the event that our observations reveal the need for deepening or redesigning foundation structures at any locations, any formwork or steel reinforcement in the affected footing excavation areas would have to be removed prior to correction of the observed problem (i.e., deepening the footing excavation, recompacting soil in the bottom of the excavation, etc.).

## *IX. GRADING NOTES*

***Geotechnical Exploration, Inc.*** recommends that we be retained to verify the actual soil conditions revealed during site grading work and footing excavation to be as anticipated in this "*Report of Preliminary Geotechnical Investigation*" for the project. In addition, the compaction of any fill soils placed during site grading work must be observed and tested by the soil engineer. It is the responsibility of the grading contractor to comply with the requirements on the grading plans and the local grading ordinance. All retaining wall and trench backfill should be properly compacted. ***Geotechnical Exploration, Inc.*** will assume no liability for damage occurring due to improperly or uncompacted backfill placed without our observations and testing.

## *X. LIMITATIONS*

Our conclusions and recommendations have been based on available data obtained from our document review, field investigation, laboratory testing and analysis, as well as our experience with similar soils and formational materials located in this area of San Diego. Of necessity, we must assume a certain degree of continuity between exploratory excavations. It is, therefore, necessary that all observations, conclusions, and recommendations be verified at the time grading operations begin or when footing excavations are placed. In the event discrepancies are noted, additional recommendations may be issued, if required.

The work performed and recommendations presented herein are the result of an investigation and analysis that meet the contemporary standard of care in our profession within the City of San Diego. No warranty is provided.

This report should be considered valid for a period of two (2) years, and is subject to review by our firm following that time. If significant modifications are made to the building plans, especially with respect to the height and location of any proposed structures, this report must be presented to us for immediate review and possible revision.

It is the responsibility of the owner and/or developer to ensure that the recommendations summarized in this report are carried out in the field operations and that our recommendations for design of this project are incorporated in the structural plans. We should be retained to review the project plans once they are available, to see that our recommendations are adequately incorporated in the plans.

This firm does not practice or consult in the field of safety engineering. We do not direct the contractor's operations, and we cannot be responsible for the safety of personnel other than our own on the site; the safety of others is the responsibility of the contractor. The contractor should notify the owner if any of the recommended actions presented herein are considered to be unsafe.

The firm of ***Geotechnical Exploration, Inc.*** shall not be held responsible for changes to the physical condition of the property, such as addition of fill soils or changing drainage patterns, which occur subsequent to issuance of this report and the changes are made without our observations, testing, and approval.

Once again, should any questions arise concerning this report, please feel free to contact the undersigned. Reference to our **Job No. 19-12420** will expedite a reply to your inquiries.

Respectfully submitted,

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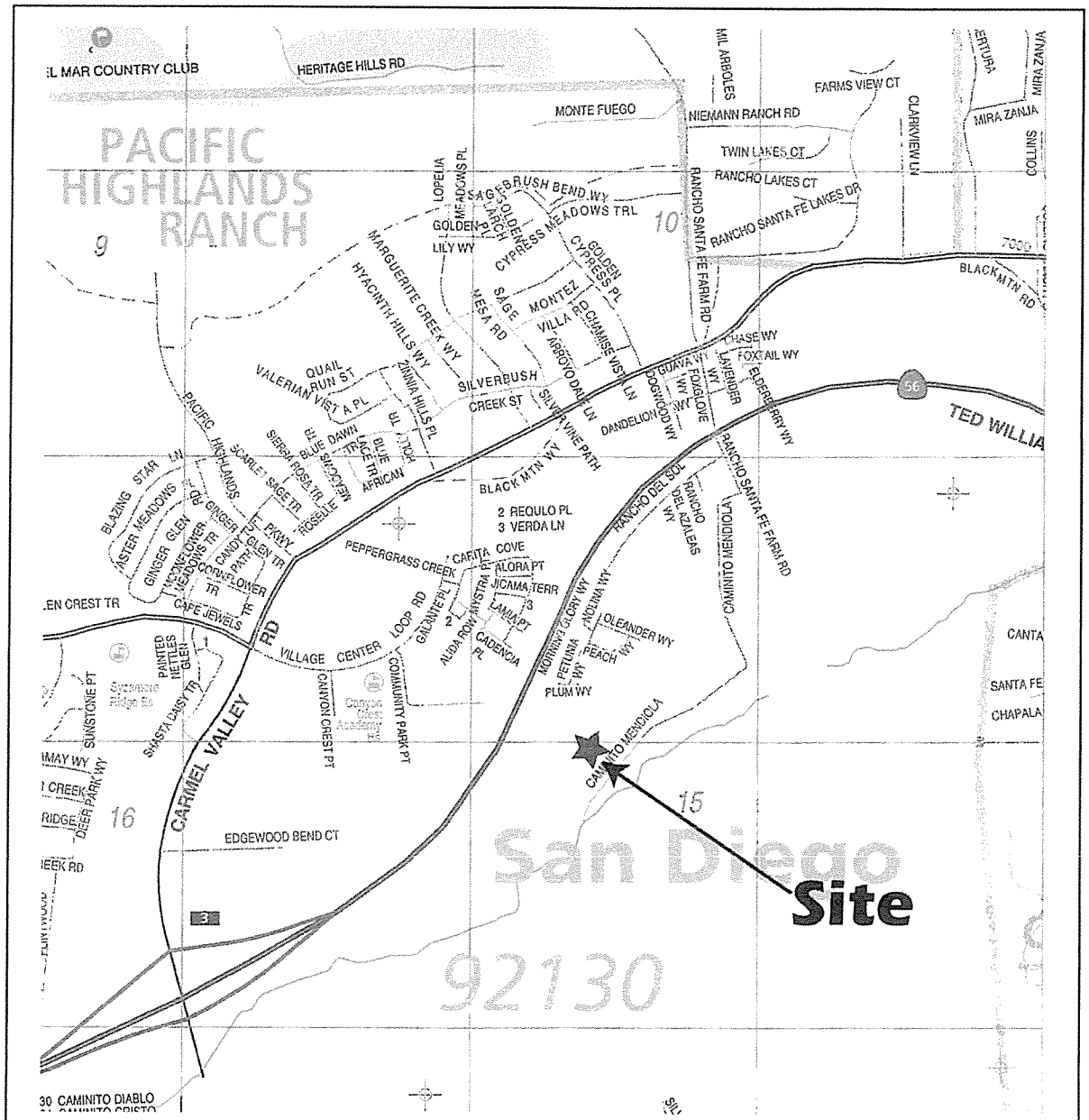
URS Project No. 27653042.00500 (2010), San Diego County Multi-Jurisdiction Hazard Mitigation Plan San Diego County, California.

U.S. Dept. of Agriculture Stereo Pair Aerial Photographs AXN-4M-13 & 14, dated March 31, 1953.

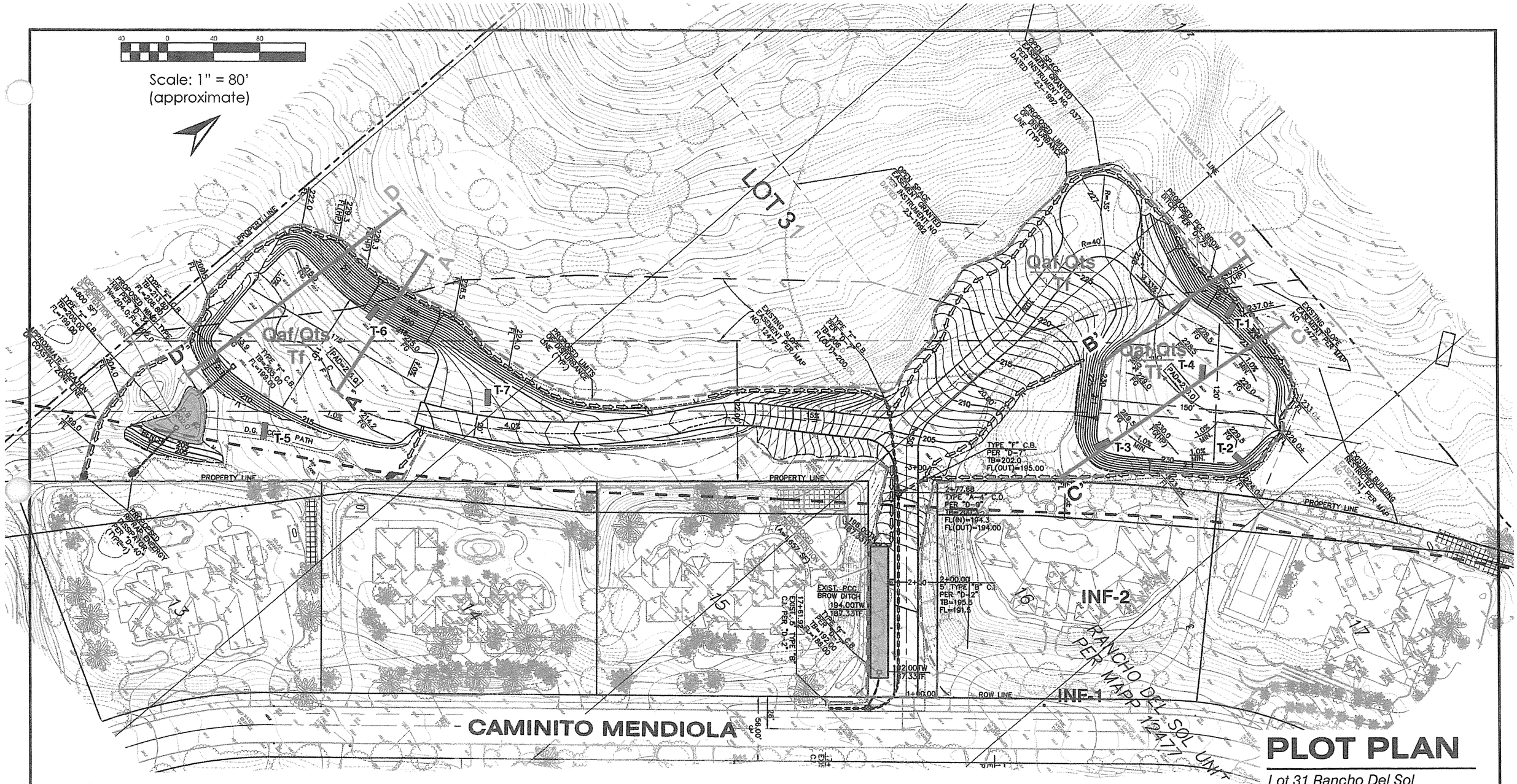
# VICINITY MAP




Thomas Bros. Guide San Diego County, pg 1188-G4

Lot 31 Rancho Del Sol
Caminito Mendiola
San Diego, CA.

*Figure No. I*
*Job No. 19-12420*




NOTE: This Plot Plan is not to be used for legal purposes. Locations and dimensions are approximate. Actual property dimensions and locations of utilities may be obtained from the Approved Building Plans or the "As-Built" Grading Plans.

REFERENCE: This PLOT PLAN was prepared from an existing PRELIMINARY GRADING PLAN by FARRINGTON ENGINEERING CONSULTANTS, INC. dated 6-20-19 and from on-site field reconnaissance performed by GEI.

## LEGEND

- T-7 — Approximate Location of Exploratory Trench
- D D' — Approximate Line of Cross Section
- Qaf/Qts — Artificial Fill/Topsoil
- Tf — Friars Formation
- Proposed Limits of Grading

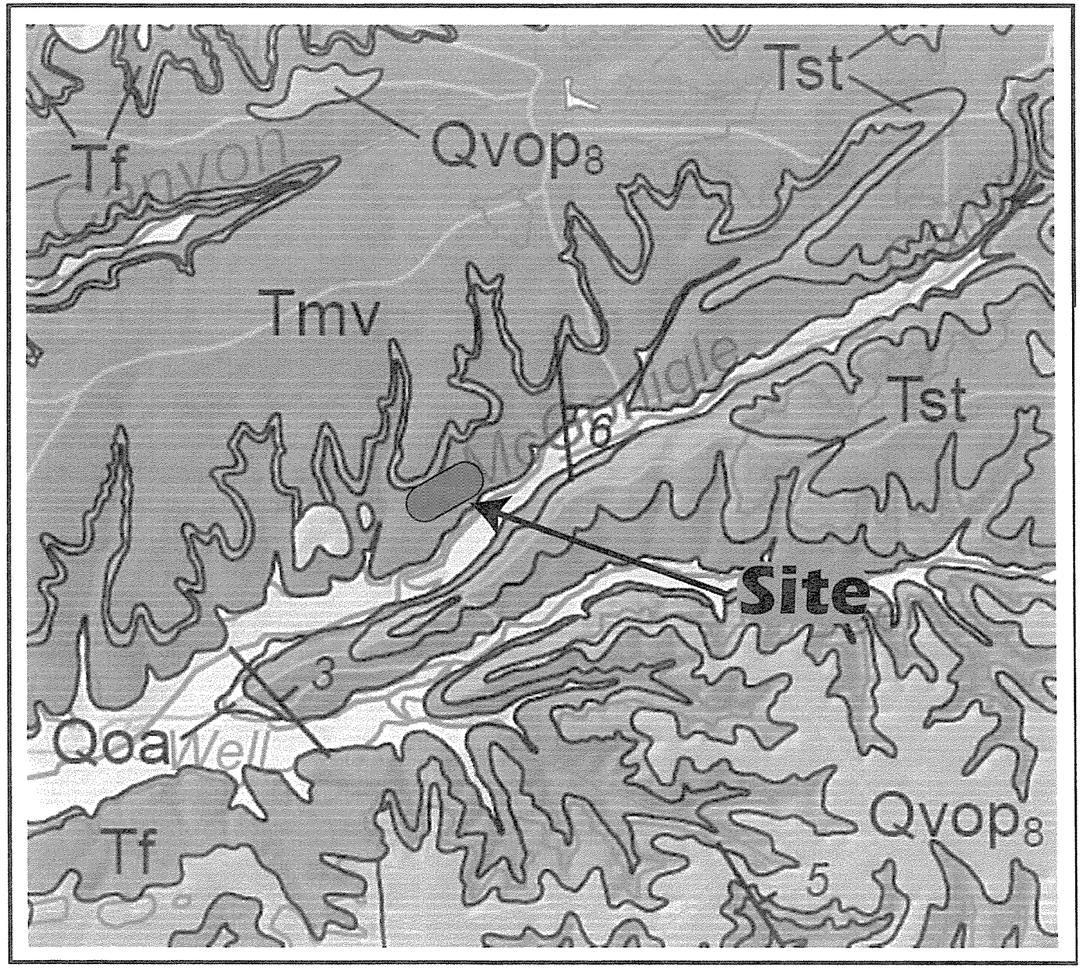
# PLOT PLAN

*Lot 31 Rancho Del Sol*
*Caminito Mendiola*
*San Diego, CA.*
*Figure No. II*
*Job No. 19-12420*

Geotechnical Exploration, Inc.

*October 2019*

*19-12420-p.ai*




Lot 31 Rancho Del Sol
Caminito Mendiola
San Diego, CA.

# EXCERPT FROM GEOLOGIC MAP OF THE SAN DIEGO 30' x 60' QUADRANGLE, CALIFORNIA

By
Michael P. Kennedy[1] and Siang S. Tan[1]
2008
Digital preparation by
Kelly R. Bovard[2], Anne G. Garcia[2], Diane Burns[2], and Carlos I. Gutierrez[1]

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

## ONSHORE MAP SYMBOLS

Contact - Contact between geologic units; dotted where concealed.

Fault - Solid where accurately located; dashed where approximately located; dotted where concealed. U = upthrown block, D = downthrown block. Arrow and number indicate direction and angle of dip of fault plane.

Anticline - Solid where accurately located; dashed where approximately located; dotted where concealed. Arrow indicates direction of axial plunge.

Syncline - Solid where accurately located; dotted where concealed. Arrow indicates direction of axial plunge.

Landslide - Arrows indicate principal direction of movement. Queried where existence is questionable.

Strike and dip of beds

Inclined

Strike and dip of igneous joints

Inclined

Vertical

Strike and dip of metamorphic foliation

Inclined

## DESCRIPTION OF UNITS

Tmv — Mission Valley Formation

Tst — Stadium Conglomerate

Tf — Friars Formation

Base Map

Onshore base (hypsography, hydrography, and transportation) from U.S.G.S. digital line graph (DLG) data, San Diego 30' x 60' metric quadrangle. Shaded topographic base from U.S.G.S. digital elevation models (DEM's). Offshore bathymetric contours and shaded bathymetry from N.O.A.A. single and multibeam data. Projection is UTM, zone 11, North American Datum 1927.

This map was funded in part by the U.S. Geological Survey National Cooperative Geologic Mapping Program, STATEMAP Award no. 98HQAG2049.

Prepared in cooperation with the U.S. Geological Survey, Southern California Areal Mapping Project



*Figure No. V*
*Job No. 19-12420*

Geotechnical Exploration, Inc.

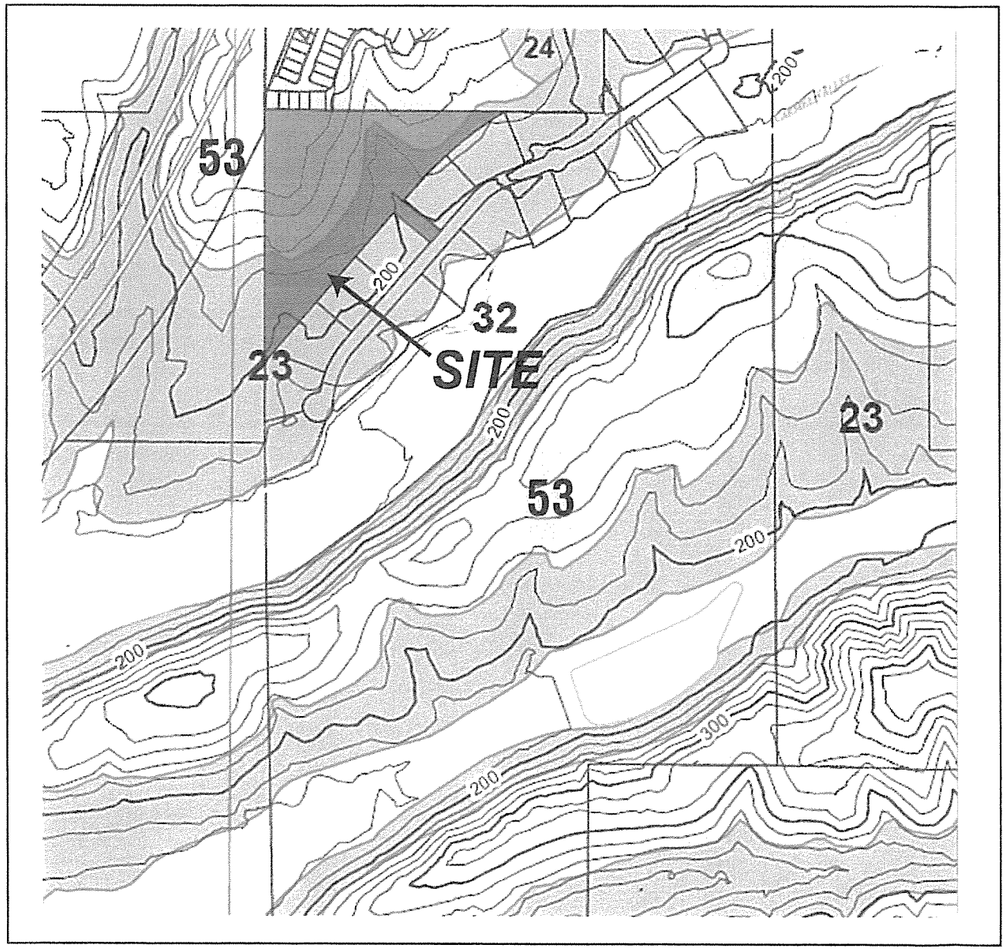
October 2019

Lot-31-2008-geo.ai

# Geologic Hazards Map Excerpt
# from City of San Diego
# Geologic Hazards and Fault Map
# Sheet 39

Development Services Department

DATE: 4/3/2008




Lot 31 Rancho Del Sol
Caminito Mendiola
San Diego, CA.

## *LEGEND*

### *Geologic Hazard Categories*

***FAULT ZONES***

- 11 Active, Alquist-Priolo Earthquake Fault Zone
- 12 Potentially Active, Inactive, Presumed Inactive, or Activity Unknown
- 13 Downtown special fault zone

***LANDSLIDES***

- 21 Confirmed, known, or highly suspected
- 22 Possible or conjectured

***SLIDE-PRONE FORMATIONS***

- 23 Friars: neutral or favorable geologic structure
- 24 Friars: unfavorable geologic structure
- 25 Ardath: neutral or favorable geologic structure
- 26 Ardath: unfavorable geologic structure
- 27 Otay, Sweetwater, and others

***LIQUEFACTION***

- 31 High Potential -- shallow groundwater major drainages, hydraulic fills
- 32 Low Potential -- fluctuating groundwater minor drainages

***COASTAL BLUFFS***

- 41 Generally unstable Numerous landslides, high steep bluffs, severe erosion, unfavorable geologic structure
- 42 Generally unstable Unfavorable bedding plains, high erosion
- 43 Generally unstable Unfavorable jointing, local high erosion
- 44 Moderately stable Mostly stable formations, local high erosion
- 45 Moderately stable Some minor landslides, minor erosion
- 46 Moderately stable Some unfavorable geologic structure, minor or no erosion
- 47 Generally stable Favorable geologic structure, minor or no erosion, no landslides
- 48 Generally stable Broad beach areas, developed harbor

***OTHER TERRAIN***

- 51 Level mesas -- underlain by terrace deposits and bedrock nominal risk
- 52 Other level areas, gently sloping to steep terrain, favorable geologic structure, Low risk
- 53 Level or sloping terrain, unfavorable geologic structure, Low to moderate risk
- 54 Steeply sloping terrain, unfavorable or fault controlled geologic structure, Moderate risk
- 55 Modified terrain (graded sites) Nominal risk

***Water (Bays and Lakes)***

***FAULTS***

- Fault
- Inferred Fault
- Concealed Fault
- Shear Zone

*Figure No. VI*
*Job No. 19-12420*

Geotechnical Exploration, Inc.

October 2019

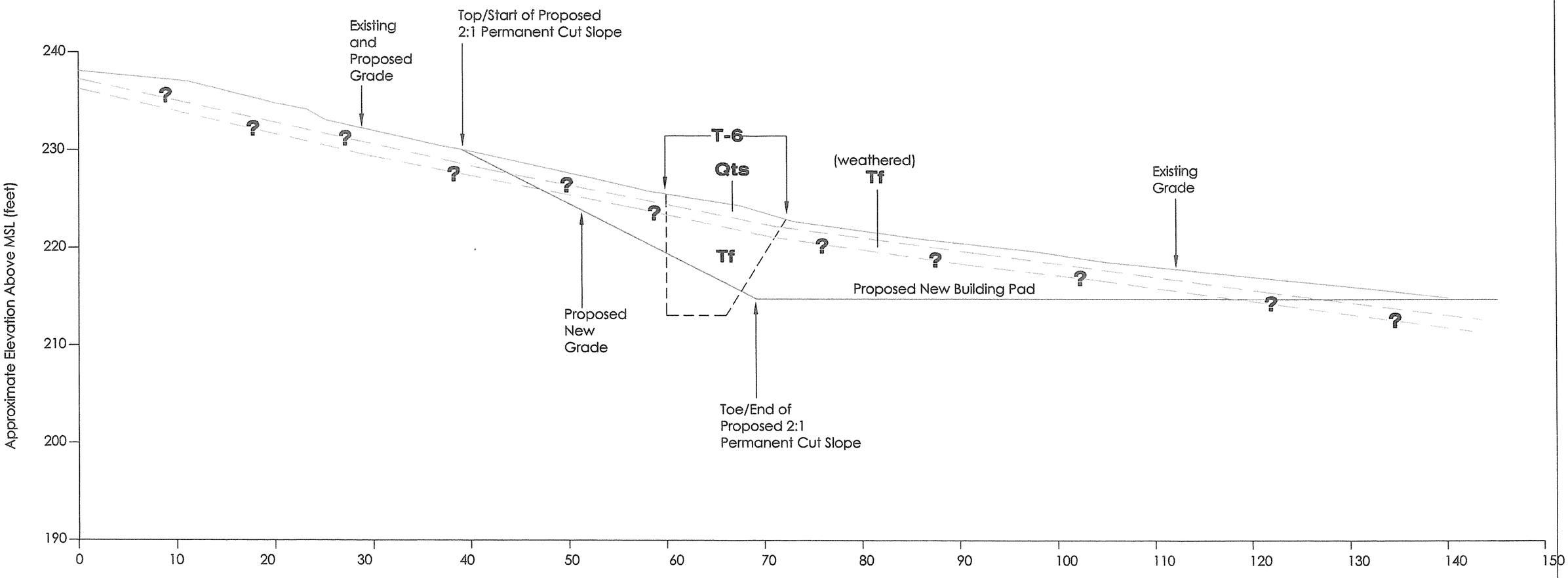
Lot-31-seis-combo.ai

# GEOLOGIC CROSS SECTION A-A'

Lot 31 Rancho Del Sol
Caminito Mendiola
San Diego, CA.

A

A'




| | |
|---|---|
| Qts | Topsoil ( 1 Foot ) |
| Tf | Weathered Friars Formation ( 1 Foot ) |
| Tf | Friars Formation |
| | Approximate Geologic Contact |

NOTE: This Cross Section is not to be used for legal purposes. Locations and dimensions are approximate. Actual property dimensions and locations of utilities may be obtained from the Approved Building Plans or the "As-Built" Grading Plans.

*Figure No. VIIa*
*Job No. 19-12420*

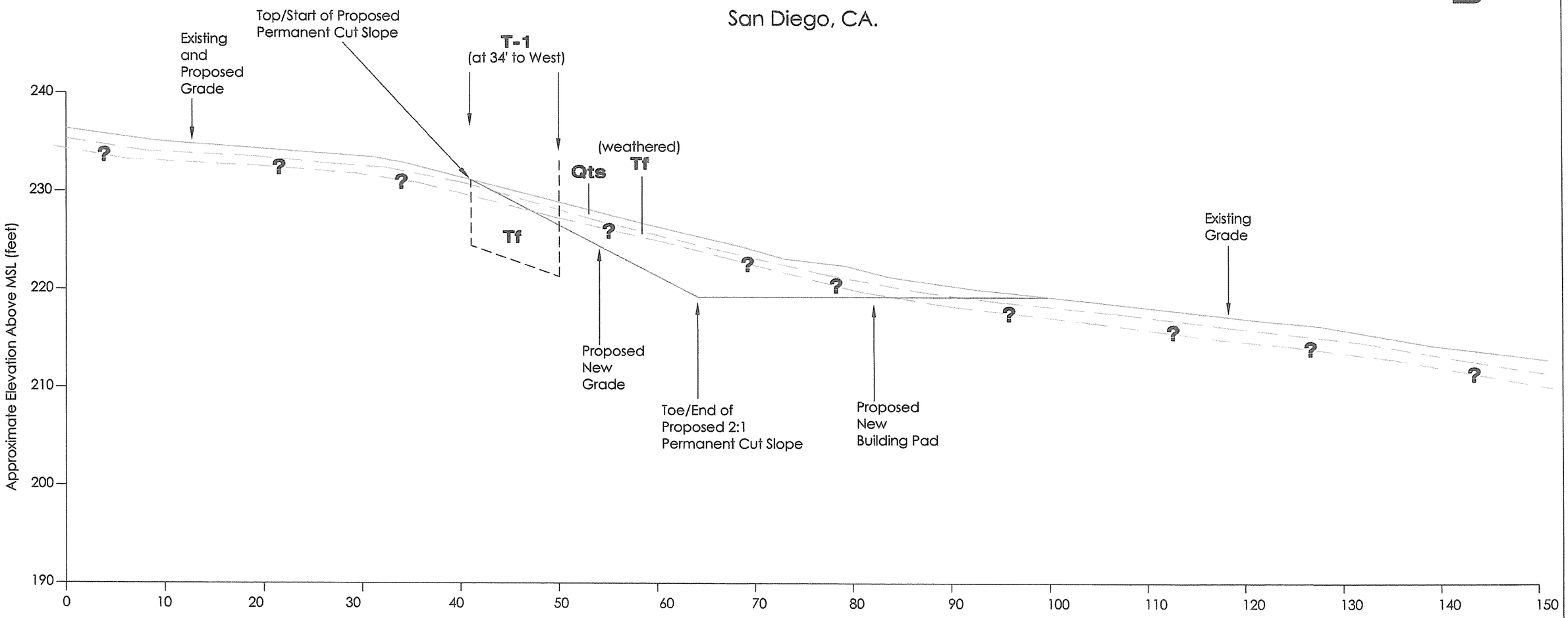
Geotechnical Exploration, Inc.

*October 2019*

19-12420-AA

# GEOLOGIC CROSS SECTION B-B'

Lot 31 Rancho Del Sol
Caminito Mendiola
San Diego, CA.




| | |
|---|---|
| Qaf/Qts | Fill/Topsoil ( 1 Foot ) |
| Tf | Weathered Friars Formation ( 1 Foot ) |
| Tf | Friars Formation |
| | Approximate Geologic Contact |

NOTE: This Cross Section is not to be used for legal purposes. Locations and dimensions are approximate. Actual property dimensions and locations of utilities may be obtained from the Approved Building Plans or the "As-Built" Grading Plans.

*Figure No. VIIb*
*Job No. 19-12420*

Geotechnical Exploration, Inc.

*October 2019*

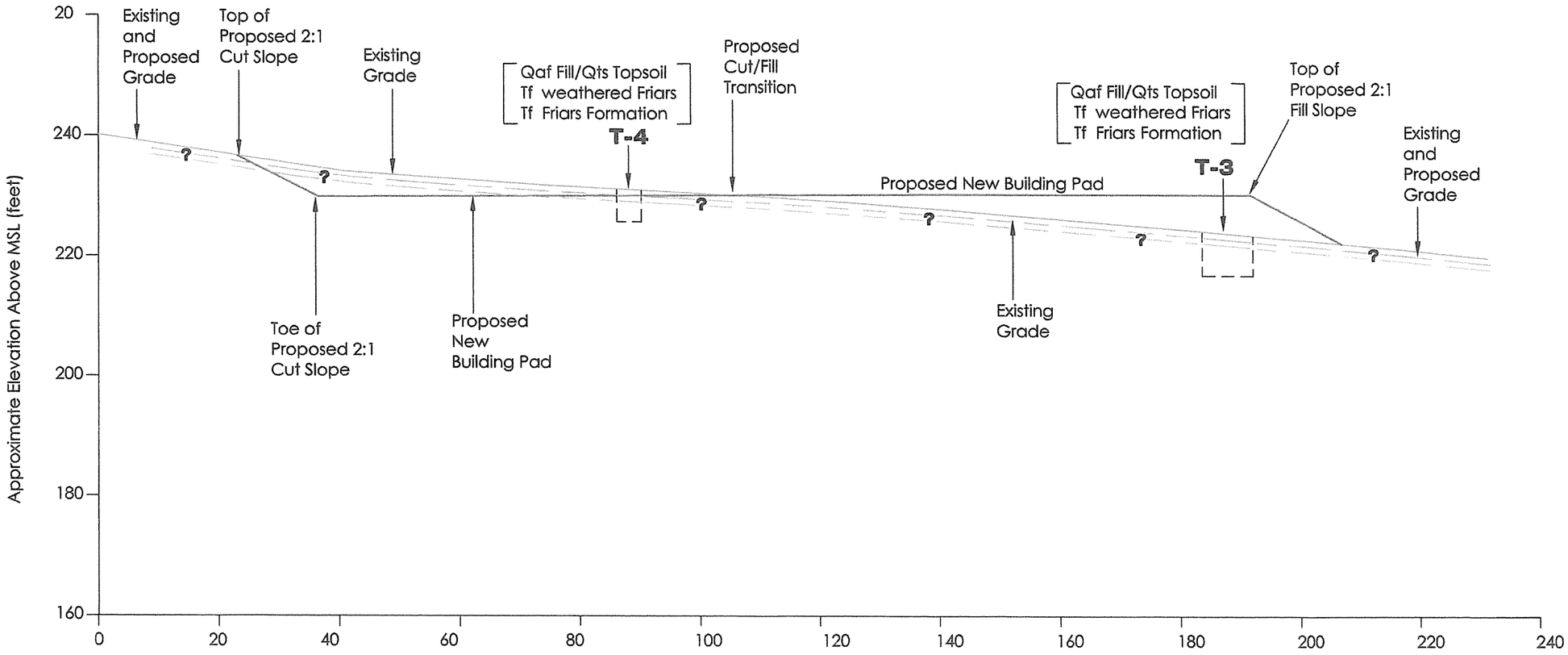
19-12420-BB

# GEOLOGIC CROSS SECTION C-C'

C

C'

Lot 31 Rancho Del Sol
Caminito Mendiola
San Diego, CA.




Relative Horizontal Distance (feet)
Scale:1" = 20'
(Horizontal and Vertical)

| | |
|---|---|
| Qaf/Qts | Fill/Topsoil ( 1 Foot ) |
| Tf | Weathered Friars Formation ( 1 Foot ) |
| Tf | Friars Formation |
| | Approximate Geologic Contact |

NOTE: This Cross Section is not to be used for legal purposes. Locations and dimensions are approximate. Actual property dimensions and locations of utilities may be obtained from the Approved Building Plans or the "As-Built" Grading Plans.

*Figure No. VIIc*
*Job No. 19-12420*

Geotechnical Exploration, Inc.

*October 2019*

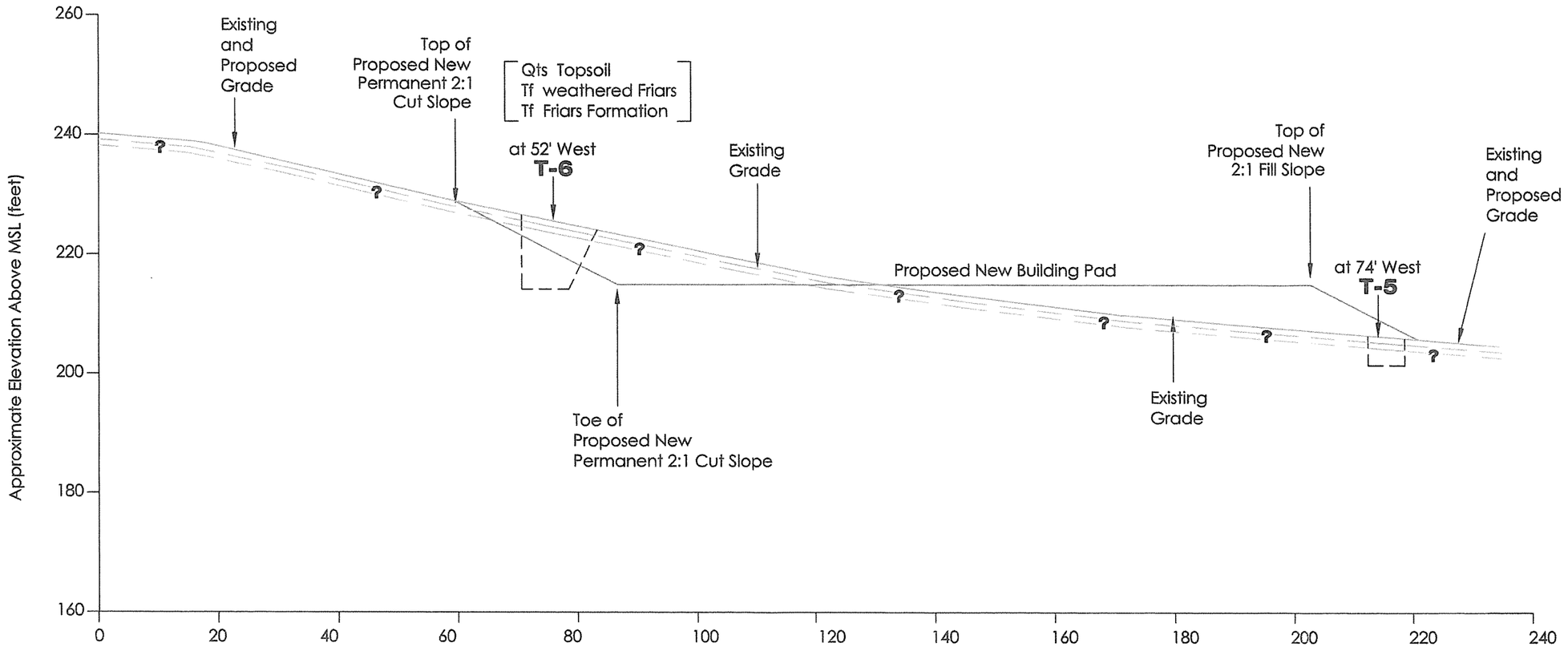
19-12420-CC

# GEOLOGIC CROSS SECTION D-D'

D

D'

Lot 31 Rancho Del Sol
Caminito Mendiola
San Diego, CA.




| | |
|---|---|
| Qaf/Qts | Fill/Topsoil ( 1 Foot ) |
| Tf | Weathered Friars Formation ( 1 Foot ) |
| Tf | Friars Formation |
| | Approximate Geologic Contact |

NOTE: This Cross Section is not to be used for legal purposes. Locations and dimensions are approximate. Actual property dimensions and locations of utilities may be obtained from the Approved Building Plans or the "As-Built" Grading Plans.

*Figure No. VIId*
*Job No. 19-12420*

Geotechnical Exploration, Inc.

*October 2019*

19-12420-DD

Geotechnical Exploration, Inc.

**EQUIPMENT:** Rubber tire backhoe

**DIMENSION & TYPE OF EXCAVATION:** 9.0-ft. x 3.0-ft x 6.75-ft. ( L x W x D ) Trench

**DATE LOGGED:** September 6, 2019

**LOGGED BY:** AH

**SURFACE ELEVATION:** ± 237' Above Mean Sea Level

**REVIEWED BY:** DH/JAB

**GROUNDWATER/SEEPAGE DEPTH:** Not Encountered

| DEPTH (feet) | SYMBOL | SAMPLE | FIELD DESCRIPTION AND CLASSIFICATION<br>DESCRIPTION AND REMARKS<br>(Grain Size, Density, Moisture, Color) | U.S.C.S | IN-PLACE MOISTURE (%) | IN-PLACE DENSITY (pcf) | OPTIMUM MOISTURE (%) | MAXIMUM DRY DENSITY (pcf) | DENSITY (% of MDD) | EXPAN(+)/ CONSOL(-) | EXPANSION INDEX | BLOW COUNTS/ FT | SAMPLE O.D. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | **SILTY SAND,** fine- to medium-grained. Loose to medium dense. Dry. Brown. Trace organic materials.<br>**TOPSOIL (Qts)**<br>-- 32% passing the No. 200 sieve. | SM | | | 10.7 | 116.2 | | | | | |
| 2 | | | **CLAYEY SAND,** fine- to medium-grained. Very dense. Slightly moist. Reddish brown with abundant iron oxide staining.<br>-- 47% passing the No. 200 sieve.<br>-- Atterberg limits: Liquid limit = 46, Plastic limit = 19, Plasticity index = 27.<br>**WEATHERED FRIARS FORMATION (Tf)** | SC | | | 12.0 | 120.6 | | | 112 | | |
| 3 | | | **SILTY SAND,** fine- to medium-grained. Very dense. Slightly moist. Yellowish pale gray with trace iron oxide staining throughout.<br>**FRIARS FORMATION (Tf) (SANDSTONE)** | SM | | | | | | | | | |
| 4 | | | -- 26% passing the No. 200 sieve. | | | | 12.4 | 118.4 | | | | | |
| 5 | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | |
| 7 | | | Bottom of trench at 6.75 feet. | | | | | | | | | | |
| 8 | | | | | | | | | | | | | |

PERCHED WATER TABLE
BULK BAG SAMPLE
1 IN-PLACE SAMPLE
MODIFIED CALIFORNIA SAMPLE
S NUCLEAR FIELD DENSITY TEST
STANDARD PENETRATION TEST

**JOB NUMBER:** 19-12420

**JOB NAME:** Lot 31 Rancho del Sol

**SITE LOCATION:** Lot 31 - Rancho del Sol San Diego, CA

**LOG NO.** T-1

**FIGURE NO.** IIIa

Geotechnical Exploration, Inc.

**EQUIPMENT:** Rubber tire backhoe

**DIMENSION & TYPE OF EXCAVATION:** 10.0-ft. x 3.0-ft x 8.5-ft. ( L x W x D ) Trench

**DATE LOGGED:** September 6, 2019

**LOGGED BY:** AH

**SURFACE ELEVATION:** ± 227' Above Mean Sea Level

**REVIEWED BY:** DH/JAB

**GROUNDWATER/SEEPAGE DEPTH:** Not Encountered

| DEPTH (feet) | SYMBOL | SAMPLE | FIELD DESCRIPTION AND CLASSIFICATION<br>DESCRIPTION AND REMARKS (Grain Size, Density, Moisture, Color) | U.S.C.S | IN-PLACE MOISTURE (%) | IN-PLACE DENSITY (pcf) | OPTIMUM MOISTURE (%) | MAXIMUM DRY DENSITY (pcf) | DENSITY (% of MDD) | EXPAN(+)/ CONSOL(-) | EXPANSION INDEX | BLOW COUNTS/ FT | SAMPLE O.D. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | **SILTY SAND,** fine- to medium-grained. Loose to medium dense. Dry. Brown. Trace organic materials.<br>**TOPSOIL / FILL (Qts / Qaf)** | SM | | | | | | | | | |
| 2 | | | **SANDY CLAY,** fine- to medium-grained sand. Very stiff. Slightly moist. Reddish brown with abundant iron oxide staining.<br>-- 61% passing the No. 200 sieve.<br>**WEATHERED FRIARS FORMATION (Tf)** | CL | 9.8 | | | | | | | | |
| 3 | | 1 | | | | | | | | | | | |
| 4 | | | **SILTY SAND,** fine- to medium-grained. Very dense. Slightly moist. Yellowish pale gray with trace iron oxide staining throughout.<br>**FRIARS FORMATION (Tf) (SANDSTONE)** | SM | | | | | | | | | |
| 5 | | | | | | | | | | | | | |
| 6 | | | **SILTY CLAY with SAND,** fine-grained sand. Hard. Moist. Pale olive gray. Thinly bedded and fissile.<br>**FRIARS FORMATION (Tf) (MUDSTONE)** | CL | | | 15.1 | 110.7 | | | | | |
| 7 | | 2 | -- 97% passing the No. 200 sieve.<br>-- Mudstone bedding attitude of N9°W@5°NE taken at 7.5 feet. | | 18.0 | | | | | | | | |
| 8 | | | | | | | | | | | | | |
| 9 | | | Bottom of trench at 8.5 feet. | | | | | | | | | | |
| 10 | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | |

PERCHED WATER TABLE
BULK BAG SAMPLE
1 IN-PLACE SAMPLE
MODIFIED CALIFORNIA SAMPLE
S NUCLEAR FIELD DENSITY TEST
STANDARD PENETRATION TEST

**JOB NUMBER:** 19-12420

**JOB NAME:** Lot 31 Rancho del Sol

**SITE LOCATION:** Lot 31 - Rancho del Sol San Diego, CA

**LOG NO.** T-2

**FIGURE NO.** IIIb

Geotechnical Exploration, Inc.

**EQUIPMENT:** Rubber tire backhoe

**DIMENSION & TYPE OF EXCAVATION:** 9.0-ft. x 3.0-ft x 7.0-ft. ( L x W x D ) Trench

**DATE LOGGED:** September 6, 2019

**LOGGED BY:** AH

**REVIEWED BY:** DH/JAB

**SURFACE ELEVATION:** ± 223' Above Mean Sea Level

**GROUNDWATER/SEEPAGE DEPTH:** Not Encountered

| DEPTH (feet) | SYMBOL | SAMPLE | FIELD DESCRIPTION AND CLASSIFICATION<br>DESCRIPTION AND REMARKS<br>(Grain Size, Density, Moisture, Color) | U.S.C.S | IN-PLACE MOISTURE (%) | IN-PLACE DENSITY (pcf) | OPTIMUM MOISTURE (%) | MAXIMUM DRY DENSITY (pcf) | DENSITY (% of MDD) | EXPAN(+)/ CONSOL(-) | EXPANSION INDEX | BLOW COUNTS/ FT | SAMPLE O.D. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **SILTY SAND,** fine- to medium-grained. Loose to medium dense. Dry. Brown.<br>**TOPSOIL / FILL (Qts / Qaf)** | SM | | | | | | | | | |
| 1 | | | **CLAYEY SAND,** fine- to medium-grained. Very dense. Slightly moist. Reddish brown with abundant iron oxide staining.<br>**WEATHERED FRIARS FORMATION (Tf)** | SC | | | | | | | | | |
| 2 | | | **SILTY SAND,** fine- to medium-grained. Very dense. Slightly moist. Yellowish pale gray with trace iron oxide staining throughout.<br>**FRIARS FORMATION (Tf) (SANDSTONE)** | SM | | | | | | | | | |
| 3 | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | |
| 7 | | | Bottom of trench at 7.0 feet. | | | | | | | | | | |
| 8 | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | |

▽ PERCHED WATER TABLE
BULK BAG SAMPLE
1 IN-PLACE SAMPLE
MODIFIED CALIFORNIA SAMPLE
S NUCLEAR FIELD DENSITY TEST
STANDARD PENETRATION TEST

**JOB NUMBER:** 19-12420

**JOB NAME:** Lot 31 Rancho del Sol

**SITE LOCATION:** Lot 31 - Rancho del Sol, San Diego, CA

**LOG NO.** T-3

**FIGURE NO.** IIIc

Geotechnical Exploration, Inc.

**EQUIPMENT:** Rubber tire backhoe

**DIMENSION & TYPE OF EXCAVATION:** 6.0-ft. x 3.0-ft x 4.5-ft. ( L x W x D ) Trench

**DATE LOGGED:** September 6, 2019

**LOGGED BY:** AH

**REVIEWED BY:** DH/JAB

**SURFACE ELEVATION:** ± 230' Above Mean Sea Level

**GROUNDWATER/SEEPAGE DEPTH:** Not Encountered

| DEPTH (feet) | SYMBOL | SAMPLE | FIELD DESCRIPTION AND CLASSIFICATION<br>DESCRIPTION AND REMARKS (Grain Size, Density, Moisture, Color) | U.S.C.S | IN-PLACE MOISTURE (%) | IN-PLACE DENSITY (pcf) | OPTIMUM MOISTURE (%) | MAXIMUM DRY DENSITY (pcf) | DENSITY (% of MDD) | EXPAN(+)/ CONSOL(-) | EXPANSION INDEX | BLOW COUNTS/ FT | SAMPLE O.D. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **SILTY SAND,** fine- to medium-grained. Loose to medium dense. Dry. Brown. Trace organic materials.<br>**TOPSOIL / FILL (Qts / Qaf)** | SM | | | | | | | | | |
| 1 | | | **SANDY CLAY,** fine- to medium-grained sand. Very stiff. Very moist. Reddish brown with abundant iron oxide staining.<br>-- 67% passing the No. 200 sieve.<br>-- Atterberg limits: Liquid limit = 59, Plastic limit = 23, Plasticity index = 36. | CH | | | | | | | 168 | | |
| 2 | | 1 | -- 69% passing the No. 200 sieve.<br>**WEATHERED FRIARS FORMATION (Tf)** | | 23.7 | | | | | | | | |
| 3 | | | **CLAYEY SAND,** fine- to medium-grained. Very dense. Slightly moist. Reddish brown with abundant iron oxide staining.<br>**WEATHERED FRIARS FORMATION (Tf)** | SC | | | | | | | | | |
| 4 | | | **SILTY SAND,** fine- to medium-grained. Very dense. Slightly moist. Yellowish pale gray with trace iron oxide staining throughout.<br>**FRIARS FORMATION (Tf) (SANDSTONE)** | SM | | | | | | | | | |
| 5 | | | Bottom of trench at 4.5 feet. | | | | | | | | | | |
| 6 | | | | | | | | | | | | | |

▽ PERCHED WATER TABLE
X BULK BAG SAMPLE
1 IN-PLACE SAMPLE
MODIFIED CALIFORNIA SAMPLE
S NUCLEAR FIELD DENSITY TEST
STANDARD PENETRATION TEST

**JOB NUMBER:** 19-12420

**JOB NAME:** Lot 31 Rancho del Sol

**SITE LOCATION:** Lot 31 - Rancho del Sol San Diego, CA

**LOG NO.** T-4

**FIGURE NO.** IIId

Geotechnical Exploration, Inc.

**EQUIPMENT:** Rubber tire backhoe

**DIMENSION & TYPE OF EXCAVATION:** 7.0-ft. x 3.0-ft x 3.5-ft. ( L x W x D ) Trench

**DATE LOGGED:** September 6, 2019

**LOGGED BY:** AH

**SURFACE ELEVATION:** ± 207.5' Above Mean Sea Level

**REVIEWED BY:** DH/JAB

**GROUNDWATER/SEEPAGE DEPTH:** Not Encountered

| DEPTH (feet) | SYMBOL | SAMPLE | FIELD DESCRIPTION AND CLASSIFICATION<br>DESCRIPTION AND REMARKS (Grain Size, Density, Moisture, Color) | U.S.C.S | IN-PLACE MOISTURE (%) | IN-PLACE DENSITY (pcf) | OPTIMUM MOISTURE (%) | MAXIMUM DRY DENSITY (pcf) | DENSITY (% of MDD) | EXPAN(+)/ CONSOL(-) | EXPANSION INDEX | BLOW COUNTS/ FT | SAMPLE O.D. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | **SILTY SAND,** fine- to medium-grained. Loose to medium dense. Dry. Brown. Trace organic materials.<br>**TOPSOIL (Qts)** | SM | | | | | | | | | |
| | | | **CLAYEY SAND,** fine- to medium-grained sand. Dense. Slightly moist. Reddish brown with abundant iron oxide staining.<br>**WEATHERED FRIARS FORMATION (Tf)** | SC | | | | | | | | | |
| 2 | | 1 | -- 41% passing the No. 200 Sieve. | | 10.6 | | | | | | | | |
| | | | **SILTY SAND,** fine- to medium-grained. Very dense. Slightly moist. Yellowish pale gray with trace iron oxide staining throughout. | SM | | | | | | | | | |
| 3 | | 2 | **FRIARS FORMATION (Tf) (SANDSTONE)** | | | | | | | | | | |
| 4 | | | Bottom of trench at 3.5 feet. | | | | | | | | | | |
| 5 | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | |

PERCHED WATER TABLE
BULK BAG SAMPLE
1 IN-PLACE SAMPLE
MODIFIED CALIFORNIA SAMPLE
S NUCLEAR FIELD DENSITY TEST
STANDARD PENETRATION TEST

**JOB NUMBER:** 19-12420

**JOB NAME:** Lot 31 Rancho del Sol

**SITE LOCATION:** Lot 31 - Rancho del Sol San Diego, CA

**LOG NO.** T-5

**FIGURE NO.** IIIe

Geotechnical Exploration, Inc.

**EQUIPMENT:** Rubber tire backhoe

**DIMENSION & TYPE OF EXCAVATION:** 12.0-ft. x 3.0-ft x 11.0-ft. ( L x W x D ) Trench

**DATE LOGGED:** September 6, 2019

**LOGGED BY:** AH

**REVIEWED BY:** DH/JAB

**SURFACE ELEVATION:** ± 224' Above Mean Sea Level

**GROUNDWATER/SEEPAGE DEPTH:** Not Encountered

| DEPTH (feet) | SYMBOL | SAMPLE | FIELD DESCRIPTION AND CLASSIFICATION<br>DESCRIPTION AND REMARKS (Grain Size, Density, Moisture, Color) | U.S.C.S | IN-PLACE MOISTURE (%) | IN-PLACE DENSITY (pcf) | OPTIMUM MOISTURE (%) | MAXIMUM DRY DENSITY (pcf) | DENSITY (% of MDD) | EXPAN(+)/ CONSOL(-) | EXPANSION INDEX | BLOW COUNTS/ FT | SAMPLE O.D. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | **SILTY SAND,** fine- to medium-grained. Loose to medium dense. Dry. Brown. Trace organic materials.<br>**TOPSOIL (Qts)** | SM | | | | | | | | | |
| 2 | | | **CLAYEY SAND,** fine- to medium-grained. Very dense. Slightly moist. Reddish brown with abundant iron oxide staining.<br>**WEATHERED FRIARS FORMATION (Tf)** | SC | | | | | | | | | |
| 4 | | | **SILTY SAND,** fine- to medium-grained. Very dense. Slightly moist. Yellowish pale gray with trace iron oxide staining throughout.<br>**FRIARS FORMATION (Tf) (SANDSTONE)** | SM | | | | | | | | | |
| 12 | | | Bottom of trench at 11.0 feet. | | | | | | | | | | |

PERCHED WATER TABLE
BULK BAG SAMPLE
1 IN-PLACE SAMPLE
MODIFIED CALIFORNIA SAMPLE
S NUCLEAR FIELD DENSITY TEST
STANDARD PENETRATION TEST

**JOB NUMBER:** 19-12420

**JOB NAME:** Lot 31 Rancho del Sol

**SITE LOCATION:** Lot 31 - Rancho del Sol San Diego, CA

**LOG NO.** T-6

**FIGURE NO.** IIIf

Geotechnical Exploration, Inc.

**EQUIPMENT:** Rubber tire backhoe

**DIMENSION & TYPE OF EXCAVATION:** 9.0-ft. x 3.0-ft x 6.0-ft. ( L x W x D ) Trench

**DATE LOGGED:** September 6, 2019

**LOGGED BY:** AH

**SURFACE ELEVATION:** ± 220.5' Above Mean Sea Level

**REVIEWED BY:** DH/JAB

**GROUNDWATER/SEEPAGE DEPTH:** Not Encountered

| DEPTH (feet) | SYMBOL | SAMPLE | FIELD DESCRIPTION AND CLASSIFICATION<br>DESCRIPTION AND REMARKS (Grain Size, Density, Moisture, Color) | U.S.C.S | IN-PLACE MOISTURE (%) | IN-PLACE DENSITY (pcf) | OPTIMUM MOISTURE (%) | MAXIMUM DRY DENSITY (pcf) | DENSITY (% of MDD) | EXPAN(+)/ CONSOL(-) | EXPANSION INDEX | BLOW COUNTS/ FT | SAMPLE O.D. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | **SILTY SAND,** fine- to medium-grained. Loose to medium dense. Dry. Brown. Trace organic materials.<br>**TOPSOIL (Qts)** | SM | | | | | | | | | |
| 2 | | | **CLAYEY SAND,** fine- to medium-grained. Very dense. Slightly moist. Reddish brown with abundant iron oxide staining.<br>**WEATHERED FRIARS FORMATION (Tf)** | SC | | | | | | | | | |
| 3 | | | **SILTY SAND,** fine- to medium-grained. Very dense. Slightly moist. Yellowish pale gray with trace iron oxide staining throughout.<br>**FRIARS FORMATION (Tf) (SANDSTONE)** | SM | | | | | | | | | |
| 4 | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | |
| 6 | | | Bottom of trench at 6.0 feet. | | | | | | | | | | |

| | |
|---|---|
| PERCHED WATER TABLE | |
| BULK BAG SAMPLE | |
| 1 IN-PLACE SAMPLE | |
| MODIFIED CALIFORNIA SAMPLE | |
| S NUCLEAR FIELD DENSITY TEST | |
| STANDARD PENETRATION TEST | |

**JOB NUMBER:** 19-12420

**JOB NAME:** Lot 31 Rancho del Sol

**SITE LOCATION:** Lot 31 - Rancho del Sol San Diego, CA

**LOG NO.** T-7

**FIGURE NO.** IIIg

# Direct Shear Test (ASTM D3080-11)

Geotechnical Exploration, Inc.

**Figure No. IV**

**Job Number:** 19-12420

**Job Name:** Lot 31 Rancho del Sol

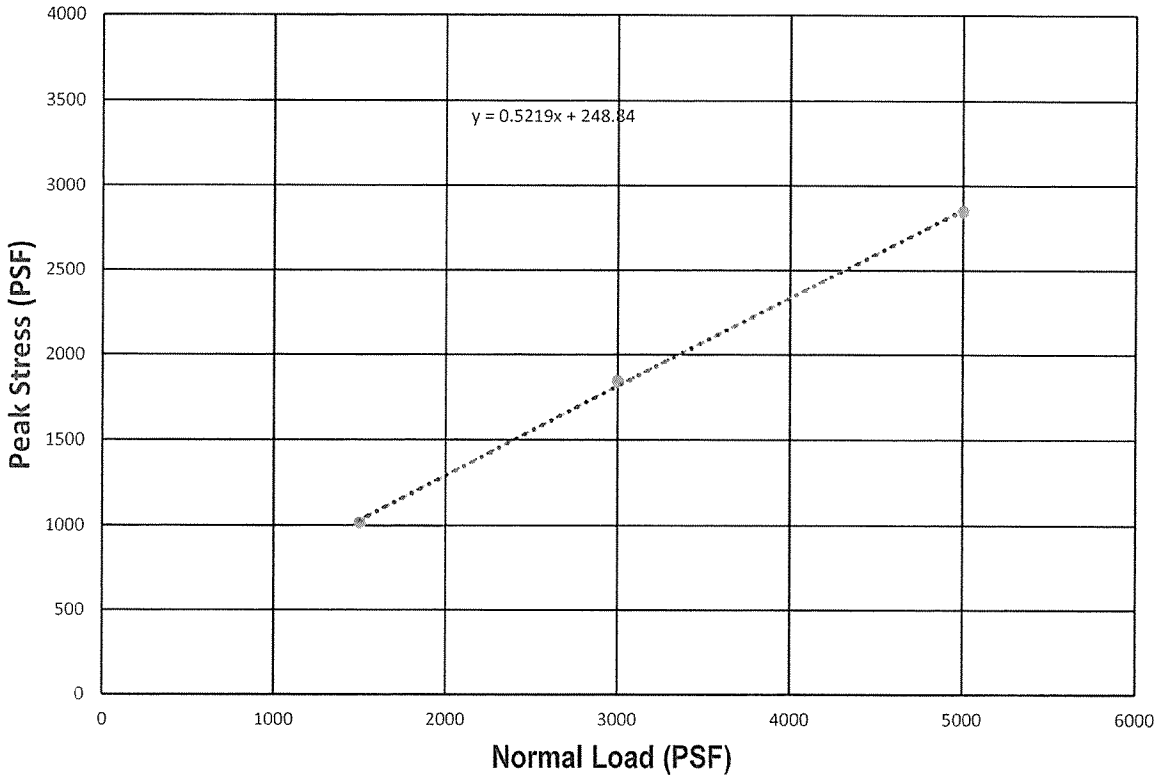
**Sample Number:** T-1 @ 3.5'-5.5'

**Sample Description:** Silty Sand (SM) Yellowish-pale-gray

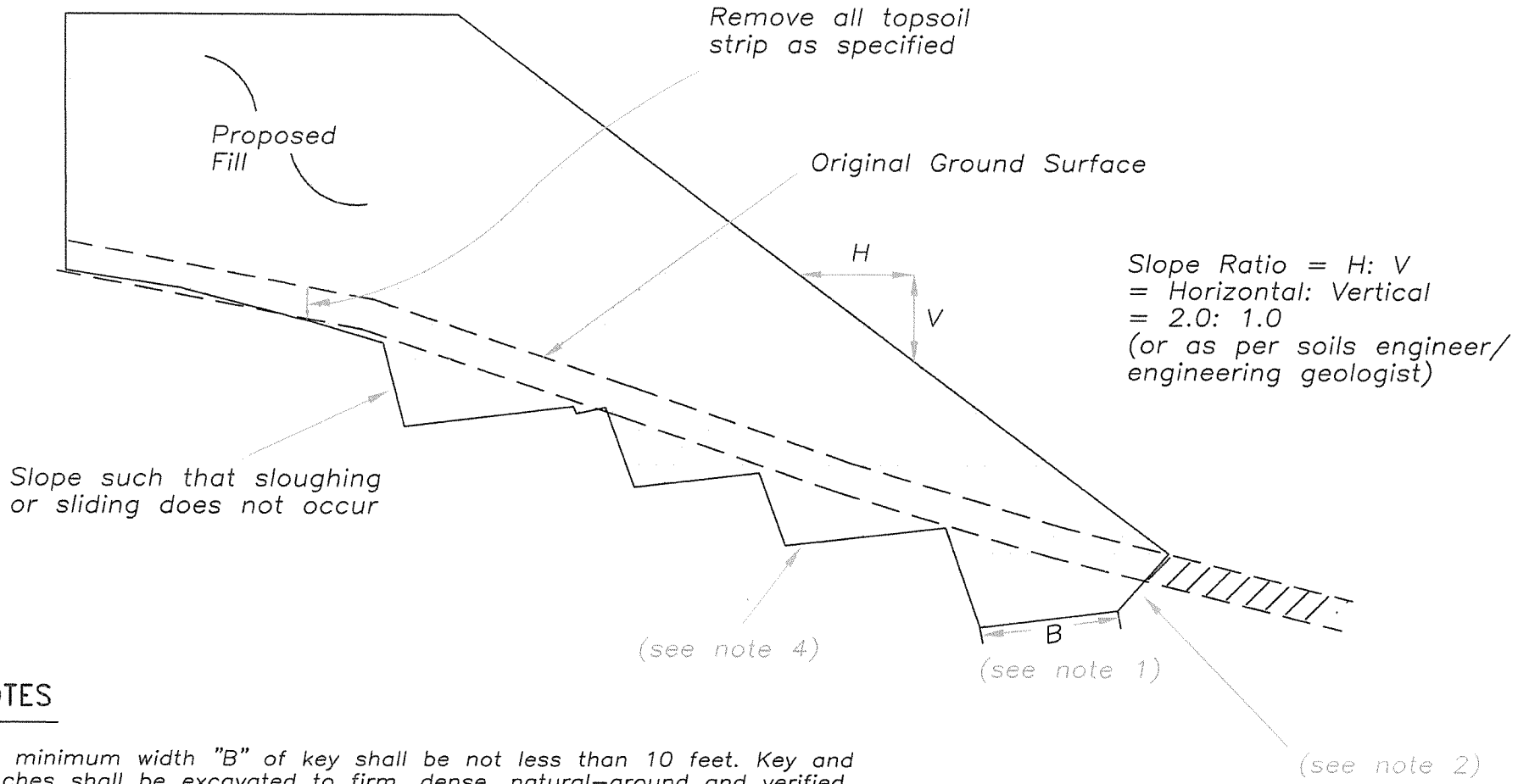
**Test Method:** Remolded to 90% of Maximum Dry Density - Saturated

| Normal Load (PSF) | Peak Stress (PSF) |
|---|---|
| 1500 | 1015 |
| 3000 | 1844 |
| 5000 | 2846 |

| | |
|---|---|
| Phi Angle (Degrees) | 27.6 |
| Cohesion (PSF) | 249 |



# BENCH AND KEY REQUIREMENTS




## NOTES

1. *The minimum width "B" of key shall be not less than 10 feet. Key and benches shall be excavated to firm, dense, natural–ground and verified by a Soils Engineer/Engineering Geologist.*
2. *The outside edge of bottom key shall be below topsoil or loose surface material: Minimum one foot embedment into dense material (or as per Soils Engineer/Engineering Geologist).*
3. *Key and benching required where the natural slope is steeper than 5.0 horizontal to 1.0 vertical (5.0:1.0), or as per Soils Engineer/ Engineering Geologist.*
4. *Minimum 10% fall into slope (or as per Soils Engineer/Engineering Geologist).*
5. *Compaction test required every two (2) vertical feet from lowest fill area.*

*Figure No. VIII*
*Job No. 19–12420*

**Geotechnical Exploration, Inc.**



*October 2019*

# APPENDIX A
# UNIFIED SOIL CLASSIFICATION CHART
# SOIL DESCRIPTION

**Coarse-grained (More than half of material is larger than a No. 200 sieve)**

| | | |
|---|---|---|
| GRAVELS, CLEAN GRAVELS (More than half of coarse fraction is larger than No. 4 sieve size, but smaller than 3") | GW | Well-graded gravels, gravel and sand mixtures, little or no fines. |
| | GP | Poorly graded gravels, gravel and sand mixtures, little or no fines. |
| GRAVELS WITH FINES (Appreciable amount) | GC | Clay gravels, poorly graded gravel-sand-silt mixtures |
| SANDS, CLEAN SANDS (More than half of coarse fraction is smaller than a No. 4 sieve) | SW | Well-graded sand, gravelly sands, little or no fines |
| | SP | Poorly graded sands, gravelly sands, little or no fines. |
| SANDS WITH FINES (Appreciable amount) | SM | Silty sands, poorly graded sand and silty mixtures. |
| | SC | Clayey sands, poorly graded sand and clay mixtures. |

**Fine-grained (More than half of material is smaller than a No. 200 sieve)**

SILTS AND CLAYS

| | | |
|---|---|---|
| *Liquid Limit Less than 50* | ML | Inorganic silts and very fine sands, rock flour, sandy silt and clayey-silt sand mixtures with a slight plasticity |
| | CL | Inorganic clays of low to medium plasticity, gravelly clays, silty clays, clean clays. |
| | OL | Organic silts and organic silty clays of low plasticity. |
| *Liquid Limit Greater than 50* | MH | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts. |
| | CH | Inorganic clays of high plasticity, fat clays. |
| | OH | Organic clays of medium to high plasticity. |
| HIGHLY ORGANIC SOILS | PT | Peat and other highly organic soils |

(rev. 6/05)

# APPENDIX B

# SLOPE STABILITY CALCULATIONS

XSTABL File: LOT31R1  9-24-19  12:04

```
*****************************************
*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
*               using the               *
*            Method of Slices           *
*                                       *
*        Copyright (C) 1992 - 2008      *
*   Interactive Software Designs, Inc.  *
*        Moscow, ID 83843, U.S.A.       *
*                                       *
*          All Rights Reserved          *
*                                       *
*  Ver. 5.208                 96 - 1358 *
*****************************************
```

## Problem Description : RDS Lot 31 Trial 1 Section A-A'

---
SEGMENT BOUNDARY COORDINATES
---

4 SURFACE boundary segments

| Soil Unit Below Segment | Segment No. | x-left (ft) | y-left (ft) | x-right (ft) | y-right (ft) |
|---|---|---|---|---|---|
| 1 | 1 | .0 | 240.0 | 12.0 | 237.0 |
| 1 | 2 | 12.0 | 237.0 | 39.0 | 230.0 |
| 1 | 3 | 39.0 | 230.0 | 69.0 | 215.0 |
| 1 | 4 | 69.0 | 215.0 | 90.0 | 215.0 |

---
ISOTROPIC Soil Parameters
---
1 Soil unit(s) specified

| Soil Unit No. | Unit Weight Moist (pcf) | Unit Weight Sat. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Pore Pressure Parameter Ru |
|---|---|---|---|---|---|
| 1 | 115.0 | 125.0 | 250.0 | 27.50 | . |

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified. 1200 trial surfaces will be generated and analyzed. 40 Surfaces initiate from each of 30 points equally spaced along the ground surface between x = 65.0 ft and x = 80.0 ft

Each surface terminates between x =10.0 ft and x=37.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft
5.0 ft line segments define each trial failure surface.

---

ANGULAR RESTRICTIONS

---

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := (slope angle - 5.0) degrees

Factors of safety have been calculated by the :

* * * * * SIMPLIFIED JANBU METHOD * * * * *

The 10 most critical of all the failure surfaces examined are displayed below - the most critical first

Failure surface No. 1 specified by 13 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 70.69 | 215.00 |
| 2 | 65.87 | 213.67 |
| 3 | 60.92 | 212.94 |
| 4 | 55.92 | 212.84 |
| 5 | 50.95 | 213.36 |
| 6 | 46.08 | 214.49 |
| 7 | 41.39 | 216.22 |
| 8 | 36.95 | 218.52 |
| 9 | 32.83 | 221.36 |
| 10 | 29.10 | 224.68 |
| 11 | 25.81 | 228.45 |
| 12 | 23.01 | 232.59 |
| 13 | 22.10 | 234.38 |

** Corrected JANBU FOS = 2.476 ** (Fo factor = 1.069)

Failure surface No. 2 specified by 13 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 71.21 | 215.00 |
| 2 | 66.38 | 213.70 |
| 3 | 61.43 | 212.98 |
| 4 | 56.43 | 212.86 |
| 5 | 51.46 | 213.35 |
| 6 | 46.57 | 214.43 |

| | | |
|---|---|---|
| 7 | 41.86 | 216.08 |
| 8 | 37.37 | 218.30 |
| 9 | 33.19 | 221.03 |
| 10 | 29.36 | 224.25 |
| 11 | 25.95 | 227.90 |
| 12 | 23.00 | 231.94 |
| 13 | 21.55 | 234.53 |

** Corrected JANBU FOS = 2.479 ** (Fo factor = 1.068)

Failure surface No. 3 specified by 13 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 70.69 | 215.00 |
| 2 | 65.97 | 213.34 |
| 3 | 61.07 | 212.36 |
| 4 | 56.08 | 212.07 |
| 5 | 51.10 | 212.49 |
| 6 | 46.22 | 213.61 |
| 7 | 41.55 | 215.39 |
| 8 | 37.18 | 217.82 |
| 9 | 33.19 | 220.84 |
| 10 | 29.67 | 224.38 |
| 11 | 26.67 | 228.39 |
| 12 | 24.27 | 232.77 |
| 13 | 23.84 | 233.93 |

** Corrected JANBU FOS = 2.480 ** (Fo factor = 1.074)

Failure surface No. 4 specified by 13 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 71.72 | 215.00 |
| 2 | 66.92 | 213.62 |
| 3 | 61.98 | 212.82 |
| 4 | 56.99 | 212.61 |
| 5 | 52.00 | 212.99 |
| 6 | 47.10 | 213.97 |
| 7 | 42.34 | 215.51 |
| 8 | 37.81 | 217.62 |
| 9 | 33.55 | 220.24 |
| 10 | 29.64 | 223.35 |
| 11 | 26.12 | 226.91 |
| 12 | 23.05 | 230.85 |
| 13 | 20.71 | 234.74 |

** Corrected JANBU FOS = 2.480 ** (Fo factor =1.069)

Failure surface No. 5 specified by 11 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 69.14 | 215.00 |
| 2 | 64.29 | 213.77 |
| 3 | 59.32 | 213.27 |
| 4 | 54.32 | 213.53 |
| 5 | 49.42 | 214.53 |
| 6 | 44.73 | 216.25 |
| 7 | 40.34 | 218.65 |
| 8 | 36.37 | 221.68 |
| 9 | 32.88 | 225.27 |
| 10 | 29.98 | 229.34 |
| 11 | 28.22 | 232.79 |

** Corrected JANBU FOS = 2.480 ** (Fo factor = 1.070)

Failure surface No. 6 specified by 13 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 70.17 | 215.00 |
| 2 | 65.42 | 213.44 |
| 3 | 60.51 | 212.52 |
| 4 | 55.52 | 212.23 |
| 5 | 50.53 | 212.58 |
| 6 | 45.63 | 213.58 |
| 7 | 40.90 | 215.20 |
| 8 | 36.42 | 217.42 |
| 9 | 32.26 | 220.19 |
| 10 | 28.49 | 223.48 |
| 11 | 25.18 | 227.23 |
| 12 | 22.38 | 231.37 |
| 13 | 20.68 | 234.75 |

** Corrected JANBU FOS = 2.480 ** (Fo factor = 1.072)

Failure surface No. 7 specified by 12 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 70.69 | 215.00 |
| 2 | 65.88 | 213.64 |
| 3 | 60.92 | 212.98 |
| 4 | 55.92 | 213.03 |
| 5 | 50.98 | 213.79 |
| 6 | 46.20 | 215.25 |
| 7 | 41.67 | 217.37 |
| 8 | 37.49 | 220.12 |
| 9 | 33.75 | 223.43 |
| 10 | 30.51 | 227.24 |
| 11 | 27.86 | 231.48 |
| 12 | 27.15 | 233.07 |

** Corrected JANBU FOS = 2.481 ** (Fo factor = 1.071)

Failure surface No. 8 specified by 13 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 71.72 | 215.00 |
| 2 | 67.03 | 213.27 |
| 3 | 62.14 | 212.22 |
| 4 | 57.16 | 211.88 |
| 5 | 52.17 | 212.24 |
| 6 | 47.28 | 213.30 |
| 7 | 42.60 | 215.05 |
| 8 | 38.21 | 217.44 |
| 9 | 34.20 | 220.43 |
| 10 | 30.65 | 223.95 |
| 11 | 27.64 | 227.95 |
| 12 | 25.23 | 232.32 |
| 13 | 24.70 | 233.71 |

** Corrected JANBU FOS = 2.481 ** (Fo factor = 1.075)

Failure surface No. 9 specified by 14 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 70.17 | 215.00 |
| 2 | 65.31 | 213.83 |
| 3 | 60.35 | 213.21 |
| 4 | 55.35 | 213.13 |
| 5 | 50.37 | 213.60 |
| 6 | 45.48 | 214.62 |
| 7 | 40.72 | 216.17 |
| 8 | 36.17 | 218.23 |
| 9 | 31.87 | 220.78 |
| 10 | 27.88 | 223.79 |
| 11 | 24.24 | 227.22 |
| 12 | 21.00 | 231.03 |
| 13 | 18.20 | 235.17 |
| 14 | 18.06 | 235.43 |

** Corrected JANBU FOS = 2.484 ** (Fo factor = 1.065)

Failure surface No.10 specified by 14 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 71.72 | 215.00 |
| 2 | 66.91 | 213.66 |
| 3 | 61.97 | 212.86 |
| 4 | 56.98 | 212.61 |

| | | |
|---|---|---|
| 5 | 51.99 | 212.91 |
| 6 | 47.06 | 213.77 |
| 7 | 42.26 | 215.17 |
| 8 | 37.65 | 217.10 |
| 9 | 33.28 | 219.52 |
| 10 | 29.20 | 222.42 |
| 11 | 25.47 | 225.75 |
| 12 | 22.13 | 229.47 |
| 13 | 19.23 | 233.54 |
| 14 | 18.20 | 235.39 |

** Corrected JANBU FOS = 2.484 ** (Fo factor = 1.067)

The following is a summary of the TEN most critical surfaces

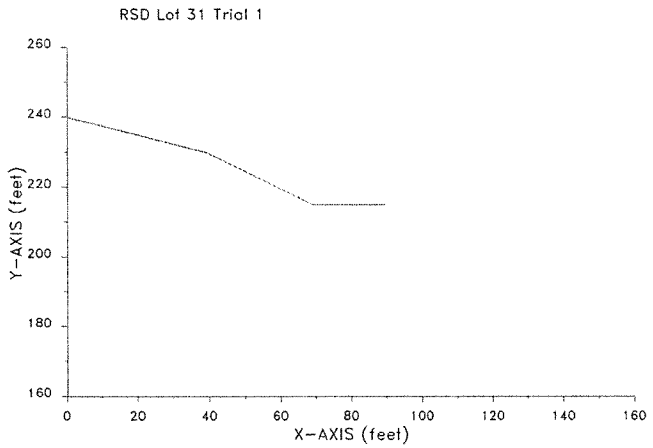
Problem Description : RSD Lot 31 Trial 1

| | Modified JANBU FOS | Correction Factor | Initial x-coord (ft) | Terminal x-coord (ft) | Available Strength (lb) |
|---|---|---|---|---|---|
| 1. | 2.476 | 1.069 | 70.69 | 22.10 | 3.721E+04 |
| 2. | 2.479 | 1.068 | 71.21 | 21.55 | 3.761E+04 |
| 3. | 2.480 | 1.074 | 70.69 | 23.84 | 3.811E+04 |
| 4. | 2.480 | 1.069 | 71.72 | 20.71 | 3.928E+04 |
| 5. | 2.480 | 1.070 | 69.14 | 28.22 | 2.963E+04 |
| 6. | 2.480 | 1.072 | 70.17 | 20.68 | 4.091E+04 |
| 7. | 2.481 | 1.071 | 70.69 | 27.15 | 3.179E+04 |
| 8. | 2.481 | 1.075 | 71.72 | 24.70 | 3.783E+04 |
| 9. | 2.484 | 1.065 | 70.17 | 18.06 | 4.020E+04 |
| 10. | 2.484 | 1.067 | 71.72 | 18.20 | 4.195E+04 |

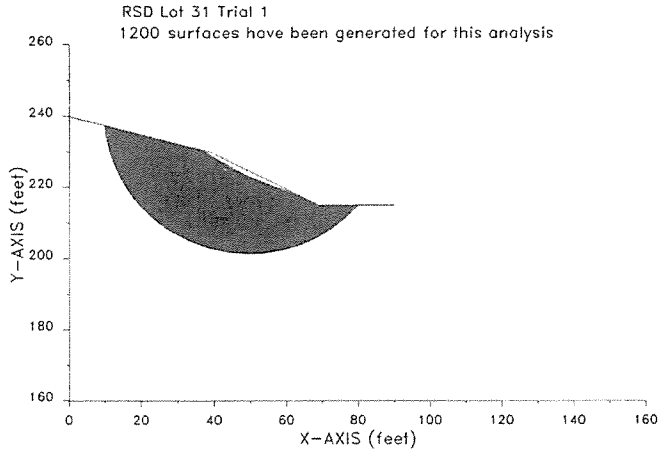
* * * END OF FILE * * *

# SECTION A-A'

LOT31R1 9-24-19 12:04




LOT31R1 9-24-19 12:04

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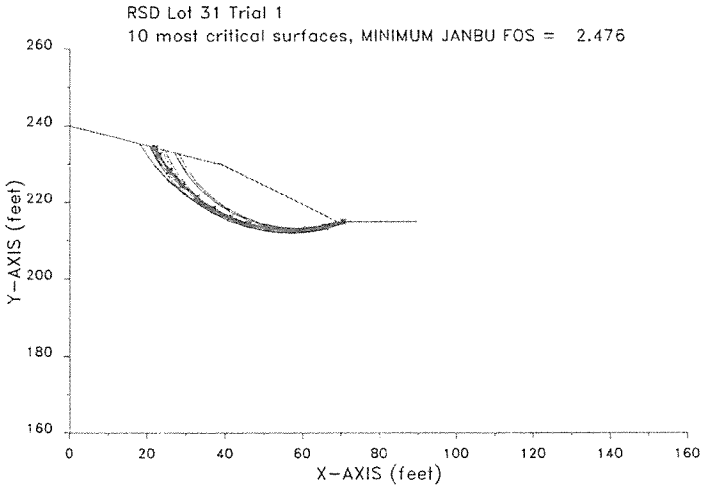

XSTABL File: LOT31R2  9-24-19  13:16

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*****************************************
*              X S T A B L              *
*                                       *
*        Slope Stability Analysis       *
*                using the              *
*            Method of Slices           *
*                                       *
*        Copyright (C) 1992 - 2008      *
*   Interactive Software Designs, Inc.  *
*        Moscow, ID 83843, U.S.A.       *
*                                       *
*          All Rights Reserved          *
*                                       *
*  Ver. 5.208                 96 - 1358 *
*****************************************
```

## Problem Description:Rancho Del Sol Lot 31 Section B

---

SEGMENT BOUNDARY COORDINATES

3 SURFACE boundary segments

| Segment No. | x-left (ft) | y-left (ft) | x-right (ft) | y-right (ft) | Soil Unit Below Segment |
|---|---|---|---|---|---|
| 1 | 20.0 | 244.0 | 41.0 | 241.0 | 1 |
| 2 | 41.0 | 241.0 | 64.0 | 229.0 | 1 |
| 3 | 64.0 | 229.0 | 80.0 | 229.0 | 1 |

---

ISOTROPIC Soil Parameters

1 Soil unit(s) specified

| Soil Unit No. | Unit Weight Moist (pcf) | Unit Weight Sat. (pcf) | Cohesion Intercept (psf) | Friction Angle (deg) | Pore Pressure Parameter Ru | Pore Pressure Constant (psf) | Water Surface No. |
|---|---|---|---|---|---|---|---|
| 1 | 115.0 | 125.0 | 250.0 | 27.50 | .000 | .0 | 0 |

A critical failure surface searching method, using a random technique for generating CIRCULAR surfaces has been specified.
2000 trial surfaces will be generated and analyzed.
50 Surfaces initiate from each of 40 points equally spaced along the ground surface between x = 60.0 ft
and x = 75.0 ft

Each surface terminates between x = 22.0 ft
and x = 39.0 ft

Unless further limitations were imposed, the minimum elevation at which a surface extends is y = .0 ft

* * * * * DEFAULT SEGMENT LENGTH SELECTED BY XSTABL * * * * *

2.0 ft line segments define each trial failure surface.

---

ANGULAR RESTRICTIONS

---

The first segment of each failure surface will be inclined within the angular range defined by :

Lower angular limit := -45.0 degrees
Upper angular limit := (slope angle - 5.0) degrees

* * * * * SIMPLIFIED JANBU METHOD * * * * *

The 10 most critical of all the failure surfaces examined are displayed below - the most critical first

Failure surface No. 1 specified by 20 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 65.00 | 229.00 |
| 2 | 63.13 | 228.28 |
| 3 | 61.21 | 227.73 |
| 4 | 59.25 | 227.34 |
| 5 | 57.26 | 227.13 |
| 6 | 55.26 | 227.09 |
| 7 | 53.27 | 227.23 |
| 8 | 51.29 | 227.54 |
| 9 | 49.35 | 228.02 |
| 10 | 47.45 | 228.67 |
| 11 | 45.63 | 229.47 |
| 12 | 43.87 | 230.44 |
| 13 | 42.21 | 231.55 |
| 14 | 40.65 | 232.81 |
| 15 | 39.21 | 234.19 |
| 16 | 37.89 | 235.70 |
| 17 | 36.71 | 237.31 |
| 18 | 35.68 | 239.02 |
| 19 | 34.79 | 240.81 |
| 20 | 34.35 | 241.95 |

** Corrected JANBU FOS = 2.752 ** (Fo factor = 1.075)

Failure surface No. 2 specified by 20 coordinate points

| Point | x-surf | y-surf |
|---|---|---|

| No. | (ft) | (ft) |
|---|---|---|
| 1 | 64.23 | 229.00 |
| 2 | 62.35 | 228.32 |
| 3 | 60.42 | 227.81 |
| 4 | 58.45 | 227.46 |
| 5 | 56.45 | 227.28 |
| 6 | 54.45 | 227.28 |
| 7 | 52.46 | 227.45 |
| 8 | 50.49 | 227.78 |
| 9 | 48.56 | 228.29 |
| 10 | 46.67 | 228.96 |
| 11 | 44.85 | 229.79 |
| 12 | 43.11 | 230.77 |
| 13 | 41.46 | 231.90 |
| 14 | 39.91 | 233.17 |
| 15 | 38.48 | 234.56 |
| 16 | 37.17 | 236.07 |
| 17 | 35.99 | 237.69 |
| 18 | 34.96 | 239.41 |
| 19 | 34.08 | 241.20 |
| 20 | 33.76 | 242.03 |

** Corrected JANBU FOS = 2.753 ** (Fo factor = 1.074)

Failure surface No. 3 specified by 20 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 65.00 | 229.00 |
| 2 | 63.10 | 228.39 |
| 3 | 61.15 | 227.92 |
| 4 | 59.17 | 227.62 |
| 5 | 57.18 | 227.47 |
| 6 | 55.18 | 227.48 |
| 7 | 53.19 | 227.65 |
| 8 | 51.21 | 227.97 |
| 9 | 49.27 | 228.46 |
| 10 | 47.37 | 229.09 |
| 11 | 45.53 | 229.87 |
| 12 | 43.76 | 230.79 |
| 13 | 42.07 | 231.86 |
| 14 | 40.46 | 233.05 |
| 15 | 38.95 | 234.36 |
| 16 | 37.56 | 235.80 |
| 17 | 36.28 | 237.33 |
| 18 | 35.12 | 238.97 |
| 19 | 34.10 | 240.69 |
| 20 | 33.42 | 242.08 |

** Corrected JANBU FOS = 2.754 ** (Fo factor = 1.071)

Failure surface No. 4 specified by 19 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 65.00 | 229.00 |
| 2 | 63.13 | 228.29 |
| 3 | 61.21 | 227.74 |
| 4 | 59.24 | 227.38 |
| 5 | 57.25 | 227.20 |
| 6 | 55.25 | 227.20 |
| 7 | 53.26 | 227.38 |
| 8 | 51.29 | 227.75 |
| 9 | 49.36 | 228.29 |
| 10 | 47.50 | 229.00 |
| 11 | 45.70 | 229.88 |
| 12 | 44.00 | 230.93 |
| 13 | 42.39 | 232.12 |
| 14 | 40.90 | 233.46 |
| 15 | 39.54 | 234.92 |
| 16 | 38.32 | 236.51 |
| 17 | 37.25 | 238.20 |
| 18 | 36.34 | 239.98 |
| 19 | 35.61 | 241.77 |

** Corrected JANBU FOS = 2.755 ** (Fo factor = 1.076)

Failure surface No. 5 specified by 20 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 64.62 | 229.00 |
| 2 | 62.76 | 228.25 |
| 3 | 60.85 | 227.67 |
| 4 | 58.89 | 227.26 |
| 5 | 56.90 | 227.02 |
| 6 | 54.90 | 226.96 |
| 7 | 52.91 | 227.07 |
| 8 | 50.93 | 227.35 |
| 9 | 48.98 | 227.81 |
| 10 | 47.08 | 228.43 |
| 11 | 45.24 | 229.22 |
| 12 | 43.48 | 230.16 |
| 13 | 41.80 | 231.26 |
| 14 | 40.23 | 232.49 |
| 15 | 38.77 | 233.86 |
| 16 | 37.44 | 235.35 |
| 17 | 36.24 | 236.95 |
| 18 | 35.19 | 238.65 |
| 19 | 34.29 | 240.44 |
| 20 | 33.64 | 242.05 |

** Corrected JANBU FOS = 2.758 ** (Fo factor = 1.076)

Failure surface No. 6 specified by 21 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 66.15 | 229.00 |
| 2 | 64.30 | 228.24 |
| 3 | 62.40 | 227.63 |
| 4 | 60.45 | 227.19 |
| 5 | 58.47 | 226.90 |
| 6 | 56.47 | 226.79 |
| 7 | 54.47 | 226.84 |
| 8 | 52.48 | 227.05 |
| 9 | 50.52 | 227.43 |
| 10 | 48.60 | 227.97 |
| 11 | 46.72 | 228.67 |
| 12 | 44.91 | 229.52 |
| 13 | 43.18 | 230.52 |
| 14 | 41.54 | 231.66 |
| 15 | 39.99 | 232.93 |
| 16 | 38.56 | 234.33 |
| 17 | 37.25 | 235.83 |
| 18 | 36.06 | 237.45 |
| 19 | 35.02 | 239.15 |
| 20 | 34.12 | 240.94 |
| 21 | 33.68 | 242.05 |

** Corrected JANBU FOS = 2.759 ** (Fo factor = 1.075)

Failure surface No. 7 specified by 19 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 64.62 | 229.00 |
| 2 | 62.68 | 228.48 |
| 3 | 60.72 | 228.12 |
| 4 | 58.73 | 227.91 |
| 5 | 56.73 | 227.86 |
| 6 | 54.73 | 227.96 |
| 7 | 52.75 | 228.22 |
| 8 | 50.79 | 228.64 |
| 9 | 48.87 | 229.20 |
| 10 | 47.01 | 229.92 |
| 11 | 45.20 | 230.78 |
| 12 | 43.47 | 231.77 |
| 13 | 41.82 | 232.91 |
| 14 | 40.26 | 234.16 |
| 15 | 38.81 | 235.54 |
| 16 | 37.47 | 237.02 |
| 17 | 36.25 | 238.61 |
| 18 | 35.15 | 240.28 |
| 19 | 34.24 | 241.97 |

** Corrected JANBU FOS = 2.759 ** (Fo factor = 1.068)

Failure surface No. 8 specified by 21 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 65.38 | 229.00 |
| 2 | 63.49 | 228.37 |
| 3 | 61.55 | 227.89 |
| 4 | 59.57 | 227.55 |
| 5 | 57.58 | 227.37 |
| 6 | 55.58 | 227.34 |
| 7 | 53.59 | 227.47 |
| 8 | 51.61 | 227.75 |
| 9 | 49.65 | 228.18 |
| 10 | 47.74 | 228.76 |
| 11 | 45.88 | 229.49 |
| 12 | 44.07 | 230.35 |
| 13 | 42.34 | 231.35 |
| 14 | 40.69 | 232.49 |
| 15 | 39.14 | 233.74 |
| 16 | 37.68 | 235.11 |
| 17 | 36.33 | 236.59 |
| 18 | 35.10 | 238.17 |
| 19 | 34.00 | 239.84 |
| 20 | 33.03 | 241.59 |
| 21 | 32.76 | 242.18 |

** Corrected JANBU FOS = 2.760 ** (Fo factor = 1.071)

Failure surface No. 9 specified by 21 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 66.54 | 229.00 |
| 2 | 64.71 | 228.19 |
| 3 | 62.82 | 227.54 |
| 4 | 60.88 | 227.06 |
| 5 | 58.90 | 226.75 |
| 6 | 56.91 | 226.60 |
| 7 | 54.91 | 226.63 |
| 8 | 52.92 | 226.83 |
| 9 | 50.95 | 227.20 |
| 10 | 49.02 | 227.73 |
| 11 | 47.15 | 228.43 |
| 12 | 45.34 | 229.29 |
| 13 | 43.62 | 230.30 |
| 14 | 41.98 | 231.46 |
| 15 | 40.46 | 232.75 |
| 16 | 39.04 | 234.16 |
| 17 | 37.76 | 235.70 |
| 18 | 36.61 | 237.33 |

| | | |
|---|---|---|
| 19 | 35.61 | 239.06 |
| 20 | 34.76 | 240.87 |
| 21 | 34.36 | 241.95 |

** Corrected JANBU FOS = 2.763 ** (Fo factor = 1.077)

Failure surface No.10 specified by 19 coordinate points

| Point No. | x-surf (ft) | y-surf (ft) |
|---|---|---|
| 1 | 64.62 | 229.00 |
| 2 | 62.71 | 228.38 |
| 3 | 60.76 | 227.93 |
| 4 | 58.78 | 227.67 |
| 5 | 56.78 | 227.59 |
| 6 | 54.79 | 227.70 |
| 7 | 52.81 | 227.99 |
| 8 | 50.86 | 228.46 |
| 9 | 48.97 | 229.11 |
| 10 | 47.15 | 229.93 |
| 11 | 45.41 | 230.91 |
| 12 | 43.76 | 232.06 |
| 13 | 42.23 | 233.34 |
| 14 | 40.83 | 234.77 |
| 15 | 39.56 | 236.31 |
| 16 | 38.44 | 237.97 |
| 17 | 37.47 | 239.72 |
| 18 | 36.68 | 241.55 |
| 19 | 36.66 | 241.62 |

** Corrected JANBU FOS = 2.765 ** (Fo factor = 1.073)

The following is a summary of the TEN most critical surfaces

Problem Description : Rancho Del Sol Lot 31 Section B

| | Modified JANBU FOS | Correction Factor | Initial x-coord (ft) | Terminal x-coord (ft) | Available Strength (lb) |
|---|---|---|---|---|---|
| 1. | 2.752 | 1.075 | 65.00 | 34.35 | 2.029E+04 |
| 2. | 2.753 | 1.074 | 64.23 | 33.76 | 2.032E+04 |
| 3. | 2.754 | 1.071 | 65.00 | 33.42 | 2.008E+04 |
| 4. | 2.755 | 1.076 | 65.00 | 35.61 | 1.905E+04 |
| 5. | 2.758 | 1.076 | 64.62 | 33.64 | 2.119E+04 |
| 6. | 2.759 | 1.075 | 66.15 | 33.68 | 2.164E+04 |
| 7. | 2.759 | 1.068 | 64.62 | 34.24 | 1.838E+04 |
| 8. | 2.760 | 1.071 | 65.38 | 32.76 | 2.093E+04 |
| 9. | 2.763 | 1.077 | 66.54 | 34.36 | 2.158E+04 |
| 10. | 2.765 | 1.073 | 64.62 | 36.66 | 1.720E+04 |

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# SECTION B-B'

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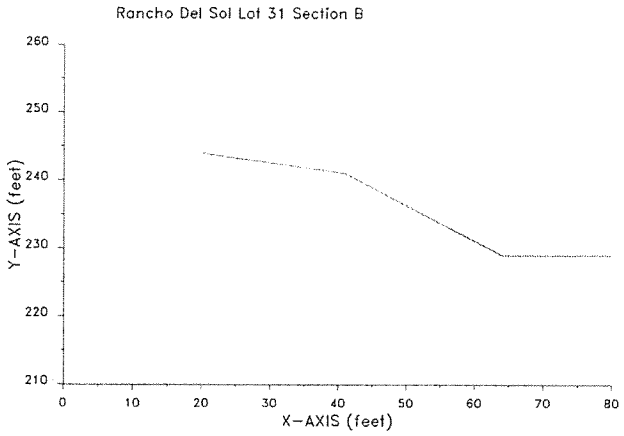


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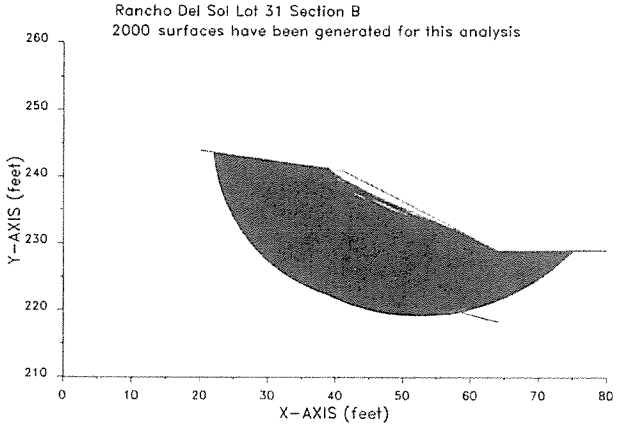


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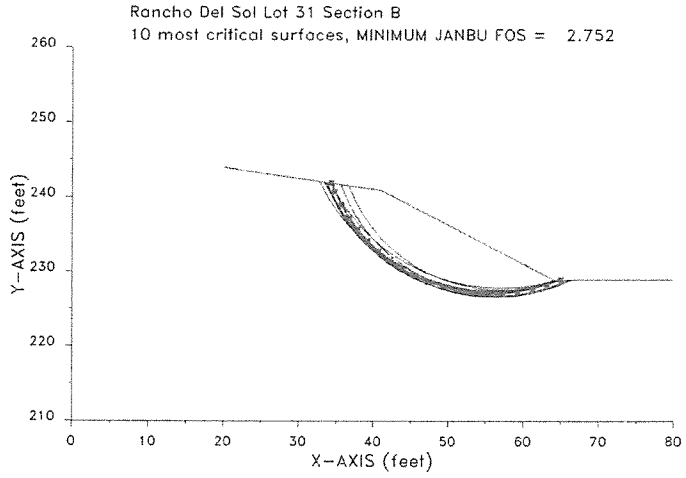
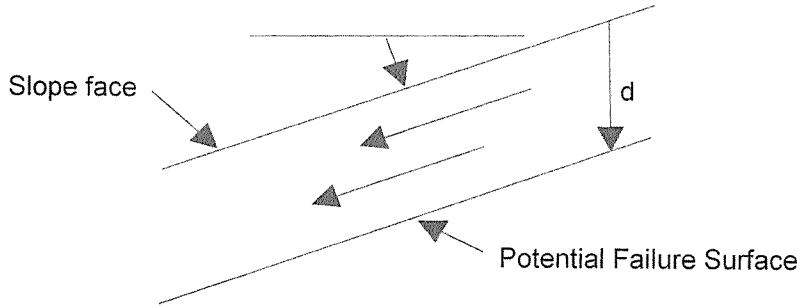


# SURFICIAL STABILITY CALCULATIONS FOR PROPOSED CUT AND FILL SLOPES

| slope ratio | slope angle |
|---|---|
| 2 to 1 | 26.6 |

| | | radians |
|---|---|---|
| phi(deg)= | 27.5 | 0.4800 |
| c(psf)= | 250 | |
| gamma Sat(pcf)= | 125 | |
| gamma Buoy(pcf)= | 62.6 | |
| slope angle(deg)= | 26.6 | 0.4643 |
| depth= | 5 | |
| **FS=** | **1.52** | |



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