The City of San Diego

PRIORITY DEVELOPMENT PROJECT (PDP) STORM WATER QUALITY MANAGEMENT PLAN (SWQMP) FOR

Project Name: Bodas Residence

PTS No. 551761

ENGINEER OF WORK:

Michael Kinnear, RCE 76785

Insert Civil Engineer's Name and PE Number Here
Provide Wet Signature and Stamp Above Line

PREPARED FOR:

Vinit Bodas
Bodas 2001 Trust
16 Greenbriar Lane
Greenwich, CT 06831

PREPARED BY:

COFFEY ENGINEERING, INC.

9/11/17

Coffey Engineering, Inc.
9666 Businesspark Ave., Suite 210
San Diego, CA 92131
(858) 831-0111

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

DATE:

September 11, 2017

Approved by: City of San Diego Date

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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

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CERTIFICATION PAGE

Project Name: Project Name: Bodas Residence
Permit Application Number: PTS No. 551761

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.

RCE 76785, Expiration Date 12/31/18

Engineer of Work's Signature, PE Number & Expiration Date

Michael Kinnear

Print Name

Coffey Engineering, Inc.

Company

9/11/2017

Date

Engineer's Stamp

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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 plan check comments is included. When applicable, insert response to plan check comments.

Submittal Number	Date	Project Status	Changes
1	5/08/2017	☑ Preliminary Design/Planning/CEQA ☐ Final Design	Initial Submittal
2	9/11/2017	☑ Preliminary Design/Planning/CEQA ☐ Final Design	
3		☐ Preliminary Design/Planning/CEQA ☐ Final Design	
4		☐ Preliminary Design/Planning/CEQA ☐ Final Design	

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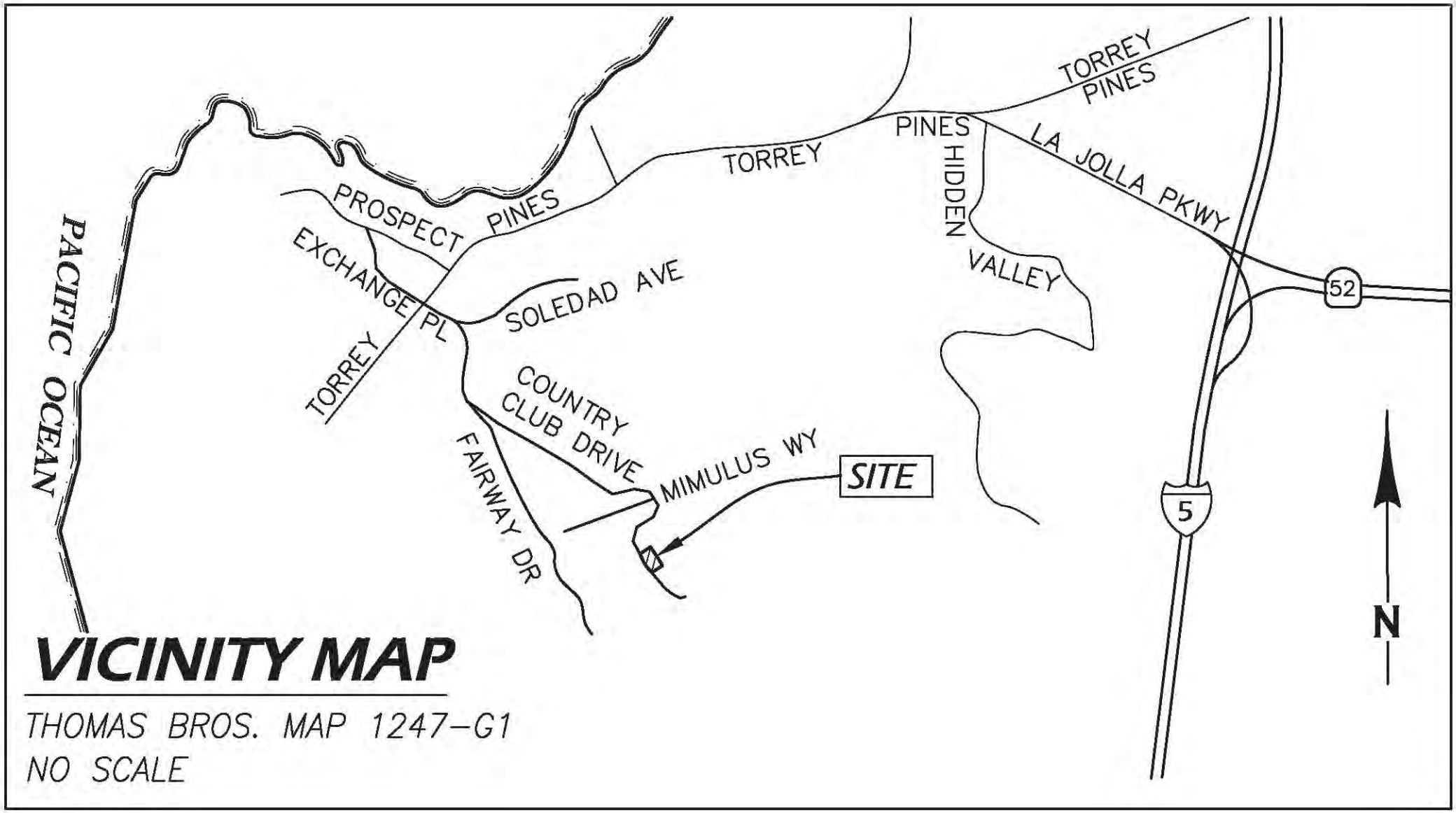
PROJECT VICINITY MAP

Project Name: Bodas Residence
Permit Application Number: PTS No. 551761

Insert Project Vicinity Map



VICINITY MAP

THOMAS BROS. MAP 1247–G1

NO SCALE

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STORM WATER REQUIREMENTS APPLICABILITY CHECKLIST

Complete and attach DS-560 Form included in Appendix A.1

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

Storm Water Requirements Applicability Checklist

FORM DS-560
OCTOBER 2016

Project Address: 6947 Country Club Dr., La Jolla CA 92037 | Project Number *(for City Use Only)*:

SECTION 1. Construction Storm Water BMP Requirements:

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

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

PART A: Determine Construction Phase Storm Water Requirements.

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

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

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

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

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

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

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

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

☐ Yes; no document required

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

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

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

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

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

PART B: Determine Construction Site Priority

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

Complete PART B and continued to Section 2

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

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

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

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

SECTION 2. Permanent Storm Water BMP Requirements.

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

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

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

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

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

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

PART D: PDP Exempt Requirements.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Michael Rei — Eng. Designer

Name of Owner or Agent *(Please Print)* — Title

Michael Rei — 8/14/17

Signature — Date

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Applicability of Permanent, Post-Construction Storm Water BMP Requirements	Form I-1

Project Identification

Project Name: Bodas Residence

Permit Application Number: PTS | Date: 9/11/17

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.

Answer each step below, starting with Step 1 and progressing through each step until reaching "Stop". Refer to Part 1 of Storm Water Standards 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 BMP Design 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):

N/A

Step 2: Is the project a Standard Project, Priority Development Project (PDP), or exception to PDP definitions? To answer this item, see Section 1.4 of the BMP Design Manual (Part 1 of Storm Water Standards) in its entirety for guidance, AND complete 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:

Form I-1 Page 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 BMP Design 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 BMP Design 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 BMP Design 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: Site not located in CCSYA.		

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	Bodas Residence
Project Address	6947 Country Club Dr., La Jolla CA 92037
Assessor's Parcel Number(s) (APN(s))	352-280-05
Permit Application Number	PTS No. 551761
Project Watershed	Select One: ☐ San Dieguito River ☐ Penasquitos ☑ Mission Bay ☐ San Diego River ☐ San Diego Bay ☐ Tijuana River
Hydrologic subarea name with Numeric Identifier up to two decimal places (9XX.XX)	Penasquitos Hydrologic Unit, Scripps HA (906.3). (San Diego Region 9)
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	0.802 Acres (34,951 Square Feet)
Area to be disturbed by the project (Project Footprint)	0.719 Acres (31,312 Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	0.263 Acres (11,474 Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	0.455 Acres (19,838 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.	+63.3 %

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:

Existing Land Cover Includes (select all that apply):
☑ Vegetative Cover
☐ Non-Vegetated Pervious Areas
☑ Impervious Areas
Description / Additional Information:

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 (GW):
☐ GW Depth < 5 feet
☐ 5 feet < GW Depth < 10 feet
☐ 10 feet < GW Depth < 20 feet
☑ GW Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):
☐ Watercourses
☐ Seeps
☐ Springs
☐ Wetlands
☑ None
Description / Additional Information:

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.

Description / Additional Information:

1. The existing urban drainage consists of sheet-flow to Country Club Drive.

2. The hillside east of the site contributes run-on to the site. All run-on from east of the site is collected by landscape drains and retaining wall subdrains, and is discharged to Country Club Dr. via a D-25 curb outlet at a rate of 0.19 cfs.

3. In the existing condition, the entire site drainage discharges to Country Club Drive. There are no storm water treatment or detention facilities currently on-site.

4. Existing conditions feature a flow rate of 1.73 CFS (including site run-on) sheet flowing to the public drainage system.

Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

Proposed is the construction of a 5,687 SF single-family residence.

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

The single-family residence will be approximately 5,687 SF. Site improvements include retaining walls and impervious surface walkways.

All impervious areas including the building total 11,474 SF.

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

Proposed pervious surfaces consist of landscaping throughout the site, as well as the implementation of a 757 SF biofiltration basin w/ partial retention for storm water treatment and hydromod requirements. The 2,810 SF driveway will be installed using pervious pavers.

All proposed pervious areas including the driveway total 19,838 SF.

Does the project include grading and changes to site topography?

☑ Yes

☐ No

Description / Additional Information:

Grading will be required to create a larger pad, driveway, biofiltration area, and 2:1 fill slopes.

In proposed conditions, retaining walls will be required to extend the pad into the hillside as much as possible. Fill slopes will be steeper than existing conditions to allow for the pad extension.

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:

The project does propose changes to the site drainage.

Landscape and hardscape drains interspersed throughout the site will collect storm water runoff and discharge to a 757 SF biofiltration basin w/ partial retention for pollutant control and hydromodification compliance. Treated storm water will be released at the low-flow threshold via an orifice and discharged to Country Club Dr., where it will replicate existing drainage patterns by entering the public drainage system at a flow rate under the pre-construction flow rate.

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

- ☑ On-site storm drain inlets
- ☐ Interior floor drains and elevator shaft sump pumps
- ☐ Interior parking garages
- ☑ Need for future indoor & structural pest control
- ☑ 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
- ☐ Large Trash Generating Facilities
- ☐ Animal Facilities
- ☐ Plant Nurseries and Garden Centers
- ☐ Automotive-related Uses

Description / Additional Information:

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)

After being released to the hillside after storm water treatment, the storm water will mimic existing drainage patterns and enter the public drainage system at an inlet located approximately 125' north of the site on Country Club Drive. The runoff will ultimately discharge to the Pacific Ocean.

Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations.

unnamed intermittent coastal streams - MUN, REC 1, REC 2, WARM, WILD

Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations.

None.

Provide distance from project outfall location to impaired or sensitive receiving waters.

The site lies approximately 2,000 feet south of the Water Quality Sensitive Area.

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

The entire site lies approximately 2,000 feet south of the Multi-Habitat Planning Area and Environmentally Sensitive Area.

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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	Pollutant(s)/Stressor(s)	TMDLs/ WQIP Highest Priority Pollutant
Pacific Ocean Shoreline, Scripps HA	Total Coliform, Enterococcus, Fecal Coliform	
at Avenida de la Playa at La Jolla Shores Beach		
Pacific Ocean Shoreline, Scripps HA, at Childrens Pool	Enterococcus, Fecal Coliform, Total Coliform	
Pacific Ocean Shoreline, Scripps HA, at La Jolla Cove	Total Coliform	
Pacific Ocean Shoreline, Scripps HA, at Pacific Beach Point , Pacific Beach	Enterococcus, Fecal Coliform, Total Coliform	
Pacific Ocean Shoreline, Scripps HA, at Ravina	Total Coliform	
Pacific Ocean Shoreline, Scripps HA, at Vallecitos Court at La Jolla Shores Beach	Total Coliform	

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 BMP Design Manual (Part 1 of Storm Water Standards) Appendix B.6):			
Pollutant	Not Applicable to the Project Site	Anticipated from the Project Site	Also a Receiving Water Pollutant of Concern
Sediment	X		
Nutrients	X		
Heavy Metals	X		
Organic Compounds	X		
Trash & Debris	X		
Oxygen Demanding Substances	X		
Oil & Grease	X		
Bacteria & Viruses	X		
Pesticides	X		

Form I-3B Page 9 of 11

Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6 of the BMP Design Manual)?

- ☑ 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):

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:

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.

There is one point of compliance for flow control, located at the inlet orifice installed in the biofiltration's overflow device. A 0.44 in diameter orifice will release stored storm water at the low-flow threshold of 0.013 CFS to the proposed D-25 curb outlet on Country Club Dr.

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

☑ No, the low flow threshold is 0.1Q2 (default low flow threshold)

☐ Yes, the result is the low flow threshold is 0.1Q2

☐ Yes, the result is the low flow threshold is 0.3Q2

☐ Yes, the result is the low flow threshold is 0.5Q2

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

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.

N/A

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.

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Source Control BMP Checklist for All Development Projects	Form I-4

Source Control BMPs

All development projects must implement source control BMPs SC-1 through SC-6 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?		
SC-1 Prevention of Illicit Discharges into the MS4	☑ Yes	☐ No	☐ N/A
Discussion / justification if SC-1 not implemented:			
SC-2 Storm Drain Stenciling or Signage	☑ Yes	☐ No	☐ N/A
Discussion / justification if SC-2 not implemented:			
SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑ Yes	☐ No	☐ N/A
Discussion / justification if SC-3 not implemented:			
SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☑ N/A
Discussion / justification if SC-4 not implemented: There are no proposed outdoor work areas.			
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☑ Yes	☐ No	☐ N/A
Discussion / justification if SC-5 not implemented:			

Form I-4 Page 2 of 2			
Source Control Requirement	Applied?		
SC-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-related Uses	☐ Yes	☐ No	☑ N/A

Discussion / justification if SC-6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for all "No" answers shown above.

Project is single-family residential development, not applicable if not selected.

Site Design BMP Checklist for All Development Projects	Form I-5

Site Design BMPs

All development projects must implement site design BMPs SD-1 through SD-8 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?		
SD-1 Maintain Natural Drainage Pathways and Hydrologic Features	☑ Yes	☐ No	☐ N/A
Discussion / justification if SD-1 not implemented:			
Overall drainage patterns will be maintained (i.e. there will not be any diversions of storm water), however due to grading activities and proposed development, the existing drainage pathways will be affected. The site, consisting of the single-family residential building, and hardscape, will ultimately direct storm water runoff to the street, where it will be collected by the public drainage system on Country Club Dr.			
1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map?	☑ Yes	☐ No	
1-2 Are trees implemented? If yes, are they shown on the site map?	☐ Yes	☑ No	
1-3 Implemented trees meet the design criteria in SD-1 Fact Sheet (e.g. soil volume, maximum credit, etc.)?	☐ Yes	☑ No	
1-4 Is tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E?	☐ Yes	☑ No	
SD-2 Have natural areas, soils and vegetation been conserved?	☑ Yes	☐ No	☐ N/A
Discussion / justification if SD-2 not implemented:			

Site Design Requirement	Applied?		
SD-3 Minimize Impervious Area	☑ Yes	☐ No	☐ N/A
Discussion / justification if SD-3 not implemented: Landscape areas to be implemented into site as much as possible. Permeable pavers will be installed for the driveway to reduce the impervious area.			
SD-4 Minimize Soil Compaction	☑ Yes	☐ No	☐ N/A
Discussion / justification if SD-4 not implemented: Soil compaction to be minimized in planned landscape areas.			
SD-5 Impervious Area Dispersion	☐ Yes	☑ No	☐ N/A
Discussion / justification if SD-5 not implemented: Roof downspouts don't outlet to landscaping until biofiltration basin. Pervious areas accepting impervious surface runoff don't meet the minimum design criteria as they are too steep.			
5-1 Is the pervious area receiving runon from impervious area identified on the site map?	☑ Yes	☐ No	
5-2 Does the pervious area satisfy the design criteria in SD-5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.)	☐ Yes	☑ No	
5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and SD-5 Fact Sheet in Appendix E?	☐ Yes	☑ No	

Form I-5 Page 3 of 4			
Site Design Requirement	Applied?		
SD-6 Runoff Collection	☑ Yes	☐ No	☐ N/A
Discussion / justification if SD-6 not implemented:			
6a-1 Are green roofs implemented in accordance with design criteria in SD-6A Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☑ No	
6a-2 Is green roof credit volume calculated using Appendix B.2.1.2 and SD-6A Fact Sheet in Appendix E?	☐ Yes	☑ No	
6b-1 Are permeable pavements implemented in accordance with design criteria in SD-6B Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☑ No	
6b-2 Is permeable pavement credit volume calculated using Appendix B.2.1.3 and SD-6B Fact Sheet in Appendix E?	☐ Yes	☑ No	
SD-7 Landscaping with Native or Drought Tolerant Species	☑ Yes	☐ No	☐ N/A
Discussion / justification if SD-7 not implemented:			
SD-8 Harvesting and Using Precipitation	☐ Yes	☑ No	☐ N/A
Discussion / justification if SD-8 not implemented: Harvest and Use has been deemed infeasible per Form I-7.			
8-1 Are rain barrels implemented in accordance with design criteria in SD-8 Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☑ No	
8-2 Is rain barrel credit volume calculated using Appendix B.2.2.2 and SD-8 Fact Sheet in Appendix E?	☐ Yes	☑ No	

Form I-5 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 has no demand for harvest and reuse.
-The onsite soil conditions are not conducive to full infiltration, however partial infiltration is feasible.
-Completion of the "Categorization of Infiltration Feasibility Condition" worksheet results in No Infiltration BMPs.
- Biofiltration w/ partial retention is selected for the project.

To address the primary and secondary pollutants of concern, structural BMP treatment control options were evaluated for required pollutant removal efficiency. A biofiltration facility w/ partial retention was selected which meets the required removal efficiency for all anticipated pollutants from the project.

Runoff from the flat graded area which will contain the vast majority of impervious areas and a small portion of landscaping areas will be collected by area drains and be directed to the proposed 757 SF biofiltration basin w/ partial retention (IMP A). After receiving treatment, storm water will be collected by the system of perforated pipes in the basin and enter a 0.44 inch drilled orifice in the overflow device, where it will discharge from the site at a flow rate of 0.013 cfs to Country Club Dr. through a D-25 curb outlet. It will ultimately replicate existing drainage patterns and drain into the public drainage inlet 125' north of the site.

Pervious pavers in Basin B.2 will be installed with a storage section sized to successfully address hydromod requirements and draw down accumulated flows in less than 36 hours. The mitigated condition will reduce expected flows from 0.11 CFS to 0.00 CFS.

(Continue on page 2 as necessary.)

Form I-6 Page 2 of X
(Page reserved for continuation of description of general strategy for structural BMP implementation at the site)
(Continued from page 1)

Form I-6 Page 3 of X (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. IMP A	
Construction Plan Sheet No.	
Type of structural BMP: ○ Retention by harvest and use (HU-1) ○ Retention by infiltration basin (INF-1) ○ Retention by bioretention (INF-2) ○ Retention by permeable pavement (INF-3) ◉ Partial retention by biofiltration with partial retention (PR-1) ○ Biofiltration (BF-1) ○ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide (BMP type/description in discussion section below) ○ 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) ○ Flow-thru treatment control with alternative compliance (provide BMP type/description in ○ Detention pond or vault for hydromodification management ○ Other (describe in discussion section below)	
Purpose: ○ Pollutant control only ○ Hydromodification control only ◉ Combined pollutant control and hydromodification control ○ Pre-treatment/forebay for another structural BMP ○ 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	The engineer of work shall certify construction. At the time this report is written the EOW is Michael Kinnear, RCE 76785.
Who will be the final owner of this BMP?	The property owner(s) in perpetuity.
Who will maintain this BMP into perpetuity?	The property owner(s).
What is the funding mechanism for maintenance?	Funding provided by private property owner(s).

Form I-6 Page 3 of X (Copy as many as needed)	
Structural BMP Summary Information	
Structural BMP ID No. IMP B	
Construction Plan Sheet No.	
Type of structural BMP: ○ Retention by harvest and use (HU-1) ○ Retention by infiltration basin (INF-1) ○ Retention by bioretention (INF-2) ○ Retention by permeable pavement (INF-3) ○ Partial retention by biofiltration with partial retention (PR-1) ○ Biofiltration (BF-1) ○ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide (BMP type/description in discussion section below) ○ 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) ○ Flow-thru treatment control with alternative compliance (provide BMP type/description in ○ Detention pond or vault for hydromodification management ◉ Other (describe in discussion section below)	
Purpose: ○ Pollutant control only ◉ Hydromodification control only ○ Combined pollutant control and hydromodification control ○ Pre-treatment/forebay for another structural BMP ○ 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	The engineer of work shall certify construction. At the time this report is written the EOW is Michael Kinnear, RCE 76785.
Who will be the final owner of this BMP?	The property owner(s) in perpetuity.
Who will maintain this BMP into perpetuity?	The property owner(s).
What is the funding mechanism for maintenance?	Funding provided by private property owner(s).

THE CITY OF SAN DIEGO	City of San Diego **Development Services** 1222 First Ave., MD-302 San Diego, CA 92101 (619) 446-5000	**Permanent BMP Construction** **Self Certification Form**
		FORM DS-563 February 2016

Date Prepared:	Project No.:
Project Applicant:	Phone:
Project Address: 6947 Country Club Dr., La Jolla CA 92037	
Project Engineer:	Phone:

The purpose of this form is to verify that the site improvements for the project, identified above, have been constructed in conformance with the approved Storm Water Quality Management Plan (SWQMP) documents and drawings.

This form must be completed by the engineer and submitted prior to final inspection of the construction permit. Completion and submittal of this form is required for all new development and redevelopment projects in order to comply with the City's Storm Water ordinances and NDPES Permit Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100. Final inspection for occupancy and/or release of grading or public improvement bonds may be delayed if this form is not submitted and approved by the City of San Diego.

CERTIFICATION:

As the professional in responsible charge for the design of the above project, I certify that I have inspected all constructed Low Impact Development (LID) site design, source control and structural BMP's required per the approved SWQMP and Construction Permit No. _____; and that said BMP's have been constructed in compliance with the approved plans and all applicable specifications, permits, ordinances and Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 of the San Diego Regional Water Quality Control Board.

I understand that this BMP certification statement does not constitute an operation and maintenance verification.

Signature: _____

Date of Signature: _____

Printed Name: _____

Title: _____

Phone No. _____

Engineer's Stamp

DS-563 (01-16)

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ATTACHMENT 1
BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

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Indicate which Items are Included:

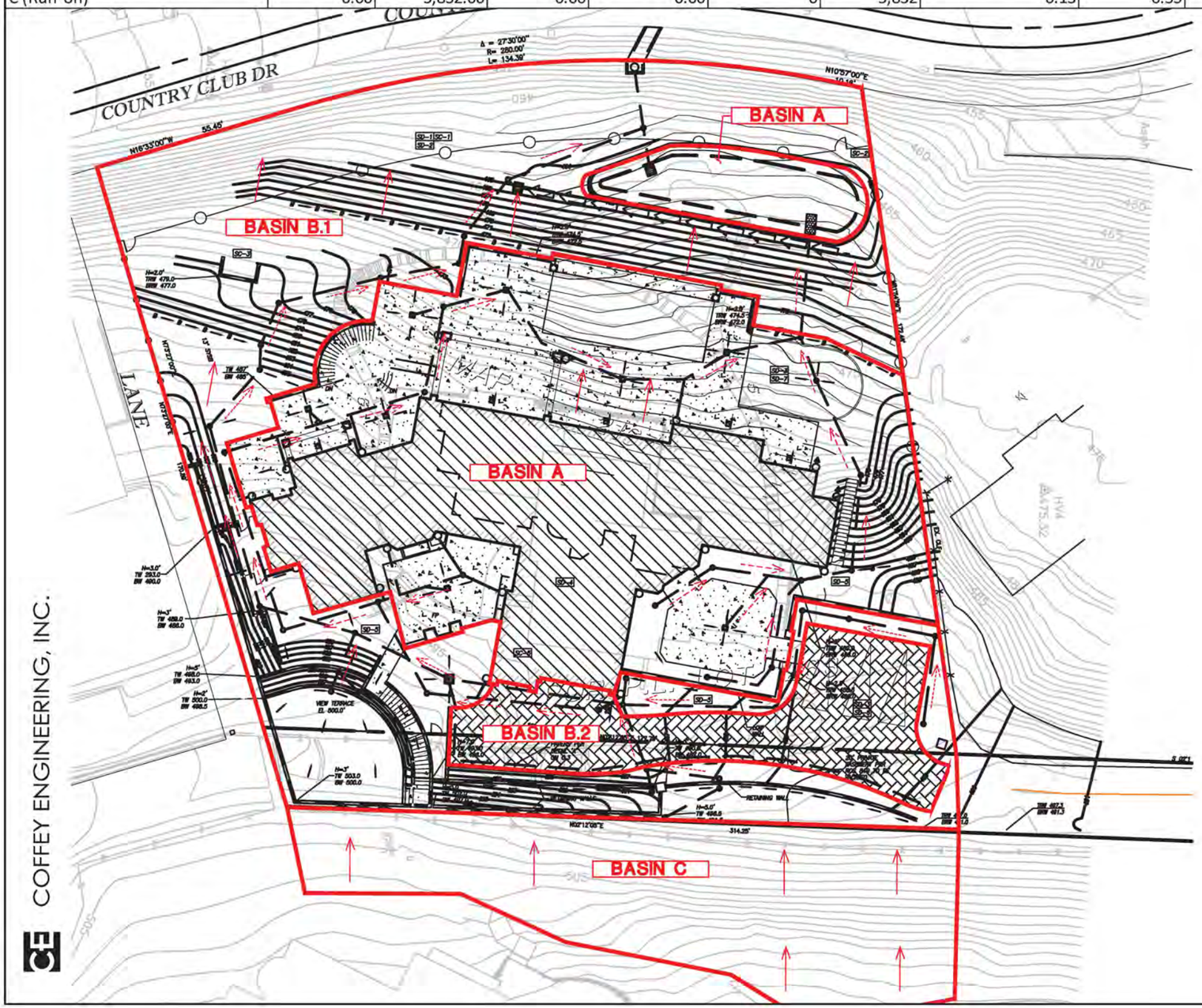
Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	☑ Included B.2-1, B-5.1
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	☑ Included on DMA Exhibit in Attachment 1a ☐ 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) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	☑ Included ☐ Not included because the entire project will use infiltration BMPs
Attachment 1d	Form I-8, Categorization of Infiltration Feasibility Condition (Required unless the project will use harvest and use BMPs) Refer to Appendices C and D of the BMP Design Manual to complete Form I-8.	☑ Included ☐ Not included because the entire project will use harvest and use BMPs
Attachment 1e	Pollutant Control BMP Design Worksheets / Calculations (Required) Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines and site design credit calculations	☑ Included

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

The DMA Exhibit must identify:

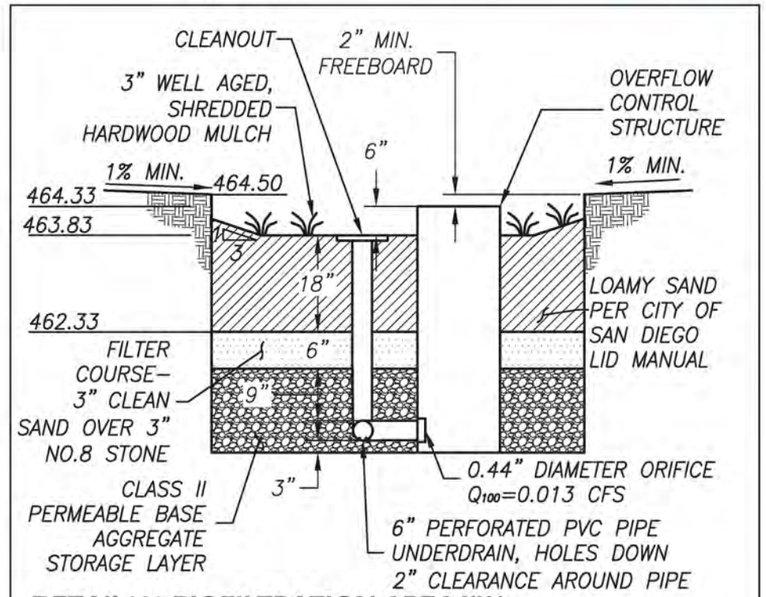
- ☑ Underlying hydrologic soil group
- ☑ Approximate depth to groundwater
- ☑ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- ☑ Critical coarse sediment yield areas to be protected
- ☑ Existing topography and impervious areas
- ☑ Existing and proposed site drainage network and connections to drainage offsite
- ☑ Proposed grading
- ☑ Proposed impervious features
- ☑ Proposed design features and surface treatments used to minimize imperviousness
- ☑ 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)
- ☑ Structural BMPs (identify location, type of BMP, and size/detail)

DMA	Impervious Area	Pervious Area	Permeable Paving	Biofiltration Area	Pool/Water Feature	Total (SF)	Total (AC)	C-Value*	Percent Impervious
A (Drains to Biofiltration)	11,209.00	3,256.00	0.00	757.00	670.00	15,892	0.36	0.75	70.53%
B.1 (Self-mitigating)	265.00	15,984.00	0.00	0.00	0	16,249	0.37	0.35	1.63%
B.2 (Self-retaining)	0.00	0.00	2,810.00	0.00	0	2,810	0.06	0.40	0.00%
C (Run-on)	0.00	5,832.00	0.00	0.00	0	5,832	0.13	0.35	0.00%



LEGEND

DESCRIPTION	SYMBOL
PROPERTY LINE	
EXISTING CONTOUR	90
DIRECTION OF SHEET FLOW	
SITE BASIN LIMIT	
DIRECTION OF PIPE FLOW TO BIOFILTRATION	
DIRECTION OF PIPE FLOW TO STREET	



DETAIL 'A'-BIOFILTRATION AREA W/ PARTIAL RETENTION (IMP 'A') - TYPICAL SECTION

NOT TO SCALE

N

SCALE: 1"=30'

BODAS RESIDENCE

6947 Country Club Dr., La Jolla CA 92037

DRAINAGE MAP 'B'
PROPOSED CONDITIONS
SCALE: 1"=30'

COFFEY ENGINEERING, INC.

Harvest and Use Feasibility Checklist	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]

4 residents/residence x 9.3 gallons/resident/day / 7.48 gallons/cubic foot x 36 hours / 24hours/day = 7.45 cubic feet/residence

1 Residence x 7.45 cubic feet/residence = 7.45 cubic feet

3. Calculate the DCV using worksheet B-2.1.
DCV = 517 (cubic feet)

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.

Bodas Residence 13-10289

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Categorization of Infiltration Feasibility Condition	Worksheet C.4-1

Part 1 - Full Infiltration Feasibility Screening Criteria
Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?

Criteria	Screening Question	Yes	No
1	Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X

Provide basis:
The infiltration test results below the proposed facility location at (INF-1) was 0.062 inches per hour, and at (INF-2) was 0.000 inches per hour with a minimum factor of safety of 2 applied at both locations. Simple open pit testing was performed at 2 locations on the site within or adjacent to the proposed infiltration basin in accordance with Appendix D of the City of San Diego BMP design manual. In addition, a comprehensive evaluation of the site was conducted in accordance with Appendix C.2. Please refer to our "Report of Limited Geotechnical Investigation Proposed Storm Water Infiltration BMP's" dated June 14, 2017 for details of the comprehensive evaluation and investigation conducted, simple open pit test rates and simple open pit rate to infiltration rate calculations and maps representative of the study.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

2	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X

Provide basis:
Our infiltration test results below the proposed facility location range from 0.000 to 0.062 inches per hour with a minimum factor of safety of 2 applied. Infiltration rates greater than 0.5 inches per hour were not encountered, therefore, the question is not applicable. Please refer to our "Report of Limited Geotechnical Investigation Proposed Storm Water Infiltration BMP's" dated June 14, 2017 for details of the comprehensive evaluation and investigation conducted, simple open pit test rates and simple open pit rate to infiltration rate calculations and maps representative of the study.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

Worksheet C.4-1 Page 2 of 4			
Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		X
Provide basis: Our infiltration test results below the proposed facility location range from 0.000 to 0.062 inches per hour with a minimum factor of safety of 2 applied. Infiltration rates greater than 0.5 inches per hour were not encountered, therefore, the question is not applicable. Please refer to our "Report of Limited Geotechnical Investigation Proposed Storm Water Infiltration BMP's" dated June 14, 2017 for details of the comprehensive evaluation and investigation conducted, simple open pit test rates and simple open pit rate to infiltration rate calculations and maps representative of the study. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		
Provide basis: Question to be answered by the design engineer. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 1 Result*	If all answers to rows 1 - 4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2		

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

Worksheet C.4-1 Page 3 of 4

Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria
Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?

Criteria	Screening Question	Yes	No
5	Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	X	

Provide basis:
The City of San Diego BMP Design Manual, Appendix C and Appendix D, do not provide values considered for appreciable rates. Although we do not consider the measured infiltration rates as appreciable from a practical standpoint, we understand the City of San Diego considers rates greater than 0.01 inches/hour as appreciable. Therefore, we have answered yes to this question.
Measured infiltration rates ranged from 0.000 to 0.062 inches per hour with a minimum factor of safety of 2 applied. Please refer to our "Report of Limited Geotechnical Investigation Proposed Storm Water Infiltration BMP's" dated June 14, 2017 for details of the comprehensive evaluation and investigation conducted, simple open pit test rates and simple open pit rate to infiltration rate calculations and maps representative of the study.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

6	Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	

Provide basis:
In our opinion, any long term infiltration at the site will not result in geotechnical hazards which cannot be reasonable mitigated to an acceptable level.
Please refer to our "Report of Limited Geotechnical Investigation Proposed Storm Water Infiltration BMP's" dated June 14, 2017 for details of the comprehensive evaluation and investigation conducted, simple open pit test rates and simple open pit rate to infiltration rate calculations and maps representative of the study.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

Bodas Residence 13-10289

Worksheet C.4-1 Page 4 of 4			
Criteria	Screening Question	Yes	No
7	Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: In our opinion, any long term infiltration at the site will not result in a significant risk for groundwater related concerns. Please refer to our "Report of Limited Geotechnical Investigation Proposed Storm Water Infiltration BMP's" dated June 14, 2017 for details of the comprehensive evaluation and investigation conducted, simple open pit test rates and simple open pit rate to infiltration rate calculations and maps representative of the study. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
8	Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		
Provide basis: Question to be answered by the design engineer. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration. If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.		

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

Bodas Residence 13-10289

Worksheet D.5-1: Factor of Safety and Design Infiltration Rate Worksheet

Factor of Safety and Design Infiltration Rate Worksheet			Worksheet D.5-1		
Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	2	0.5
		Predominant soil texture	0.25	3	0.75
		Site soil variability	0.25	2	0.5
		Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			2.00
B	Design	Level of pretreatment/ expected sediment loads	0.5		
		Redundancy/resiliency	0.25		
		Compaction during construction	0.25		
		Design Safety Factor, $S_B = \Sigma p$			
Combined Safety Factor, $S_{total} = S_A \times S_B$					
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)					
Design Infiltration Rate, in/hr, $K_{design} = K_{observed} / S_{total}$					

Supporting Data

Briefly describe infiltration test and provide reference to test forms:

Simple open pit testing was performed at 2 locations within or adjacent to the proposed facility per the requirements of the City of San Diego Storm Water Standards, BMP Design Manual, in accordance with Appendix D.
Please refer to our "Report of Limited Geotechnical Investigation Proposed Storm Water Infiltration BMP's" dated June 14, 2017 for details of the comprehensive evaluation and investigation conducted, simple open pit test results and converted simple open pit test results to infiltration rate calculations, and maps representative of the study.

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	.515	inches
2	Area tributary to BMP (s)	A=	0.33	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.76	unitless
4	Trees Credit Volume	TCV=	0	cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	471.8	cubic-feet

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 1 of 2)	
1	Remaining DCV after implementing retention BMPs	471.80	cubic-feet
Partial Retention			
2	Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible	0.031	in/hr.
3	Allowable drawdown time for aggregate storage below the underdrain	36	hours
4	Depth of runoff that can be infiltrated [Line 2 x Line 3]	1.116	inches
5	Aggregate pore space	0.40	in/in
6	Required depth of gravel below the underdrain [Line 4/ Line 5]	0.4	inches
7	Assumed surface area of the biofiltration BMP	757	sq-ft
8	Media retained pore storage	0.1	in/in
9	Volume retained by BMP [[Line 4 + (Line 12 x Line 8)]/12] x Line 7	183.951	cubic-feet
10	DCV that requires biofiltration [Line 1 – Line 9]	287.85	cubic-feet
BMP Parameters			
11	Surface Ponding [6 inch minimum, 12 inch maximum]	6	inches
12	Media Thickness [18 inches minimum], also add mulch layer thickness to this line for sizing calculations	18	inches
13	Aggregate Storage above underdrain invert (12 inches typical) – use 0 inches for sizing if the aggregate is not over the entire bottom surface area	9	inches
14	Freely drained pore storage	0.2	in/in
15	Media filtration rate to be used for sizing (5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
16	Allowable Routing Time for sizing	6	hours
17	Depth filtered during storm [Line 15 x Line 16]	30	inches
18	Depth of Detention Storage [Line 11 + (Line 12 x Line 14) + (Line 13 x Line 5)]	13.20	inches
19	Total Depth Treated [Line 17 + Line 18]	43.2	inches

Note: Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs (continued)

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1 (Page 2 of 2)	
Option 1 – Biofilter 1.5 times the DCV			
20	Required biofiltered volume [1.5 x Line 10]	431.77	cubic-feet
21	Required Footprint [Line 20/ Line 19] x 12	119.94	sq-ft
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
22	Required Storage (surface + pores) Volume [0.75 x Line 10]	215.89	cubic-feet
23	Required Footprint [Line 22/ Line 18] x 12	196.26	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	14,465	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.760	
26	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Worksheet B.5-2, Line 11)	0.03	
27	Minimum BMP Footprint [Line 24 x Line 25 x Line 26]	329.80	sq-ft
28	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 27)	329.80	sq-ft
Check for Volume Reduction [Not applicable for No Infiltration Condition]			
29	Calculate the fraction of DCV retained in the BMP [Line 9/Line 1]	0.389	unitless
30	Minimum required fraction of DCV retained for partial infiltration condition	0.375	unitless
31	Is the retained DCV ≥ 0.375? If the answer is no increase the footprint sizing factor in Line 26 until the answer is yes for this criterion.	☑ Yes	☐ No

Note:

1. Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in Line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)
2. The DCV fraction of 0.375 is based on a 40% average annual percent capture and a 36-hour drawdown time.
3. The increase in footprint for volume reduction can be optimized using the approach presented in Appendix B.5.2. The optimized footprint cannot be smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2.
4. If the proposed biofiltration BMP footprint is smaller than the alternative minimum footprint sizing factor from Worksheet B.5-2, but satisfies Option 1 or Option 2 sizing, it is considered a compact biofiltration BMP and may be allowed at the discretion of the City Engineer, if it meets the requirements in Appendix F.

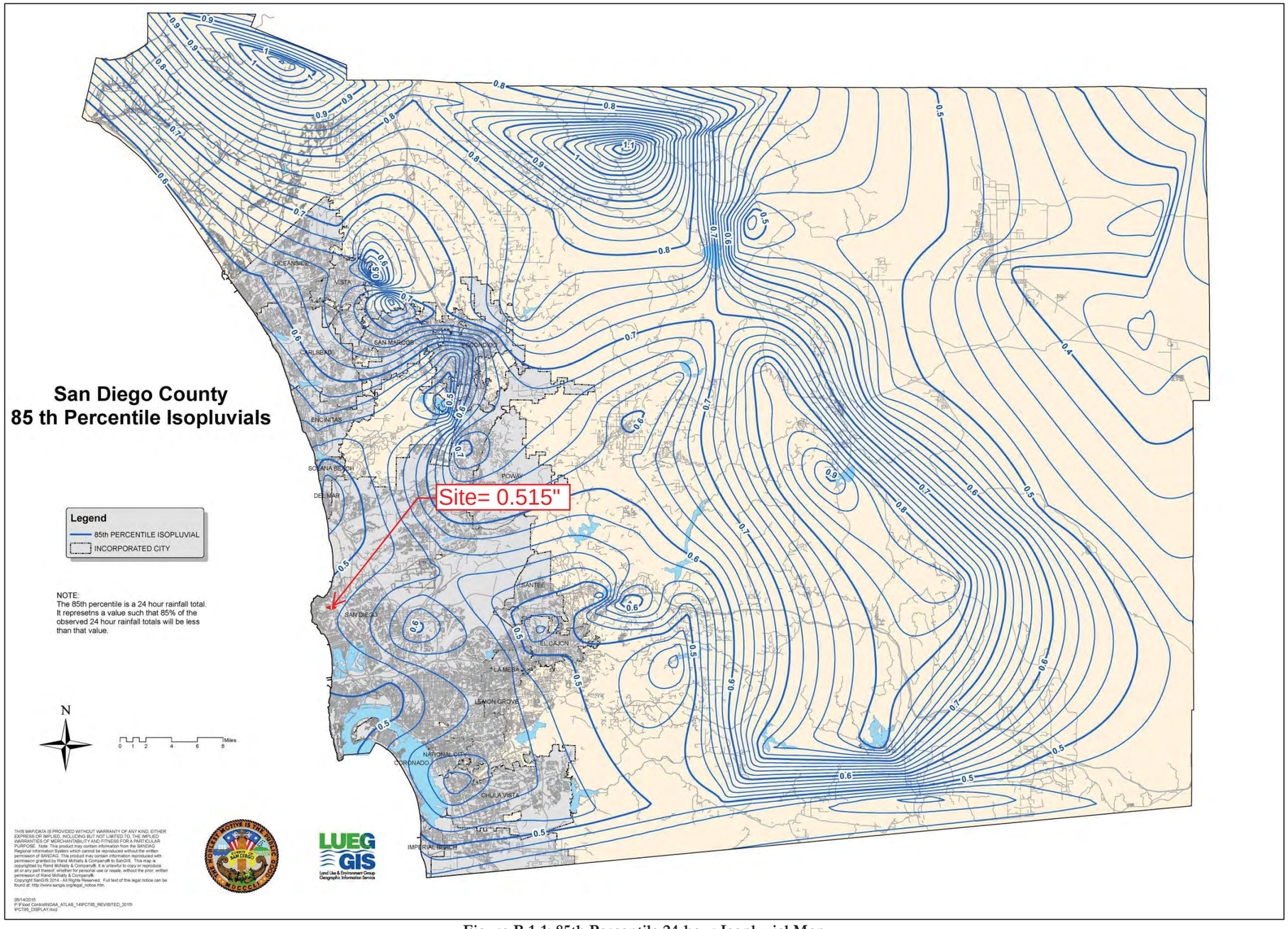


Figure B.1-1: 85th Percentile 24-hour Isopluvial Map

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.

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Indicate which Items are Included:

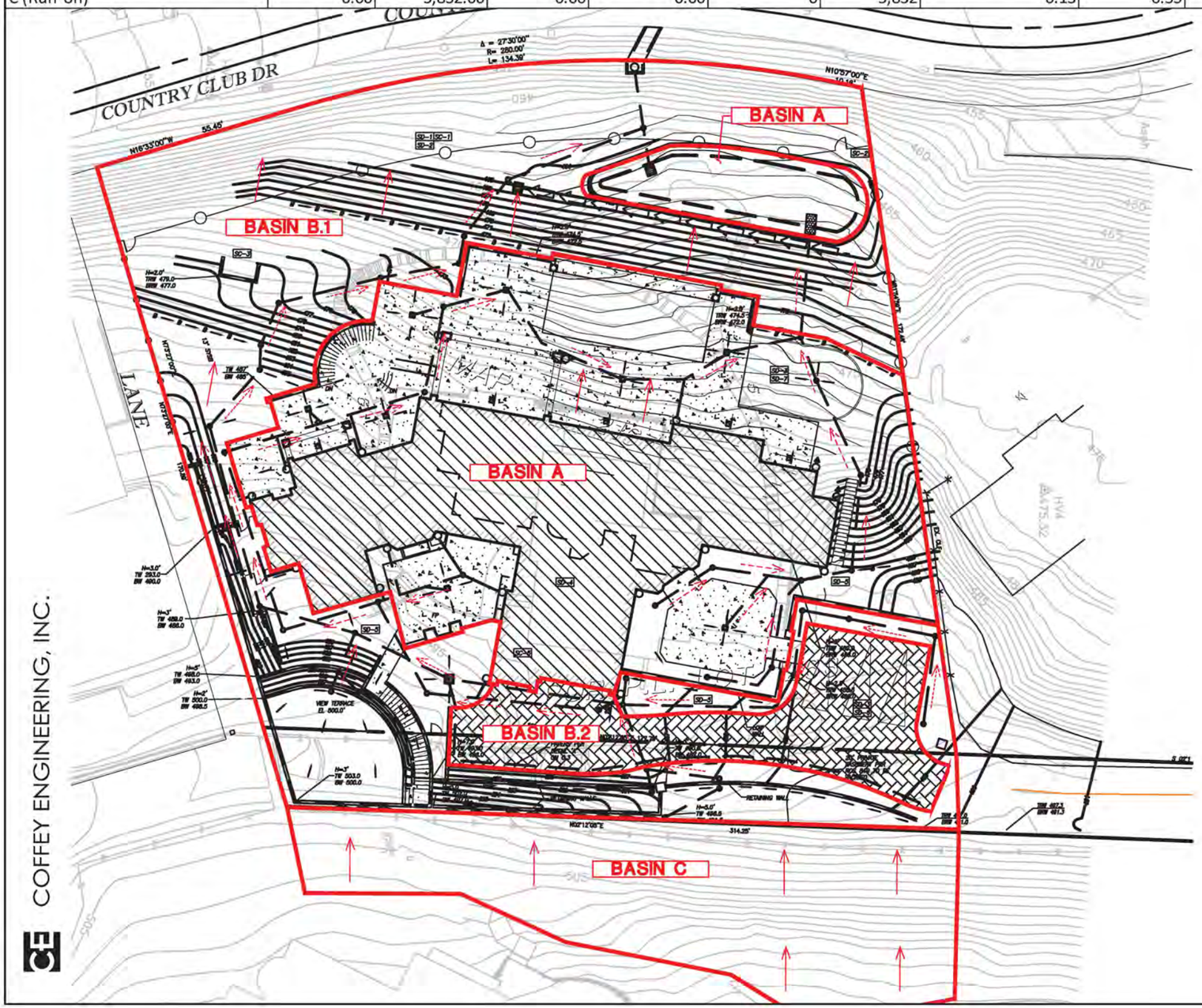
Attachment Sequence	Contents	Checklist
Attachment 2a	Hydromodification Management Exhibit (Required)	☑ Included See Hydromodification Management Exhibit Checklist.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 6.2 of the BMP Design Manual.	☑ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required) Optional analyses for Critical Coarse Sediment Yield Area Determination ☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite ☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
Attachment 2c	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	○ Not Performed ○ Included ○ Submitted as separate stand-alone document
Attachment 2d	Flow Control Facility Design and Structural BMP Drawdown Calculations (Required) Overflow Design Summary for each structural BMP See Chapter 6 and Appendix G of the BMP Design Manual	◉ Included ○ Submitted as separate stand-alone document
Attachment 2e	Vector Control Plan (Required when structural BMPs will not drain in 96 hours)	○ Included ◉ Not required because BMPs will drain in less than 96 hours

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

The Hydromodification Management Exhibit must identify:

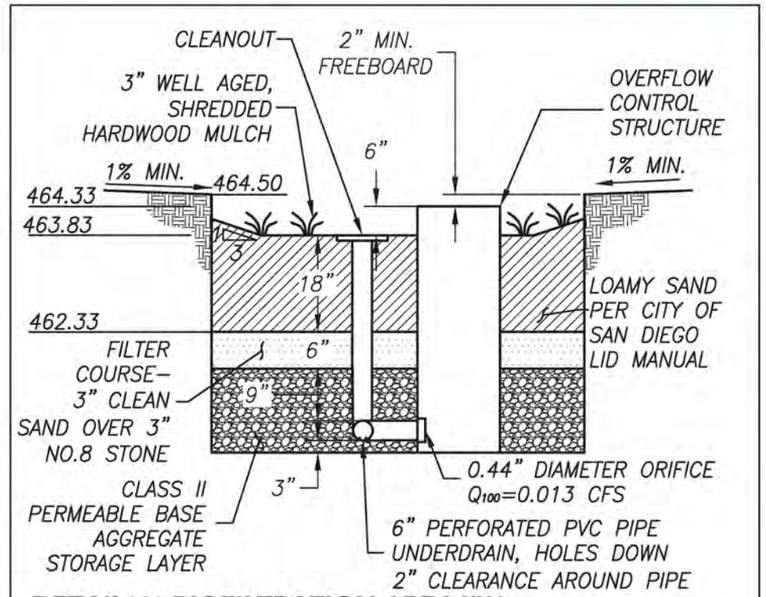
- ☑ Underlying hydrologic soil group
- ☑ Approximate depth to groundwater
- ☑ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- ☑ Critical coarse sediment yield areas to be protected
- ☑ Existing topography
- ☑ Existing and proposed site drainage network and connections to drainage offsite
- ☑ 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)

DMA	Impervious Area	Pervious Area	Permeable Paving	Biofiltration Area	Pool/Water Feature	Total (SF)	Total (AC)	C-Value*	Percent Impervious
A (Drains to Biofiltration)	11,209.00	3,256.00	0.00	757.00	670.00	15,892	0.36	0.75	70.53%
B.1 (Self-mitigating)	265.00	15,984.00	0.00	0.00	0	16,249	0.37	0.35	1.63%
B.2 (Self-retaining)	0.00	0.00	2,810.00	0.00	0	2,810	0.06	0.40	0.00%
C (Run-on)	0.00	5,832.00	0.00	0.00	0	5,832	0.13	0.35	0.00%



LEGEND

DESCRIPTION	SYMBOL
PROPERTY LINE	
EXISTING CONTOUR	90
DIRECTION OF SHEET FLOW	
SITE BASIN LIMIT	
DIRECTION OF PIPE FLOW TO BIOFILTRATION	
DIRECTION OF PIPE FLOW TO STREET	



DETAIL 'A'-BIOFILTRATION AREA W/ PARTIAL RETENTION (IMP 'A') - TYPICAL SECTION

NOT TO SCALE

N

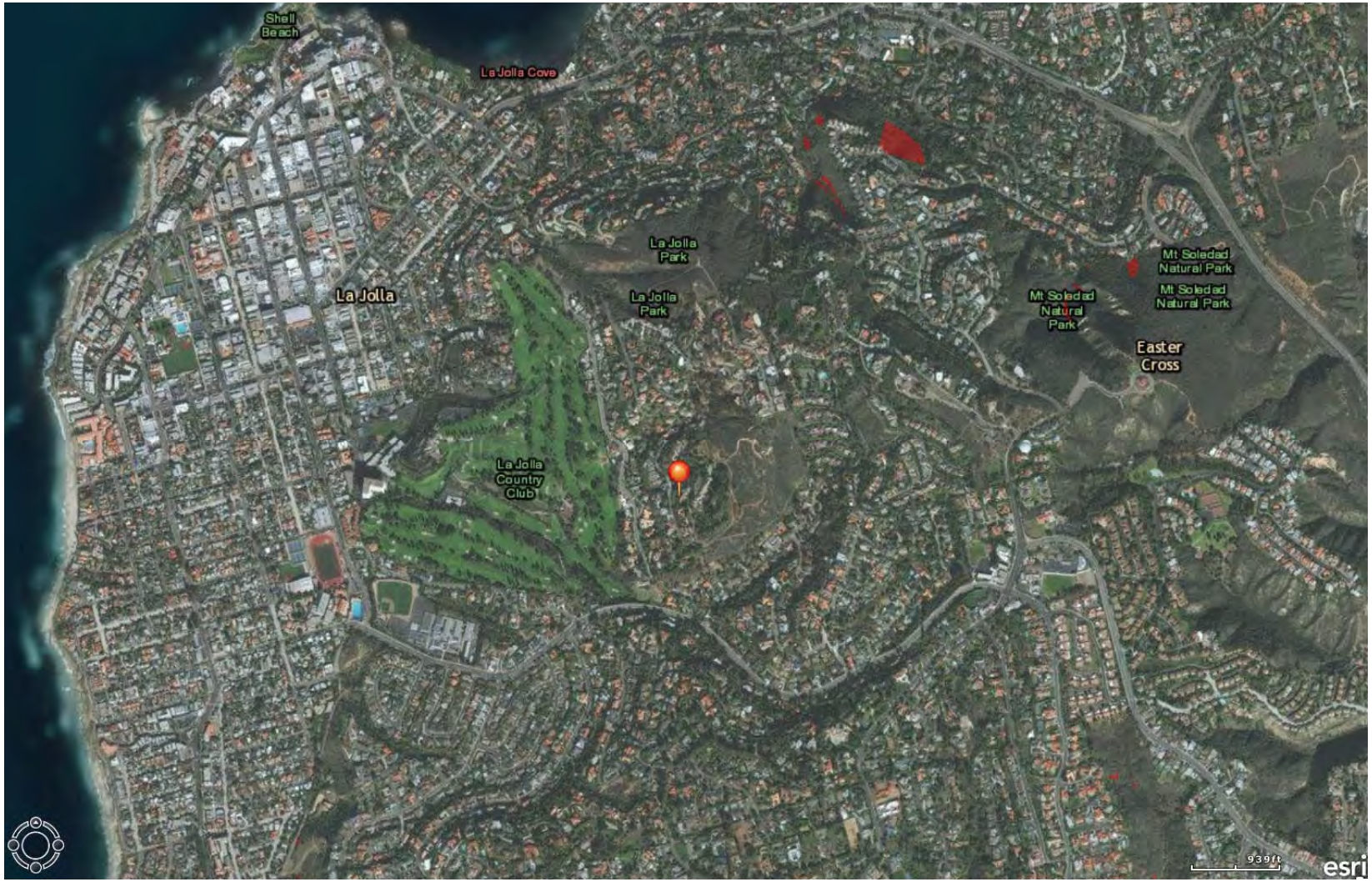
SCALE: 1"=30'

BODAS RESIDENCE

6947 Country Club Dr., La Jolla CA 92037

DRAINAGE MAP 'B'
PROPOSED CONDITIONS
SCALE: 1"=30'

COFFEY ENGINEERING, INC.



CRITICAL COURSE SEDIMENT YIELD AREAS – BODAS RESIDENCE

Integrated Management Practices Sizing Calculations

A (Drains to Biofiltration)

Low Flow Threshold	Soil Group	Slope	Rain Guage
0.1Q2	D - High Runoff (Clay Soils)	Steep	Oceanside

	Surface Area (ft^2)	Surface Area (AC)	Surface Type	Runoff Factor
Impervious Area	11,209.00	0.26	Concrete (1.0)	1
Pervious Area	3,256.00	0.07	Landscape (0.1)	0.1
Pervious Pavers	0.00	0.00	Solid Unit Pavers o	0.2

IMP Type	Area Factor	V1 Factor	V2 Factor	Surface Area Required (ft^2)	V1 Required (ft^3)	V2 Required (ft^3)	Surface Area Provided (ft^2)	V1 Provided (ft^3)	V2 Provided (ft^3)	Volume (gallons	Length of Pipe	
Infiltration Devices	N/A	N/A	N/A	0.00	0.00	0.00				0.00	#REF!	#REF!
Bioretention	N/A	N/A	N/A	0.00	0.00	0.00						
Biofiltration with Partial Ret.	0.065	0.0542	0.039	749.75	625.18	449.85	757.00	630.83	454.20	4,718.63	#REF!	#REF!
Biofiltration with Imp. Liner	0.105	0.0875	0.063	1,211.13	1,009.28	726.68				0.00	#REF!	#REF!
Cistern	N/A	0.18	N/A	0.00	2,076.23	0.00				0.00	#REF!	#REF!

Required Cistern Length

Triton S-29	Triton S-22	Triton C-10	Triton M-6
0.00	0.00	0.00	0.00

B.2 (Self-retaining)

Low Flow Threshold	Soil Group	Slope	Rain Guage
0.1Q2	D - High Runoff (Clay Soils)	Steep	Oceanside

	Surface Area (ft^2)	Surface Area (AC)	Surface Type	Runoff Factor
Impervious Area	0.00	0.00	Concrete (1.0)	1
Pervious Area	0.00	0.00	Landscape (0.1)	0.1
Pervious Pavers	2,810.00	0.06	Solid Unit Pavers o	0.2

IMP Type	Area Factor	V1 Factor	V2 Factor	Surface Area Required (ft^2)	V1 Required (ft^3)	V2 Required (ft^3)	Surface Area Provided (ft^2)	V1 Provided (ft^3)	V2 Provided (ft^3)	Volume (gallons	Length of Pipe	
Infiltration Devices	N/A	N/A	N/A	0.00	0.00	0.00				0.00	#REF!	#REF!
Bioretention	N/A	N/A	N/A	0.00	0.00	0.00						
Biofiltration with Partial Ret.	0.065	0.0542	0.039	36.53	30.46	21.92				0.00	#REF!	#REF!
Biofiltration with Imp. Liner	0.105	0.0875	0.063	59.01	49.18	35.41				0.00	#REF!	#REF!
Cistern	N/A	0.18	N/A	0.00	101.16	0.00	2,810.00	101.16		756.68	#REF!	#REF!

Required Cistern Length

Triton S-29	Triton S-22	Triton C-10	Triton M-6
0.00	0.00	0.00	0.00

Orifice Sizing Calculations

(1) $Q=C_d \times A \times (2gH)^{0.5}$ Orifice Discharge Equation

(2) $A= [0.1Q_2 \times A_{DMA}]/C_d \times (2gH)^{0.5}$ Orifice Area Equation (for 0.1Q2 as lower limit threshold)

Cd = 0.58 dimensionless g = 32.2 ft/s2 H = 1.7500 ft

	Rain Gage	Soil Type	Cover	Slope	Q2 Sizing Factor	DMA Area (ac)	Lower Limit of Q2	**Orifice Area (in2)**	**Orifice Dia. (in)**
A (Drains to Biofiltration)	Oceanside	B	Scrub	Steep	0.181	0.3648	0.1	**0.15**	**0.44**

Table 1-6. Unit Runoff Ratios

Rain Gauge	Soil	Cover	Slope	Q_2 (cfs/acre)	Q_{10} (cfs/ac)
Lake Wohlford	A	Scrub	Low	0.136	0.369
Lake Wohlford	A	Scrub	Moderate	0.207	0.416
Lake Wohlford	A	Scrub	Steep	0.244	0.47
Lake Wohlford	B	Scrub	Low	0.208	0.414
Lake Wohlford	B	Scrub	Moderate	0.227	0.448
Lake Wohlford	B	Scrub	Steep	0.253	0.482
Lake Wohlford	C	Scrub	Low	0.245	0.458
Lake Wohlford	C	Scrub	Moderate	0.253	0.481
Lake Wohlford	C	Scrub	Steep	0.302	0.517
Lake Wohlford	D	Scrub	Low	0.253	0.48
Lake Wohlford	D	Scrub	Moderate	0.292	0.516
Lake Wohlford	D	Scrub	Steep	0.351	0.538
Oceanside	A	Scrub	Low	0.035	0.32
Oceanside	A	Scrub	Moderate	0.093	0.367
Oceanside	A	Scrub	Steep	0.163	0.42
Oceanside	B	Scrub	Low	0.08	0.365
Oceanside	B	Scrub	Moderate	0.134	0.4
Oceanside	B	Scrub	Steep	0.181	0.433
Oceanside	C	Scrub	Low	0.146	0.411
Oceanside	C	Scrub	Moderate	0.185	0.433
Oceanside	C	Scrub	Steep	0.217	0.458
Oceanside	D	Scrub	Low	0.175	0.434
Oceanside	D	Scrub	Moderate	0.212	0.455
Oceanside	D	Scrub	Steep	0.244	0.571
Lindbergh	A	Scrub	Low	0.003	0.081
Lindbergh	A	Scrub	Moderate	0.018	0.137
Lindbergh	A	Scrub	Steep	0.061	0.211
Lindbergh	B	Scrub	Low	0.011	0.134
Lindbergh	B	Scrub	Moderate	0.033	0.174
Lindbergh	B	Scrub	Steep	0.077	0.23
Lindbergh	C	Scrub	Low	0.028	0.19
Lindbergh	C	Scrub	Moderate	0.075	0.232
Lindbergh	C	Scrub	Steep	0.108	0.274
Lindbergh	D	Scrub	Low	0.05	0.228

Low-Flow Orifice Flow Rate (cfs)
0.01320685

IMP 'A' - Biofiltration Basin

Orifice Dia. (ft)	Orifice Dia. (in)	Surface Area (ft^2)	Drawdown Time (hours)	
0.037	0.443	757	62.92	<96 Hours - OKAY

Depth of Water in Bioretention Area	Q (ft^3/sec)*	∆Vol (ft^3)	∆Time (sec)	∆Time (min)	∆Time (hours)
1.7500	0.011385216				
1.6667	0.011110833	63.08	5608.39	93.47	1.55
1.5833	0.0108295	63.08	5750.44	95.84	1.59
1.5000	0.010540662	63.08	5903.87	98.39	1.63
1.4167	0.010243682	63.08	6070.27	101.17	1.68
1.3333	0.009937831	63.08	6251.59	104.19	1.73
1.2500	0.009622264	63.08	6450.20	107.5	1.79
1.1667	0.00929599	63.08	6669.04	111.15	1.85
1.0833	0.00895784	63.08	6911.79	115.19	1.91
1.0000	0.008606414	63.08	7183.14	119.71	1.99
0.9167	0.008240014	63.08	7489.22	124.82	2.08
0.8333	0.007856545	63.08	7838.11	130.63	2.17
0.7500	0.007453373	63.08	8240.84	137.34	2.28
0.6667	0.007027108	63.08	8712.87	145.21	2.42
0.5833	0.006573257	63.08	9276.71	154.61	2.57
0.5000	0.006085654	63.08	9966.62	166.11	2.76
0.4167	0.005555416	63.08	10838.06	180.63	3.01
0.3333	0.004968916	63.08	11988.09	199.8	3.33
0.2500	0.004303207	63.08	13607.09	226.78	3.77
0.1667	0.003513554	63.08	16140.53	269	4.48
0.0833	0.002484458	63.08	21034.74	350.57	5.84
0.0700	0.002277043	10.09	4239.55	70.65	1.17
0.0600	0.002108132	7.57	3452.54	57.54	0.95
0.0500	0.001924453	7.57	3754.41	62.57	1.04
0.0400	0.001721283	7.57	4152.79	69.21	1.15
0.0300	0.001490675	7.57	4713.63	78.56	1.3
0.0200	0.001217131	7.57	5591.24	93.18	1.55
0.0100	0.000860641	7.57	7286.65	121.44	2.02
0.0090	0.000816476	0.76	902.73	15.04	0.25
0.0080	0.000769781	0.76	954.44	15.9	0.26
0.0070	0.000720064	0.76	1016.21	16.93	0.28
0.0060	0.00066665	0.76	1091.78	18.19	0.3
0.0050	0.000608565	0.76	1187.25	19.78	0.32
0.0040	0.000544317	0.76	1313.22	21.88	0.36
0.0030	0.000471393	0.76	1490.58	24.84	0.41
0.0020	0.000384891	0.76	1768.10	29.46	0.49
0.0010	0.000272159	0.76	2304.24	38.4	0.64
	Total Vol.	**1323.99**		**Total Hours**	**62.92**

*Q_{max}

IMP 'B' Pervious Pavers

Calculations for Basin B.2 Self-Retaining Designation

For Basin B.2 to be categorized as a self-retaining DMA per SD-6B of Section 5.2.3 of the BMP Manual, the total drainage area to area of permeable pavement needs to be 1.5:1 or less. The pavers in Basin B.2 comprise all of the drainage area, for a 1:1 ratio and satisfying the self-retaining criteria.

Calculations below support DMA's compliance with hydromodification requirements.

Volume Required for Storage in Basin B.2 for hydromod compliance: **101.16 ft²**

Surface area provided by pervious pavers: **2,810 ft²**

Required depth of storage area to meet required volume of 101.16 ft²:

$$Depth = \frac{101.16\ ft^3}{0.4\ (void\ ratio)} * \left(\frac{1}{2{,}810\ ft^2}\right) * \left(\frac{12\ in}{1\ ft}\right) = 1.08\ inches$$

Infiltration Rate provided by Perc Test performed 14 June, 2017: **0.031 in/hr**

Drawdown Time for proposed pervious pavers storage section:

$$Drawdown\ Time = \frac{1.08\ inches}{0.031\ in/hr} = 34.84\ hours < 36\ hours$$

Therefore, due to the storage area's ability to draw down the 1.08 inches needed for storage volume in the required 36 hours, the basin satisfies hydromodification flow control measures. As a result of the DMA's pavers to drainage area ratio, it is successfully designated as a self-retaining DMA per the City of San Diego BMP Manual section 5.2.3 Self-Retaining DMAs via Qualifying Site Design BMPs.

ATTACHMENT 3
STRUCTURAL BMP MAINTENANCE INFORMATION

This is the cover sheet for Attachment 3.

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Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 3a	Structural BMP Maintenance Thresholds and Actions (Required)	☑ Included See Structural BMP Maintenance Information Checklist.
Attachment 3b	Maintenance Agreement (Form DS-3247) (when applicable)	◯ Included ◯ Not Applicable

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

Preliminary Design / Planning / CEQA level submittal:

- Attachment 3a must identify:
  - ☐ Typical maintenance indicators and actions for proposed structural BMP(s) based on Section 7.7 of the BMP Design Manual
- Attachment 3b is not required for preliminary design / planning / CEQA level submittal.

Final Design level submittal:

Attachment 3a must identify:

- ☑ Specific maintenance indicators and actions for proposed structural BMP(s). This shall be based on Section 7.7 of the BMP Design Manual and enhanced to reflect actual proposed components of the structural BMP(s)
- ☑ 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)
- ☑ When applicable, frequency of bioretention soil media replacement.
- ☑ 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

Attachment 3b: For private entity operation and maintenance, Attachment 3b 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 3A

Maintenance Plan

Bodas Residence

Treatment BMP Maintenance Plan for Vegetated BMPs

Typical Maintenance Indicator(s) for Vegetated BMPs	Maintenance Activities
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation.
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.
Overgrown vegetation	Mow or trim as appropriate, but not less than the design height of the vegetation per original plans when applicable (e.g. a vegetated swale may require a minimum vegetation height).
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the City Engineer shall be contacted prior to any additional repairs or reconstruction.
Standing water in vegetated swales	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, loosening or replacing top soil to allow for better infiltration, or minor re-grading for proper drainage. If the issue is not corrected by restoring the BMP to the original plan and grade, the City Engineer shall be contacted prior to any additional repairs or reconstruction.
Standing water in bioretention, biofiltration with partial retention, or biofiltration areas, or flow-through planter boxes for longer than 96 hours following a storm event*	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains (where applicable), or repairing/replacing clogged or compacted soils.
Obstructed inlet or outlet structure	Clear obstructions.
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable.
*These BMPs typically include a surface ponding layer as part of their function which may take 96 hours to drain following a storm event.	

- **Access of Structural BMPs for Inspection and Maintenance**

    - The biofiltration basin consisting of vegetated area is 757 ft^2. A concrete inlet will be installed within this basin with its rim elevated 0.50' above the surface.
    - The inlet should be visible from the surface and can be accessed through the grate.
    - The biofiltration basin is accessible from the hillside gate adjacent to Country Club Drive, or through the hardscape in the rear yard.

- **Maintenance Thresholds**

    - Any grasses within the biofiltration area shall be cut when in excess of 4" tall.
    - Debris & sediment shall be cleared from the basin when 2" have accumulated.
    - Any amount sediment or debris accumulation observed within the overflow inlet shall be removed when seen.
    - During routine landscape maintenance activities, if bare areas or erosion are observed they shall be re-seeded.
    - If standing water is observed for longer than 24-hours the soil media shall be inspected for clogging and cleaned.

- **Biofiltration Soil Media Replacement**

    - Soil media within the biofiltration area shall be replaced when the filtration rate drops below 5"/hour if regular maintenance cannot restore this rate.

- **Recommended Maintenance Equipment**

    - Equipment needed for maintenance will typically include those needed for routine landscape maintenance:

        - Hand Shovels
        - Wheel barrows
        - Lawn mower
        - Hedge clippers
        - Other

- **Special Training**

    - Maintenance and inspection activities required are typical for routine landscape maintenance. No special training required.

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

Vinit Bodas
16 Greenbriar Lane
Greenwich, CT 06831

(THIS SPACE IS FOR THE 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:
6947 Country Club Dr., La Jolla CA 92037 (APN 352-280-05)

(PROPERTY ADDRESS)

and more particularly described as:

PORTIONS OF LOT 5 & 6 IN LA JOLLA COUNTRY CLUB ESTATES

(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 BMP's] prior to the issuance of construction permits. The Maintenance Agreement is intended to ensure the establishment and maintenance of Permanent Storm Water BMP's onsite, 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 or engineering 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 BMP's, 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 BMP's within their property, according to the OMP guidelines as described in the attached exhibit(s), the project's WQTR 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 Exhibits(s):

_____
(Owner Signature)

_____
(Print Name and Title)

_____
(Company/Organization Name)

_____
(Date)

THE CITY OF SAN DIEGO

APPROVED:

_____
(City Control engineer Signature

_____
(Print Name)

_____
(Date)

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

ATTACHMENT 4
COPY OF PLAN SHEETS SHOWING PERMANENT STORM WATER BMPS

This is the cover sheet for Attachment 4.

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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.

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ATTACHMENT 5
DRAINAGE REPORT

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

COFFEY ENGINEERING, INC.

Drainage Study

Bodas Residence
6947 Country Club Dr., La Jolla, CA 92037

APN 352-280-05

Project Information:

Owner: Vinit Bodas
Bodas 2001 Trust
16 Greenbriar Lane
Greenwich, CT 06831
Developer: Martin Architecture

September

9666 Businesspark Avenue, Suite 210 San Diego, CA 92131 Phone: (858)831-0111 Fax: (858)831-0179

Table of Contents

1. **Existing Conditions**

The 34, 951 SF (0.802-acre) site consists of a previously developed lot totaling 7,259 SF of impervious area and 27,602 SF of pervious landscaping. The entire site (Basin X), sheet flows west to Country Club Dr. In addition to the site, approximately 5,832 SF of pervious vegetated area contributes run-on to the site from the east hillside. See Drainage Map 'A'.

2. **Proposed Project**

Proposed is the construction of a 5,687 SF single-family residence. Site improvements include retaining walls, impervious surface walkways, and pervious paver driveway. Proposed landscaping consists of the implementation of a biofiltration basin for stormwater treatment and hydromod compliance.

3. **Purpose and Scope of Report**

This report will evaluate the existing and water run-off flow patterns and flow rate characteristics for the project site. All calculations are for a 100-year expected storm event.

4. **Method of Calculations**

The Rational Method, as defined by *County of San Diego Hydrology Manual (2003)*, will be used to calculate storm water flow rates. Where noted, the following calculations were used to determine flow properties:

<u>Rainfall Characteristics</u>

$Q = C * I * A$, where

Q = Flow rate (ft^3/sec)
C = Runoff coefficient
(Runoff coefficient per County of San Diego Hydrology Manual Table 3-1 reproduced in Appendix C. Soil type D determined from the *Soil Hydrologic Groups* map from the County of San Diego Hydrology Manual reproduced in Appendix C also.)
I = Rainfall intensity (in/hr.)
A = Area (acres)

<u>Rainfall Intensity (per County of San Diego Hydrology Manual Figure 3-1 reproduced in Appendix C)</u>

$I = 7.44 * P_6 * D^{-0.645}$, where

I = Rainfall intensity (in/hr.)
P_6 = Adjusted 6-hour precipitation (inches)
D = Storm duration (min), equal to T_c for time-of-concentration storms

Tc = Ti+Tt+Tp (time-of-concentration), where
Ti=Over land initial time.
Tt=Travel time on natural watersheds.
Tp=Travel time on drainage structures (pipes, brow ditch, gutter etc.)

Overland Time of Flow (per County of San Diego Hydrology Manual Figure 3-3 reproduced in Appendix C)

$Ti = 1.8(1.1-C)\, D^{0.50} / (\, s^{0.33})$ (Overland initial time of concentration formula), where

D= Watercourse Distance (feet)(see table 3-2 for the max. overland flow length)
s = Slope (%)
C= Runoff Coefficient
Ti=Initial time of concentration (min.)

5. **Results and Conclusions:**

In the existing conditions, the site (including run-on) discharges a flow of 1.73 cfs west to Country Club Dr., where it is collected by a storm water inlet approximately 125' north of the site and ultimately discharged to the Pacific Ocean.

Post-construction conditions replicate the existing flow pattern, and feature a flow rate of 1.97 cfs. This increase of 0.24 cfs can be attributed to an increase in the impervious area on-site, and will require water attenuation for hydromodification compliance.

In response to this a 757 SF biofiltration basin w/ partial retention will store and release site runoff at the low flow threshold of 0.014 cfs. This mitigated flow will discharge to a proposed private storm drain line that will outlet to Country Club Dr. via a D-25 curb outlet.

This will result in a reduction of runoff in the mitigated flow condition, from 1.97 cfs, to 0.870 cfs. The mitigated flow rate will be a decrease of 0.86 cfs from existing conditions.

The D-25 curb outlet will handle non-mitigated flows of 1.30 cfs (24.37 fps), and 0.205 cfs (14.18 fps) in the mitigated condition. Flows will exit the hillside discharge pipe into the D-25 curb outlet at an angle to reduce velocities prior to entering the street.

6. **Exemption from CWA Section 401/404:**

The proposed project is exempt from permitting under Federal Clean Water Act section 401 or 404 because it does not directly discharge into navigable waters of the United States. The project will convey storm water runoff to a City of San Diego storm drain inlet.

7. **Declaration of Responsible Charge**

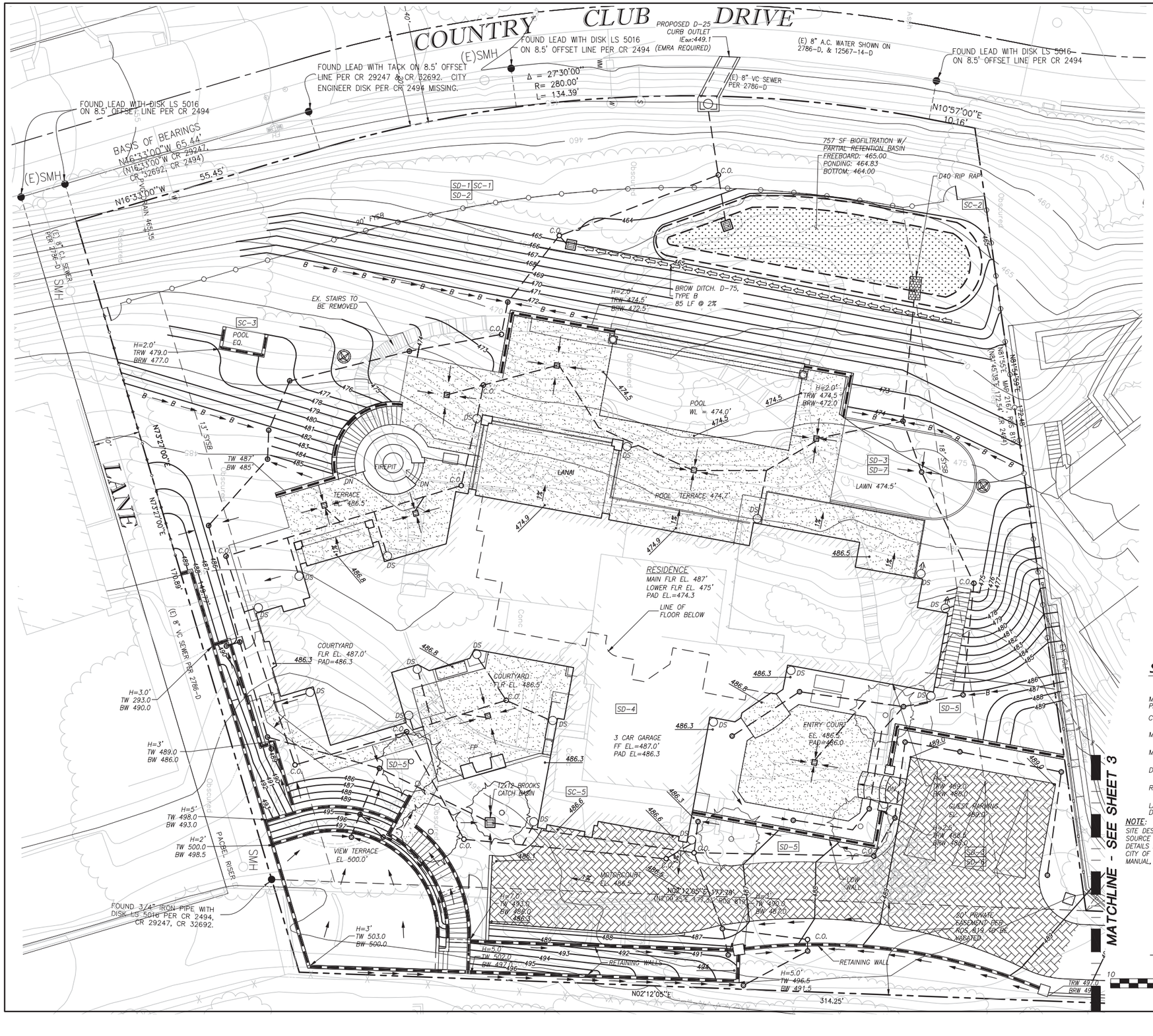
I hereby declare that I am the Civil Engineer of work for this project, that I have exercised responsible charge over the design of the project as defined in section 6703 of the business and professions code, and that the design is consistent with current design.

I understand that the check of project drawings and specifications by the County of San Diego is confined to a review only and does not relieve me, as Engineer of Work, of my responsibilities for project design.

_____ _____

Michael Kinnear Date
RCE 76785
Exp. 12-31-18

Appendix A –Reference Plans Drainage Maps



LEGEND

DESCRIPTION	STD DWG	SYMBOL
PROPERTY LINE		N45°45'45"W
PROPERTY LINE – OFFSITE		N45°45'45"W
ROW CENTERLINE		℄
EXISTING CONTOUR		90
PROPOSED CONTOUR		90
EASEMENT LINE		
EXISTING SEWER LINE		S
EXISTING WATER MAIN		W
BRUSH LINE		
EXISTING SPOT ELEVATION		1510.0 x
EX. TREE; EX. PALM		
EX. WATER SERVICE		W
EX. SEWER SERVICE		S
PR SPOT ELEVATION		100.00
DRAINAGE SWALE OR DIRECTION OF FLOW		
6" PVC DRAIN LINE		
6" LANDSCAPE DRAIN		
6" PVC CLEANOUT		
RETAINING WALL		
CMU STEMWALL WALL		
BUILDING FOOTPRINT		
BERM SWALE		B
4" DOWNSPOUT		DS
PERMEABLE PAVERS		
BROW DITCH	SDRSD D-75	

ABBREVIATIONS

AC	ASPHALTIC CONCRETE	FL	FLOWLINE
BRW	(GRADE AT) BOTTOM OF RETAINING WALL	H	HIGH; HEIGHT
CB	CATCH BASIN	HP	HIGH POINT
℄; CL	CENTER LINE	IE	INVERT ELEVATION
C.I.	CAST IRON	(P); PR	PROPOSED
CO	CLEANOUT	PCC	PORTLAND CEMENT CONCRETE
CONC.	CONCRETE	PLTR; PA	PLANTER/PLANTING AREA
DS	DOWNSPOUT	S	SEWER
(E); EX.	EXISTING	SD	STORM DRAIN
EL	ELEVATION	TC	TOP OF CURB
FF	FINISH FLOOR	TRW	(GRADE AT) TOP OF RET. WALL
FH	FIRE HYDRANT	W	WATER
		WM	WATER METER

CIVIL ENGINEER:

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

REGISTERED PROFESSIONAL ENGINEER JOHN S. COFFEY No. C062716 CIVIL STATE OF CALIFORNIA

PRELIMINARY

JOHN S. COFFEY RCE 062716 DATE

SITE DESIGN BMPS

DESCRIPTION	SYMBOL
MAINTAIN NATURAL DRAINAGE PATHWAYS & HYDROLOGICAL FEATURES	SD-1
CONSERVE NATURAL AREAS	SD-2
MINIMIZE IMPERVIOUS AREAS	SD-3
MINIMIZE SOIL COMPACTION	SD-4
DISPERSE IMPERVIOUS AREAS	SD-5
RUNOFF COLLECTION	SD-6
LANDSCAPE WITH NATIVE OR DROUGHT TOLERANT SPECIES	SD-7

SOURCE CONTROL BMPS

DESCRIPTION	SYMBOL
PREVENT ILLICIT DISCHARGES INTO THE MS4	SC-1
STORM DRAIN STENCILING OR SIGNAGE	SC-2
PROTECT OUTDOOR MATERIALS STORAGE AREAS	SC-3
PROTECT TRASH STORAGE AREAS FROM RAINFALL, RUN-ON, RUNOFF, AND WIND DISPERSAL	SC-5

NOTE:
SITE DESIGN BMP (LOW IMPACT DEVELOPMENT (LID)), SOURCE CONTROL BMP, AND SITE MANAGEMENT BMP DETAILS AND EXPLANATIONS CAN BE FOUND IN THE CITY OF SAN DIEGO STORM WATER STANDARDS MANUAL, JANUARY 2016.

GRADING/ DRAINAGE PLAN

CITY OF SAN DIEGO, CALIFORNIA

COASTAL DEVELOPMENT PERMIT

BODAS RESIDENCE

6947 Country Club Drive
La Jolla, CA 92037

REVISIONS	ORIGINAL 07/10/17

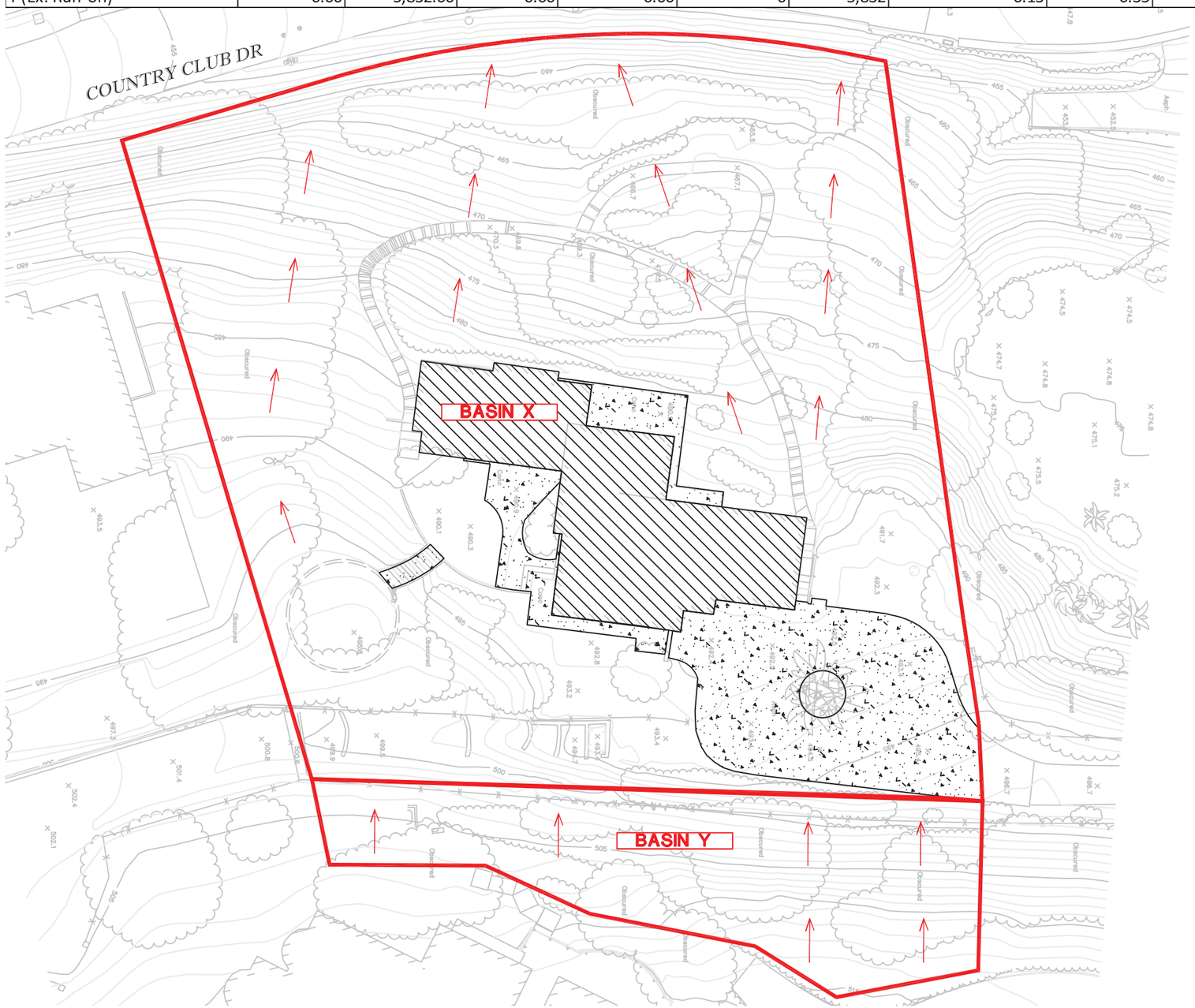
PRELIMINARY GRADING PLAN — C.2

DRAWN BY: G. Carr
CHECKED BY: J. Coffey

SHEET 2 OF 3

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

DMA	Impervious Area	Pervious Area	Permeable Paving	Biofiltration Area	Pool/Water Feature	Total (SF)	Total (AC)	C-Value*	Percent Impervious
X (Ex. sheet flow off-site)	7,259.00	27,602.00	0.00	0.00	0	34,861	0.80	0.47	20.82%
Y (Ex. Run-on)	0.00	5,832.00	0.00	0.00	0	5,832	0.13	0.35	0.00%



LEGEND

DESCRIPTION	SYMBOL
PROPERTY LINE	
EXISTING CONTOUR	90
DIRECTION OF FLOW	
SITE BASIN LIMIT	

N

SCALE: 1"=30'

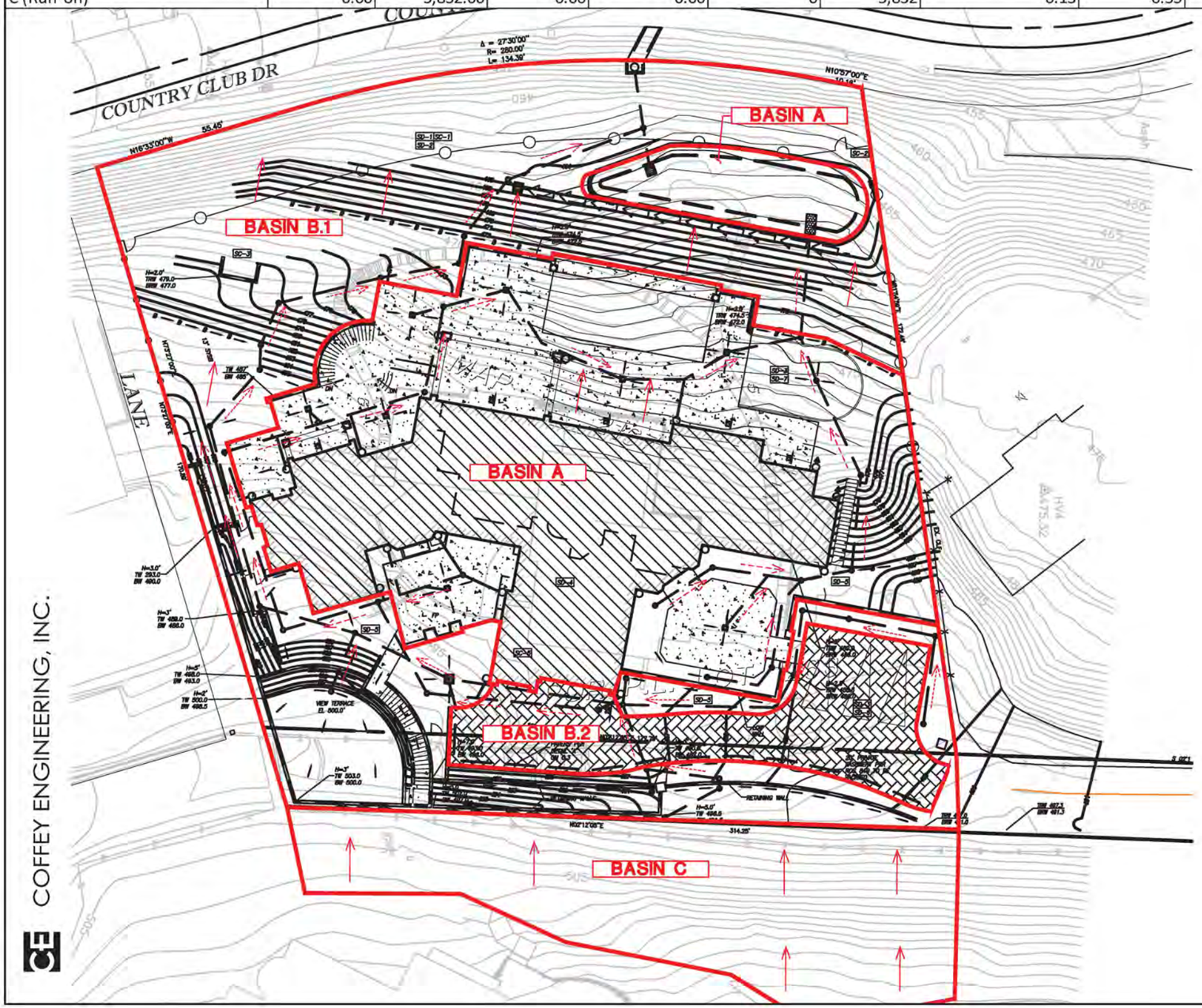
BODAS RESIDENCE

6947 Country Club Dr., La Jolla CA 92037

DRAINAGE MAP 'A'
EXISTING CONDITIONS
SCALE: 1"=30'

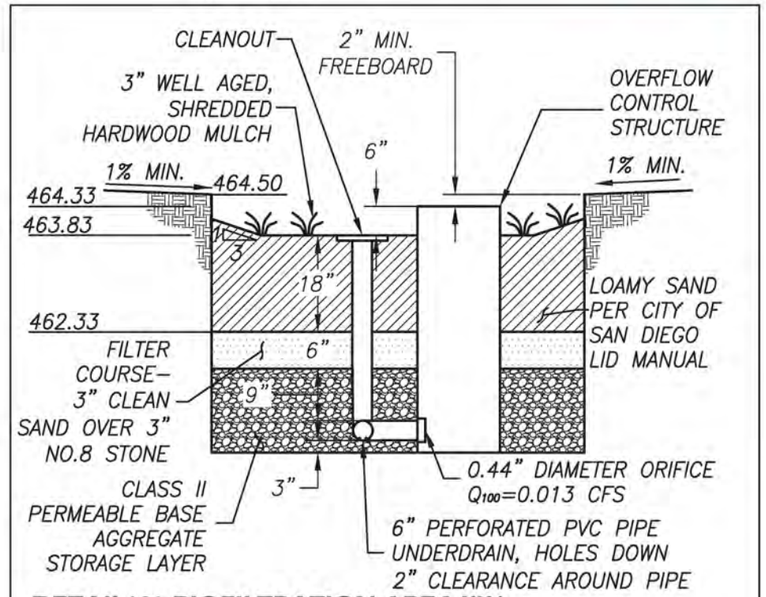
COFFEY ENGINEERING, INC.

DMA	Impervious Area	Pervious Area	Permeable Paving	Biofiltration Area	Pool/Water Feature	Total (SF)	Total (AC)	C-Value*	Percent Impervious
A (Drains to Biofiltration)	11,209.00	3,256.00	0.00	757.00	670.00	15,892	0.36	0.75	70.53%
B.1 (Self-mitigating)	265.00	15,984.00	0.00	0.00	0	16,249	0.37	0.35	1.63%
B.2 (Self-retaining)	0.00	0.00	2,810.00	0.00	0	2,810	0.06	0.40	0.00%
C (Run-on)	0.00	5,832.00	0.00	0.00	0	5,832	0.13	0.35	0.00%



LEGEND

DESCRIPTION	SYMBOL
PROPERTY LINE	
EXISTING CONTOUR	90
DIRECTION OF SHEET FLOW	
SITE BASIN LIMIT	
DIRECTION OF PIPE FLOW TO BIOFILTRATION	
DIRECTION OF PIPE FLOW TO STREET	



DETAIL 'A'-BIOFILTRATION AREA W/ PARTIAL RETENTION (IMP 'A') - TYPICAL SECTION

NOT TO SCALE

N

SCALE: 1"=30'

BODAS RESIDENCE

6947 Country Club Dr., La Jolla CA 92037

DRAINAGE MAP 'B'
PROPOSED CONDITIONS
SCALE: 1"=30'

COFFEY ENGINEERING, INC.

Appendix B –Calculation/Evaluations

100 Year Storm

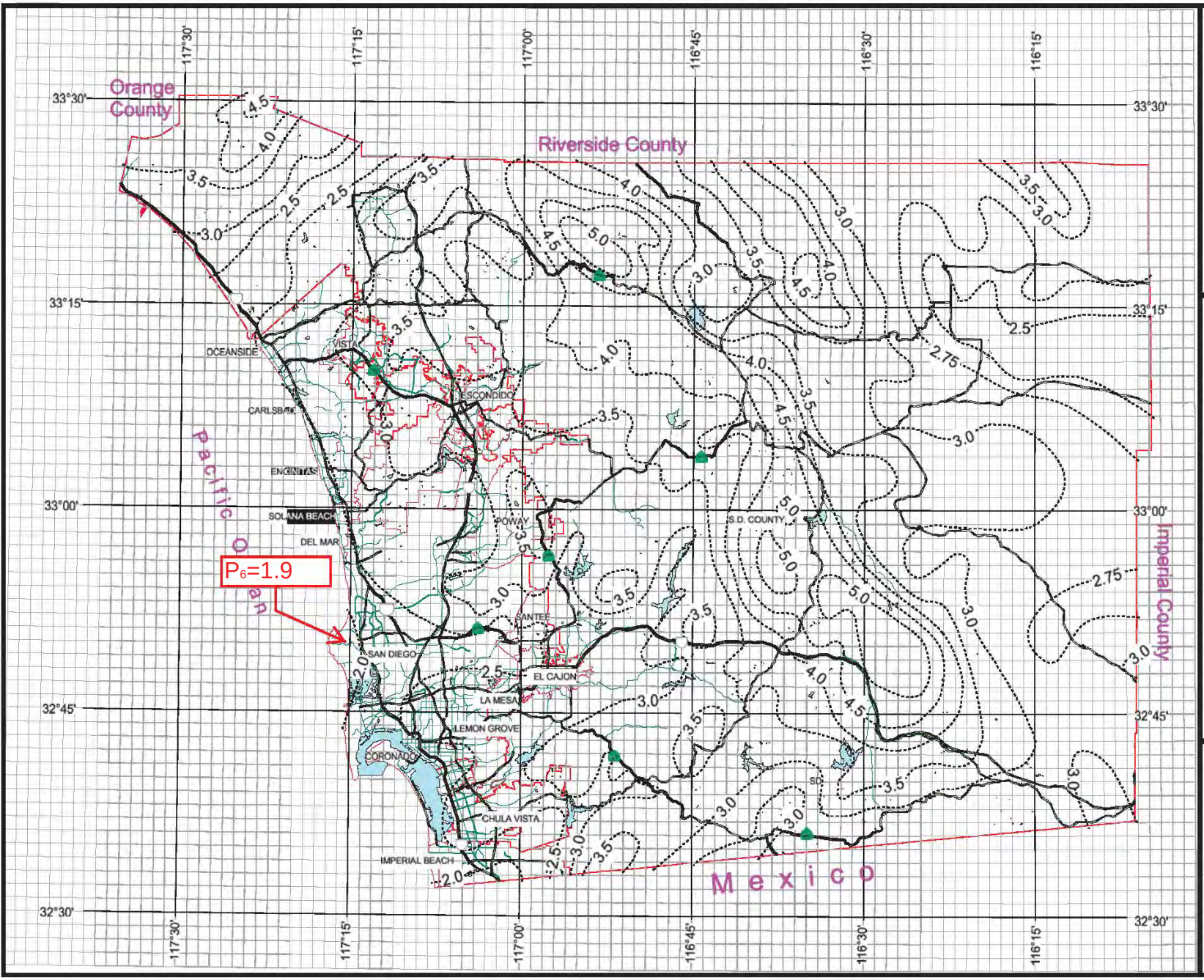
Table B - Pre Construction Flow Conditions							
		Summary					
Flow ID (Basin)	Runoff Coefficient, C	(5 min minimum) Total time-of-concentration, T_c (min)	Rainfall Intensity, I (in/hr)	Basin Area, A (acres)	**Q (cfs)**	Flow ID (Basin)	Flow Description
X	0.47	5.00	4.10	0.800	**1.54**	X	Ex. sheet flow off-site
Y	0.35	5.00	4.10	0.134	**0.19**	Y	Ex. Run-on
				Sum =	1.73		

Table B - Post Construction Flow Conditions						Table B - Hydraulics of Proposed Structures	
		Summary					
Flow ID (Basin)	Runoff Coefficient, C	(5 min minimum) Total time-of-concentration, T_c (min)	Rainfall Intensity, I (in/hr)	Basin Area, A (acres)	**Q (cfs)**	Flow ID (Basin)	Flow Description
A	0.75	5.00	4.10	0.365	**1.12**	A	Drains to Biofiltration
B.1	0.35	5.00	4.10	0.373	**0.54**	B.1	Self-mitigating
B.2	0.40	5.00	4.10	0.065	**0.11**	B.2	Self-retaining
C	0.35	5.00	4.10	0.134	**0.19**	C	Run-on
				Sum =	1.96		

	Pre-Construction (CFS)	Post-Construction (Non-Mitigated) (CFS)	Post-Con (Mitigated)** (CFS)
Site Discharge	1.73	1.96	0.74

**** Post-Construction site discharge is calculated by taking the site discharge (including run-on) and subtracting the basin contributing to the storage device (Basin A), as well as the self-retaining area (Basin B.2). Using the orifice discharge equation in Attachment 2, the orifice flow rate of Basin A is then added to the remaining site flow rate to calculate the total mitigated flow rate discharging to the street.**

Appendix C –Reference Tables & Figures (County of San Diego Hydrology Manual)



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

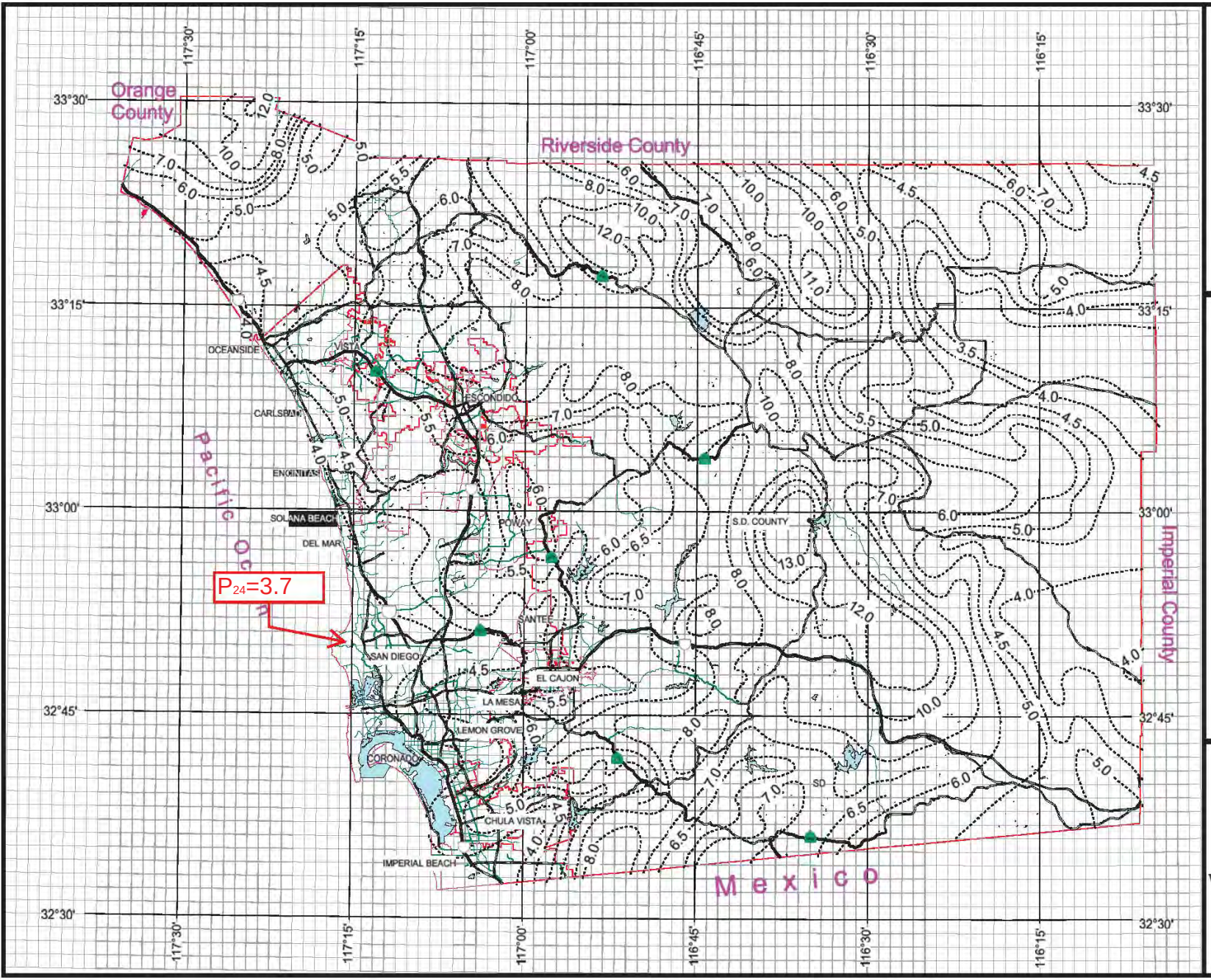
Isopluvial (inches)

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N W E S

3 0 3 Miles



County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

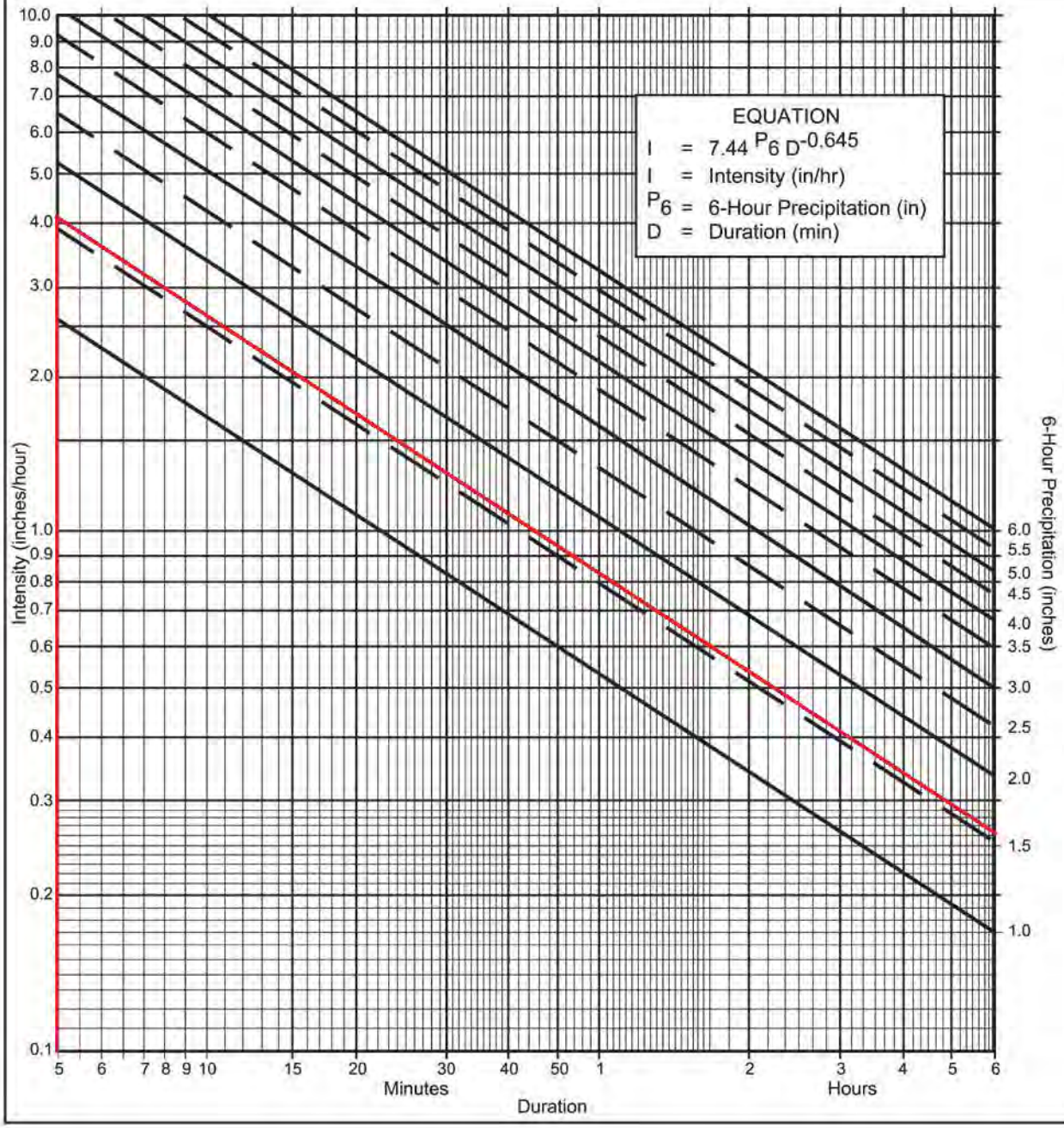
Isopluvial (inches)

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N W E S

3 0 3 Miles



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 1.9 year

(b) P_6 = 1.9 in., P_{24} = 3.7, $\frac{P_6}{P_{24}}$ = 51 %(2)

(c) Adjusted P_6(2) = 1.9 in.

(d) t_x = 5 min.

(e) I = 4.1 in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

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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.

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

14 June 2017

Mr. Vinit Bodas
11 Greenbriar Lane
Greenwich, CT 06831

Job No. 13-10289

Subject: **Report of Limited Geotechnical Investigation**
Proposed Storm Water Infiltration BMPs
Bodas Property
6947 Country Club Drive
La Jolla, California

Dear Mr. Bodas:

In accordance with your request, and our proposal dated February 2, 2017, we herein provide this limited geotechnical investigation report to allow evaluation of the feasibility of utilizing storm water infiltration BMPs for a bio-filtration basin, at the location of the subject site in La Jolla. On May 5, 2017, we placed two test pits on the lot for evaluation of subsurface soil infiltration, per the requirements of the City of San Diego's BMP Design Manual in accordance with Appendix C of their Guidelines for Geotechnical Reports, and Appendix D, Approved Infiltration Rate Assessment Methods.

I. PROJECT SUMMARY AND SCOPE OF SERVICES

It is our understanding that the existing property will be developed to receive a new single-family residence and associated improvements. The property is currently developed with a single-story residential structure and associated improvements. We have reviewed the *"Grading/Drainage Plan"* of the property prepared by Coffey Engineering, dated May 1, 2017. In addition, we have also reviewed our *"Update*

Report of Preliminary Geotechnical and Geologic Investigation" of the subject site dated May 8, 2017.

The scope of work performed for this investigation included a site reconnaissance and subsurface exploration program, laboratory testing, simple open pit falling head testing within the location of the proposed bio-filtration basins, and the preparation of this report. The data obtained and the analyses were performed to allow evaluation of the feasibility of storm water infiltration BMPs.

II. SITE DESCRIPTION

The project is located on Country Club Drive in the La Jolla area of the City of San Diego. The subject site is known as Assessor's Parcel No. 352-280-05, Lot 5 of La Jolla Country Club Estates per Recorded Map 2167 in the City and County of San Diego, State of California. It is currently addressed as 6947 Country Club Drive. Refer to the Vicinity Map, Figure No. I, for the location of the site.

The bio-filtration basin is proposed to the west of the existing residential structure, in the northwest portion of the property. The lot consists of a west-facing, moderately to steeply sloping hillside, with intermittently incised east/west trending (westerly draining) drainage canyons. The site exists today as a primarily cut lot bounded to the north by an existing residential property at a lower elevation; to the south by a similar residential property; to the west by an approximately 40- to 50-foot-high, west-facing slope that descends to Country Club Drive at its downslope terminus; and to the east by a west-facing, approximately 5- to 8-foot-high ascending cut slope that abuts a relatively large residential property, Fox Hill Estate, along its upslope terminus. The existing building pad is relatively level at an elevation of approximately 487 feet above Mean Sea Level (MSL). The existing

level pad is approximately 37 feet higher than Country Club Drive. The bio-filtration basin project is planned for the western side of the new development with a surface elevation of elevation of 464 feet above MSL.

III. FIELD INVESTIGATION

Our prior exploratory work at the site, as described in our referenced report, included advancement of one large-diameter boring to a depth of 75.5 feet and six small-diameter borings ranging from 3 to 6 feet in depth.

Our recent limited field investigation consisted of a surface reconnaissance and a subsurface exploration program using hand tools to investigate, sample and perform infiltration testing of the subsurface soils. Two exploratory hand-excavated pits were advanced within or adjacent to the proposed bio-filtration basin area on May 5, 2017. The pits were advanced to depths of 37 and 36 inches with a diameter of 2 feet. The soils encountered in the exploratory excavations were continuously logged in the field by our representative and described in accordance with the Unified Soil Classification System. The approximate locations of the exploratory excavations and simple open pit testing (INF-1 and INF-2) are shown on the Site Plan, Figure No. II.

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

IV. SOIL DESCRIPTION

Our recent subsurface exploration program (INF-1 and INF-2) revealed that the storm water bio-filtration basin area is underlain by Tertiary-age Ardath Shale Formation. The encountered materials consisted of loose clayey sand/sandy clay artificial fill soils to approximately 1 foot, underlain by firm to stiff sandy clay topsoil/slopewash soils from approximately 1 to 2 feet. Firm to stiff, sandy clay formational soils of the Ardath Shale were encountered underlying the topsoil/slopewash soils at approximately 2 feet. Soil conditions encountered in both excavations were similar. Refer to the Excavation Logs, Figure No. III.

These recently dug pits and related information depict subsurface conditions only at the specific locations shown on the site plan and on the particular date of the investigation. The passage of time may result in changes in the subsurface conditions due to environmental changes.

IV. LABORATORY TESTS AND SOIL INFORMATION

The following test was conducted on the sampled soils:

1. *Determination of Percentage of Particles Passing #200 Sieve (ASTM D1140-06)*

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. Based on our laboratory test results at

infiltration test locations INF-1 and INF-2, 87 and 80 percent of the soils passed the #200 sieve, respectively.

V. GROUNDWATER

Free groundwater was not encountered in the exploratory excavations at the time of excavation. Our prior exploratory excavations did not encounter significant groundwater to a maximum depth of exploration of 75.5 feet below the ground surface elevations. It must be noted, however, that fluctuations in the level of groundwater may occur due to extended periods of rainfall, variations in ground surface topography, subsurface stratification, and other possible factors that may not have been evident at the time of our field investigations.

VI. CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on the field investigation conducted by our firm, our laboratory test results, infiltration test results, and our experience with soils similar to those at the site.

We performed simple open pit falling head testing at two locations within or adjacent to the proposed bio-filtration basin at a depth of 37 inches at INF-1, and 36 inches at INF-2, per the requirements of the City of San Diego's Storm Water Standards, BMP Design Manual, in accordance with Appendix D. Testing at both locations, (INF-1 and INF-2), revealed falling head rates of 240 and 0.0 (head did not fall) minutes/inch, respectively. The simple open pit test rate results for INF-1 and INF-2 have been converted to infiltration rates, using the Porchet Method and indicate infiltration rates of 0.1240- and 0.000-inch/hour, respectively. Refer to Appendix A for simple open pit test rate results and simple open pit infiltration rate

calculations. Based on the results of our simple open pit testing and review of USDA soil maps, the site has been assigned to hydrologic soil group (HSG) D. As part of our geologic/geotechnical site evaluation, we considered the following issues:

1. The site is ***not*** subject to high groundwater conditions (within 10 feet of the base of the bio-retention facility).

2. The site is ***not*** in close proximity to a known contaminated soil site.

3. The site does ***not*** have any significant thicknesses of artificial fill believed to exist in the area of the currently planned project. Most of the site consists of Tertiary-age Ardath Shale Formation deposits near the ground surface. Per our referenced report existing fill soils are to be removed and recompacted (if required) as part of the new site development.

4. The site ***has*** an infiltration rates of 0.124- and 0.000-inch/hour, without a factor of safety applied.

5. Based on our *"Report of Preliminary Geologic and Geotechnical Investigation"* for the subject site dated October 25, 2016, the laboratory soil testing and our experience suggest indicate expansion indices ranging from medium to high for the encountered site formational soils.

6. The site ***is not*** located within 100 feet from a drinking water well.

7. The site ***is not*** located within 100 feet from an on-site septic system or designated expansion area.

8. The site ***is*** located adjacent to a slope steeper than 25 percent.

9. The site ***is*** located within hazard category 22, possible or conjectured landslide, however, the questionable landslide was not encountered during our geotechnical investigation conducted on March 28, 2013.

Based on the results of our simple open pit falling head testing and evaluation of the infiltration rates, it is our professional opinion that the proposed bio-filtration basin does not have appreciable infiltration rates for the design of full infiltration BMPs on the western portion of the lot. However, the recorded infiltration rates do allow for the design of very minor partial infiltration. Therefore, we recommend the recorded infiltration rates with appropriate factors of safety be applied and incorporated into the bio-filtration basin design. In addition, we recommend the sidewalls of the proposed basin be lined with impermeable liner.

VII. LIMITATIONS

The findings, opinions, and conclusions presented herein have been made in accordance with generally accepted principles and practice in the field of expressed or implied, is made.

We have reviewed our *"Update Report of Preliminary Geotechnical and Geologic Investigation"* for the subject site dated May 8, 2017, and our findings and opinions are based in part on the information provided therein. Our findings, opinions and conclusions are specifically limited to the scope of services described herein, for the evaluation and feasibility of storm water infiltration, within and immediately adjacent to, the proposed bio-filtration basin.

This opportunity to be of service is sincerely appreciated. If you have any questions regarding this letter, please contact our office. Reference to our **Job No. 13-10289** will help expedite a response to your inquiry.

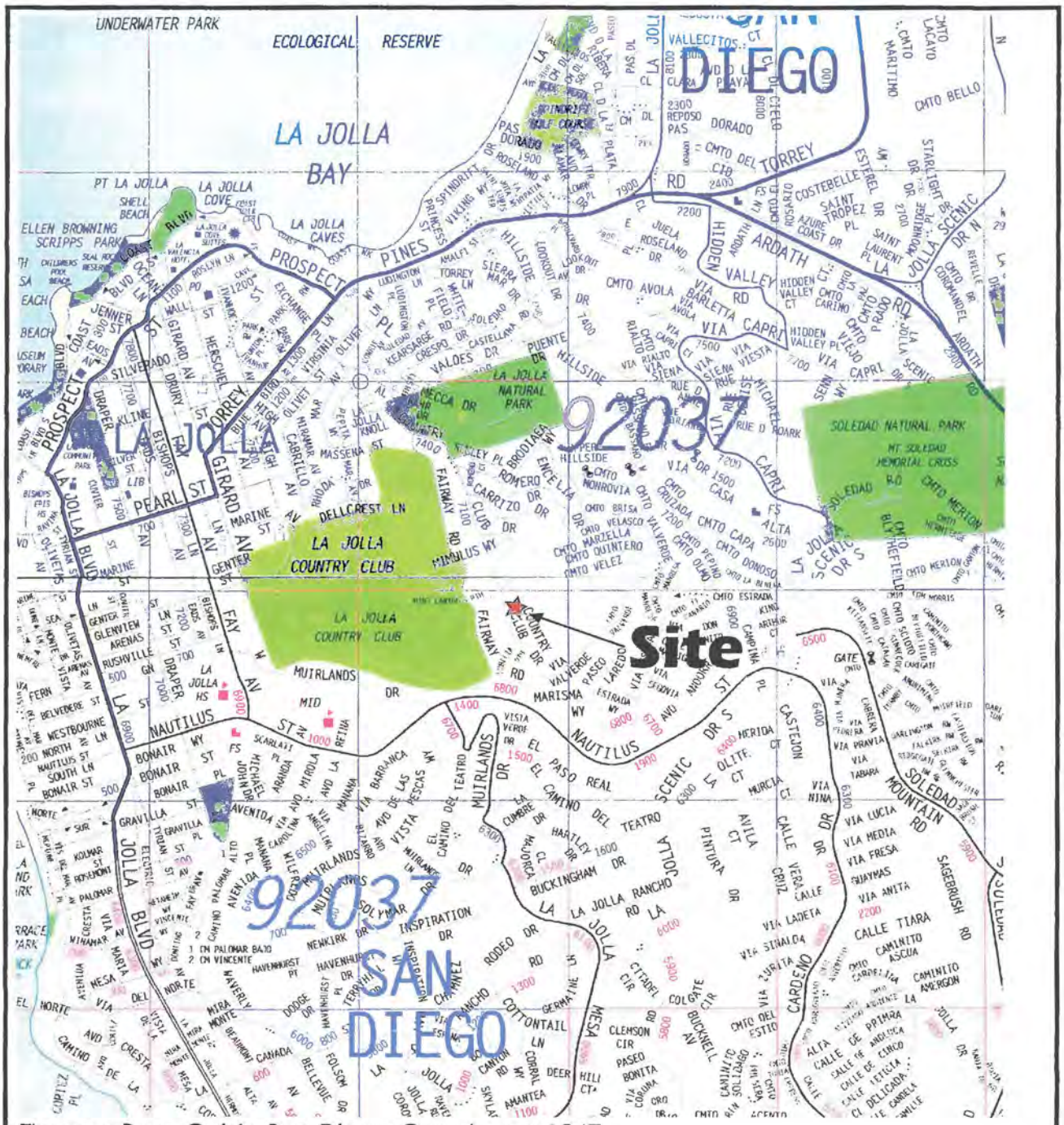
Respectfully submitted,

GEOTECHNICAL EXPLORATION, INC.

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

Jaime A. Cerros, P.E.
R.C.E. 34422/G.E. 2007
Senior Geotechnical Engineer

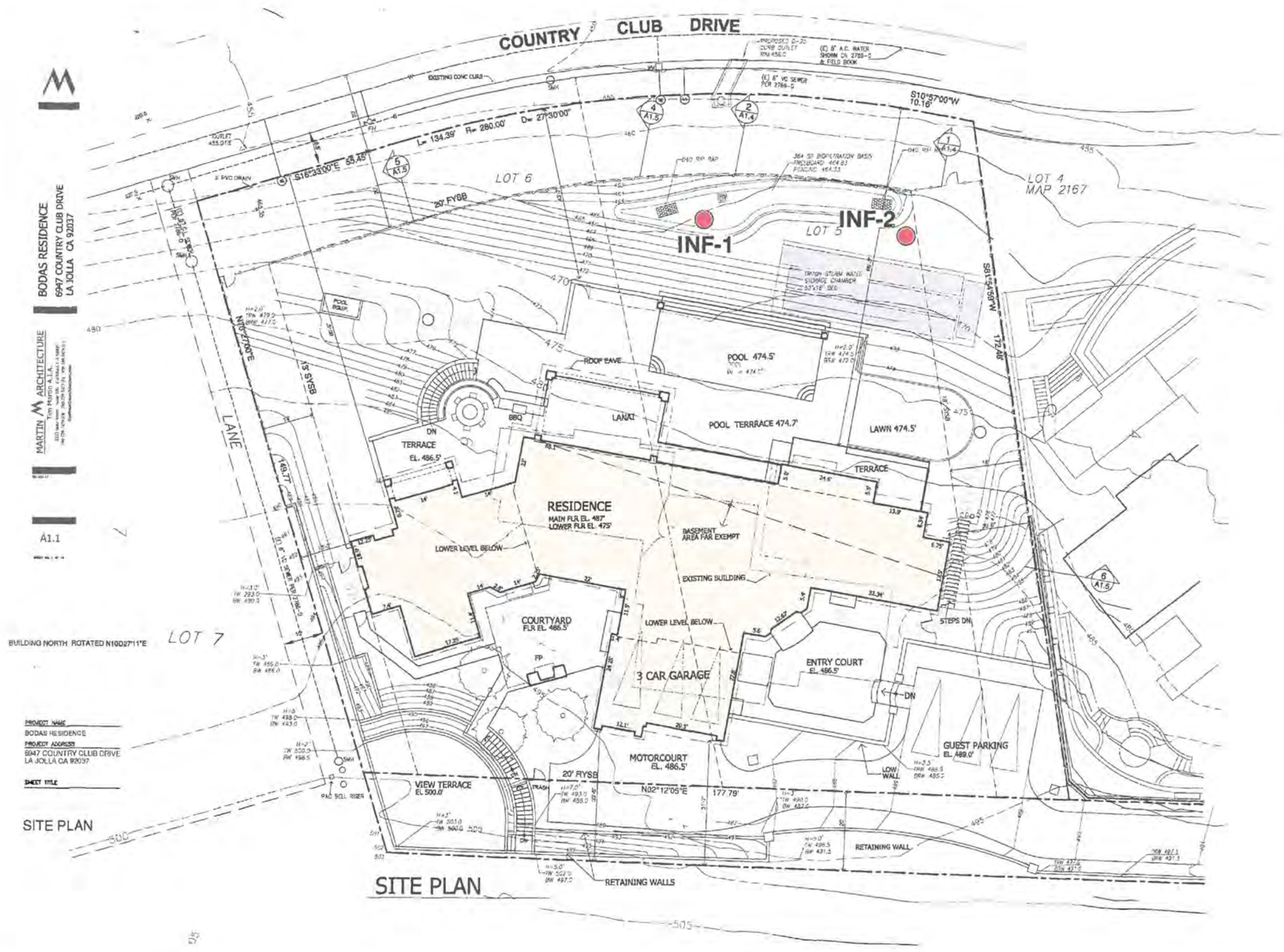
VICINITY MAP



Thomas Bros. Guide San Diego County, pg 1247

Bodas Property
6947 Country Club Drive
La Jolla, CA.

Figure No. I
Job No. 13-10289



Scale: 1" = 30'
(approximate)

REFERENCE: This Plot Plan was prepared from an existing SITE PLAN by MARTIN ARCHITECTURE dated 05-03-17 and from on-site field reconnaissance performed by GEI.

LEGEND

INF-2 Approximate Location of Infiltration Test

NOTE: This Plot Plan is not to be used for legal purposes. Locationss 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.

PLOT PLAN

Bodas Residence
6947 Country Club Drive
La Jolla, CA.
Figure No. II
Job No. 13-10289

Geotechnical Exploration, Inc.

(May 2017)

13-10289-p6.ai

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Hand Tools	2' X 2' X 3' Pit	5-5-17
SURFACE ELEVATION	**GROUNDWATER/ SEEPAGE DEPTH**	**LOGGED BY**
± 465.5' Mean Sea Level	Not Encountered	SO

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
1			**CLAYEY SAND/ SANDY CLAY**, with abundant roots and minor rock/gravel. Loose/soft. Dry. Gray-brown. **FILL (Qaf)**	SC/ CL								
			SANDY CLAY, with occasional cobbles. Firm to stiff. Dry to damp. Dark brown and yellow-brown. **TOPSOIL/ SLOPEWASH (Qsw)**	CL								
2		1	**SANDY CLAY**. Firm to stiff. Moist. Yellow-brown and gray-brown. **TOPSOIL/ SLOPEWASH/WEATHERED ARDATH SHALE FORMATION (Qsw/Ta)** – 87% passing #200 sieve.	CL								
3			Bottom @ 3'									
4												

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

JOB NAME		
Bodas Residence		
SITE LOCATION		
6947 Country Club Drive, La Jolla, CA		
JOB NUMBER	REVIEWED BY	LOG No.
13-10289	LDR/JAC	INF-1
FIGURE NUMBER	Geotechnical Exploration, Inc.	
IIIa		

EXPLORATION LOG 10289 BODAS.GPJ GEO_EXPL.GDT 6/9/17

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Hand Tools	2' X 2' X 3' Pit	5-5-17
SURFACE ELEVATION	**GROUNDWATER/ SEEPAGE DEPTH**	**LOGGED BY**
± 466.5' Mean Sea Level	Not Encountered	SO

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
			CLAYEY SAND/ SANDY CLAY, with abundant tree roots and minor rock/gravel. Loose/soft. Dry. Gray-brown. **FILL (Qaf)** -- 3/4" irrigation pipe.	SC/ CL								
1		1	**SANDY CLAY**, with occasional rock/cobble. Firm to stiff. Dry. Brown. **TOPSOIL/ SLOPEWASH (Qsw)**	CL								
2		2	**SANDY CLAY**. Firm to stiff. Moist. Dark brown and yellow-brown. **TOPSOIL/ SLOPEWASH/WEATHERED ARDATH SHALE FORMATION (Qsw/Ta)** -- 80% passing #200 sieve.	CL								
3			Bottom @ 3'									
4												

EXPLORATION LOG 10289 BODAS.GPJ GEO_EXPL.GDT 5/18/17

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

JOB NAME		
Bodas Residence		
SITE LOCATION		
6947 Country Club Drive, La Jolla, CA		
JOB NUMBER	REVIEWED BY	LOG No.
13-10289	LDR/JAC	INF-2
FIGURE NUMBER	Geotechnical Exploration, Inc.	
IIIb		

APPENDIX A

SIMPLE OPEN PIT TEST RESULTS AND INFILTRATION RATE CONVERSIONS

Simple Open Pit Test Sheet

Project Name:Bodas | Calculated By: SO | Date: 5/15/17 | Soil Classification: (CL)
Project No. 13-10289 | Checked By: | Date:
Date Excavated: 5/5/17
Test Hole No: INF-1 | Test Hole Dia: 24" | Depth of Test Hole: 37"

	Time (minutes)	Time interval	Initial water level	Final water level (inches)	Change in water (inches)	Percolation rate (min/inches)
	950	60	30.500	31.500	1.000	60.000
	1050					
	1050	60	31.000	31.500	0.500	120.000
	1150					
	1150	60	30.750	31.000	0.250	240.000
	1250					

Simple Open Pit Test Sheet

Project Name:Bodas
Project No. 13-10289
Date Excavated: 5/5/17
Test Hole No: INF-2

Calculated By: SO
Checked By:

Test Hole Dia: 24"

Date: 5/15/17
Date:

Depth of Test Hole: 36"

Soil Classification: (CL)

	Time (minutes)	Time interval	Initial water level	Final water level (inches)	Change in water (inches)	Percolation rate (min/inches)
	1000	60	30.000	30.000	0.000	0.000
	1100					
	1100	60	30.000	30.000	0.000	0.000
	1200					
	1200	60	30.000	30.000	0.000	0.000
	100					

Simple Open Pit Rate to Infiltration Rate Conversion (Porchet Method)

Project Name:Bodas
Project No. 13-10289
Test Hole No: INF-1

Calculated By: SO
Checked By:
Test Hole Dia: 24"

Date: 5/15/17
Date:
Depth of Test Hole: 37"

Porchet Corrections

Infiltration rate=((delta h*60r)/(delta t*(r+2 h avg))

Test No.	EB Depth (inches)	Delta T (min)	Water Depth 1 (inches)	Water Depth 2 (inches)	h 1 (inches)	h 2 (inches)	delta h (inches)	h avg (inches)	r (radius) (inches)	delta h*60r	delta t*(r+2 h avg)	Infiltration rate (in/hr)
1	37	60	30.500	31.500	6.500	5.500	1.000	6.000	12	720	1440	0.500
2	37	60	31.000	31.500	6.000	5.500	0.500	5.750	12	360	1410	0.255
3	37	60	30.750	31.000	6.250	6.000	0.250	6.125	12	180	1455	0.124
4												
5												
6												
7												
8												
9												

Simple Open Pit Rate to Infiltration Rate Conversion (Porchet Method)

Project Name:Bodas
Project No. 13-10289
Test Hole No: INF-2

Calculated By: SO
Checked By:
Test Hole Dia: 24"

Date: 5/15/17
Date:
Depth of Test Hole: 36"

Porchet Corrections

Infiltration rate=((delta h*60r)/(delta t*(r+2 h avg))

Test No.	EB Depth (inches)	Delta T (min)	Water Depth 1 (inches)	Water Depth 2 (inches)	h 1 (inches)	h 2 (inches)	delta h (inches)	h avg (inches)	r (radius) (inches)	delta h*60r	delta t*(r+2 h avg)	Infiltration rate (in/hr)
1	36	60	30.000	30.000	6.000	6.000	0.000	6.000	12	0	1440	0.000
2	36	60	30.000	30.000	6.000	6.000	0.000	6.000	12	0	1440	0.000
3	36	60	30.000	30.000	6.000	6.000	0.000	6.000	12	0	1440	0.000
4												
5												
6												
7												
8												
9												

Bodas Residence 13-10289

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Categorization of Infiltration Feasibility Condition	Worksheet C.4-1

Part 1 - Full Infiltration Feasibility Screening Criteria
Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?

Criteria	Screening Question	Yes	No
1	Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X

Provide basis:
The infiltration test results below the proposed facility location at (INF-1) was 0.062 inches per hour, and at (INF-2) was 0.000 inches per hour with a minimum factor of safety of 2 applied at both locations. Simple open pit testing was performed at 2 locations on the site within or adjacent to the proposed infiltration basin in accordance with Appendix D of the City of San Diego BMP design manual. In addition, a comprehensive evaluation of the site was conducted in accordance with Appendix C.2. Please refer to our "Report of Limited Geotechnical Investigation Proposed Storm Water Infiltration BMP's" dated June 14, 2017 for details of the comprehensive evaluation and investigation conducted, simple open pit test rates and simple open pit rate to infiltration rate calculations and maps representative of the study.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

2	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X

Provide basis:
Our infiltration test results below the proposed facility location range from 0.000 to 0.062 inches per hour with a minimum factor of safety of 2 applied. Infiltration rates greater than 0.5 inches per hour were not encountered, therefore, the question is not applicable. Please refer to our "Report of Limited Geotechnical Investigation Proposed Storm Water Infiltration BMP's" dated June 14, 2017 for details of the comprehensive evaluation and investigation conducted, simple open pit test rates and simple open pit rate to infiltration rate calculations and maps representative of the study.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

Worksheet C.4-1 Page 2 of 4			
Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		X
Provide basis: Our infiltration test results below the proposed facility location range from 0.000 to 0.062 inches per hour with a minimum factor of safety of 2 applied. Infiltration rates greater than 0.5 inches per hour were not encountered, therefore, the question is not applicable. Please refer to our "Report of Limited Geotechnical Investigation Proposed Storm Water Infiltration BMP's" dated June 14, 2017 for details of the comprehensive evaluation and investigation conducted, simple open pit test rates and simple open pit rate to infiltration rate calculations and maps representative of the study. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		
Provide basis: Question to be answered by the design engineer. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 1 Result*	If all answers to rows 1 - 4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2		

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

Worksheet C.4-1 Page 3 of 4

Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria
Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?

Criteria	Screening Question	Yes	No
5	Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.	X	

Provide basis:
The City of San Diego BMP Design Manual, Appendix C and Appendix D, do not provide values considered for appreciable rates. Although we do not consider the measured infiltration rates as appreciable from a practical standpoint, we understand the City of San Diego considers rates greater than 0.01 inches/hour as appreciable. Therefore, we have answered yes to this question.
Measured infiltration rates ranged from 0.000 to 0.062 inches per hour with a minimum factor of safety of 2 applied. Please refer to our "Report of Limited Geotechnical Investigation Proposed Storm Water Infiltration BMP's" dated June 14, 2017 for details of the comprehensive evaluation and investigation conducted, simple open pit test rates and simple open pit rate to infiltration rate calculations and maps representative of the study.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

6	Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	

Provide basis:
In our opinion, any long term infiltration at the site will not result in geotechnical hazards which cannot be reasonable mitigated to an acceptable level.
Please refer to our "Report of Limited Geotechnical Investigation Proposed Storm Water Infiltration BMP's" dated June 14, 2017 for details of the comprehensive evaluation and investigation conducted, simple open pit test rates and simple open pit rate to infiltration rate calculations and maps representative of the study.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

Bodas Residence 13-10289

Worksheet C.4-1 Page 4 of 4			
Criteria	Screening Question	Yes	No
7	Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: In our opinion, any long term infiltration at the site will not result in a significant risk for groundwater related concerns. Please refer to our "Report of Limited Geotechnical Investigation Proposed Storm Water Infiltration BMP's" dated June 14, 2017 for details of the comprehensive evaluation and investigation conducted, simple open pit test rates and simple open pit rate to infiltration rate calculations and maps representative of the study. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
8	Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.		
Provide basis: Question to be answered by the design engineer. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration. If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.		

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

Bodas Residence 13-10289

Worksheet D.5-1: Factor of Safety and Design Infiltration Rate Worksheet

Factor of Safety and Design Infiltration Rate Worksheet			Worksheet D.5-1		
Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	2	0.5
		Predominant soil texture	0.25	3	0.75
		Site soil variability	0.25	2	0.5
		Depth to groundwater / impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			2.00
B	Design	Level of pretreatment/ expected sediment loads	0.5		
		Redundancy/resiliency	0.25		
		Compaction during construction	0.25		
		Design Safety Factor, $S_B = \Sigma p$			
Combined Safety Factor, $S_{total} = S_A \times S_B$					
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)					
Design Infiltration Rate, in/hr, $K_{design} = K_{observed} / S_{total}$					

Supporting Data

Briefly describe infiltration test and provide reference to test forms:

Simple open pit testing was performed at 2 locations within or adjacent to the proposed facility per the requirements of the City of San Diego Storm Water Standards, BMP Design Manual, in accordance with Appendix D.
Please refer to our "Report of Limited Geotechnical Investigation Proposed Storm Water Infiltration BMP's" dated June 14, 2017 for details of the comprehensive evaluation and investigation conducted, simple open pit test results and converted simple open pit test results to infiltration rate calculations, and maps representative of the study.

UPDATE REPORT OF PRELIMINARY GEOTECHNICAL AND GEOLOGIC INVESTIGATION

Bodas Property
6947 Country Club Drive
La Jolla, California

JOB NO. 13-10289
08 May 2017

Prepared for:

Mr. Vinit Bodas

Geotechnical Exploration, Inc.

SOIL AND FOUNDATION ENGINEERING ● GROUNDWATER ● ENGINEERING GEOLOGY

08 May 2017

Mr. Vinit Bodas
11 Greenbriar Lane
Greenwich, CT 06831

Job No. 13-10289

Subject: **Update Report of Preliminary Geotechnical and Geologic Investigation**
Bodas Property
6947 Country Club Drive
La Jolla, California

Dear Mr. Bodas:

In accordance with your request and our proposal dated February 1, 2017, ***Geotechnical Exploration, Inc.*** has updated our report of investigation of the geotechnical and geologic conditions at the subject property. The field work was originally performed on March 28 and April 4, 2013 for a prior owner. This report updates the report of investigation originally prepared in 2013.

In our opinion, if the conclusions and recommendations presented in this report are implemented during site preparation and construction, the site will be suited for future residential construction.

This opportunity to be of service is sincerely appreciated. If you should have any questions concerning the following report, please do not hesitate to contact our office. Reference to our **Job No. 13-10289** will help to expedite a response to your inquiry.

Respectfully submitted,

GEOTECHNICAL EXPLORATION, INC.

Jaime A. Cerros, P.E.
R.C.E. 34422/G.E. 2007
Senior Geotechnical Engineer

Leslie D. Reed, President
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UPDATE REPORT OF PRELIMINARY GEOTECHNICAL AND GEOLOGIC INVESTIGATION

Bodas Property
6947 Country Club Drive
La Jolla, California

JOB NO. 13-10289

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

I. SCOPE OF WORK AND EXECUTIVE SUMMARY

It is our understanding, based upon information provided Mr. Tim Martin, Architect, that it is planned to construct a new single-family residence at the property. The subject property is mapped within a City of San Diego Development Services Department (DSD) Geologic Hazard Category (GHC) zone identified as a *"possible or conjectured"* landslide zone, Zone 22.

We also performed a preliminary review of in-house files associated with this area of La Jolla, including a 2006 report of geotechnical investigation on the adjacent northerly lot (recently updated). We note that this older developed area of La Jolla is known to have experienced some soil-related problems. Our 2006 investigation of the adjacent northerly property identified soil-related causes for damage to a single-family residence (since demolished). The house had experienced damage as a result of a combination of differential fill soil settlement due to poor compaction and expansive soil movements. The house spanned both fill soils and cut ground (excavated) soils. This also contributed to the damage. The home was not damaged by landslide activity.

The Scope of Work performed at the subject site is briefly outlined as follows:

1. Review of available published and proprietary engineering reports and maps that are pertinent to the site including our April 4, 2013 report from which we obtained the geologic and soils information presented herein.

2. Excavation of one large-diameter boring to allow down hole logging of geologic conditions by our Certified Engineering Geologist to address the *"possible or conjectured"* landslide condition.

3. Excavation of 6 additional exploratory borings utilizing a limited-access auger drill rig in order to visually identify soil types, collect soil samples, and take appropriate soil tests. The soils encountered in the excavations were logged by our Field Geologist, and undisturbed and loose bag samples were collected in the various soil types to the maximum depths of exploration.

4. Laboratory and field testing on collected soil samples to evaluate their designation according applicable portions of the Unified Soil Classification System (see Appendix A), in-place density, soil characteristics, and engineering properties pertinent to the investigation.

5. Engineering analysis of the results of our field and laboratory testing; including an evaluation of the allowable bearing capacity and wall active and passive pressures for the potential future bearing soils.

6. A geologic reconnaissance of the project location and general area. This reconnaissance included a review of the pertinent literature and maps, a field review of the site and surrounding terrain, and drawing of conclusions and recommendations pertaining to the existing local and regional geology and geologic hazards. The reconnaissance included the large-diameter boring.

7. The results of the field and laboratory soil testing, along with our findings, conclusions and recommendations (with appropriate excavation logs, a cross section and other graphics) are presented in this update geotechnical report per City of San Diego guidelines. The report also addresses the seismic risk potential of the site with respect to local and regional faulting per the current California Building Code.

Our investigation revealed that the lot is underlain at shallow depths by hard/very dense formational soils of the Ardath Shale. These soils consist primarily of clay (claystone and mudstone) with a minor amount of silty sand. At depth the Ardath Shale grades stratigraphically into the Scripps Formation. Fill soils derived from the Ardath Shale exist on the northern portion of the lot and also as a veneer across most of the western portion of the lot.

Our geologic investigation also revealed that there are no known or suspected landslides on the site that can affect future development. No landslide deposits were observed in the boring. Measured bedding attitudes are generally into the slope. No significant open fracturing was observed. In our opinion, there are no constraints to future development of the site due to landsliding.

II. SITE DESCRIPTION

The property is more particularly described as Assessor's Parcel No. 352-280-05, Lot 5 of La Jolla country Club Estates per Recorded Map 2167 in the City and County of San Diego, State of California. Refer to Figure No. I, the Vicinity Map, for the location of the property.

Based on site observations, it appears that pre-grading topography in the area of the subject site consisted of a west-facing, moderately to steeply sloping hillside, with intermittently incised east/west trending (westerly draining) drainage canyons. The site exists today as a primarily cut lot bounded to the north by the residential property at a lower elevation investigated by our firm in 2006 (the house on this adjacent site has since been razed); to the south by a similar residential property; to the west by an approximately 40- to 50-foot-high, west-facing slope that descends to Country Club Drive at its downslope terminus; and to the east by a west-facing, approximately 5- to 8-foot-high ascending cut slope that abuts a relatively large easterly residential property, Fox Hill Estate, along its upslope terminus.

The property has a relatively large concrete slab-on-grade parking area on its northeast portion. The parking lot is accessed via an asphaltic-concrete (AC) paved driveway from the north. The AC driveway is accessed from another driveway ascending from County Club Drive to the west.

The structure on the property consists of a remodeled, one-story wood-frame and stucco structure with slab-on-grade floors, raised wood floors, raised wood decking and an attached garage.

Vegetation consists of moderately thick growth of a variety of mature ornamental shrubs, smaller plants, ground cover, some large palms and mature trees across and around the pad and on the bounding slopes. There are unpaved landscape pathways on the slope to the west and small lawns and brick patios on the east side of the building.

A topographic survey of the property was available during our work at the site. This survey was provided by Tim Martin, Architect. It also depicts the planned new residential structure. The existing building pad is relatively level at an elevation of approximately 487 feet above Mean Sea Level (MSL). The existing level pad is approximately 37 feet higher than Country Club Drive. Refer to Figure No. II, the Plot Plan and Site Specific Geology Map, for the general configuration of the property and improvements.

III. FIELD INVESTIGATION

A large-diameter boring was advanced during our 2013 exploratory work to a depth of 75½ feet where the bucket auger met practical refusal. The boring walls were cleaned and then downhole logged by our Principal Certified Engineering Geologist to assess whether the area is underlain by the *"possible or conjectured landslide"* shown on City of San Diego DSD Geologic Hazard Map Sheet 29 (refer to Section VII of this report).

Six small-diameter borings were also advanced in 2013 around the building to help define the soil profile across the lot. These were advanced to depths ranging from 3 to 6 feet. The location of the exploratory borings is shown on the Plot Plan and Site Specific Geology Map., Figure No. II.

The small-diameter borings were observed and logged by our Project Geologist, and samples were taken of the encountered soils throughout the field operations. Logs of the encountered soils and geologic conditions have been prepared on the basis of our observations and the results have been summarized on Figure No. III. The predominant soil types were classified in general accordance with applicable portions of the Unified Soil Classification System (refer to Appendix A).

IV. FIELD AND LABORATORY TESTS & SOIL INFORMATION

A. Field Tests

Standard Penetration Tests were performed in the small-diameter borings by using a 140-pound weight falling 30 inches to drive a 2-inch O.D. by 1-3/8-inch I.D. sampler tube a distance of 18 inches. A relatively undisturbed sample was also obtained from a small-diameter boring by driving a 3-inch outside-diameter (O.D.) by 2-3/8-inch inside-diameter (I.D.) split-tube sampler a distance of 18 inches. The number of blows required to drive the samplers the last 12 inches was recorded for use in evaluation of the soil consistency. The following chart provides an in-house correlation between the number of blows and the consistency of the soil for the Standard Penetration Test and the 3-inch (*"Cal"*) sampler.

Soil	***Density Designation***	***2-inch O.D. Sampler Blows/Foot***	***3-inch O.D. Sampler Blows/Foot***
Sand and Non-plastic Silt	Very Loose	0-4	0-7
	Loose	5-10	8-20
	Medium Dense	11-30	21-53
	Dense	31-50	54-98
	Very Dense	Over 50	Over 98

Soil	***Density Designation***	***2-inch O.D. Sampler Blows/Foot***	***3-inch O.D. Sampler Blows/Foot***
Clay and Plastic Silt	Very soft	0-2	0-2
	Soft	3-4	3-4
	Firm	5-8	5-9
	Stiff	9-15	10-18
	Very Stiff	15-30	19-45
	Hard	31-60	46-90
	Very Hard	Over 60	Over 90

In general the tests performed in the field included: the Standard Practice for Soil Investigation and Sampling by Auger Borings (ASTM D1452), Test Method for Penetration Test and Split-barrel Sampling of Soils (ASTM D1586) and Standard Practice for Ring-lined Barrel Sampling of Soils (ASTM D3550).

Blow counts with the 2-inch sampler ranged from 41 to 85 (hard to very hard/dense to very dense), averaging over 66 per foot (very hard/very dense) for the encountered Ardath Shale Formation. Fill soils generally consist of a veneer across the explored portion of the site and were not sampled significantly.

B. Laboratory Tests

Laboratory tests were performed on disturbed and relatively undisturbed soil samples in order to evaluate their physical and mechanical properties and their ability to support future residential improvements. Test results are presented on Figure No. III. The following tests were conducted on the sampled soils:

1. *Moisture Content (ASTM D2216-10)*
2. *Standard Test Method For Density of Soil In Place By the Drive Cylinder Method (ASTM D2937-10)*
3. *Determination of Percentage of Particles Smaller than #200 (ASTM D1140-06)*
4. *Expansion Index (ASTM 4829-11)*

Moisture Content (ASTM D2216-10) measurements were performed. These tests help to establish the in situ moisture and density of samples retrieved from the exploratory excavations. The moisture content of a soil sample is a measure of the water content, expressed as a percentage of the dry weight of the sample.

Density measurements were performed on retrieved formational soil samples using the *Standard Test For Density of Soil In Place By the Drive Cylinder Method ASTM D2927-10*. The soils collected by the Drive Cylinder Method performed with a sampler driven with a hammer automated driven using an automated cathead. This helps to establish the in situ density of retrieved samples.

The *Determination of Percentage of Particles Smaller than #200 (ASTM D1140-06)* test helps to more precisely classify the tested soils based on their fine material content, and to provide qualitative information related to engineering characteristics such as expansion potential, permeability, and shear strength.

The Expansion Index (EI) of soils is determined, when necessary, utilizing the *Standard Test Method for Expansion Index of Soils (ASTM D 4829-11).* In accordance with the Standard (Table 5.3), potentially expansive soils are classified as follows:

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

Based on the EI test results, the on-site silty and clayey Ardath Shale Formation soils have a medium to high expansion potential, with measured Expansion Indices of 84 to 103. Based on our experience and the results of our laboratory sieve testing the on-site silty and clayey fill soils have a medium expansion potential.

Based on the above laboratory test data, our observations of the primary soil types on the project, and our previous experience with laboratory testing of soils of the sample type, our Geotechnical Engineer has assigned conservative values for friction angle and cohesion to evaluate those soils that will have significant lateral support or bearing functions on the project. These values have been utilized in recommending the allowable bearing value as well as the active and passive earth pressures for foundation designs.

V. GENERAL GEOLOGIC DESCRIPTION

San Diego County has been divided into three major geomorphic provinces: the Coastal Plain, the Peninsular Ranges and the 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, metasedimetary 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, where the subject property is located, 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. The Cretaceous sediments form the local basement rocks on the Point Loma area. 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. 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 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, prior to April 2010, the San Diego County area has been relatively quiet seismically. No fault ruptures or major earthquakes had been experienced in historic time within the greater 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 were recorded M4.0 to M4.2. In addition, the Oceanside earthquake of July 13, 1986, located approximately 26 miles offshore of the City of Oceanside, was an 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. Another 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. Several earthquakes ranging from M5.0 to M6.0 occurred in northern Baja California, centered in the Gulf of California on August 3, 2009. These were felt in San Diego but no injuries or damage was reported. A M5.8 earthquake followed by a M4.9 aftershock occurred on December 30, 2009, centered about 20 miles south of the Mexican border city of Mexicali. These were also felt in San Diego, swaying high-rise buildings, but again no significant damage or injuries were reported.

On Easter Sunday, April 4, 2010, a large earthquake occurred in Baja California, Mexico. It was widely felt throughout the southwest including Phoenix, Arizona and San Diego in 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 20th century events (e.g., 1915 and 1934) in this region of northern Baja California. The event caused widespread damage to structures, closure of businesses, government offices and schools, power outages, displacement of people from their homes and injuries in the nearby major metropolitan areas of Mexicali in Mexico and Calexico in southern California. Estimates of the cost of the damage range to $100 million.

This event's aftershock zone extended 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. Aftershocks from this event have continued along the trend northwest and southeast of the original event, including within San Diego County, closer to the San Diego metropolitan area. There have been hundreds of these earthquakes including events up to M5.7.

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 Geologist, 1973). The California Division of Mines and Geology defines a *"potentially active"* fault as one that has had ground surface displacement during Quaternary time, i.e., between 11,000 and 1.6 million years (Hart, E.W., 1980).

VI. SITE-SPECIFIC GEOLOGIC DESCRIPTION

A. Stratigraphy

Our field work, reconnaissance and review of pertinent geologic maps and reports indicate that the site is underlain by siltstone and sandstone formational materials of the Tertiary-age Ardath Shale Formation (Ta). Underlying the Ardath Shale are materials of the Scripps Formation, encountered at a depth of approximately 57

feet. The formational soils are overlain by up to 6½ feet of fill soils on the northern portion of the lot. Generally, fill soils elsewhere on the lot consist of a veneer overlying shallow formational soils. A minor thickness of topsoil and slopewash was also encountered in boring B-1.

The Plot Plan and Site-specific Geologic Map depicts the general location of the encountered fill soils and formational soils with a fill veneer. Figure No. IV presents an excerpt of a plan view geologic map of the general area of the site. Figure No. V presents a generalized geologic cross section through the property.

Artificial Fill (Qaf): The encountered fill soils atr the explored locations range from less than 1 foot in depth across most of lot to about 6½ feet deep (at the location of boring B-1) along the northern side of the pad. The fill soils consist of light brown to gray-brown silty sand/sandy silt, sandy clay and clay. The fill soils are of variable density, of medium expansion potential and moderate consolidation potential. Refer to Figure No. III for details.

Ardath Shale Formation (Ta): Sandstone and siltstone formational soils of the Ardath Shale Formation were encountered at a depth of 1 foot or less along the eastern side of the residence and at a depth of approximately 6½ feet along the north side of the building pad. The encountered formational materials consist of hard to very hard/dense to very dense gray, red-brown and yellow-brown clay, silty clay, clayey silt and silty sand. The formational materials are considered to have good bearing strength characteristics (if they possess moisture content not lower than Optimum) and are considered suitable in their current condition for bearing support. Refer to Figure No. III for details.

Scripps Formation (Tsc): The Tertiary Scripps Formation underlies the Ardath Shale. These materials were observed in the large-diameter boring below a depth of 57½ feet. As exposed in the boring they consist of hard gray clay and hard red-tan clayey silt. These materials do not outcrop at the site. Refer to Figure Nos. IIIa-h.

B. Structure

The Tertiary-age Ardath Shale Formation (Ta) and Scripps Formation (Tsc) underlie the site. The siltstone and fine sandstone of the Ardath Formation are generally moderately indurated. As measured in the referenced large-diameter boring and as shown around the area of the property on geologic maps (Kennedy & Tan, 2008 and Kennedy, 1975) these units generally strike north-south to northeast-southwest with dips of less than 5 degrees to 15 degrees in an easterly to southeasterly direction (into slope). Chaotic and disturbed bedding associated with fracturing and other signs of ground disturbance typical of landsliding were not observed.

VII. GEOLOGIC HAZARDS

A review of the City of San Diego DSD Geologic Hazards Map (Sheet No. 29) indicates that the site is located within a moderate-risk geologic hazard category (GHC) designated as Zone 22. This zone is identified as a *"landslide zone"* with a *"possible or conjectured"* landslide. An excerpted portion of the Geologic Hazards Map and legend are presented as Figure No. VI.

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

A. ***Local and Regional Faults***

No faults are mapped on or very near the subject property. In our explicit professional opinion, neither an active fault nor potentially active fault underlies the site. Reference to the City of San Diego DSD Geologic Hazards Map Sheet No. 29 indicates that the Country Club Fault is approximately ½-mile northeast of the site. The fault is considered inactive.

Rose Canyon Fault: The Rose Canyon Fault Zone (RCFZ), including the Mount Soledad and Rose Canyon Faults, is located 2½ miles northeast of the site. It 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 causing a M7.2 earthquake per the California Geologic Survey (2002) and considered microseismically active, although no significant recent earthquake is 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 (California Department of Conservation/California Geological Survey, Special Publication 42, 2007).

The slip rate along the RCFZ is not well constrained according to recent studies (Southern California Edison, 2012). Earlier estimates suggested a minimum rate of $1.5^{+0.5}/_{-0.4}$ mm/yr (Lindvall and Rockwell, 1995). Recent analysis of the offset of deflected drainages using aerial imagery of the Old Town area implies a long-term slip rate of 2 mm/yr.

Recent fault trench excavations (as reported in Southern California Edison, 2012) along the trend of the RCFZ within the Old Town area of San Diego suggests that the recurrence interval for surface-rupturing earthquakes (≥M5) is shorter than previous studies have indicated, and may be in the range of 400 to 500 years. Further, the most recent earthquake (MRE) along the RCFZ appears to have occurred during the mid-17th century.

Coronado Bank Fault: The Coronado Bank Fault is located approximately 12 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.

Elsinore Fault: The Elsinore Fault is located approximately 38 to 70 miles east and northeast of the site. The fault extends approximately 200 km (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 as large as M7.5. Study and logging of exposures 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 to 7 (Rockwell, 1985). More recently, the California Geologic Survey (2002) considers the Elsinore Fault capable of producing an earthquake of M6.8 to M7.1.

San Jacinto Fault: The San Jacinto Fault is located 60 to 67 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, 2009)

The San Jacinto Fault Zone has a high level of historical seismic activity, with at least 10 damaging (M6.0 to M7.0) earthquakes having occurred on this fault zone between 1890 and 1986. Earthquakes on the San Jacinto 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/yr for the northern segments of the fault, and slip rates of 4 ±2 mm/yr 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 were 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 lot is not directly on an active fault trace and, therefore, the risk of ground rupture is remote. However, due to the close proximity of the Rose Canyon Fault, strong ground shaking could occur in the area.

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 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 the nearby Rose Canyon Fault Zone. Although the chance of such an event is remote, it could occur within the useful life of a built structure. The anticipated ground accelerations from earthquakes on faults within 100 miles of the site are provided in Appendix B. The Modified Mercalli Index, a shaking intensity index, is presented in Appendix C.

Landslides: The property is mapped within Geologic Hazard Category (GHC) 22, a *"possible or conjectured"* landslide zone. However, based upon our exploratory downhole geologic logging and review of aerial photographs (AXN-4M-89 & 90,

dated April 11, 1953) there are no known or conjectured ancient landslides located on the site.

Slope Stability: The existing site slopes are stable with respect to surficial and gross stability with factors of safety of over 1.5. Slope stability analyses were performed and are presented here in Appendix D.

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 also considered remote due to the dense nature of the natural-ground material and the lack of a shallow static groundwater surface under the site. No soil liquefaction or soil strength loss in the building pad area is anticipated to occur due to a seismic event.

Geologic Hazards Summary: It is our opinion, based upon a review of the available maps and our site investigation that the site is suited for a future residential structure and associated improvements should the recommendations provided herein be implemented during site preparation. There are no known significant geologic hazards on or near the site that would constrain development of the new residential project.

VIII. GROUNDWATER

Groundwater was not encountered during the course of our field investigation. The existing building pad is primarily at an elevation of approximately 495 feet above MSL. The true groundwater surface is anticipated to be many tens of feet below this elevation and it is not anticipated that ground water problems will occur. We have encountered seepage conditions (shallow *"perched"* groundwater) on similar properties where irrigation is heavy on or up gradient from the site.

It should be kept in mind that grading operations will also change surface drainage patterns and 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 damage from 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 operations, should be evaluated and remedied by the project civil and geotechnical consultants. The project developer and the property owner, however, must realize that post-

construction appearances of groundwater may have to be dealt with on a site-specific basis.

On properties such as the subject site where formational materials exist at relatively shallow depths, even normal landscape irrigation practices or periods of extended rainfall can result in shallow *"perched"* water conditions. The perching (shallow depth) accumulation of water on a low permeability surface can result in areas of persistent wetting and drowning of lawns, plants and trees. Resolution of such conditions, should they occur, may require site-specific design and construction of subdrain and shallow *"wick"* drain dewatering systems.

The following findings are based upon the practical field exploration conducted by our firm and the resulting laboratory tests, in conjunction with our knowledge and experience with the soils in the La Jolla area of the City of San Diego.

IX. CONCLUSIONS AND RECOMMENDATIONS

The subject lot and surrounding area are underlain at depth by the Tertiary-age Ardath Shale Formation (Ta) and Scripps Formation (Tsc). These formations consist primarily of hard siltstone, claystone and fine sandstone. These soils have good bearing-strength characteristics. At shallow depth the clayey materials are considered to have a medium to high expansion potential. Shallow amounts of fill soils overlie these materials.

No evidence of an ancient *"possible or conjectured"* landsliding was indentified in the large-diameter boring. Disturbed soils were not present. Measured bedding attitudes are primarily into slope and no significant fracturing was identified. In our explicit opinion, the site is stable and there are no constraints on future

development of the property with respect to an ancient landslide. It is our explicit opinion that an ancient landslide does not exist at the site.

It is our opinion that the site is suitable for a future residential project provided the recommendations herein are incorporated during design and construction. Further, it is our explicit opinion that future site development should not measurably destabilize neighboring properties or induce the settlement of adjacent structures if developed as recommended herein. At the time, a future project is planned this report will require updating for the specific project per City of San Diego DSD practice.

In our explicit opinion, there are no other geologic hazards on or near the site that would preclude redevelopment as a residential lot. It is also our explicit opinion that the site formational soils, i.e., the Ardath Shale Formation, are relatively impermeable and not suitable for permanent storm water infiltration or percolation.

The following recommendations are based upon the practical field investigation conducted by our firm, and resulting laboratory tests, in conjunction with our knowledge and experience with the soils in the La Jolla area of the City of San Diego. If the existing improvements at the property are to be demolished, it is anticipated that the upper 2 to 3 feet of soils would be disturbed. If formational soils are at the ground surface and their moisture content is not adequate they will require regrading and moisture conditioning (to Optimum Moisture) to a depth of 3 feet. If it is not planned to lower existing grades such as for the construction of a new lower floor or basement the disturbed soils would require replacement as properly compacted soils. A grading plan identifying the existing and planned final site topography and drainage for a future project will have to be prepared by a licensed Civil Engineer.

A. Seismic Design Criteria

The following site soil seismic design recommendations are provided for use in design of a future site residential structure.

1. *Seismic Data Bases:* An estimation of the peak ground acceleration and the repeatable high ground acceleration (RHGA) likely to occur at the project site based on the known significant local and regional faults within 100 miles of the site is also included in Appendix B. Appendix B is a table generated from the computer programs EQFault by Thomas F. Blake (2010) utilizing a digitized file of late-Quaternary California faults (EQFault). Estimations of site intensity are also provided in these listings as Modified Mercalli Index values. The Modified Mercalli Intensity Index is provided as Appendix C.

2. *Seismic Design Criteria:* The proposed structure should be designed in accordance with Section 1613 of the 2010 CBC, which incorporates by reference the ASCE 7-05 for seismic design. We recommend the following parameters be utilized. We have determined the mapped spectral acceleration values for the site based on a latitude of 32.8364 degrees and longitude of -117.2611 degrees, utilizing a program titled *"Seismic Hazard Curves, Response Parameters and Design Parameters-v5.0.8,"* provided by the USGS, which provides a solution for ASCE 7-05 (Section 1613 of the 2010 CBC) utilizing digitized files for the Spectral Acceleration maps. In addition, we have assigned a Site Classification of C.

   The response parameters for design are presented in the following table. The design Spectral Acceleration (SA) vs. Period (T) is shown on Appendix E.

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}
1.264	0.487	1.0	1.313	1.264	0.640	0.842	0.426

B. Preparation of Soils for Site Development

3. *Clearing and Stripping:* The existing parking slab improvements and vegetation on the building pad should be removed prior to the preparation of the new building pad and areas of associated improvements. This includes any roots from existing trees and shrubbery. Holes resulting from the removal of root systems or other buried foundations, debris or obstructions that extend below the planned grades should be cleared and backfilled with properly compacted fill.

4. *Treatment of Existing Fill or Loose Soils:* We recommend that the existing fill soils (and minor topsoils) be removed and recompacted, re-graded or excavated as needed for a future project. The existing on-site soils are suitable for re-use as compacted fills. These soils primarily are of medium to high expansivity. If it is desired they can be replaced (i.e., excavated and exported from the site) with select low- or non-expansive imported soils. The recompaction work should consist of (a) removing the fill soils down to the very stiff or hard/dense native formational materials; (b) scarifying, moisture conditioning, and compacting the exposed natural subgrade soils; and (c) cleaning and replacing the removed material as compacted structural fill or placing the low- or non-expansive imported soils as structural fill.

If the existing house is demolished and the site is not planned for significant new grading the depth required to remove the disturbed soils is anticipated to be at least 3 feet but should be confirmed by our representative during the excavation work based on their examination of the soils being exposed. Fill soils are thicker on the northern portion of the lot and toward the west, and should be removed and recompacted their full depth of approximately 6½ feet. The lateral extent of excavations should be at least 8 feet beyond the edge of the planned perimeter foundations of the residence and any areas to receive exterior improvements where feasible.

If there is a cut/fill transition under the proposed residence or major improvements, in order to reduce the abrupt transition in soil bearing conditions at their intersection, the daylight line, we recommend that the *"cut"* portion of the pad be excavated, or undercut, to a minimum depth of 3 feet and replaced with compacted fill.

Preferably, removal and recompaction work should extend to as near as practical to the property boundaries. Any unsuitable materials (such as oversize rubble, expansive clayey soils, and/or organic matter) should be selectively removed as indicated by our representative and disposed of off-site.

Any rigid improvements founded on loose, uncompacted soils can be expected to undergo movement and possible damage. ***Geotechnical Exploration, Inc.*** takes no responsibility for the performance of any improvements built on loose inadequately compacted fills. Any exterior area to receive concrete improvements should be verified for compaction and

moisture within 48 hours prior to concrete placement or during the fill placement if the thickness of fill exceeds 1 foot.

5. *Subgrade Preparation:* If recompacted fill soils will be utilized to support new improvements after the required excavations are made. Existing fill and disturbed soils should be removed to expose the very hard/very dense native ground/subgrade soils and excavated to at least 3 feet from the proposed finished subgrade in the building pad area. Prior to fill soil placement the excavation should be properly keyed/benched per the recommendations and observations of our field representative. The exposed subgrade soils in areas to receive recompacted fill should be scarified to a minimum depth of 6 inches, moisture conditioned, and compacted to the requirements for structural fill.

   At the time of future site construction moisture content of surficial soils may have decreased requiring moisture conditioning of the upper 3 feet of soils. Soil moisture content should be increased to 5 percent over Optimum Moisture content or over then be maintained by periodic sprinkling until within 48 hours prior to any concrete placement.

6. *Expansive Soil Conditions:* Site fill and formational soils are of medium to high expansivity. Clayey soils used as fill should be moisture conditioned to at least 5 percent above Optimum Moisture content and compacted to 88 to 92 percent. Soils of medium or greater expansion potential should not be used as retaining wall backfill soils. Imported low-expansive soils should be used as retaining wall backfill.

7. *Material for Fill:* Existing on-site soils with an organic content of less than 3 percent by volume are, in general, suitable for use as fill. Any imported fill material should be a low-expansion potential (Expansion Index of 50 or less per ASTM D4829-11). In addition, both imported and existing on-site materials for use as fill should not contain rocks or lumps more than 6 inches in greatest dimension if the fill soils are compacted with heavy compaction equipment (or 3 inches in greatest dimension if compacted with lightweight equipment). All materials for use as fill should be approved by our representative prior to importing to the site.

8. *Fill Compaction:* All structural fill to be placed should be compacted to a minimum degree of compaction of 90 percent based upon ASTM D1557-09. Fill material 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 a water content that will permit proper compaction by either: (1) aerating and drying the fill if it is too wet, or (2) moistening the fill with water if it is too dry. Each lift should be thoroughly mixed before compaction to ensure a uniform distribution of moisture. For low expansive soils, the moisture content should be within 2 percent of optimum. For medium to highly expansive soils, the moisture content should be at least 5 percent over Optimum. Medium to highly expansive soils should not be compacted over 92 percent of Maximum Dry Density.

   No uncontrolled fill soils should remain after completion of the site work. In the event that temporary ramps or pads are constructed of uncontrolled fill soils, the loose fill soils should be removed and/or recompacted prior to completion of the grading operation.

9. *Trench and Retaining Wall Backfill:* All backfill soils placed in utility trenches or behind retaining walls should be compacted to at least 90 percent of Maximum Dry Density. 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. Backfill soils placed behind retaining walls and/or crawl space retaining walls should be installed as early as the retaining walls are capable of supporting lateral loads. Backfill soils should be low expansive, with an Expansion Index equal to or lower than 50.

C. Design Parameters for Proposed Foundations

10. *Footings:* We recommend that at the minimum a new residence be supported on conventional, individual-spread and/or continuous footing foundations bearing entirely on well-compacted fill material. All footings should be founded at least 24 inches below the lowest adjacent finished grade for both one- and two-story structures. Footings located adjacent to utility trenches should have their bearing surfaces situated below an imaginary 1.0:1.0 plane projected upward from the bottom edge of the adjacent utility trench.

If the proposed footings are located closer than 8 feet inside the top or face of a yard slope, they should be deepened to 2 feet below a line beginning at a point 8 feet horizontally inside the slopes and projected outward and downward, parallel to the face of the slope and into firm soils (see Figure No. VII, Foundation Requirements Near Slopes). Footings located adjacent to utility trenches should have their bearing surfaces situated below an

imaginary 1.0:1.0 plane projected upward from the bottom edge of the adjacent utility trench.

11. *Footing Bearing Values*: At the recommended depths, footings on properly compacted fill soil or very hard/very dense formational soils may be designed for allowable bearing pressures of 2,000 pounds per square foot (psf) for combined dead and live loads and 3,000 psf for all loads, including wind or seismic, for footings in fill. Footings should have a minimum width of 12 inches.

12. *Footing Reinforcement*: 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 two No. 5 top and two No. 5 bottom reinforcing bars be provided in the footings. A minimum clearance of 3 inches should be maintained between steel reinforcement and the bottom or sides of the footing. Isolated square footings should contain, as a minimum, a grid of three No. 4 steel bars on 12-inch centers, both ways. In order for us to offer an opinion as to whether the footings are founded on soils 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.

13. *Lateral Loads:* Lateral load resistance for the structure supported on footing foundations may be developed in friction between the foundation bottoms

and the supporting subgrade. An allowable friction coefficient of 0.35 is considered applicable. An additional allowable passive resistance equal to an equivalent fluid weight of 300 pcf acting against the foundations may be used in design provided the footings are poured neat against the properly 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.

14. *Settlement:* Settlements under building loads are expected to be within tolerable limits for a future residence founded on the properly recompacted fill soils or in-place formational soils. 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 angular rotation should be less than 1/240.

D. ***Concrete Slab-on-grade Criteria***

15. *Minimum Floor Slab 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 future 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. If suspended slabs are used they should be built per the specifications of the Structural Engineer. First floor slabs may be built on a 15-mil Stego Wrap layer placed on a 4-inch layer crushed rock base (maximum ¾-inch) on properly moisture conditioned soils.

15.2 Preferably, any proposed lower-level slabs should be provided with a waterproofing membrane such as Paraseal on a 4-inch-thick gravel base placed on properly compacted subgrade, per the manufacturer's instructions. The owner should be consulted as to the degree of slab moisture protection desired. If perched groundwater or seeps are observed after a basement excavation (if constructed) is complete, a subdrain drainage system may need to be installed beneath the slab.

15.3 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 Emission:* 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 has been 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 and barrier 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.

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 Stego wrap vapor barrier 15-mil or equivalent. The vapor barrier should be placed per the manufacturer's instructions.

17.1 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.

17.2 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.

18. *Exterior Slab Reinforcement:* As a minimum for protection of on-site improvements, we recommend that all nonstructural concrete slabs (such as patios, sidewalks, etc.), be at least 4 inches in actual thickness, founded on properly compacted and tested fill or dense native formation and underlain by no more than 3 inches of clean leveling sand (if needed), with No. 3 bars at 18-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. The subgrade of exterior improvements should be verified as properly prepared within 48 hours prior to concrete placement. Moisture content of clayey soils to receive concrete should be at least 5 percent over optimum within 48 hours of concrete placement.

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 and isolation joints in exterior slabs should be sealed with elastomeric joint sealant. The sealant should be inspected every 6 months and be properly maintained.

19. *Concrete Pavement:* Driveway pavement, consisting of Portland cement concrete at least 6 inches in thickness, may be placed on properly compacted subgrade soils. The concrete should be at least 3,500 psi compressive strength, with control joints no farther than 15 feet apart. Pavement joints should be properly sealed with permanent joint sealant, as required in sections 201.3.6 through 201.3.8 of the Standard Specifications for Public Work Construction, 2015 Edition. Subgrade soil for the driveway should be compacted to at least 90 percent of Maximum Dry Density.

    Control joints should be placed within 12 hours after concrete placement or as soon as the concrete allows saw cutting without aggregate raveling. The sawcuts should penetrate at least one-quarter the thickness of the slab.

    Should pavers be used as paved surfaces for driveways or parking areas we can provide special recommendations upon request.

E. Slopes

20. *Permanent Slopes*: Any new cut or fill slopes up to 20 feet in height should be constructed at an inclination of 2.0:1.0 (horizontal to vertical). Properly compacted fills should possess a factor of safety of at least 1.5 against deep-seated or shallow slide planes. In our opinion, the existing slopes possess a factor of safety of 1.5 against gross and shallow failure potential (see Appendix D).

21. *Slope Observations:* A representative of ***Geotechnical Exploration, Inc.*** must observe any temporary slopes *during construction*. In the event that

soils and formational material comprising a slope are not as anticipated, any required slope design changes would be presented at that time.

22. *Temporary Slopes*: Temporary slopes should be stable for a maximum slope height of 15 feet in the existing very hard/very dense soils at a gradient of 0.5:1.0 (horizontal to vertical). The bottom 3 feet may be cut vertical if dense/stiff to very stiff or hard (cohesive) natural ground soils are encountered. No soil stockpiles, improvements or other surcharges may exist or be placed within a horizontal distance of 10 feet from the top of the excavation.

    If these recommendations are not feasible due to space constraints, temporary shoring i.e., soldier pile and lagging, may be required for safety and to protect adjacent property improvements and construction personnel. Temporary shoring, if needed (i.e., soldier pile and lagging), should be designed as recommended in the following section (Section F). This office should be contacted for additional recommendations if additional shoring or steep temporary slopes are required.

23. *Cal-OSHA*: Where not superseded by specific recommendations presented in this report, trenches, excavations and temporary slopes at the subject site should be constructed in accordance with Title 8, Construction Safety Orders, issued by Cal-OSHA.

24. *Slope Top/Face Performance:* The soils that occur in close proximity to the top or face of even properly compacted fill or dense natural ground cut slopes often possess poor lateral stability. The degree of lateral and vertical deformation depends on the inherent expansion and strength characteristics

of the soil types comprising the slope, slope steepness and height, loosening of slope face soils by burrowing rodents, and irrigation and vegetation maintenance practices, as well as the quality of compaction of fill soils. Structures and other improvements could suffer damage due to these soil movement factors if not properly designed to accommodate or withstand such movement.

25. *Slope Top Structure Performance:* Rigid improvements such as top-of-slope walls, columns, decorative planters, concrete flatwork, swimming pools and other similar types of improvements can be expected to display varying degrees of separation typical of improvements constructed at the top of a slope. The separations result primarily from slope top lateral and vertical soil deformation processes. These separations often occur regardless of being underlain by cut or fill slope material. Proximity to a slope top is often the primary factor affecting the degree of separations occurring.

Typical and to-be-expected separations can range from minimal to up to 1 inch or greater in width. In order to reduce the effect of slope-top lateral soil deformation, we recommend that the top-of-slope improvements be designed with flexible connections and joints in rigid structures so that the separations do not result in visually apparent cracking damage and/or can be cosmetically dressed as part of the ongoing property maintenance. These flexible connections may include "slip joints" in wrought-iron fencing, evenly spaced vertical joints in block walls or fences, control joints with flexible caulking in exterior flatwork improvements, etc.

In addition, use of planters to provide separation between top-of-slope hardscape such as patio slabs and pool decking from top-of-slope walls can

aid greatly in reducing cosmetic cracking and separations in exterior improvements. Actual materials and techniques would need to be determined by the project architect or the landscape architect for individual properties. Steel dowels placed in flatwork may prevent noticeable vertical differentials, but if provided with a slip-end they may still allow some lateral displacement.

F. Retaining Wall Design Criteria

26. *Design Parameters – Unrestrained:* The active earth pressure (to be utilized in the design of any cantilever retaining walls, utilizing imported very low- to low-expansive soils [EI less than 50] as backfill) should be based on an *Equivalent Fluid Weight* of 38 pounds per cubic foot (for level backfill only). In the event that a retaining wall is surcharged by sloping backfill, the design active earth pressure should be based on the appropriate Equivalent Fluid Weight presented in the following table.

	*Height of Slope/Height of Wall**			
Slope Ratio	**0.25**	**0.50**	**0.75**	**1.00(+)**
2.0:1.0 (existing slope)	42	48	50	52

*To determine design active earth pressures for ratios intermediate to those presented, interpolate between the stated values.

27. *Design Parameters – Restrained:* Retaining walls designed for a restrained condition should utilize a uniform pressure equal to 9xH (nine times the total height of retained soil, considered in pounds per square foot) considered as acting everywhere on the back of the wall ***in addition to the design Equivalent Fluid Weight***. The soil pressure produced by any footings,

improvements, or any other surcharge placed within a horizontal distance equal to the height of the retaining portion of the wall should be included in the wall design pressure. The recommended lateral soil pressures are based on the assumption that no loose soils or soil wedges will be retained by the retaining wall.

Backfill soils should consist of low-expansive soils with EI less than 50, and should be placed from the heel of the foundation to the ground surface within the wedge formed by a plane at 30 degrees from vertical, and passing by the heel of the foundation and the back face of the retaining wall. A soil at-rest pressure of 56 pcf may also be used for restrained retaining walls if level soil is retained.

If a temporary soldier pile and lagging wall is constructed, the previous unrestrained and restrained wall parameters should correspond to the parameters for highly expansive soils. If the wall is allowed to rotate at least 0.01H at the top, the unrestrained parameters should be used. If the wall cannot rotate, the restrained parameters should be used. For highly expansive soil, the unrestrained shoring wall may be designed using 65 pcf.

28. *Surcharge Loads:* Any loads placed on the active wedge behind a cantilever wall should be included in the design by multiplying the load weight by a factor of 0.32. For a restrained wall, the lateral factor should be 0.48. The surcharge factor for unrestrained shoring walls shall be 0.53. Retaining walls over 6 feet in exposed height will require seismic loading design. The soil seismic increment would be 15 pcf and be added to the static soil pressure, with a zero value at the top and the maximum value at the bottom.

29. *Wall Drainage:* Proper subdrains and free-draining backwall material or board drains (such as J-drain or Miradrain) should be installed behind all retaining walls (in addition to proper waterproofing) on the subject project. ***Geotechnical Exploration, Inc.*** will assume no liability for damage to structures or improvements that is attributable to poor drainage. Refer to Figure No. VIII for a schematic drawing of appropriate retaining wall back drainage.

The architectural plans should clearly indicate that subdrains for any lower-level walls be placed at an elevation at least 1 foot below the bottom of the lower-level slabs. At least 0.5-percent gradient should be provided to the subdrain. The subdrain should be placed in an envelope of crushed rock gravel up to 1 inch in maximum diameter, and be wrapped with Mirafi 140N geofabric or equivalent. The subdrain should consist of Amerdrain or QuickDrain (rectangular section boards) or equivalent. If the slab is to be supported on top of basement wall footings, then the subdrain should be placed on the outer face of the footing, not on top of the footing.

30. *Surface or Subsurface Drainage Quality Control*: It must be understood that it is not within the scope of our services to provide quality control oversight for surface or subsurface drainage construction or retaining wall sealing and base of wall drain construction. It is the responsibility of the contractor and/or their retained inspection service provider to verify proper wall sealing, geofabric installation, protection board (if needed), drain depth below interior floor or yard surface, pipe percent slope to the outlet, etc.

G. Site Drainage Considerations

31. *Surface Drainage:* Adequate measures should be taken to properly finish-grade the lot after the residence and other improvements are in place. Drainage waters from this site and adjacent properties should be directed away from the footings, floor slabs, and slopes, onto the natural drainage direction for this area or into properly designed and approved drainage facilities provided by the project civil engineer. Roof gutters and downspouts should be installed on the residence, with the runoff directed away from the foundations via closed drainage lines.

    Proper subsurface and surface drainage will help minimize the potential for waters to seek the level of the bearing soils under the footings and floor slabs. Failure to observe this recommendation could result in undermining and possible differential settlement of the structure or other improvements or cause other moisture-related problems. Currently, the California Building Code requires a minimum 1-percent surface gradient for proper drainage of building pads unless waived by the building official. Concrete pavement may have a minimum gradient of 0.5-percent.

32. *Erosion Control*: Appropriate erosion control measures should be taken at all times during and after construction to prevent surface runoff waters from entering footing excavations or ponding on finished building pad areas.

33. *Planter Drainage:* Planter areas, flower beds and planter boxes should be sloped to drain away from the footings and floor slabs at a gradient of at least 5 percent within 5 feet from the perimeter walls. Any planter areas adjacent to the residence or surrounded by concrete improvements should be

provided with sufficient area drains to help with rapid runoff disposal. No water should be allowed to pond adjacent to the residence or other improvements.

H. General Recommendations

34. *Project Start Up Notification:* In order to reduce any work delays during site development, this firm should be contacted at least 48 hours and preferably 48 hours prior to any need for observation of grading removal of existing site fill soils, approval of exposed formational keys and benches, field density testing of compacted fill soils, footing excavation observations, etc. 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 re-designing 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.).

35. *Construction Best Management Practices (BMPs):* Construction BMPs must be implemented in accordance with the requirements of the controlling jurisdiction. Sufficient BMPs must be installed to prevent silt, mud or other construction debris from being tracked into the adjacent street(s) or storm water conveyance systems due to construction vehicles or any other construction activity. The contractor is responsible for cleaning any such debris that may be in the street at the end of each work day or after a storm event that causes breach in the installed construction BMPs.

All stockpiles of uncompacted soil and/or building materials that are intended to be left unprotected for a period greater than 7 days are to be provided with erosion and sediment controls. Such soil must be protected each day when the probability of rain is 40% or greater. A concrete washout should be provided on all projects that propose the construction of any concrete improvements that are to be poured in place. All erosion/sediment control devices should be maintained in working order at all times. All slopes that are created or disturbed by construction activity must be protected against erosion and sediment transport at all times. The storage of all construction materials and equipment must be protected against any potential release of pollutants into the environment.

X. 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 "*Update Report of Preliminary Geotechnical and Geologic 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.

XI. LIMITATIONS

Our findings and conclusions have been based upon all available data obtained from the research and field reconnaissance, as well as our experience with the soils and native materials located in the La Jolla area of the City of San Diego.

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 County of San Diego.

This opportunity to be of service is sincerely appreciated. Should you have any questions, please feel free to contact our office. Reference to our **Job No. 13-10289** will help expedite a reply to your inquiries.

Respectfully submitted,

GEOTECHNICAL EXPLORATION, INC.

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JOB NO. 13-10289
May 2017

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Gross and Shallow Failure Analysis
Slope Stability Calculations

Bodas Property
6947 Country Club Drive
La Jolla, California

Job No. 13-10289

Soil Design Parameters

Soil Unit Weight: 120 pcf; Saturated Unit Weight: 130 pcf
Friction Angle: 24 degrees
Cohesion: 400 psf
Slope Angle, β: 26.56 degrees (Existing 2 to 1 predominant slope)

Shallow Failure Stability Analysis

$Fs = C/(\gamma \text{ sat} \times H \times \cos\wedge 2\ (\beta) \times \text{Tan}\ \beta) \quad + \quad (\gamma'/\gamma \text{ sat})(\tan \phi/\tan\beta)$

$= 400/(130 \times 3.0 \times 0.800 \times 0.50) \quad + \quad (67.6/130)\ (0.445/0.50)$

$= 2.564 + 0.463$

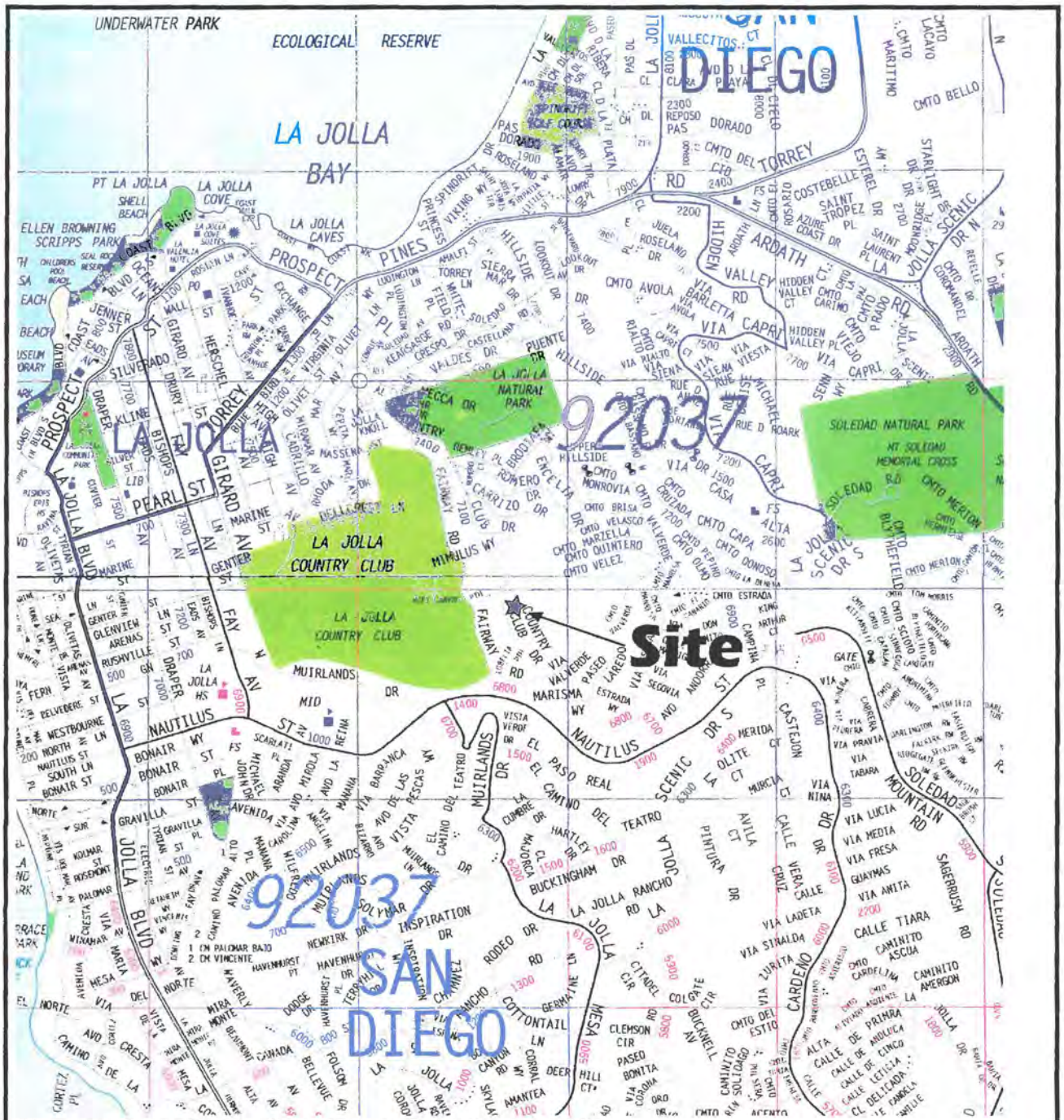
$= \mathbf{3.03} > \mathbf{1.50}$ **ok.**

Gross Failure Stability Analysis

The total maximum slope height (H) on the property is less than 100 feet. If the soil cohesion is 400 psf, the moist soil is 120 pcf, and the slope is no steeper than 2.0 to 1.0 (Horizontal to Vertical) for the predominant site soil, then the following calculation applies:

From Taylor's Charts (for a factor of safety of 1.5 and a ratio ($C/\gamma.H$) = 0.040) the calculated soil height for a 2.0 to 1.0 slope is 83 feet, which is higher than the existing on-site slope height of approximately 50 feet. Therefore, the slope is grossly stable with a factor of safety higher than 1.5.

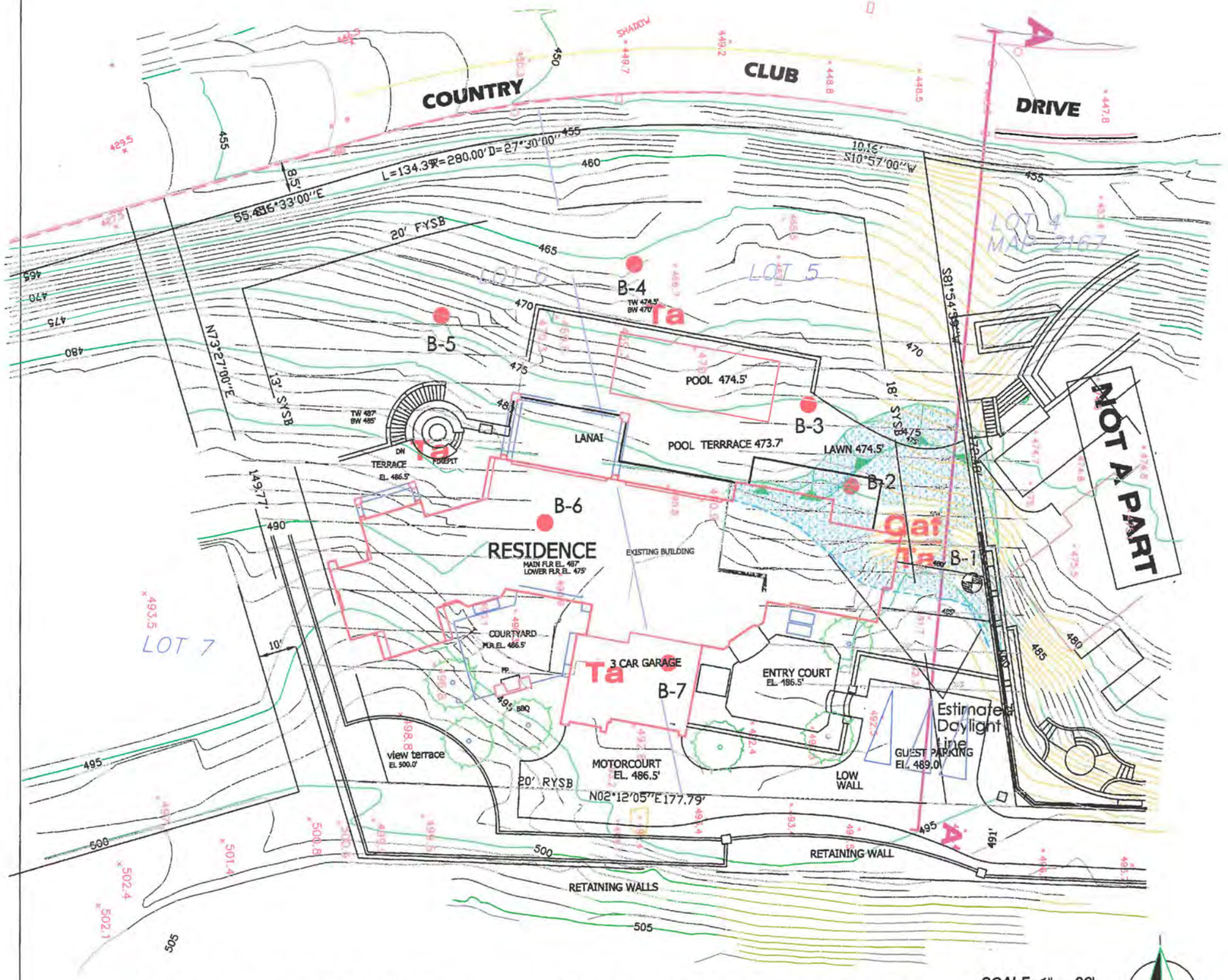
VICINITY MAP



Thomas Bros. Guide San Diego County, pg 1247

Bodas Property
6947 Country Club Drive
La Jolla, CA.

Figure No. I
Job No. 13-10289



Legend

- ASSUMED PROPERTY BOUNDARY
- EXISTING STRUCTURE
- B-1 — APPROXIMATE LOCATION OF LARGE DIAMETER BORING
- B-7 — APPROXIMATE LOCATION OF SMALL DIAMETER BORING
- ESTIMATED DAYLIGHT LINE
- FILL SLOPE
- A — A — SCHEMATIC GEOLOGIC CROSS SECTION
- Qaf — Artificial Fill over
- Ta — Ardath Shale Formation

BODAS RESIDENCE
6947 COUNTRY CLUB DRIVE
LA JOLLA CA 92037

MARTIN ARCHITECTURE
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04-07-17

A1.1

PLOT PLAN and SITE SPECIFIC GEOLOGY MAP

Bodas Property
6947 Country Club Drive
La Jolla, CA.
Figure No. II
Job No. 13-10289

Geotechnical Exploration, Inc.

April 2017

SCALE: 1" = 30' (approximate)

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 SITE PLAN by Martin Architecture dated 4-7-17 and from on-site field reconnaissance performed by GEI.

13-10289-p5

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Large Diameter Bucket Drill Rig	**30-inch diameter boring**	**3-28-13**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 500' Mean Sea Level	**Not Encountered**	**DCV/ LDR**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	EXPANSION INDEX	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
1			**SILTY SAND.** Loose. Damp. Brown. **LANDSCAPE TOPSOIL (Qaf)**	SM									
2			**CLAY.** Very stiff. Very moist. Gray-brown. **FILL (Qaf)**	CL									
3													
4													
5													
6													
7			**SILTY CLAY.** Very stiff. Damp. Light medium brown. **TOPSOIL/ SLOPEWASH (Qsw)**	CL									
8			-- 95% passing #200 sieve.								84		
9			Continued...										

EXPLORATION LOG 10289 COPLEY.GPJ GEO_EXPL.GDT 5/1/17

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

JOB NAME		
Bodas Property		
SITE LOCATION		
6947 Country Club Drive, La Jolla, CA		
JOB NUMBER	REVIEWED BY	LOG No.
13-10289	**LDR**	**B-1**
FIGURE NUMBER	Geotechnical Exploration, Inc.	
IIIa		

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Large Diameter Bucket Drill Rig	**30-inch diameter boring**	**3-28-13**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 500' Mean Sea Level	**Not Encountered**	**DCV/ LDR**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	EXPANSION INDEX	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
11			**SILTY CLAY**. Very stiff. Damp. Light medium brown. **TOPSOIL/ SLOPEWASH (Qsw)** @ 11' - N30°E, 3°NW on minor concretionary zone.	CL									
12													
13			grades into... **CLAYEY SILT/ SILTY CLAY** , with minor **SAND**; interbeds 2"- 3" thick. Very stiff. Moist. Gray- to red-brown and tan. **ARDATH SHALE FORMATION (Ta)** @ 13' - horizontal bedding.	ML-CL									
14													
15			@ 15' - 1/16" thick iron-healed joint, N45°E, 75°SE; 1/4" bedding offset. -- 91% passing #200 sieve.										
16													
17			@ 17'6" - 1/32"- 1/16" live roots in joints.										
18			@ 18' - strike E-W, 5°S on gray **SILTY CLAY**/ tan **CLAYEY SILT** interbeds.										
19			@ 19' - vertical iron-healed joint, strike S30°E. Continued...										

EXPLORATION LOG 10289 COPLEY.GPJ GEO_EXPL.GDT 5/1/17

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

JOB NAME		
Bodas Property		
SITE LOCATION		
6947 Country Club Drive, La Jolla, CA		
JOB NUMBER	REVIEWED BY	LOG No.
13-10289	**LDR**	**B-1**
FIGURE NUMBER	Geotechnical Exploration, Inc.	
IIIb		

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Large Diameter Bucket Drill Rig	**30-inch diameter boring**	**3-28-13**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 500' Mean Sea Level	**Not Encountered**	**DCV/ LDR**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	EXPANSION INDEX	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
21			**CLAYEY SILT/ SILTY CLAY** , with minor **SAND**; interbeds 2"- 3" thick. Very stiff. Moist. Gray- to red-brown and tan. **ARDATH SHALE FORMATION (Ta)** @ 20' - horizontal bedding as defined by thin concretionary zones.	ML-CL									
22			@ 22' - 1/32" iron-healed joint, N75°E, 80°SE.										
23			@ 23' - well-defined thin bedding 1/16"-3/16" thick red-tan **CLAYEY SILT** and gray **SILTY CLAY** (2" thick zone).										
24													
25			@ 25' - offset beds of tan **CLAYEY SILT** down to SE 9" against gray **SILTY CLAY** above offset. Bedding is consistent with lithology. Offsetting joint N35°E, 10°SE.										
26			-- 89% passing #200 sieve.										
27			@ 27' to 29' - 2-foot diameter "augen" covers north side of hole, 8-inch core surrounded by concentric banding.										
28													
29			Continued...										

EXPLORATION LOG 10289 COPLEY.GPJ GEO_EXPL.GDT 5/1/17

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

JOB NAME		
Bodas Property		
SITE LOCATION		
6947 Country Club Drive, La Jolla, CA		
JOB NUMBER	REVIEWED BY	LOG No.
13-10289	**LDR**	**B-1**
FIGURE NUMBER	Geotechnical Exploration, Inc.	
IIIc		

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Large Diameter Bucket Drill Rig	**30-inch diameter boring**	**3-28-13**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 500' Mean Sea Level	**Not Encountered**	**DCV/ LDR**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	EXPANSION INDEX	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
31			**CLAYEY SILT/ SILTY CLAY** , with minor **SAND**; interbeds 2"- 3" thick. Very stiff. Moist. Gray- to red-brown and tan. **ARDATH SHALE FORMATION (Ta)** @ 30' - horizontal gray **CLAY** within massive **SAND**. @ 31'3" - horizontal **SILTY CLAY**, 4" thick within tan **CLAYEY SILT**.	ML-CL									
32			@ 32'6" - concretionary bedding zone, S20°E, 5°SW.										
33													
34			@ 34' - parallel iron oxide healed joints, N40°E, 71°SE.										
35													
36			-- 89% passing #200 sieve.										
37													
38			@ 38'6" to 40' - concentrically banded augen across SE quadrant of hole, no concretionary center.										
39			Continued...										

EXPLORATION LOG 10289 COPLEY.GPJ GEO_EXPL.GDT 5/1/17

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

JOB NAME
Bodas Property

SITE LOCATION
6947 Country Club Drive, La Jolla, CA

JOB NUMBER	REVIEWED BY	LOG No.
13-10289	**LDR**	**B-1**
FIGURE NUMBER **IIId**	Geotechnical Exploration, Inc.	

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Large Diameter Bucket Drill Rig	**30-inch diameter boring**	**3-28-13**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 500' Mean Sea Level	**Not Encountered**	**DCV/ LDR**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	EXPANSION INDEX	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
41			**CLAYEY SILT/ SILTY CLAY**, with minor **SAND**; interbeds 2"- 3" thick. Very stiff. Moist. Gray- to red-brown and tan.	ML-CL									
42			**ARDATH SHALE FORMATION (Ta)** Primary coloration: gray **SILTY CLAY** with thin interbeds of red-tan **CLAYEY SILT**. Parallel 1" thick red-tan **CLAYEY SILT** beds, N40°E, 13°SE. Bedding indistinct, differentiation primarily by color mottling.										
43			@ 42'6" - Gray **SILTY CLAY**, N85°W, 2°-3°NE; high angle iron-healed joints still common.										
44			-- 86% passing #200 sieve.										
45			@ 44'7" - bedding augen structure across NE 1/4 of boring; 6" thick, horizontal. @ 45' to 45'6" - **CLAY**. Very stiff. Moist. Gray. N45°E, 3°SE.										
46			@ 46'8" to 47' - 3/4" gray **CLAY** over 1/4" **SAND** beds, S20°E, 4°SW.										
47													
48			@ 47'8" - well-defined bedding.										
49			@ 48'6" - interbedded gray **CLAY** and tan **SILT**; same attitude. @49'8" - 9" diameter "baseball-size" augen on S70°E side of boring. Continued...										

EXPLORATION LOG 10289 COPLEY.GPJ GEO_EXPL.GDT 5/1/17

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

JOB NAME		
Bodas Property		
SITE LOCATION		
6947 Country Club Drive, La Jolla, CA		
JOB NUMBER	REVIEWED BY	LOG No.
13-10289	**LDR**	**B-1**
FIGURE NUMBER	Geotechnical Exploration, Inc.	
IIIe		

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Large Diameter Bucket Drill Rig	**30-inch diameter boring**	**3-28-13**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 500' Mean Sea Level	**Not Encountered**	**DCV/ LDR**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	EXPANSION INDEX	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
51			**CLAYEY SILT/ SILTY CLAY**, with minor **SAND**; interbeds 2"- 3" thick. Very stiff. Moist. Gray- to red-brown and tan. **ARDATH SHALE FORMATION (Ta)** @ 50'5" to 50'10" - 18" augen structure; gray **CLAY** below augen, N20°E, 4°SE. -- increasing tan **SAND**.	ML-CL									
52													
53			@ 53'6" - angular, blocky clasts along N-S striking vertical joint, horizontal bedding; east side down.										
54													
55			@ 55' - 1/8"- 1/4" horizontal interbeds of gray **SILTY CLAY** and tan **CLAYEY SILT**, iron-healed joint offsets east side 1/4". -- 85% passing #200 sieve.										
56			@ 56'10" - very distinct bedding, three 1" thick gray **SILTY CLAY** beds and three 1/2" thick **SAND** beds, strike N-S, 3°E. -- 18" thick gray **CLAY** layer below interbeds. Contact strikes N-S, 30°E.										
57			**SILTY CLAY**. Hard. Damp. Red-tan.	ML									
58			**SCRIPPS FORMATION (Tsc)** @ 58'3" to 58'5" - 1/2" thick gray **CLAY** bed in red-tan **SAND**, strike N-S, 30°E.										
59			to 59'3" - banded gray, tan and black augens, 6"- 8" thick. @ 59'6" - tan **SILTY FINE SAND** over gray **SILTY CLAY**, strikes N-S, 4°E. Continued...										

EXPLORATION LOG 10289 COPLEY.GPJ GEO_EXPL.GDT 5/1/17

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

JOB NAME		
Bodas Property		
SITE LOCATION		
6947 Country Club Drive, La Jolla, CA		
JOB NUMBER	REVIEWED BY	LOG No.
13-10289	**LDR**	**B-1**
FIGURE NUMBER	Geotechnical Exploration, Inc.	
IIIf		

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Large Diameter Bucket Drill Rig	**30-inch diameter boring**	**3-28-13**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 500' Mean Sea Level	**Not Encountered**	**DCV/ LDR**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	EXPANSION INDEX	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
61			**SILTY CLAY**. Hard. Damp. Red-tan. **SCRIPPS FORMATION (Tsc)**	ML									
62													
63			@ 62'4", 63'4" and 64' - set of 3 parallel joints, N45°E, 57°SE; no offset of bedding. Clean contact between **SILTY FINE SAND** and **CLAY**. Sand has filled upper 6" of joints, iron-healed below. -- 86% passing #200 sieve.										
64			@ 64'3" - thin iron concretionary bedding with horizontal gray **CLAY** to bottom of boring.										
65													
66													
67													
68													
69			Continued...										

EXPLORATION LOG 10289 COPLEY.GPJ GEO_EXPL.GDT 5/1/17

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

JOB NAME		
Bodas Property		
SITE LOCATION		
6947 Country Club Drive, La Jolla, CA		
JOB NUMBER	REVIEWED BY	LOG No.
13-10289	**LDR**	**B-1**
FIGURE NUMBER	Geotechnical Exploration, Inc.	
IIIg		

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Large Diameter Bucket Drill Rig	**30-inch diameter boring**	**3-28-13**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
± 500' Mean Sea Level	**Not Encountered**	**DCV/ LDR**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	EXPANSION INDEX	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
71			**SILTY CLAY.** Hard. Damp. Red-tan. **SCRIPPS FORMATION (Tsc)**	ML									
72													
73													
74													
75													
76			Practical drilling refusal on concretion. No seeps; no caving. Bottom @ 75.5'										
77													
78													
79													

EXPLORATION LOG 10289 COPLEY.GPJ GED_EXPL.GDT 5/1/17

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

JOB NAME		
Bodas Property		
SITE LOCATION		
6947 Country Club Drive, La Jolla, CA		
JOB NUMBER	REVIEWED BY	LOG No.
13-10289	**LDR**	**B-1**
FIGURE NUMBER	Geotechnical Exploration, Inc.	
IIIh		

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Limited Access Auger Drill Rig	**6-inch diameter boring**	**4-4-13**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
n/a	**Not Encountered**	**DCV**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
1			**SILTY SAND/ SANDY SILT** , with gravel (to 2 1/2") and cobble (to 3 1/2"). Loose. Damp. Light brown.	SM-ML								
			FILL (Qaf)									
			-- 52% passing #200 sieve.									
2												
			-- no sample recovery; rock.								53/ rock	2"
3			Drilling refusal on cobble layer.									
			Bottom @ 3'									
4												
5												

EXPLORATION LOG 10289 COPLEY.GPJ GEO_EXPL.GDT 5/1/17

PERCHED WATER TABLE	JOB NAME **Bodas Property**	
BULK BAG SAMPLE	SITE LOCATION **6947 Country Club Drive, La Jolla, CA**	
IN-PLACE SAMPLE	JOB NUMBER **13-10289**	REVIEWED BY **LDR/JAC**
MODIFIED CALIFORNIA SAMPLE	FIGURE NUMBER **IIIi**	Geotechnical Exploration, Inc.
NUCLEAR FIELD DENSITY TEST		LOG No. **B-2**
STANDARD PENETRATION TEST		

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Limited Access Auger Drill Rig	**6-inch diameter boring**	**4-4-13**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
n/a	**Not Encountered**	**DCV**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
1			**SILTY SAND/ SANDY SILT**, with gravel. Loose. Damp. Light brown. **FILL (Qaf)**	SM-ML								
2			**CLAY (MUDSTONE)**. Hard to very hard. Damp. Yellow-brown and gray. **ARDATH SHALE FORMATION (Ta)**	CL								
3											66	2"
4												
5			– becomes slightly sandy.								67	2"
6												
7			Bottom @ 6'									
8												
9												

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

JOB NAME		
Bodas Property		
SITE LOCATION		
6947 Country Club Drive, La Jolla, CA		
JOB NUMBER	REVIEWED BY	LOG No.
13-10289	**LDR/JAC**	**B-3**
FIGURE NUMBER	Geotechnical Exploration, Inc.	
IIIj		

EXPLORATION LOG 10289 COPLEY.GPJ GEO_EXPL.GDT 5/1/17

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Limited Access Auger Drill Rig	**6-inch diameter boring**	**4-4-13**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
n/a	**Not Encountered**	**DCV**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
1			**SILTY SAND/ SANDY SILT** , with gravel. Loose/soft. Damp. Brown. **FILL (Qaf)**	SM-ML								
2			**SILTY CLAY**. Hard to very hard. Damp to moist. Gray and yellow- to red-brown. **ARDATH SHALE FORMATION (Ta)**	CL							41	2"
3												
4												
5											85/ 9"	2"
6			Sampler refusal. Bottom @ 5.25'									

EXPLORATION LOG 10289 COPLEY.GPJ GEO_EXPL.GDT 5/1/17

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

JOB NAME		
Bodas Property		
SITE LOCATION		
6947 Country Club Drive, La Jolla, CA		
JOB NUMBER	REVIEWED BY	LOG No.
13-10289	**LDR/JAC**	**B-4**
FIGURE NUMBER	Geotechnical Exploration, Inc.	
IIIk		

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Limited Access Auger Drill Rig	**6-inch diameter boring**	**4-4-13**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
n/a	**Not Encountered**	**DCV**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
1			**SANDY CLAYEY SILT/ SANDY SILTY CLAY**, with gravel (including Ardath Formation pieces). Loose. Damp. Brown. **FILL (Qaf)**	ML-CL								
2												
3			**SILTY SAND**. Dense. Damp. Tan and red-brown. **ARDATH SHALE FORMATION (Ta)** Sampler refusal.	SM							50/ 6"	2"
4			Bottom @ 4'									
5												

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

JOB NAME		
Bodas Property		
SITE LOCATION		
6947 Country Club Drive, La Jolla, CA		
JOB NUMBER	REVIEWED BY	LOG No.
13-10289	**LDR/JAC**	**B-5**
FIGURE NUMBER	Geotechnical Exploration, Inc.	
IIII		

EXPLORATION LOG 10289 COPLEY.GPJ GEO_EXPLGDT 5/1/17

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Limited Access Auger Drill Rig	**6-inch diameter boring**	**4-4-13**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
n/a	**Not Encountered**	**DCV**

DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
			LANDSCAPE TOPSOIL/ LAWN, 5" thick.									
			SILTY CLAY. Hard. Moist. Olive, gray and tan.	CL								
1			**ARDATH SHALE FORMATION (Ta)**									
2											58	2"
3			Bottom @ 2.75'									
4												
5												

EXPLORATION LOG 10289 COPLEY.GPJ GEO_EXPLGDT 5/1/17

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

JOB NAME: **Bodas Property**

SITE LOCATION: **6947 Country Club Drive, La Jolla, CA**

JOB NUMBER: **13-10289**

REVIEWED BY: **LDR/JAC**

FIGURE NUMBER: **IIIm**

Geotechnical Exploration, Inc.

LOG No. **B-6**

EQUIPMENT	DIMENSION & TYPE OF EXCAVATION	DATE LOGGED
Limited Access Auger Drill Rig	**6-inch diameter boring**	**4-4-13**
SURFACE ELEVATION	GROUNDWATER/ SEEPAGE DEPTH	LOGGED BY
n/a	**Not Encountered**	**DCV**

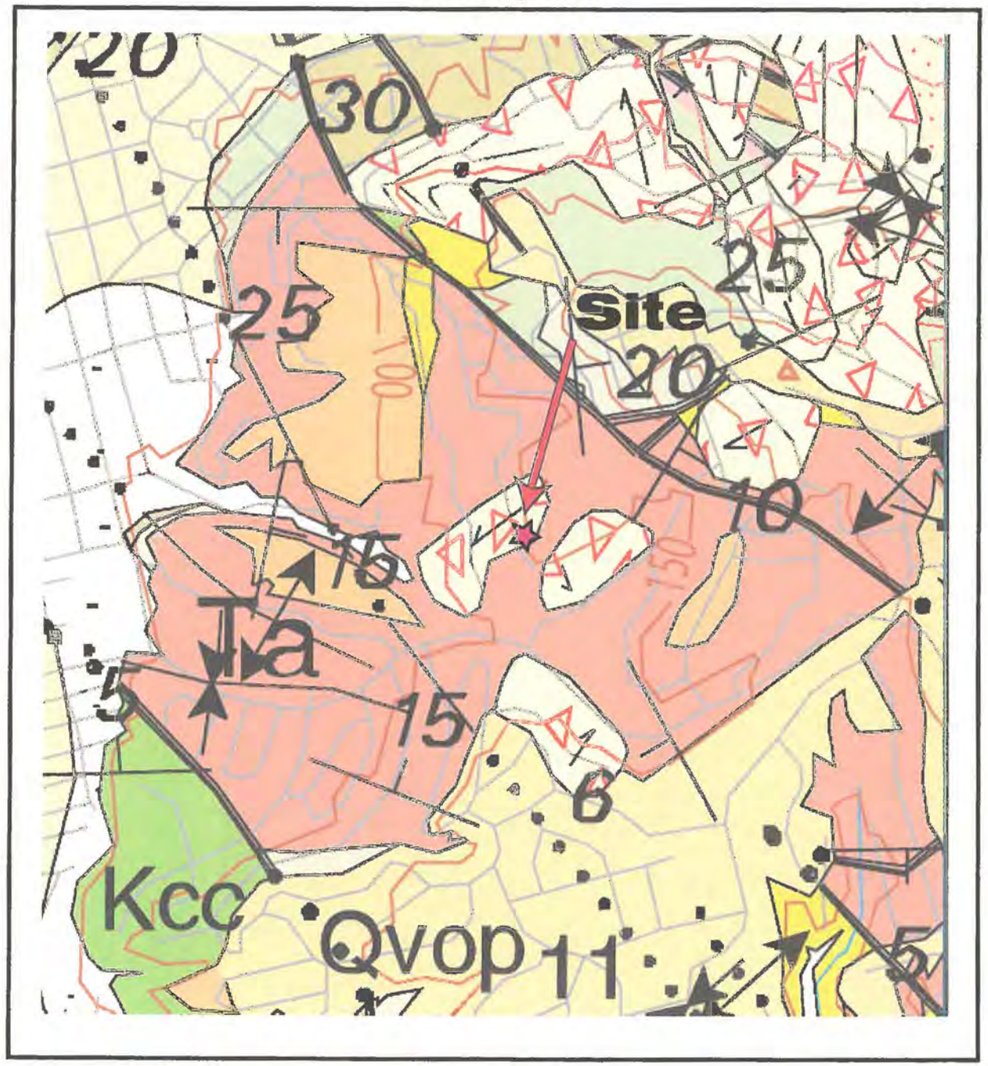
DEPTH (feet)	SYMBOL	SAMPLE	FIELD DESCRIPTION AND CLASSIFICATION DESCRIPTION AND REMARKS (Grain size, Density, Moisture, Color)	U.S.C.S.	IN-PLACE MOISTURE (%)	IN-PLACE DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	DENSITY (% of M.D.D.)	EXPAN. + (%) CONSOL. -	EXPANSION INDEX	BLOW COUNTS/FT.	SAMPLE O.D. (INCHES)
			LANDSCAPE TOPSOIL/ LAWN.										
1			**SILTY SAND**. Loose. Moist. Brown. **FILL (Qaf)**	SM									
2			**SILTY CLAY** , slightly sandy. Very hard. Damp to moist. Olive-brown and gray. **ARDATH SHALE FORMATION (Ta)** -- 88% passing #200 sieve.	CL									
3											103		
4					19.8	95.2							
5					19.2	108.6						71/ 5.5"	3"
6			Bottom @ 5'										

EXPLORATION LOG 10289 COPLEY.GPJ GEO_EXPL.GDT 5/1/17

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

JOB NAME		
Bodas Property		
SITE LOCATION		
6947 Country Club Drive, La Jolla, CA		
JOB NUMBER	REVIEWED BY	LOG No.
13-10289	**LDR/JAC**	**B-7**
FIGURE NUMBER	Geotechnical Exploration, Inc.	
IIIn		

GEOLOGIC MAP
2008
compiled by Michael P. Kennedy
and Siang S Tan



Bodas Property
6947 Country Club Drive
La Jolla, CA.

EXCERPT FROM GEOLOGIC MAP OF THE SAN DIEGO 30' x 60' QUADRANGLE, CALIFO NIA

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; dotted where concealed.

Syncline—Solid where accurately located; dotted where concealed.

Kgd – granite pegmatite dike

Closed depression—Closed depression in Elsinore fault zone.

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

Strike and dip of beds
- Inclined
- Overturned
- Vertical
- Horizontal

Strike and dip of igneous foliation
- Inclined
- Vertical

Strike and dip of igneous joints
- Inclined
- Vertical

Strike and dip of metamorphic foliation
- Inclined

Strike and dip of sedimentary joints
- Vertical

DESCRIPTION OF MAP UNITS

Landslide deposits undivided (Holocene and Pleistocene)—Highly fragmented to largely coherent landslide deposits. Unconsolidated to moderately well consolidated. Most mapped landslides contain scarp area as well as slide deposit. Many Pleistocene age landslides were reactivated in part or entirely during late Holocene

Ardath Shale (middle Eocene)—Mostly uniform, weakly fissile olive-gray silty shale. The upper part contains thin beds of medium-grained sandstone, similar to thicker ones in the overlying Scripps Formation, and concretionary beds with molluscan fossils. The type section of the Ardath Shale is on the east side of Rose Canyon, 800 m south of the Ardath Road intersection with Interstate 5 (Kennedy and Moore, 1971)

Figure No. IV
Job No.13-10289
Geotechnical Exploration, Inc.
April 2017

Bodas-geo-comb.ai

SCHEMATIC CROSS SECTION A-A'

Bodas Property
6947 Country Club Drive
La Jolla, CA.

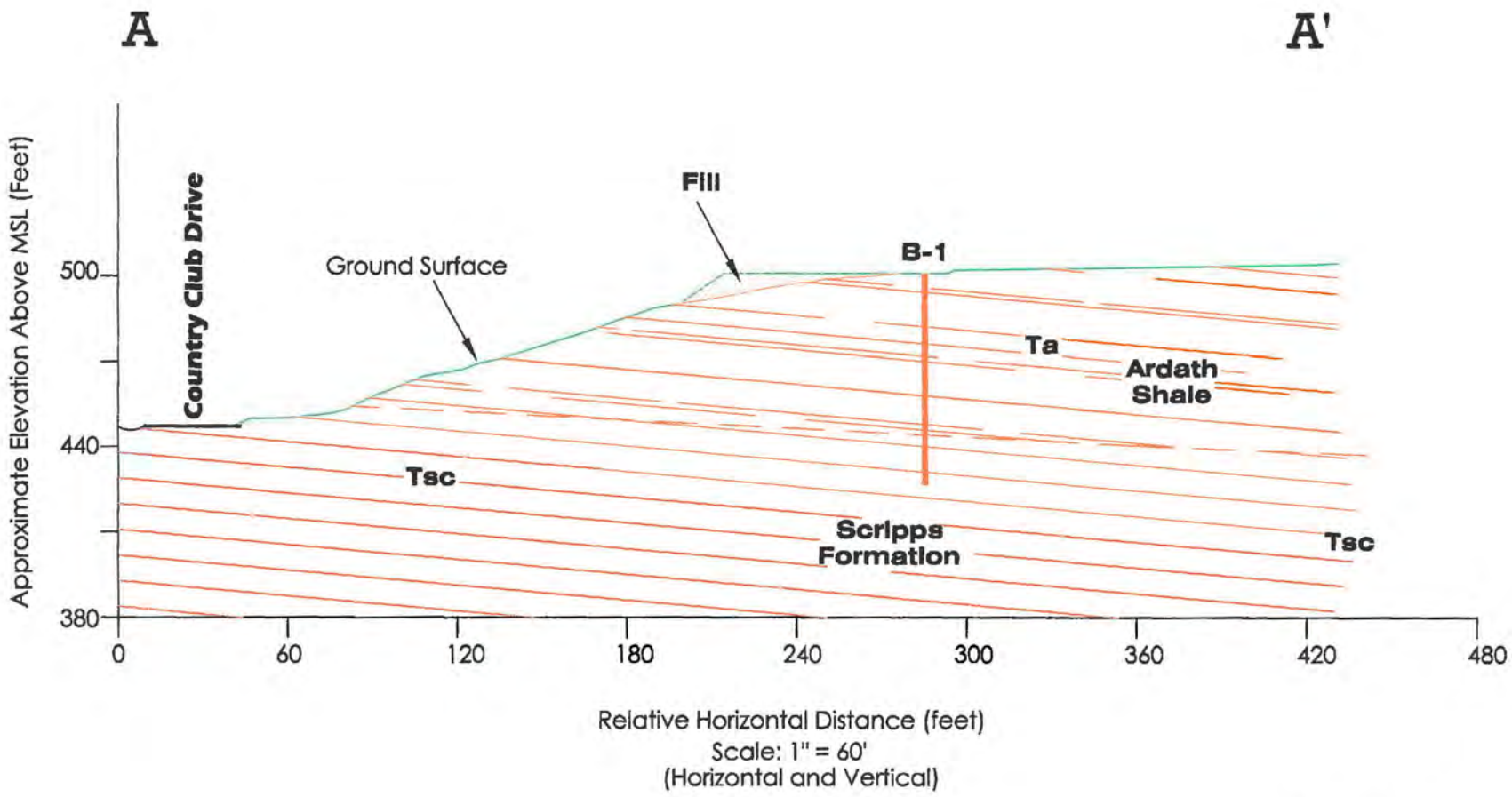


Figure No. V
Job No. 13-10289

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.

GGi Geotechnical Exploration, Inc.

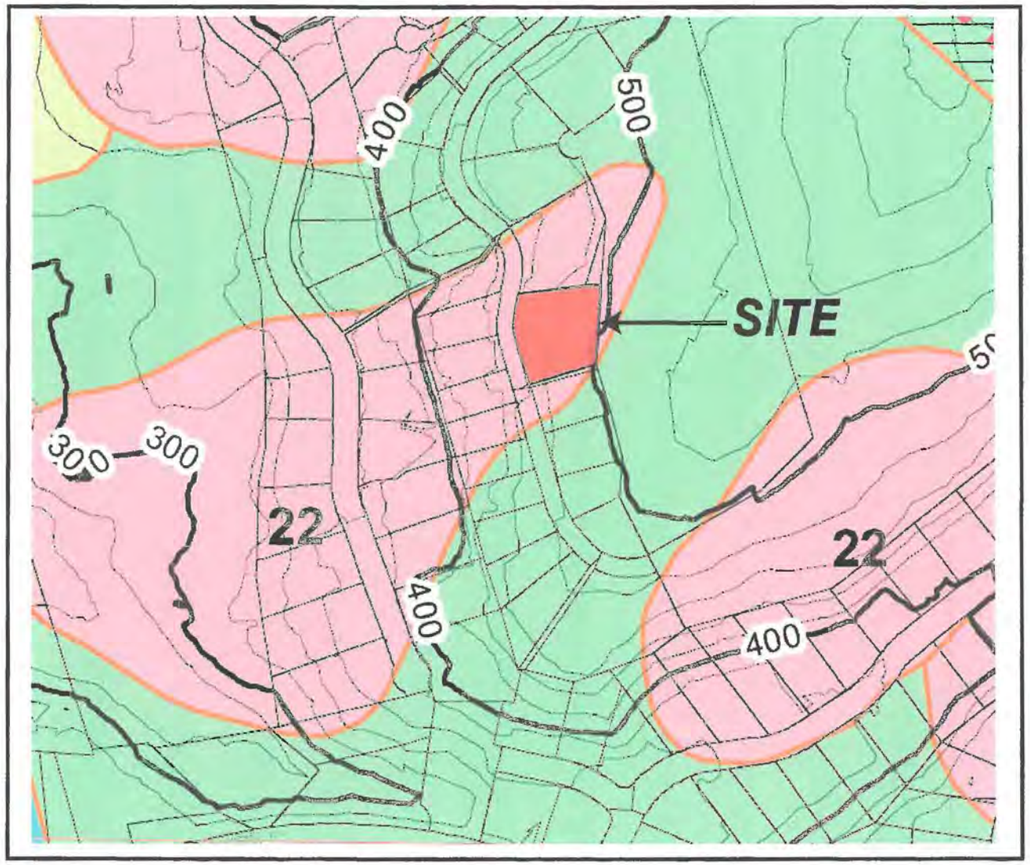
April 2017

13-10289-Va

Geologic Hazards Map Excerpt
from City of San Diego
Geologic Hazards and Fault Map
Sheet 29

Development Services Department

DATE: 4/3/2008



Bodas Property
6947 Country Club Drive
La Jolla, 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

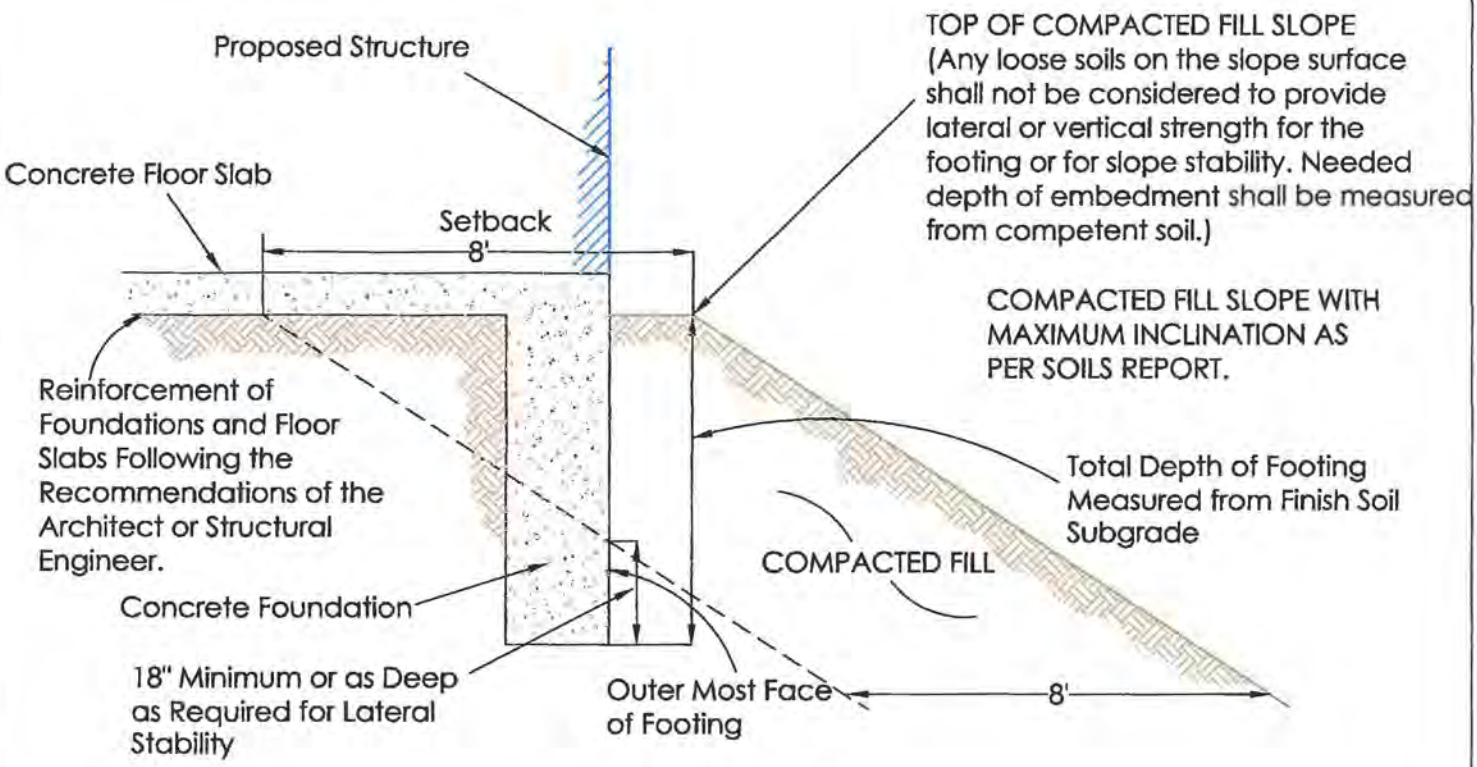
Figure No. VI
Job No. 13-10289

Geotechnical Exploration, Inc.

April 2017

Bodas-seis-combo.ai

FOUNDATION REQUIREMENTS NEAR SLOPES



TYPICAL SECTION

(Showing Proposed Foundation Located Within 8 Feet of Top of Slope)

18" FOOTING / 8' SETBACK

Total Depth of Footing

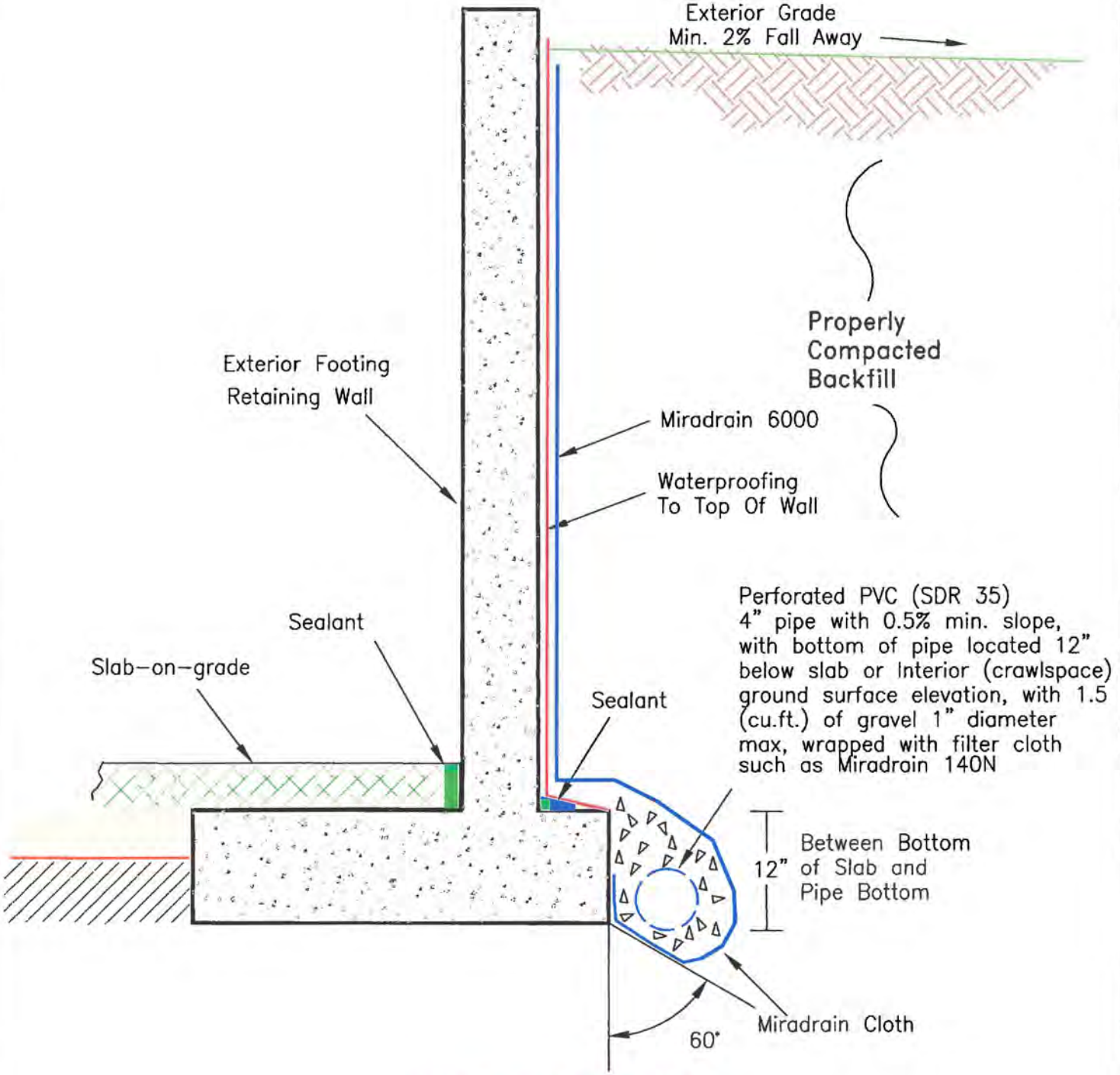
Distance From Top of Slope	1.5:1.0 SLOPE *	2.0:1.0 SLOPE
0	82"	66"
2'	66"	54"
4'	51"	42"
6'	34"	30"
8'	18"	18"

* when applicable

Figure No. VII
Job No. 13-10289

Geotechnical Exploration, Inc.

RECOMMENDED RETAINING WALL DRAINAGE SCHEMATIC



NOT TO SCALE

Figure No. VIII
Job No. 13-10289

Geotechnical Exploration, Inc.

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

SEISMIC DATA EQFAULT TABLES

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

DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: 13-10289

DATE: 04-25-2013

JOB NAME: Copley Test Run

CALCULATION NAME: Copley 6947 eqf Test Run Analysis

FAULT-DATA-FILE NAME: CDMGFLTE.DAT

SITE COORDINATES:
SITE LATITUDE: 32.8364
SITE LONGITUDE: 117.2611

SEARCH RADIUS: 100 mi

ATTENUATION RELATION: 8) Bozorgnia Campbell Niazi (1999) Hor.-Soft Rock-Uncor.
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
DISTANCE MEASURE: cdist
SCOND: 0
Basement Depth: 5.00 km Campbell SSR: 1 Campbell SHR: 0
COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: CDMGFLTE.DAT

MINIMUM DEPTH VALUE (km): 3.0

EQFAULT SUMMARY

Page 1

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG. (Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
ROSE CANYON	2.2(3.5)	6.9	0.486	X
CORONADO BANK	11.9(19.2)	7.4	0.274	IX
NEWPORT-INGLEWOOD (Offshore)	24.2(39.0)	6.9	0.094	VII
ELSINORE-JULIAN	38.5(62.0)	7.1	0.061	VI
ELSINORE-TEMECULA	40.1(64.5)	6.8	0.046	VI
EARTHQUAKE VALLEY	46.2(74.3)	6.5	0.030	V
PALOS VERDES	50.0(80.5)	7.1	0.044	VI
ELSINORE-COYOTE MOUNTAIN	53.0(85.3)	6.8	0.032	V
ELSINORE-GLEN IVY	56.0(90.1)	6.8	0.030	V
SAN JACINTO-ANZA	61.0(98.1)	7.2	0.037	V
SAN JACINTO-COYOTE CREEK	61.3(98.6)	6.8	0.027	V
SAN JACINTO-SAN JACINTO VALLEY	65.6(105.5)	6.9	0.026	V
NEWPORT-INGLEWOOD (L.A.Basin)	65.7(105.7)	6.9	0.026	V
SAN JACINTO - BORREGO	66.9(107.6)	6.6	0.020	IV
CHINO-CENTRAL AVE. (Elsinore)	69.9(112.5)	6.7	0.025	V
WHITTIER	73.6(118.5)	6.8	0.021	IV
COMPTON THRUST	75.1(120.8)	6.8	0.028	V
SUPERSTITION MTN. (San Jacinto)	78.5(126.4)	6.6	0.016	IV
ELYSIAN PARK THRUST	79.8(128.4)	6.7	0.024	IV
LAGUNA SALADA	80.5(129.5)	7.0	0.022	IV
SAN JACINTO-SAN BERNARDINO	81.6(131.3)	6.7	0.017	IV
ELMORE RANCH	82.8(133.2)	6.6	0.015	IV
SUPERSTITION HILLS (San Jacinto)	83.5(134.4)	6.6	0.015	IV
SAN ANDREAS - Southern	83.8(134.8)	7.4	0.029	V
SAN ANDREAS - San Bernardino	83.8(134.8)	7.3	0.026	V
SAN ANDREAS - Coachella	87.8(141.3)	7.1	0.021	IV
PINTO MOUNTAIN	90.0(144.9)	7.0	0.019	IV
SAN JOSE	91.0(146.4)	6.5	0.015	IV
BURNT MTN.	92.3(148.5)	6.4	0.011	III
SIERRA MADRE	94.7(152.4)	7.0	0.021	IV
EUREKA PEAK	94.9(152.7)	6.4	0.011	III
CUCAMONGA	94.9(152.8)	7.0	0.021	IV
BRAWLEY SEISMIC ZONE	96.9(155.9)	6.4	0.011	III
NORTH FRONTAL FAULT ZONE (West)	97.2(156.4)	7.0	0.020	IV
IMPERIAL	98.5(158.5)	7.0	0.017	IV
CLEGHORN	99.4(159.9)	6.5	0.011	III
NORTH FRONTAL FAULT ZONE (East)	99.6 (160.3)	6.7	0.016	IV

****

-END OF SEARCH- 37 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE ROSE CANYON FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 2.2 MILES (3.5 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.4863 g

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**********************
*                    *
*    E Q F A U L T   *
*                    *
*    Version 3.00    *
*                    *
**********************
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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: 13-10289

DATE: 04-25-2013

JOB NAME: Copley Test Run

CALCULATION NAME: Copley 6947 eqf Test Run Analysis

FAULT-DATA-FILE NAME: CDMGFLTE.DAT

SITE COORDINATES:
SITE LATITUDE: 32.8364
SITE LONGITUDE: 117.2611

SEARCH RADIUS: 100 mi

ATTENUATION RELATION: 8) Bozorgnia Campbell Niazi (1999) Hor.-Soft Rock-Uncor.
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
DISTANCE MEASURE: cdist
SCOND: 0
Basement Depth: 5.00 km Campbell SSR: 1 Campbell SHR: 0
COMPUTE RHGA HORIZ. ACCEL. (FACTOR: 0.65 DISTANCE: 20 miles)

FAULT-DATA FILE USED: CDMGFLTE.DAT

MINIMUM DEPTH VALUE (km): 3.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

Page 1

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: RHGA SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD.MERC.
ROSE CANYON	2.2(3.5)	6.9	0.316	IX
CORONADO BANK	11.9(19.2)	7.4	0.178	VIII
NEWPORT-INGLEWOOD (Offshore)	24.2(39.0)	6.9	0.094	VII
ELSINORE-JULIAN	38.5(62.0)	7.1	0.061	VI
ELSINORE-TEMECULA	40.1(64.5)	6.8	0.046	VI
EARTHQUAKE VALLEY	46.2(74.3)	6.5	0.030	V
PALOS VERDES	50.0(80.5)	7.1	0.044	VI
ELSINORE-COYOTE MOUNTAIN	53.0(85.3)	6.8	0.032	V
ELSINORE-GLEN IVY	56.0(90.1)	6.8	0.030	V
SAN JACINTO-ANZA	61.0(98.1)	7.2	0.037	V
SAN JACINTO-COYOTE CREEK	61.3(98.6)	6.8	0.027	V
SAN JACINTO-SAN JACINTO VALLEY	65.6(105.5)	6.9	0.026	V
NEWPORT-INGLEWOOD (L.A.Basin)	65.7(105.7)	6.9	0.026	V
SAN JACINTO - BORREGO	66.9(107.6)	6.6	0.020	IV
CHINO-CENTRAL AVE. (Elsinore)	69.9(112.5)	6.7	0.025	V
WHITTIER	73.6(118.5)	6.8	0.021	IV
COMPTON THRUST	75.1(120.8)	6.8	0.028	V
SUPERSTITION MTN. (San Jacinto)	78.5(126.4)	6.6	0.016	IV
ELYSIAN PARK THRUST	79.8(128.4)	6.7	0.024	IV
LAGUNA SALADA	80.5(129.5)	7.0	0.022	IV
SAN JACINTO-SAN BERNARDINO	81.6(131.3)	6.7	0.017	IV
ELMORE RANCH	82.8(133.2)	6.6	0.015	IV
SUPERSTITION HILLS (San Jacinto)	83.5(134.4)	6.6	0.015	IV
SAN ANDREAS - Southern	83.8(134.8)	7.4	0.029	V
SAN ANDREAS - San Bernardino	83.8(134.8)	7.3	0.026	V
SAN ANDREAS - Coachella	87.8(141.3)	7.1	0.021	IV
PINTO MOUNTAIN	90.0(144.9)	7.0	0.019	IV
SAN JOSE	91.0(146.4)	6.5	0.015	IV
BURNT MTN.	92.3(148.5)	6.4	0.011	III
SIERRA MADRE	94.7(152.4)	7.0	0.021	IV
EUREKA PEAK	94.9(152.7)	6.4	0.011	III
CUCAMONGA	94.9(152.8)	7.0	0.021	IV
BRAWLEY SEISMIC ZONE	96.9(155.9)	6.4	0.011	III
NORTH FRONTAL FAULT ZONE (West)	97.2(156.4)	7.0	0.020	IV
IMPERIAL	98.5(158.5)	7.0	0.017	IV
CLEGHORN	99.4(159.9)	6.5	0.011	III
NORTH FRONTAL FAULT ZONE (East)	99.6 (160.3)	6.7	0.016	IV

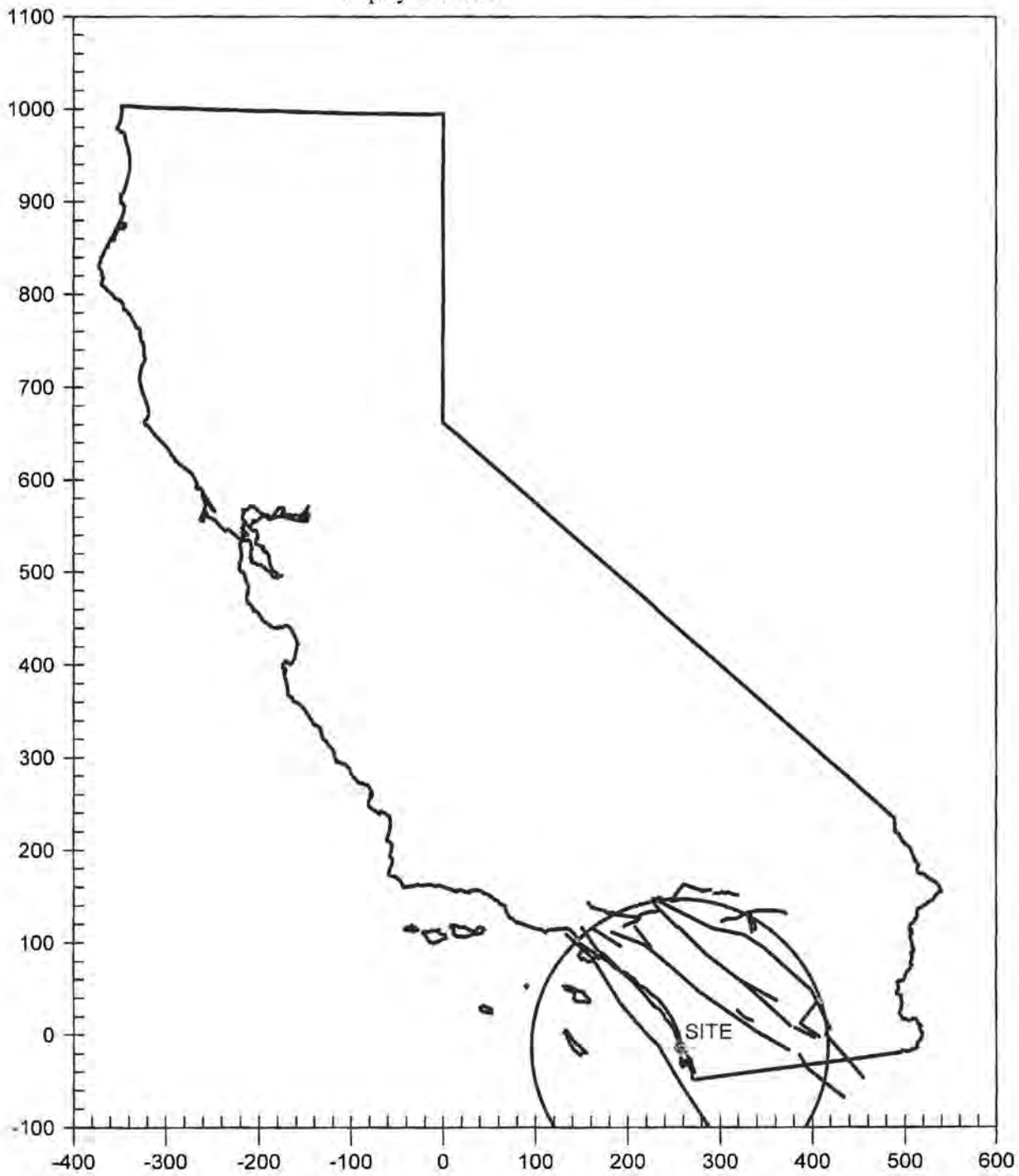
-END OF SEARCH- 37 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE ROSE CANYON FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 2.2 MILES (3.5 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.3161 g

CALIFORNIA FAULT MAP

Copley Test Run



APPENDIX C

MODIFIED MERCALLI INTENSITY INDEX

APPENDIX C
MODIFIED MERCALLI INTENSITY SCALE OF 1931
(Excerpted from the California Division of Conservation Division of Mines and Geology DMG Note 32)

The first scale to reflect earthquake intensities was developed by deRossi of Italy, and Forel of Switzerland, in the 1880s, and is known as the Rossi-Forel Scale. This scale, with values from I to X, was used for about two decades. A need for a more refined scale increased with the advancement of the science of seismology, and in 1902, the Italian seismologist Mercalli devised a new scale on a I to XII range. The Mercalli Scale was modified in 1931 by American seismologists Harry O. Wood and Frank Neumann to take into account modern structural features.

The Modified Mercalli Intensity Scale measures the intensity of an earthquake's effects in a given locality, and is perhaps much more meaningful to the layman because it is based on actual observations of earthquake effects at specific places. It should be noted that because the damage used for assigning intensities can be obtained only from direct firsthand reports, considerable time -- weeks or months -- is sometimes needed before an intensity map can be assembled for a particular earthquake.

On the Modified Mercalli Intensity Scale, values range from I to XII. The most commonly used adaptation covers the range of intensity from the conditions of *"I -- not felt except by very few, favorably situated,"* to *"XII -- damage total, lines of sight disturbed, objects thrown into the air."* While an earthquake has only one magnitude, it can have many intensities, which decrease with distance from the epicenter.

It is difficult to compare magnitude and intensity because intensity is linked with the particular ground and structural conditions of a given area, as well as distance from the earthquake epicenter, while magnitude depends on the energy released at the focus of the earthquake.

I	Not felt except by a very few under especially favorable circumstances.
II	Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
III	Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing of truck. Duration estimated.
IV	During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Felt by nearly everyone, many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.
VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.
VII	Everybody runs outdoors. Damage negligible in building of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.
XI	Few, if any, masonry structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
XII	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects thrown upward into the air.

APPENDIX D

SLOPE STABILITY ANALYSIS

Gross and Shallow Failure Analysis
Slope Stability Calculations

Copley Trust Property
6947 Country Club Drive
La Jolla, California

Job No. 13-10289

Soil Design Parameters

Soil Unit Weight: 120 pcf; Saturated Unit Weight: 130 pcf
Friction Angle: 24 degrees
Cohesion: 400 psf
Slope Angle, β: 26.56 degrees (Existing 2 to 1 predominant slope)

Shallow Failure Stability Analysis

$Fs = C/(\gamma \text{ sat} \times H \times \cos^2(\beta) \times \tan\beta) + (\gamma'/\gamma \text{ sat})(\tan\phi/\tan\beta)$

$= 400/(130 \times 3.0 \times 0.800 \times 0.50) + (67.6/130)(0.445/0.50)$

$= 2.564 + 0.463$

$= \mathbf{3.03 > 1.50 \text{ ok.}}$

Gross Failure Stability Analysis

The total maximum slope height (H) on the property is less than 100 feet. If the soil cohesion is 400 psf, the moist soil is 120 pcf, and the slope is no steeper than 2.0 to 1.0 (Horizontal to Vertical) for the predominant site soil, then the following calculation applies:

From Taylor's Charts (for a factor of safety of 1.5 and a ratio ($C/\gamma.H$) = 0.040) the calculated soil height for a 2.0 to 1.0 slope is 83 feet, which is higher than the existing on-site slope height of approximately 50 feet. Therefore, the slope is grossly stable with a factor of safety higher than 1.5.

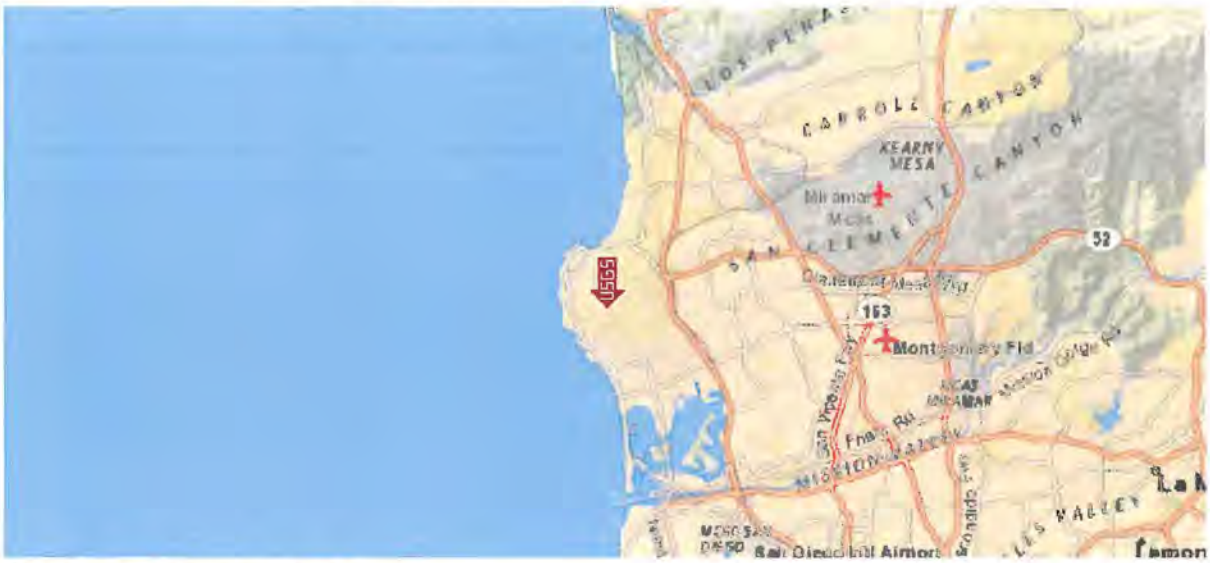
APPENDIX E

USGS Design Maps Summary Report

USGS Design Maps Summary Report

User-Specified Input

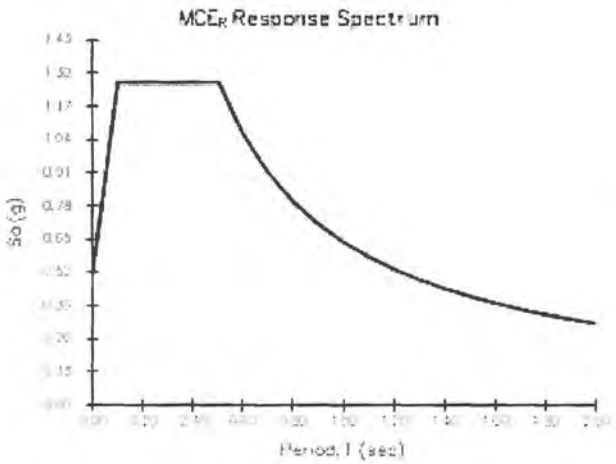
Report Title	6947 Country Club Drive, La Jolla, CA Thu May 4, 2017 20:50:31 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	32.8364°N, 117.2611°W
Site Soil Classification	Site Class C – "Very Dense Soil and Soft Rock"
Risk Category	I/II/III

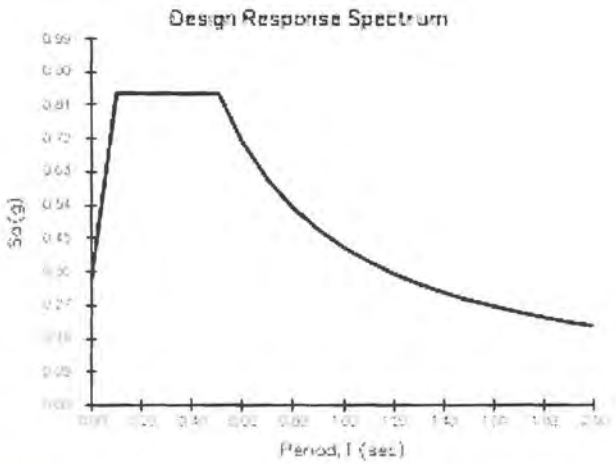


USGS-Provided Output

S_S =	1.264 g	S_{MS} =	1.264 g	S_{DS} =	0.842 g
S_1 =	0.487 g	S_{M1} =	0.640 g	S_{D1} =	0.426 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

USGS Design Maps Detailed Report

ASCE 7-10 Standard (32.8364°N, 117.2611°W)

Site Class C – "Very Dense Soil and Soft Rock", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1]	S_S = 1.264 g
From Figure 22-2 [2]	S_1 = 0.487 g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class C, based on the site soil properties in accordance with Chapter 20.

Table 20.3-1 Site Classification

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index PI > 20, • Moisture content $w \geq 40\%$, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk-Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4-1: Site Coefficient F_a

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at Short Period				
	$S_S \leq 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \geq 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_S

For Site Class = C and S_S = 1.264 g, F_a = 1.000

Table 11.4-2: Site Coefficient F_v

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at 1-s Period				
	$S_1 \leq 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \geq 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_1

For Site Class = C and S_1 = 0.487 g, F_v = 1.313

Equation (11.4–1): $S_{MS} = F_a S_S = 1.000 \times 1.264 = 1.264$ g

Equation (11.4–2): $S_{M1} = F_v S_1 = 1.313 \times 0.487 = 0.640$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

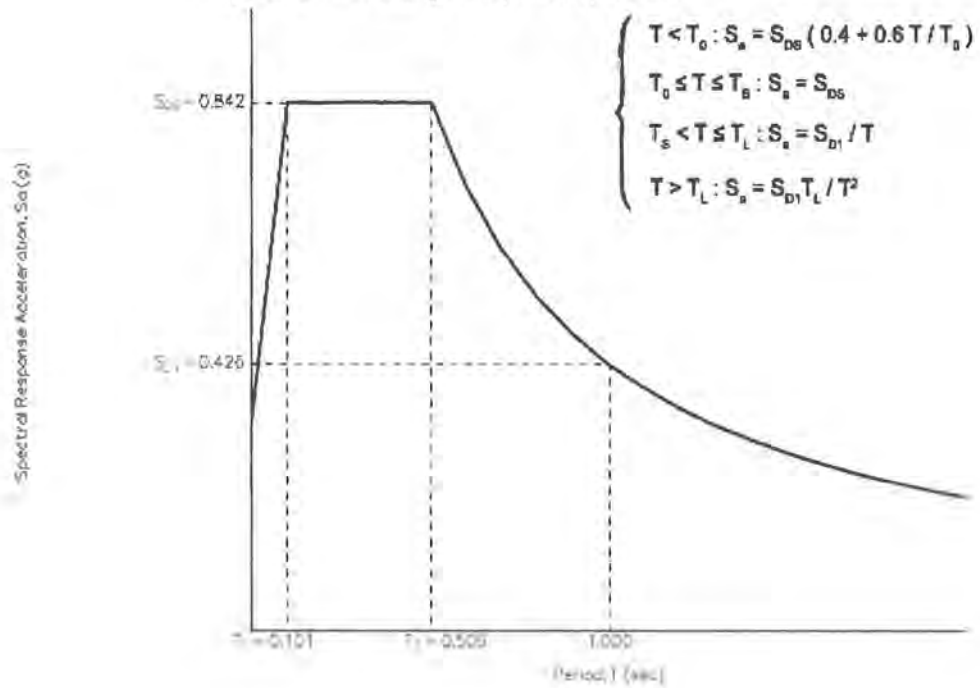
Equation (11.4–3): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 1.264 = 0.842$ g

Equation (11.4–4): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 0.640 = 0.426$ g

Section 11.4.5 — Design Response Spectrum

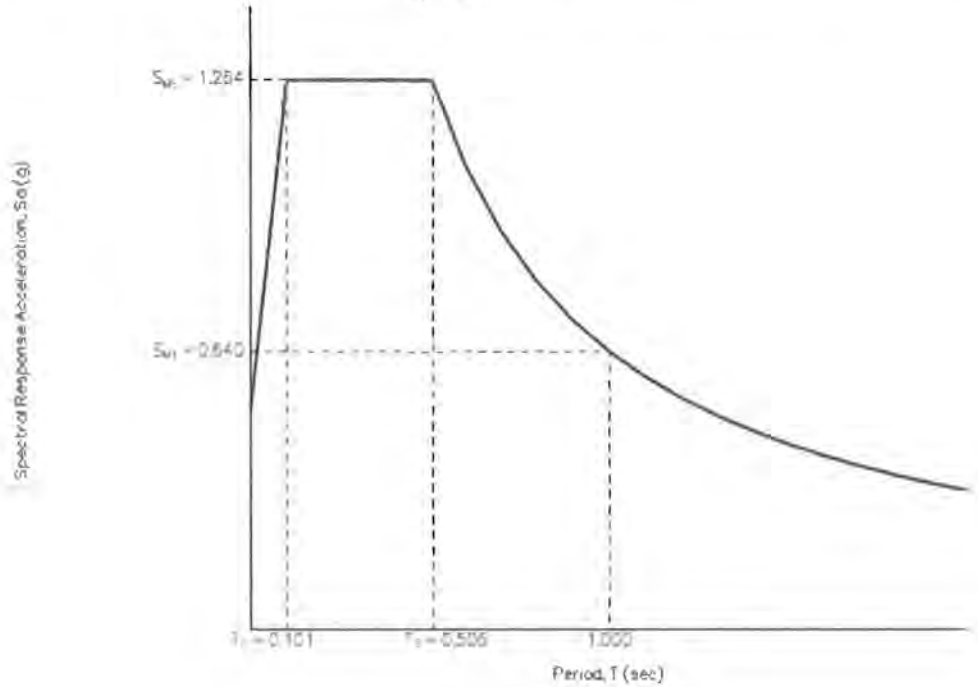
From Figure 22-12 [3] $T_L = 8$ seconds

Figure 11.4–1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7 [4] PGA = 0.565

Equation (11.8–1): $PGA_M = F_{PGA}PGA = 1.000 \times 0.565 = 0.565$ g

Table 11.8–1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of PGA

For Site Class = C and PGA = 0.565 g, F_{PGA} = 1.000

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17 [5] C_{RS} = 0.845

From Figure 22-18 [6] C_{R1} = 0.876

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 0.842 g, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.426 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = D

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 22-1*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf