# REPORT OF PRELIMINARY GEOTECHNICAL INVESTIGATION

Proposed Lee-DeGuzman Residence
1855 Spindrift Drive
La Jolla, California

**JOB NO. 22-13755**
13 July 2023

Prepared for:

***Bryce Lee and Crisanta DeGuzman***

**Geotechnical Exploration, Inc.**

SOIL AND FOUNDATION ENGINEERING ● GROUNDWATER ● ENGINEERING GEOLOGY

13 July 2023

Bryce Lee and Crisanta DeGuzman
1855 Spindrift Drive
La Jolla, CA 92037

**Job No. 22-13755**

Subject: **Report of Preliminary Geotechnical Investigation**
Proposed Lee-DeGuzman Residence
1855 Spindrift Drive
La Jolla, California

Dear Mr. Lee and Ms. DeGuzman:

In accordance with our proposal dated May 31, 2023, ***Geotechnical Exploration, Inc.*** has performed a preliminary geotechnical investigation for the subject project in La Jolla, California. The field work was performed on April 11, 2023.

If the conclusions and recommendations presented in this report are incorporated into the design and construction of the proposed residential development, it is our opinion that the site is suitable for the proposed project from a geotechnical perspective.

This opportunity to be of service is sincerely appreciated. Should you have any questions concerning the following report, please do not hesitate to contact us. Reference to our **Job No. 22-13755** will expedite a response to your inquiries.

Respectfully submitted,

**GEOTECHNICAL EXPLORATION, INC.**

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# REPORT OF PRELIMINARY GEOTECHNICAL INVESTIGATION

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1851 Spindrift Drive
La Jolla, California

## JOB NO. 22-13755

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

## *I. PROJECT SUMMARY*

It is our understanding, based on communications with your project architect, Aidlin Darling Design, that the existing three-story residential structure and pool at the subject site are to be completely demolished and replaced with a new three-story, single-family residential structure with a third level pool, attached garage and associated improvements. The new residential structure is to be constructed of standard-type building materials utilizing conventional shallow foundations with either slabs on-grade or raised wood floors. Foundation loads are expected to be typical for this type of relatively light construction with exception of the loads created by the elevated pool. When final architectural, engineering and/or grading plans have been prepared, they should be made available for our review. Additional or modified recommendations would be provided at that time if warranted.

The site is located within the latest revision of the Alquist-Priolo Fault Zone described in the CGS Earthquake Zones of Required Investigation, La Jolla Quadrangle, (California Geological Survey [CGS], 2021). Our review of the City of San Diego Seismic Safety Study -- Geologic Hazards Map Sheet 29, dated 2008, and the San Diego Zoning and Parcel Information Portal (ZAPP), also indicate that the site is located in Geologic Hazard Category (GHC) 11. Our fault investigation report for this site dated July 7, 2023 (GEI, 2023) was issued under separate cover and our investigation revealed no evidence of active faulting or potentially active faulting crossing the project area.

Based on our current understanding of the planned construction, it is our opinion that the proposed site development would not destabilize neighboring properties or induce the settlement of adjacent structures or right-of-way improvements if designed and constructed in accordance with our recommendations.

Please be aware that the importance of thorough observation and testing during construction should be recognized by the client and the contractor(s) to provide appropriate documentation for any necessary as-graded reports. Recommendations for observation and testing are provided under the "Conclusions and Recommendations" section of this report.

## *II. SCOPE OF WORK*

The work performed for this investigation utilized the Topographic Survey Map prepared by Coffey Engineering dated August 4, 2022. Our investigation included a site reconnaissance and subsurface exploration program under the direction of our engineering geologist with the placement, logging and sampling of six exploratory borings (B-1 to B-6) utilizing a track mounted hollow stem drill rig and a tripod drill rig. In addition, we reviewed available published information pertaining to the site geology, evaluated the bearing characteristics of the encountered surficial fill and formational material, performed geotechnical engineering analysis of the field data, and prepared this report. The data obtained and the analyses performed were for the purpose of determining if an active fault crosses the property and providing geotechnical design parameters, recommendations and construction criteria for the construction of a new residential structure, as well as the associated improvements.

Our work also included review of available published information pertaining to the site and nearby geology, field observations of the geologic features exposed in the bluff face above the beach to the west, laboratory testing of sampled soils, geotechnical engineering analysis of the field and laboratory data, and the preparation of this report. The data obtained and the analyses performed were for the purpose of providing design and construction criteria for the project earthwork, building foundations, and slab on-grade or raised wood floors and pavements.

## ***III. <u>SITE DESCRIPTION</u>***

The subject site is addressed as 1851 Spindrift Drive, and is known as Assessor's Parcel No. 346-451-11-00, Lot 41, per Recorded Map No. 1762, in the La Jolla region of the City and County of San Diego, State of California. Refer to Figure No. I, the Vicinity Map, for site location.

The roughly rectangular-shaped property is approximately 4,609 square feet in size. The front of the site faces northwest toward Spindrift Drive and is bordered on the northeast by a similar single-family residence at a lower elevation; on the southeast and southwest by similar single-family residences at slightly higher elevations; and on the northwest by Spindrift Drive. The site is currently occupied by a three-story single-family residence with a pool in the rear yard, an attached one-car garage on the front, retaining walls, flatwork, and associated improvements. The site consists of a two-level terraced building pad with approximately 7 feet differential in elevation from front to back. The overall gradient of the site is gently descending toward the northwest.

Elevations across the site range from approximately 64 feet above mean sea level (MSL) in the front yard, to 74 feet above MSL near the southeast property line. Information concerning approximate elevations across the site was obtained from the Topographic Survey Map prepared by Coffey Engineering dated August 4, 2022. Vegetation on the site consists of an ornamental garden with shrubbery and a few small trees.

## IV. FIELD INVESTIGATION

The field investigation consisted of a surface reconnaissance and a subsurface exploration program utilizing a track mounted hollow stem auger and a tripod drill rig with a solid stem auger. Near continuous sampling was performed to the full depth of the excavations to investigate and sample the subsurface soils on April 11, 2023.

Six exploratory borings (B-1 to B-6) were excavated across the site and in the areas of the proposed new construction. The exploratory borings were excavated to depths ranging from 14 to 17.8 feet in order to obtain representative soil samples to define the soil profile across the site and to define the Old Paralic Deposits (Qop$_6$) and Point Loma Formation (Kp) contact surface profile. The soils encountered in the exploratory borings were continuously logged in the field by our representative and described in accordance with the Unified Soil Classification System (refer to Appendix A). The approximate locations of the exploratory excavations are shown on the Plot Plan with Site-specific Geologic Map, Figure No. II.

Representative samples were obtained from the exploratory borings at selected depths appropriate to the investigation. Sampling consisted of utilizing a 2-inch O.D. standard penetration sampler (SPT) and a 3-inch O.D. California modified sampler with thin-wall rings driven with a 140-pound automatic hammer to obtain relatively undisturbed samples. Bulk samples were also collected from the exploratory borings to aid in classification and for appropriate laboratory testing. All samples were returned to our laboratory for evaluation and testing. Exploratory boring logs were prepared on the basis of our observations and laboratory test results, and are attached as Figure Nos. IIIa-f.

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

## *V. LABORATORY TESTS AND SOIL INFORMATION*

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 the proposed new structure and associated improvements. The test results are presented on the logs, Figure Nos. IIIa-f and on Figure Nos. IVa-b, Laboratory Data. The following tests were conducted on representative soil samples:

1. *Moisture Content (ASTM D2216-19)*
2. *Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures using Coated Samples (ASTM D1188-07)*
4. *Laboratory Compaction Characteristics (ASTM D1557-12e1)*
5. *Expansion Index (ASTM D4829-19)*

Moisture content and density measurements were performed by ASTM methods D2216-19 and D2937-17e2 Density Measurement per Drive Cylinder method respectively to establish the in-situ moisture and density of samples retrieved from the exploratory borings in conjunction with bulk samples to establish the in-situ moisture and density of samples retrieved from the exploratory borings. Tests performed by ASTM method D1188-07 determined the bulk specific gravity utilizing paraffin-coated specimens of samples obtained.

Laboratory compaction values (ASTM D1557-12e1) establish the optimum moisture content and the laboratory maximum dry density of the tested soils. The relationship between the moisture and density of remolded soil samples helps to establish the relative compaction of the existing fill soils and soil compaction conditions to be anticipated during any future grading operation. The test results are presented on the logs at the appropriate sample depths.

The expansion potential of soils is determined, when necessary, utilizing the Standard Test Method for Expansion Index of Soils (ASTM D4829-19). 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 |

Our laboratory test of a representative sample of the encountered soils yielded an expansion index of 32. Based on the table presented above, the sampled soils have a low potential for expansion.

Based on our visual and laboratory correlated classification, and our experience with similar soils in the San Diego region, it is our opinion that the existing fill and formational materials encountered in all borings possesses a low potential for expansion. Therefore, we have assigned a maximum expansion index of less than 50 to these soils.

Based on the field and laboratory test data, our observations of the primary soil types, and our previous experience with laboratory testing of similar soils, our Geotechnical Engineer has assigned values for friction angle, coefficient of friction, and cohesion for those soils that will have significant lateral support or load bearing functions on the project. These values have been utilized in determining the recommended bearing value as well as active and passive earth pressure design criteria for foundations and structures.

## *VI. REGIONAL 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, metasedimentary and plutonic rocks predominate in the Peninsular Ranges with primarily Cenozoic sedimentary rocks to the west and east of this central mountain range (Demere, 1997). Refer to Appendix B for more detailed regional geologic descriptions.

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

Our field investigation, reconnaissance and review of the geologic map by Kennedy and Tan, 2008, *"Geologic Map of San Diego, 30'x60' Quadrangle, CA"* indicate that the site is underlain at shallow depth by Old Paralic Deposits, Unit 6 ($Qop_6$) formational materials, described in the literature as late to middle Pleistocene, poorly sorted, moderately permeable, reddish-brown, interfingered strandline, beach, estuarine and colluvial deposits composed of siltstone, sandstone and conglomerate. The paralic deposits are underlain by upper Cretaceous Point Loma Formation described as mostly interbedded, fine grained, dusky-yellow sandstone and olive-gray siltstone. The overlying fill and landscape materials are approximately 3 to 4 feet thick at the explored locations and were also encountered in all exploratory borings. An excerpt of the geological map (Kennedy and Tan, 2008) is included as Figure No. V, Geologic Map and Legend.

### *A. Stratigraphy*

*Artificial Fill Soils (Qaf) and Landscape Topsoil (Qts)*: The entire site is overlain by 3 to 4 feet of artificial fill soils that were encountered in all our exploratory borings (B-1 to B-6). Approximately 1 foot of landscape topsoils were encountered in exploratory borings B-5 and B-6. The observed fill and topsoils consist of fine- to medium-grained silty sands (SM) and clayey sands (SC). The fill and topsoils are slightly moist to moist, dark brown and light gray. The density was observed to be loose to medium dense. In our opinion, the fill soils are not suitable in their current condition for support of loads from the proposed structures. The fill soils are considered to have a low expansion potential, and after selective removal of trash and organic matter, the existing fill materials are suitable for use as properly compacted new fill material on the site. Refer to Figure Nos. IIIa-f for details.

*Old Paralic Deposits, Unit 6 (Qop$_6$)*: Underlying the fill soils, we encountered terrace deposits described in the geologic maps as late to middle Pleistocene, Quaternary Old Paralic Deposits Unit 6 this material was encountered in all exploratory borings at relatively shallow depths of 3 to 4 feet. These terrace deposits were observed to extend to depths ranging from 9 to 9.5 feet in the front driveway area and to 15.5 to 16 feet in the higher elevation backyard area. This material was observed to generally consist of fine- to medium-grained silty sands (SM) sandy clays (CL) and clayey sands (SC). These soils were observed to be moist to very moist and medium dense to dense and stiff to very stiff. The terrace deposits are considered to have generally a low expansion potential and are suitable in their current condition for support of loads from the proposed structures or additional fill. Refer to Figure Nos. IIIa-f for details.

*Point Loma Formation (Kp):* All of our exploratory borings were extended through the terrace deposits into the underlying Cretaceous formational materials. These soils are described as upper Cretaceous Point Loma Formation. At the subject site, this material consisted of mottled orange-brown, dark orange-brown, brown to yellow-brown and gray with iron oxide staining, dense to very dense silty sandstone. It was observed to be moist, moderately cemented and massive.

## ***B. Structure***

Our field investigation as well as the review of the "*Geologic Map of San Diego, 30'x60' Quadrangle, CA,"* by Kennedy and Tan, 2008, indicates that the site is underlain by stable late to middle Pleistocene Old Paralic Deposits and upper Cretaceous Point Loma Formation. The Paralic Deposits over Point Loma Formation contact is relatively flat-lying with no indications of significant structural activity since deposition of the Old Paralic Deposits Unit 6 ($Qop_6$). Visible geologic structure was not identified during our field investigation. The presence of the Paralic Deposits in all of our exploratory borings and the consistency of the bedding contact indicates there has been no faulting offset across the site.

Geologic structure information from near the project was obtained from geologic mapping (Kennedy and Tan, 2008) and literature of the La Jolla area. Bedding strikes of 70 to 71 degrees north-northwest and dips of 20 to 30 degrees to the southwest within the Cretaceous Point Loma Formation have been mapped to the southwest. Also mapped to the northeast within the Cretaceous formational material is a bedding attitude with a strike of 28 degrees to the northwest and a dip of 50 degrees northeast. However due to the essentially flat-lying terrain on which the property is located, these bedding attitudes within the Point Loma Formation do not create a stability problem for the essentially flat-lying property.

Paralic Deposits, also referred to as Marine Terrace Deposits, form on near horizontal wave-cut benches during sea-level regression and regional uplift. The geologic map by Kennedy and Tan, 2008, depicts a relatively level unconformity basal contact of the Old Paralic Deposits over the underlying Point Loma Formation (Kp), indicating no significant structural or faulting deformation has occurred.

It is our opinion that the general strength characteristics and structure of the Old Paralic Deposits, Unit 6, are favorable and suitable for bearing proposed structures and improvements.

## *VIII. GEOLOGIC HAZARDS*

Our review of the City of San Diego Seismic Safety Study -- Geologic Hazards Map Sheet 29, dated 2008, and the San Diego Zoning and Parcel Information Portal (ZAPP), indicates that the site is located in several geologic hazard areas designated as Categories (GHC) 11, 12 and 27. An excerpt of the map is included as Figure No. VI. Category 11 is identified as a fault zone, described as *"Active, Alquist-Priolo Earthquake Fault Zone."* Category 12 is potentially active fault zone, described as "*Inactive, presumed inactive or activity unknown*." Our fault investigation report dated July 7, 2023, was issued under separate cover and revealed no evidence of active faulting or potentially active faulting crossing the project area. It is, therefore, our opinion that no active fault crosses the project area. Category 27 is identified as a slide-prone formation *"Otay, Sweetwater and others."* As noted previously, the subject site is underlain by stable late to middle Pleistocene Old Paralic Deposits and upper Cretaceous Point Loma Formation. We note that the subject site, is located on a generally level terrain, as such, is not subject to potential landsliding.

We have utilized Figure No. VII to show the locations of fault trenches that were placed on individual properties or on Spindrift Drive in front of investigated properties by GEI, Southern California Soil and Testing (SCS&T, 1991) and Geosoils, Inc. (GSI, 2013 and 2017). An expanded discussion of these findings is presented in our fault report dated July 7, 2023. All three investigating firms found no evidence of primary faulting or minor faulting offset of the overlying Paralic Deposits of the 80,000- to 120,000-year-old Bird Rock Terrace materials exposed on the bluff face west of the property. This information, along with the no-fault-found information from fault trenching on multiple private properties northeast of 1855 Spindrift Drive, strongly suggests that the primary rupture zone of the Rose Canyon Fault (well constrained by fault trenching) is located as mapped approximately paralleling the southwest side of Roseland Drive about 540 feet northeast of the subject property. The southwestern extent of geologic mapping of the bluff face exposure below 1834 Spindrift Drive by GSI (2013, 2017) indicates that the primary rupture zone of the Mount Soledad Fault would be approximately 135 feet southwest of the subject property.

## ***A. <u>Local and Regional Faults</u>***

As described above, the field reconnaissance of geologic features in the vicinity of the subject and our site investigation did not show evidence of active faulting crossing the site. The primary seismic considerations for improvements at the subject site are surface rupture of fault traces, damage caused by ground shaking during a seismic event, and seismically-induced ground settlement. The potential for any or all of these hazards depends upon the recency of fault activity and the proximity of nearby faults to the subject site. The following is a discussion of the geologic conditions and hazards common to the San Diego area.

The major active faults nearest to the site are all part of the San Diego Section of the Newport-Inglewood-Rose Canyon Fault Zone. The following local and regional faults and fault zones are mapped in general proximity to the site:

- Rose Canyon Fault Zone: The Rose Canyon Fault Zone is the southern portion (San Diego Section) of the Newport-Inglewood-Rose Canyon Fault system. This fault zone is formed by several active faults in the San Diego area. The closest mapped fault in this zone is the northern portion of the Rose Canyon Fault, mapped approximately 540 feet northeast of the site and the northern portion of the Mount Soledad Fault, mapped approximately 135 feet southwest of the subject property. Other nearby active faults that form the Rose Canyon Fault Zone are the northern portion of the Spanish Bight Fault mapped approximately 6 miles south-southeast of the site, the northern portion of the Coronado fault, mapped approximately 10.5 miles south-southeast of the site, the northern portion of the Downtown Grabben Fault, mapped approximately 11 miles southeast of the site, and the northern portion of the Silver Strand Fault, mapped approximately 12.3 miles south-southeast of the site. Review of the available references indicates that the Rose Canyon Fault Zone system is considered to be capable of generating an M6.9 earthquake (EERI, 2021).

Other fault zones considered active in the general vicinity of the subject site are (distances are to the closest point to the mapped fault):

- Coronado Bank Fault Zone: Mapped approximately 12 to 14 miles southwest of the site and estimated to be capable of a M7.6 earthquake.
- San Diego Trough Fault Zone: Mapped approximately 23 miles southwest of the site. The most recent surface rupture is of Holocene age (SCEDC, 2022).
- San Clemente Fault Zone: Mapped approximately 47 miles to the southwest of the site. The most recent surface rupture is of Holocene age (SCEDC, 2022).

- Elsinore Fault Zone: The Temecula and Julian sections of the Elsinore Fault Zone are mapped approximately 37 and 39 miles, respectively, northeast of the site and are estimated to be capable of a of a M6.5 to M7.5 earthquake (SCEDC, 2022).
- San Jacinto Fault Zone: Mapped approximately 60 to 64 miles northeast of the site. This fault is estimated to be capable of a M6.5 to M7.5 (SCEDC, 2022).

The potential for strong ground shaking from earthquakes on active southern California faults and active faults in northwestern Mexico should be anticipated at the site. Design of building structures in accordance with the current building codes would reduce the potential for injury or loss of human life. Buildings constructed in accordance with current building codes may suffer significant damage but should not undergo total collapse.

## ***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 subject site is not directly on a known active fault trace and, therefore, the risk of ground rupture is remote.

*Ground Shaking*: Structural damage caused by seismically induced ground shaking is a detrimental effect directly related to faulting and earthquake activity. Ground shaking is considered to be the greatest seismic hazard in San Diego County. The intensity of ground shaking is dependent on the magnitude of the earthquake, the distance from the earthquake, and the seismic response characteristics of underlying soils and geologic units. Earthquakes of M5.0 or greater are generally associated with significant damage. It is our opinion that the most serious damage to the site would be caused by a large earthquake originating on a nearby strand of the Rose Canyon Fault Zone. Although the chance of such an event is remote, it could occur within the useful life of the structure.

*Landslides*: Our site reconnaissance did not reveal indications of landsliding at the site. Our review of the *Geologic Map of San Diego, 30'x60' Quadrangle, CA* by Kennedy and Tan (2008) and the *USGS US Landslide Inventory*, indicate that there are no landslides identified in the vicinity of the site nor at the site. As such, it is our opinion that there are no known recent or active landslides underlying the site and the site is stable.

*Slope Stability*: The site and general vicinity is relatively level terrain. Slope stability analysis has not been performed for the proposed project.

*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 formational materials due to seismic shaking is considered to be very low due to the nature of the underlying natural materials and lack of shallow static groundwater. In our opinion the site does not have a potential for soil strength loss to occur due to the underlying formational material densities and lack of a shallow groundwater table.

*Tsunami and Seiche:* A tsunami is a series of long waves generated in the ocean by a sudden displacement of a large volume of water. Underwater earthquakes, landslides, volcanic eruptions, meteor impacts, or onshore slope failures can cause this displacement. Tsunami waves can travel at speeds averaging 450 to 600 miles per hour. As a tsunami nears the coastline, its speed diminishes, its wave length decreases, and its height increases greatly. After a major earthquake or other tsunami-inducing activity occurs, a tsunami could reach the shore within a few minutes. One coastal community may experience no damaging waves while another may experience very destructive waves. Some low-lying areas with the potential for significant tsunami impact could experience severe inland inundation of water and deposition of debris more than 3,000 feet inland.

Historical wave heights and run-up elevations from tsunamis that have impacted the San Diego Coast have historically fallen within the normal range of the tides (Joy, 1968). The site is located approximately 300 feet from the exposed coastline and at an elevation of approximately 60 to 71 feet above MSL. Furthermore, the site is not mapped within the "tsunami inundation area" of the Tsunami Inundation Map for Emergency Panning, La Jolla Quadrangle, 2009, by the California Emergency Planning Agency, California Geological Survey and University of Southern California. An excerpt of the map and legend are presented as Figure No. VIII. It is our opinion, based on the elevation of the site, that the risk of tsunami inundation is low.

A seiche is a run-up of water within a lake or embayment triggered by fault- or landslide-induced ground displacement. The site is not located within immediately downstream from a lake or embayment. There are no significant bodies of water located at higher elevation or in the general vicinity of the capable of producing a seiche and inundating the site.

*<u>Flood Hazard:</u>* Review of the FEMA flood map number 06073C1582H, effective on 12/20/2019, indicates the project site is located within Special Flood Hazard Area (SFHA) X. Zone X is described as "Area of Minimal Flood Hazard". The civil engineer

should verify this statement with the City of San Diego and County of San Diego (FEMA, 2019).

Geologic Hazards Summary*:* It is our opinion based on multiple investigations by GEI and others that the actual trace of the Rose Canyon Fault within Zone 11 of the City of San Diego Geologic Hazards Maps is approximately 540 feet northeast of the subject property located at 1855 Spindrift Drive. We note that this is also the only location where the Rose Canyon Fault is actually exposed and mapped in the coastal bluff face. The only other formational joints and breakage observed in the bluff face by GEI and others are considered to be stress relief features resulting from sympathetic response of Point Loma Formation materials to movement on the primary traces of the Rose Canyon and Mount Soledad Faults to the northeast and southwest of the property. In our opinion these breakage features do not present a significant fault offset hazard to the proposed project and an active fault does not underlie the property.

Based upon a review of the available maps, our research and our site investigation, the site is underlain at relatively shallow depth by natural terrace deposits and overlying formational materials and is suited for the proposed project provided the recommendations presented herein are implemented. It is our opinion that the proposed site development would not destabilize neighboring properties or induce the settlement of adjacent structures or City street improvements if designed and constructed in accordance with our recommendations. No significant geologic hazards are known to exist on the subject site that would prohibit the proposed construction.

## *IX. SITE-SPECIFIC FAULT INVESTIGATION*

As mentioned previously, six exploratory borings were placed because of the property's inclusion in the established Alquist-Priolo Earthquake Fault Zone, Geologic Hazard Category 11, for active faulting. We provide as Figure No. VII "Prior Investigation Locations on Expanded Alquist-Priolo Map" showing the location of the property within the Zone 11 mapping.

As depicted on boring logs B-1 through B-6, no surficial deposits such as topsoil or slopewash were exposed or encountered during our continuous sampling. All other surficial materials were removed during site grading to produce the building pad. All borings exposed Paralic Deposits ($Qop_6$) and the contact with Cretaceous Point Loma Formation for observation and logging. The contact was observed to be roughly horizontal in a northeast-southwest direction. A more detailed discussion is presented in our fault report dated July 7, 2023.

In summary, there is no evidence that an active fault crosses the subject property.

## *IX. GROUNDWATER*

Groundwater was not encountered in our exploratory excavations during the field investigation. We do not anticipate significant groundwater problems to develop in the future, *if the property is developed as proposed and proper drainage is implemented and maintained.*

It should be kept in mind that grading operations can change surface drainage patterns and/or reduce permeabilities due to the densification of compacted soils. Such changes of surface and subsurface hydrologic conditions, plus irrigation of landscaping or significant increases in rainfall, may result in the appearance of surface or near-surface water at locations where none existed previously. The appearance of such water is expected to be localized and cosmetic in nature, if good positive drainage is implemented, as recommended in this report, during and at the completion of construction.

It must be understood that unless discovered during initial site exploration or encountered during site grading operations, it is extremely difficult to predict if or where perched or true groundwater conditions may appear in the future. When site 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 grading operations, should be evaluated and remedied by the project civil and geotechnical consultants. The project developer and property owner, however, must realize that post-construction appearances of groundwater may have to be dealt with on a site-specific basis.

## *X. CONCLUSIONS AND RECOMMENDATIONS*

The following recommendations are based upon the practical field investigations conducted by our firm, and resulting laboratory tests, in conjunction with our knowledge and experience with similar soils in the La Jolla area. The opinions, conclusions, and recommendations presented in this report are contingent upon ***Geotechnical Exploration, Inc.*** being retained to review the final plans and specifications as they are developed and to observe the site earthwork and installation of foundations. Accordingly, we recommend that the following paragraph be included on the grading and foundation plans for the project.

> *If the geotechnical consultant of record is changed for the project, the work shall be stopped until the replacement has agreed in writing to accept responsibility within their area of technical competence for approval upon completion of the work. It shall be the responsibility of the permittee to notify the governing agency in writing of such change prior to the recommencement of grading and/or foundation installation work and comply with the governing agency's requirements for a change to the Geotechnical Consultant of Record for the project.*

Existing fill soils across the site are not suitable in their current condition to support the loads from structures or additional fill soils. A full removal and recompaction of all existing fill soils will be required prior to construction of the residential structure or associated improvements. Due to the presence of existing retaining walls along the northern and southern property lines, temporary shoring will most likely be required to prevent excavations from caving during grading operations.

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

1. *General:* Grading should conform to the guidelines presented in the 2022 California Building Code (CBC) as well as the requirements of the City of San Diego.

   Earthwork construction, removal and reprocessing of fill materials, as well as general grading procedures of the contractor should be observed and the fill placed selectively tested by representatives of the geotechnical engineer, ***Geotechnical Exploration Inc***. If any unusual or unexpected conditions are exposed in the field, they should be reviewed by the geotechnical engineer and if warranted, modified and/or additional remedial recommendations will be offered. Specific guidelines and comments pertinent to the planned development are provided herein.

The recommendations presented herein have been completed using the information provided to us regarding site development. If information concerning the proposed development is revised, or any changes in the design and location of the proposed residential structure and is modified after issuing this report, this office should be notified and the changes should be evaluated to determine if the recommendations presented in this report still apply.

2. *Clearing and Stripping:* Demolition of the existing house structure along with any existing site improvements should be undertaken within the areas of the proposed new construction. This is to include the complete removal of all subsurface footings, utility lines and miscellaneous debris. After clearing, the ground surface should be stripped of existing vegetation within the areas of proposed new construction. This includes any roots from existing trees and shrubbery. Holes resulting from the removal of root systems or other buried obstructions including the existing pool removal, that extend below the planned grades should be cleared and backfilled with suitable compacted material compacted to the requirements provided under Recommendation Nos. 3, 4, and 5 below, after the excavation bottom has exposed dense or medium dense formational soils as confirmed by our representative. Prior to any filling operations, the cleared and stripped vegetation and debris should be disposed of off-site.

3. *Shoring Installation and Excavation:* After the site has been cleared and stripped of debris and utility lines, soldier beam installation for the shoring should be performed most likely along the northern, eastern and southern property lines if adjacent property improvements may be damaged during grading operations and foundation construction. During excavation operations, but after shoring soldier piles are installed and after placement of lagging, drainage geodrain shall be installed if permanent shoring is to be

installed. Excavated material should be stockpiled in a safe and suitable location so as not the surcharge the top of any temporary slopes or adjacent site improvements. All existing fill and loose natural soils should be entirely removed in the building pad area until medium dense formational materials are exposed. The anticipated depth of removal (below existing grade) will be about 8 feet at the front of the property and 5 feet in the rear of the property

Based on the results of our exploratory borings, as well as our experience with similar materials in the project area, it is our opinion that the existing fill soils, topsoils and Old Paralic Deposits, Unit 6 formational materials can be excavated utilizing ordinary light to heavy weight earthmoving equipment. Contractors should not, however, be relieved of making their own independent evaluation of excavating the on-site materials prior to submitting their bids. Variability in excavating the subsurface materials should be expected across the project area.

In areas where soil removal and recompaction is implemented (and after that area has been cleared, stripped, and the required excavations made), the exposed and approved bottom of excavation should be scarified to a depth of 8 inches, moisture conditioned, and compacted to the requirements for structural fill.

The areal extent of removals should extend at least 5 feet beyond the outer envelope of any new structures or improvements (where feasible), or the depth of the soil removal required excavations, whichever is larger. Total depth of excavations required to remove the existing fill and loose natural soils should be confirmed by our representatives during the excavation work based on their examination of the soils being exposed.

4. *Material for Fill:* Existing on-site low-expansion potential (Expansion Index of 50 or less per ASTM D4829-19) soils with an organic content of less than 3 percent by volume are, in general, suitable for use as fill. Imported fill material, where required, should have a low-expansion potential. 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.

   Medium to highly expansive soils should not be used as fill material on the site. High organic content landscape topsoils existing at the site should be selectively removed during excavation operations. Backfill material to be placed behind retaining walls should be low expansive (E.I. less than 50), with rocks no larger than 3 inches in diameter.

5. *Structural Fill Compaction:* All structural fill, wall backfill and areas to receive any associated improvements, should be compacted to a minimum degree of compaction of 90 percent based upon ASTM D1557-12e1. 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) watering the fill if it is too dry. Each lift should be thoroughly mixed before compaction to ensure a uniform distribution of moisture. Soil compaction testing by nuclear method ASTM D6938-17a or sand cone method ASTM D1556-15e1 should be performed every 2 feet of fill placement by a representative of ***Geotechnical Exploration, Inc.*** Furthermore, our representative should perform necessary observation of fill placement during grading operations throughout the project.

Any rigid improvements founded on the existing undocumented fill 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 natural soils or inadequately compacted fills. Subgrade soils in any exterior area receiving concrete improvements should be verified for compaction and moisture by a representative of our firm within 48 hours prior to concrete placement.

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.

6. *Trench and Retaining Wall Backfill:* All utility trenches and retaining walls should be backfilled with properly compacted fill. Backfill material should be placed in lift thicknesses appropriate to the type of compaction equipment utilized and compacted to a minimum degree of compaction of 90 percent by mechanical means. Any portion of the trench backfill in public street areas within pavement sections should conform to the material and compaction requirements of the adjacent pavement section. 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. Soil compaction testing by nuclear method ASTM D6938-17a or sand cone method ASTM D1556-15e1 should be performed for every 2 feet of fill placement by a representative of ***Geotechnical Exploration, Inc.*** in retaining wall and trench backfill areas as well in general fill or backfill areas.

Backfill soils placed behind retaining walls should be installed as early as the retaining walls are capable of supporting lateral loads. Backfill soils behind retaining walls should be low expansive (Expansion Index less than 50 per ASTM D4829).

*7.* <u>*Observations and Testing*</u>: As stated in CBC 2019, <u>*Section 1705.6 Soils*</u>*:* "*Special inspections and tests of existing site soil conditions, fill placement and load-bearing requirements shall be performed in accordance with this section and Table 1705.6 (see below). The approved geotechnical report and the construction documents prepared by the registered design professionals shall be used to determine compliance. During fill placement, the special inspector shall verify that proper materials and procedures are used in accordance with the provisions of the approved geotechnical report." A summary of* Table 1705.6 "REQUIRED SPECIAL INSPECTIONS AND TESTS OF SOILS" is presented below:

*a) Verify materials below shallow foundations are adequate to achieve the design bearing capacity;*
*b) Verify excavations are extended to proper depth and have reached proper material;*
*c) Perform classification and testing of compacted fill materials;*
*d) Verify use of proper materials, densities and ft thicknesses during placement and compaction of compacted fill prior to placement of compacted fill, inspect subgrade and verify that site has been prepared properly.*

Section 1705.6 "Soils" statement and Table 1705.6 indicates that it is mandatory that a representative of this firm (responsible engineering firm) perform observations and fill compaction testing during excavation operations to verify that the remedial operations are consistent with the recommendations presented in this report. All grading excavations resulting from the removal of soils should be observed and evaluated by a representative of our firm before they are backfilled.

The Geotechnical Engineer of Record, in this case ***Geotechnical Exploration, Inc.,*** cannot be held responsible for the costs and time delays associated with the lack of contact and requests for testing services by the client, general contractor, grading contractor or any of the project design team responsible for requesting the required geotechnical services. Request for services is to be made through our office telephone number (858) 549-7222 and the telephone number of the GEI personnel assigned to the project or via email at least 24 hours in advance prior to the needed service visit.

8. *Water-Soluble Sulfate and Chloride Testing*: We recommend that the water-soluble sulfate content and chloride content of the near-surface soils be tested at the completion of grading and before foundation excavations. The test results should be evaluated by an engineer specializing in corrosivity. Cement type recommendations should be provided by the structural engineer based on the current edition of the CBC or the American Concrete Institute and the soluble sulfate and chloride test results.

## ***B. Seismic Design Criteria***

9. *Seismic Data Bases:* The estimation of the peak ground acceleration and the repeatable high ground acceleration (RHGA) likely to occur at the site is based on the known significant local and regional faults within 100 miles of the site.

10. *Seismic Design Criteria:* The proposed structure should be designed in accordance with the 2019 CBC, which incorporates by reference the ASCE 7-16 for seismic design. We have determined the mapped spectral acceleration values for the site based on a latitude of 32.8507 degrees and a longitude of -117.2621 degrees, utilizing a program titled “S*eismic Design Map Tool” and* provided by the USGS through SEAOC, which provides a solution for ASCE 7-16 utilizing digitized files for the Spectral Acceleration maps. See Appendix B.

11. *Structure and Foundation Design*: The design of the new structures and foundations should be based on Seismic Design Category D, Risk Category II.

12. *Spectral Acceleration and Design Values*: The structural seismic design, when applicable, should be based on the following values, which are based on the site location, soil characteristics, and seismic maps by USGS, as required by the 2019 CBC. A response Spectrum Acceleration (SA) vs. Period (T) for the site is also included in Appendix C. The Site Class D (Stiff Soils) values for this property are:

**TABLE I**

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

| $S_S$ | $S_1$ | $S_{MS}$ | $S_{M1}$ | $S_{DS}$ | $S_{D1}$ | $F_a$ | $F_v$ | PGA | $PGA_M$ | SDC |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.404 | 0.491 | 1.404 | 0.888 | 0.936 | 0.592 | 1.0 | 1.808 | 0.641 | 0.705 | D |

## ***C. Foundation Recommendations***

Based on our conversation with the project architect the existing structure and pool are proposed to be demolished and replaced with a new three-story structure with a pool on the third level and associated improvements, we recommend the building structure and retaining walls be constructed with conventional continuous and, if needed, with column foundations founded into medium dense to dense formational soils or properly compacted fill soils. The third level pool may be supported with drilled cast-in place piers (caissons) and grade beam system to prevent surcharging adjacent retaining walls or building walls and foundations.

13. *Foundations:* We recommend that the proposed new structure be supported on conventional, individual-spread and/or continuous foundations bearing on formational or properly compacted fill material. No footings should be underlain by undocumented fill soils. All building footings should be built on medium dense to dense formational soils or properly compacted fill prepared as recommended above in Recommendation Nos. 3, 4 and 5. All footings for one- to two-story structures should be founded at least 1.5 feet below the lowest adjacent finished grade and into competent soils. For a three-story structure, the footings should be founded at least 24 inches below the lowest adjacent finished grade and into competent soils.

    The bearing surfaces of footings located adjacent to utility trenches should be situated below an imaginary 1.0:1.0 plane projected upward from the bottom edge of the adjacent utility trench. Otherwise, the utility trenches should be excavated farther from the footing locations. Footings located adjacent to the tops of slopes (if existing) should be extended sufficiently deep in order to provide at least 8 feet of horizontal cover between the slope face and outside edge of the footing at the footing bearing level.

14. *Bearing Values:* At the recommended depths, footings on properly recompacted fill soils may be designed for allowable bearing pressures of 2,500 pounds per square foot (psf) for combined dead and live loads and 3,325 psf for all loads, including wind or seismic. The footings should, however, have a minimum width of 15 inches and comply with the lateral footing setback of 7

feet to any descending slope face. An increase in soil allowable static bearing can be used as follows: 1,100 psf for each additional foot over 1.5 feet in depth, and 700 psf for each additional foot in width over 1 foot, to a total allowable static bearing pressure not exceeding 5,000 psf. The static soil bearing value may be increased one-third for seismic and wind load analysis.

15. *Continuous Footing Reinforcement:* All footings should be reinforced as specified by the structural engineer. However, based on our field investigation findings and laboratory testing, we provide the following minimum recommendations. All continuous footings should contain top and bottom reinforcement to provide structural continuity and to permit spanning of local irregularities. We recommend that at least four No. 5 reinforcing bars be provided in the footings (two near the top and two near the bottom). A minimum clearance of 3 inches should be maintained between steel reinforcement and the bottom or sides of the footing.

In order for us to offer an opinion as to whether the footings are founded on soils of sufficient load bearing capacity and with the necessary 7 feet of horizontal cover to the slope face, it is essential that our representative inspect the footing excavations prior to the placement of reinforcing steel or forms.

*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.*

16. *Drilled Piers (caissons) and Grade Beams*: We recommend that new pool structure be supported with pier and grade beam system designed by the project Structural Engineer. The piers must penetrate at least 3 feet into

undisturbed Point Loma Formational materials (approximately 14 feet in the front and 20 feet in the back of the property below existing elevations). We recommend that the pier and grade beams foundation system consist of drilled cast-in-place end-bearing piers, deriving support in the undisturbed formational materials underlying the existing fill soils and terrace deposits at the site and be interconnected with the grade beams in two directions.

17. *Vertical Pier Loading:* For vertical loading, all end-bearing piers should be embedded into at least 3 feet into dense undisturbed Point Loma Formation formational materials (through the existing fill and old paralic deposits, approximately 14 feet in the front and 20 feet in the back of the property below existing elevations).

18. *Pier Allowable End Bearing Capacity:* The minimum 2 ft diameter drilled pier allowable end bearing capacity of 15,000 psf may be utilized at the minimum formation embedment depth of 3 feet into undisturbed Point Loma Formation. This recommended allowable end-bearing vertical capacity already includes the effect of negative friction produced by the new recompacted fills in place. Any pile weight (150 pcf) above the soil surface should be considered as dead load and should be deducted from the net end-bearing capacity. The effective load of the buried part of pile may be calculated as being 30 pcf.

    It is important that when drilling/excavating piers, in order to utilize the end-bearing capacity, the amount of loose material at the bottom of the excavation must be limited. For end-bearing capacity piers, no slough over 1 inch in thickness should remain at the bottom of the excavation before concrete placement. Therefore, we recommend that piers be designed with a minimum diameter of 24 inches in order to facilitate observation of the excavations and allow ease of material removal at the bottom. The drilling contractor should provide an appropriate cleaning tool to satisfy this requirement. Otherwise, casing installation and hand-tool cleaning (or another acceptable option) will be required. The shaft friction capacity of the piers may be added to the end-bearing capacity if piles are more than 5 feet into dense formational materials. The recommended allowable average shaft frictional resistance is 600 psf.

19. *Piers Spacing*: As noted previously, the minimum center-to-center spacing of piers for vertical and lateral load support should be at least three piers in diameter. For piers located in the same line of direction as the applied lateral load, the shadow effect produces a reducing factor in their combined individual lateral load capacity. For spacing that ranges from 3B, 4B, 5B, 6B, and farther (where B is the pier diameter), the reduction factors in the pile group should be 0.6, 0.75, 0.9 and 1.0 for leading piers, and 0.41, 0.60, 0.78, 0.9, and 1.0, respectively, for trailing piers.

20. *Pier Weight:* A pier weight of 30 pcf should be used for the buried portion. For any portion of the piers above ground, the full weight should be considered. The required pier diameter, length and embedment into dense formational materials should be established by the structural engineer based on the length needed to adequately support the total vertical and lateral loads included in the design.

21. *Lateral Resistance*: For lateral earthquake or wind load resistance, the structural engineer can use any allowable method that considers the equilibrium of forces and moments.

22. *Pier Passive Resistance:* If a balance of forces is calculated based on the applied lateral forces and soil reaction forces, the allowable passive (equivalent fluid) forces recommended are 150 pcf for existing level fill and 260 pcf for

dense formational materials and for properly recompacted fill. The passive resistance of piers should be measured beginning at an effective embedment depth where at least 8 feet of horizontal daylight distance to the slope face is provided from the face of leading piers closer to the slope face. Total passive resistance of the piers may be considered applicable on a projected surface equal to 2½ times the diameter of the piers, multiplied by the vertical length being considered below the effective start of passive resistance embedment times the passive resistance value recommended in this paragraph for existing fill or formational soils and recompacted fills.

Similar soil passive resistance values may be used for portions of the project where shallow or conventional deepened footings are used, in addition to a frictional resistance calculated with an allowable friction coefficient of 0.40.

23. *Pier Drilling Observations*: Pier drilling or excavation operations should be performed under the continued observations of a representative of our firm to confirm the penetration into dense formational materials.

24. *Pier Design Standards:* The design and construction of the piers should be in accordance with the recommendations presented above, the current CBC requirements accepted by the City of San Diego, and also in accordance with ACI 336, 3R-14 Design and Construction of Drilled Caissons, of the American Concrete Institute.

25. *Filling of Pier Excavations*: Pier excavations should be filled with concrete within 2 days after the excavations are completed to help reduce the risk of soil caving, mud or slough intrusion, etc. Slough material filling the bottom of holes should be removed prior to concrete placement. If caving occurs while

drilling piles (prior to reaching the required depth), shoring will be required. Some caving is anticipated to occur due to the loose soil conditions of the fill soils with little cohesion. Shoring may be removed while placing concrete using the Tremie method. Other options in lieu of excavation shoring may be considered if pre-approved by our office.

26. *Settlement:* Settlements under the structure loads are expected to be within tolerable limits for the proposed construction. 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.

27. *Retaining and Shoring Walls:* Where temporary slope recommendations cannot be met due to limitations such as close proximity to property lines or existing structures, shoring will be required. Based on the design and location of the proposed house structure and required soil removals during grading operations, shoring will be most likely required along the northern and southern property lines, and also on the east side of the pool. Geologic observations by our firm will be mandatory for excavations over 3 feet in height. If our geologist considers that soil or geologic features show potential instability for temporary excavations, additional unanticipated shoring may be required.

    The active earth pressure (to be utilized in the design of cantilever, non-restrained walls) with properly compacted backfill should be based on an Equivalent Fluid Weight of 38 pcf (for level backfill only) if on-site low expansive soils are used. Additional uniform vertical loads applied within the potential failure block should be added to the active soil earth pressure by multiplying the vertical surcharge load by a 0.35 lateral earth pressure coefficient to convert them to uniform lateral loads.

For shoring design, we recommend that 43 pcf equivalent fluid pressure be used for level backfill condition. For soldier pile shoring, we recommend an allowable average shaft frictional capacity of 600 psf in the embedded lower part. The soldier piles may have an allowable passive resistance of 260 pcf applied on 2.5 times the diameter, times the effective depth of embedment. The effective depth of embedment in areas close to a descending slope face should start at a depth providing at least 8 feet of lateral cover to the pile face.

Wherever walls will be subjected to surcharge loads, they should also be designed for an additional uniform lateral pressure equal to one-third the anticipated surcharge pressure in the case of unrestrained walls and one-half the anticipated surcharge pressure in the case of restrained walls.

For seismic design of unrestrained walls over 6 feet in retaining height, we recommend that the seismic pressure increment be taken as a fluid pressure distribution utilizing an equivalent fluid weight of 17 pcf. A kh value of 0.19 may be used when designing retaining walls with a computer program such as *Retain Pro*.

The passive earth pressure of the encountered formation or properly recompacted fill soils to be used for design of shallow foundations and footings to resist the lateral forces, should be based on an allowable Equivalent Fluid Weight of 260 pcf. This passive earth pressure is valid for design only if the ground adjacent to the foundation structure is essentially level for a distance of at least three times the total depth of the foundation and is properly compacted or dense natural soil. An allowable Coefficient of Friction of 0.40

times the dead load may be used between the bearing soils and concrete foundations, walls or floor slabs.

The preceding design pressures assume that the walls are backfilled with low expansion potential materials (Expansion Index less than 50) and that there is sufficient drainage behind the walls to prevent the build-up of hydrostatic pressures from surface water infiltration. We recommend that wall drainage be provided using J-Drain 200/220 and J-Drain-SWD. No gravel or separate pipe is required with the J-Drain system. The upper edge of the geodrain board material should terminate 12 inches below the finish surface where the surface is covered by slabs or 18 inches below the finish surface in landscape areas. Gravel should only be used behind retaining walls where space constraints prohibit the proper compaction of backfill soils. For more information, refer to Figure No. VIII, Retaining Wall Drainage Recommendations.

Backfill placed behind the walls should be compacted to a minimum degree of compaction of 90 percent using light compaction equipment (95 percent if placed in the building pad area where a cut-fill transition exists beneath the structure). If heavy equipment is used, the walls should be appropriately temporarily braced. The structural plans should specify if any retaining walls should be braced as soon as they are built, prior to backfill placement.

### ***D. <u>Concrete Slab on-grade Criteria</u>***

Slabs on-grade may only be used on medium dense formational soils or properly compacted fill soils.

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

    In our opinion, new interior floor slabs should be at least 5 inches actual thickness and be reinforced with a minimum of No. 3 steel bars on 15-inch centers, both ways, placed at mid-height in the slab. We also opine that the lower level (basement) garage slabs be at least 6 inches thick and reinforced with No. 4 bars at 15-inch on center spacing. Soil moisture content should be kept above the optimum prior to waterproofing placement under the new concrete slab. Any interior slabs should be underlain by a vapor barrier and may be placed directly on formational soils or properly compacted subgrade surface.

    We note that shrinkage cracking can result in reflective cracking in brittle flooring surfaces such as stone and tiles. It is imperative that if movement intolerant flooring materials are to be utilized, the flooring contractor and/or architect should provide specifications for the use of high-quality isolation membrane products installed between slab and floor materials.

29. *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 are providing as Appendix D a discussion regarding minimum protection for slabs. Actual recommendations should be provided by the project architect and waterproofing consultants or product manufacturer.

It is recommended to contact the vapor barrier manufacturer to schedule a pre-construction meeting and to coordinate a review, in-person or digital, of the vapor barrier installation.

30. *Exterior Slab Thickness and Reinforcement:* Exterior slab reinforcement and control joints should be detailed by the project Structural Engineer. As a minimum for protection of on-site improvements, we recommend that all exterior pedestrian concrete slabs be at least 4 inches thick, reinforced with No. 3 bars at 15-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. Slabs on-grade may only be used on medium dense formational soils or properly compacted fill soils.

## ***E. Pavements***

31. *Concrete Pavement:* In order to control shrinkage cracking, the design of concrete reinforcement and saw-cut weakened-plane joints should be provided by the project Structural Engineer, however, we recommend that as a minimum driveways subject only to automobile and light truck traffic be at least 5½ inches thick and be supported directly on properly prepared/compacted on-site subgrade sols. The upper 12 inches of the subgrade below the slab should be compacted to a minimum degree of compaction of 95 percent just prior to paving. The concrete should conform

to Section 201 of The Standard Specifications for Public Works Construction, 2021 Edition, for Class 560-C-3250.

32. *Interlocking Permeable Pavers*: If desired for use, we recommend that permeable pavement pavers for the driveway (subject only to automobile and light truck traffic), be supported on a 1½ inches of bedding No. 8 sand on a 6-inch thickness of crushed miscellaneous base conforming to Section 200-2 of the Standard Specifications for Public Works Construction, 2018 Edition or 6 inches of No. 57 crushed rock gravel per ASTM D448 gradation. The upper 6 inches of the pavement subgrade soil, as well as the aggregate base layer, should be compacted to a minimum degree of compaction of 95 percent. Preparation of the subgrade and placement of the base materials should be performed under the observation of our representative.

## *F. Site Drainage Considerations*

33. *Surface Drainage:* Adequate measures should be taken to properly finish-grade the site after the new improvements are in place. Drainage waters from this site and adjacent properties should be directed away from the footings, 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. Proper subsurface and surface drainage will help reduce the potential for waters to seek the level of the bearing soils under the wall footings or other extensive improvements.

Failure to observe this recommendation could result in undermining, soil expansion, and possible differential settlement of the retaining wall or other improvements or cause other moisture-related problems. Currently, the 2019 CBC requires a minimum of 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. The surface gradient adjacent to structures must drain away as indicated in the 2022 CBC.

Due to the possible build-up of groundwater (derived primarily from rainfall and irrigation), excess moisture is a common problem behind retaining walls that may be planned. These problems are generally in the form of water seepage through walls and mineral staining. In order to minimize the potential for moisture-related problems to develop, the backfill side of all retaining walls must be adequately waterproofed and drained.

34. *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 grade.

35. *Planter Drainage:* Planter areas and planter boxes should be sloped to drain away from the foundations. Planter boxes should be constructed with a closed bottom and a subsurface drain, installed in gravel, with the direction of subsurface and surface flow away from the footings to an adequate drainage facility.

36. *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 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. General Recommendations***

37. *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.

38. *Project Start Up Notification:* In order to reduce any work delays during site excavation and development, our firm should be contacted at least 48 hours before any required observation of footing excavations or field density testing of compacted fill soils. If possible, placement of formwork and steel reinforcement in footing excavations should not occur prior to our observations of the excavations. If 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 before the correction of the observed problem (i.e., deepening the footing excavation, compacting or removal of loose soil in the bottom of the excavation, etc.).

39. *Construction Best Management Practices (BMPs):* Sufficient BMPs must be installed to prevent silt, mud, or other construction debris from being tracked into the adjacent street(s) or stormwater 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 a breach in the installed construction BMPs.

All stockpiles of uncompacted soil and/or building materials that are 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 higher. 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 and 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.

## *XI. GRADING NOTES*

It is recommended that ***Geotechnical Exploration; Inc.*** be retained to verify that soil conditions revealed during grading for the project are as anticipated in this *"Report of Preliminary Geotechnical Investigation."* In addition, the compaction of any fill soils placed during grading must be observed and tested by our field representative.

It is the responsibility of the general contractor to comply with the requirements on the approved plans and the local building ordinances. All/any retaining wall and trench backfill should be properly compacted. ***Geotechnical Exploration, Inc.*** will assume no liability for damage occurring due to improperly compacted or uncompacted backfill placed without our observations and testing.

## ***XII. LIMITATIONS***

Our conclusions and recommendations have been based on available data obtained from our field investigation, background review and laboratory analysis, as well as our experience with similar soils and natural ground materials located in the City of San Diego. Of necessity, we must assume a certain degree of continuity between exploratory excavations and/or natural exposures. It is, therefore, necessary that all observations, conclusions, and recommendations be verified at the time excavation begins. In the event discrepancies are noted, additional recommendations may be issued, if required. The work performed and recommendations presented herein are the result of an investigation and analysis that meet the contemporary standard of care in our profession within the County of San Diego. No warranty is provided.

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

As stated previously, 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 to verify proper wall sealing, geofabric installation, protection board installation (if needed), drain depth below interior floor or yard surfaces; pipe percent slope to the outlet, etc.

It is the responsibility of the owner and/or developer to ensure that the recommendations summarized in this report are carried out in the field operations and that our recommendations for design of this project are incorporated in the project plans. We should be retained to review the final project plans once they are available to verify that our recommendations are adequately incorporated in them. Additional or revised recommendations may be necessary after our review.

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

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

Once again, should any questions arise concerning this report, please feel free to contact the undersigned. Reference to our **Job No. 22-13755** will expedite a reply to your inquiries.

Respectfully submitted,

**GEOTECHNICAL EXPLORATION, INC.**

Leslie D. Reed, President
C.E.G. 999/P.G. 3391

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

Leslie D. Reed
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Exp. 3/31/25

Jaime A. Cerros
GE 2007
EXP. 9/30/23

# REFERENCES

JOB NO. 22-13755

July 2021

2007 Working Group on California Earthquake Probabilities, 2008, The Uniform California Earthquake Rupture Forecast, Version 2 (UCERF 2), U.S Geological Survey Open-file Report 2007-1437 and California Geological Survey Special Report 203.

Berger, V. and Schug, D.L., 1991, Probabilistic Evaluation of Seismic Hazard in the San Diego-Tijuana Metropolitan Region, Environmental Perils, San Diego Region, Geological Society of America by the San Diego Association of Geologists, October 20, 1991, p. 89-99.

California Emergency Planning Agency, California Geological Survey, University of Southern California, 2009, Tsunami Inundation Map for Emergency Panning, La Jolla Quadrangle.

City of San Diego, 2008, Seismic Safety Study, Geologic Hazards and Faults, Development Services Department, Grid Tile No. 29.

Demere, T.A. 1997, Geology of San Diego County, California, San Diego Natural History Museum, http://archive.sdnhm.org/research/paleontology/sdgeol.html, accessed July 30, 2020.

Earthquake Engineering Research Institute (EERI), 2021.

Geotecnical Exploration Inc., 2023. Report of Geologic Fault Investigation Proposed Lee-DeGuzman Residence, 1855 Spindrift Drive, La Jolla, California. Project No. 22-13755, dated July 07, 2023.

Grant Ludwig, L.B. and Shearer, P.M., 2004, Activity of the Offshore Newport-Inglewood Rose Canyon Fault Zone, Coastal Southern California, from Relocated Microseismicity, Bulletin of the Seismological Society of America, 94(2), 747-752.

Greene, H.G., Bailey, K.A., Clarke, S.H., Ziony, J.I. and Kennedy, M.P., 1979, Implications of fault patterns of the inner California continental borderland between San Pedro and San Diego, *in* Abbott, P.L., and Elliot, W.J., eds., Earthquakes and other perils, San Diego region: San Diego Association of Geologists, Geological Society of America field trip, November, 1979, p. 21–28.

Greensfelder, R.W., 1974, Maximum Credible Rock Accelerations from Earthquakes in California, California Division of Mines and Geology.

Hart, E.W. and Bryant, W.A., 1997, Fault-Rupture Hazard Zones in California, California Division of Mines and Geology, Special Publication 42.

Hart, E.W., Smith, D.P. and Saul, R.B., 1979, Summary Report: Fault Evaluation Program, 1978 Area (Peninsular Ranges-Salton Trough Region), California Division of Mines and Geology, Open-file Report 79-10 SF, 10.

Hauksson, E. and Jones, L.M., 1988, The July 1986 Oceanside ($M_L$=5.3) Earthquake Sequence in the Continental Borderland, Southern California Bulletin of the Seismological Society of America, v. 78, p. 1885-1906.

Hileman, J.A., Allen, C.R. and Nordquist, J.M., 1973, Seismicity of the Southern California Region, January 1, 1932 to December 31, 1972; Seismological Laboratory, Cal-Tech, Pasadena, California.

Kennedy, M.P., 1975, Geology of the La Jolla Quadrangle, San Diego County, California; Bulletin 200, Calif. Division of Mines and Geology.

Kennedy, M.P. and Tan, S.S., 2008, Geologic Map of San Diego 30’x60’ Quadrangle, California, California Geological Survey, Department of Conservation.

Richter, C.F., 1958, Elementary Seismology, W.H. Freeman and Company, San Francisco, California.

Rockwell, T.K., 2010, The Rose Canyon Fault Zone in San Diego, Proceedings of the Fifth International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics, Paper No. 7.06C.

Rockwell, T.K., Dawson, T.E., Young Ben-Horin, J. and Seitz, G., 2014, A 21-Event, 4,000-Year History of Surface Ruptures in the Anza Seismic Gap, San Jacinto Fault, and Implications for Long-term Earthquake Production on a Major Plate Boundary Fault, Pure and Applied Geophysics, v. 172, 1143–1165 (2015).

Rockwell, T.K., Millman, D.E., McElwain, R.S. and Lamar, D.L., 1985, Study of Seismic Activity by Trenching Along the Glen Ivy North Fault, Elsinore Fault Zone, Southern California: Lamar-Merifield Technical Report 85-1, U.S.G.S. Contract 14-08-0001-21376, 19 p.

Ross, Z.E., Hauksson E. and Ben-Zion Y., 2017, Abundant Off-fault Seismicity and Orthogonal Structures in the San Jacinto Fault Zone, Science Advances, 2017; 3(3): e1601946. Published 2017 Mar 15.

Singleton, D.M., Rockwell, T.K., Murbach, D., Murbach, M., Maloney, J., Freeman, T., Levy, Y., 2019, Late-Holocene Rupture History of the Rose Canyon Fault in Old Town, San Diego: Implications of Cascading Earthquakes on the Newport-Inglewood-Rose Canyon Fault System, Bulletin of the Seismological Society of America 109, p. 855-874.

Southern California Earthquake Data Center, 2022, Earthquake information, Fault Name Index, https://scedc.caltech.edu/earthquake/faults.html.

Toppozada, T.R. and Parke, D.L., 1982, Areas Damaged by California Earthquakes, 1900-1949, California Division of Mines and Geology, Open-file Report. 82-17.

U.S. Dept. of Agriculture, 04-11-1953, Aerial Photographs AXN-8M-2 and 3

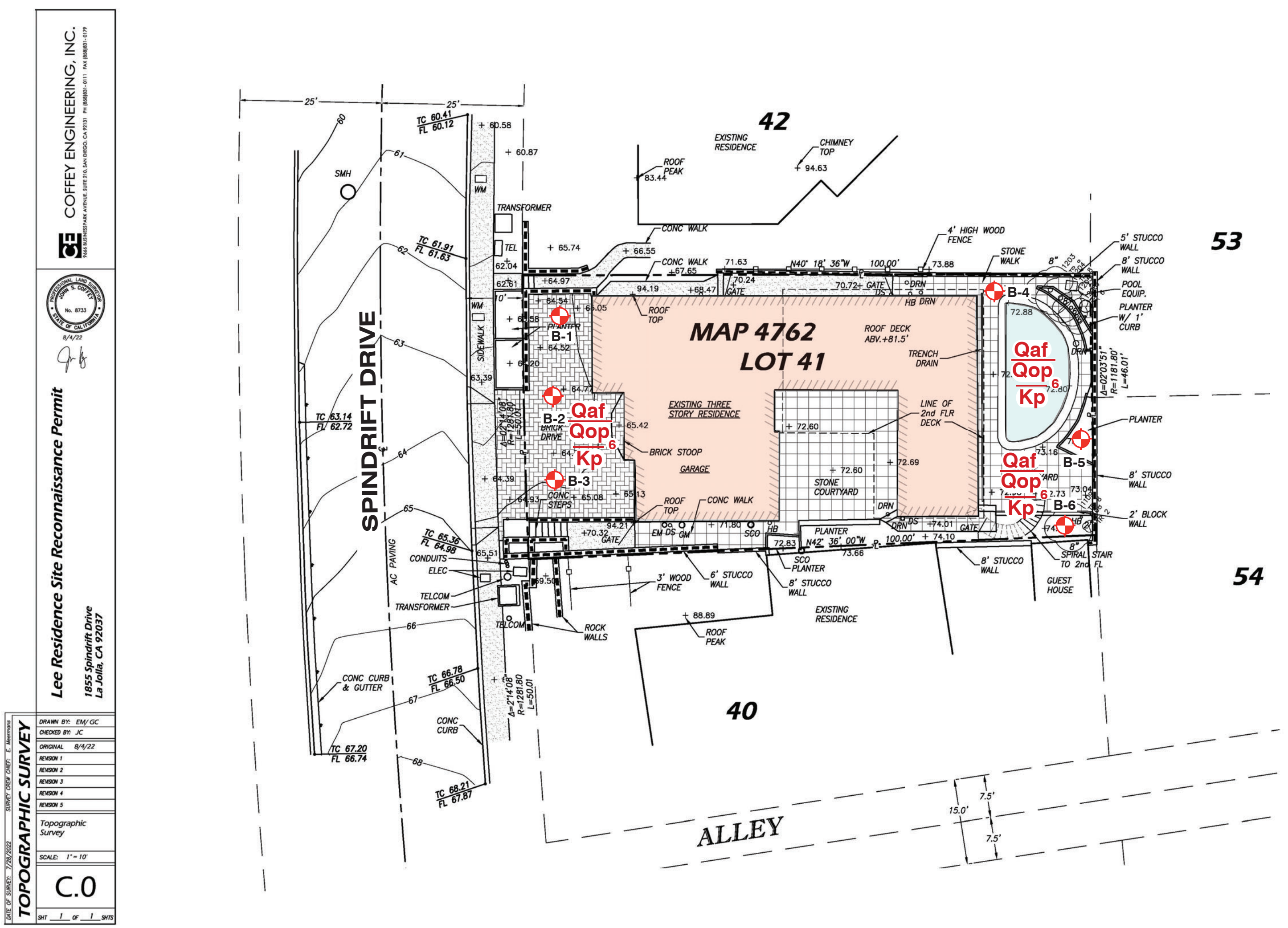
# VICINITY MAP

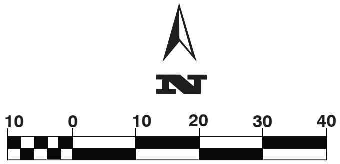
*Thomas Bros Guide San Diego County pg. 1227-G6*

Lee-DeGuzman Residential Property
1855 Spindrift Drive
La Jolla, CA.

*Figure No. I*
*Job No. 22-13755*

**Geotechnical Exploration, Inc.**





GRAPHIC SCALE
1" = 20'
(approximate)

## LEGEND

| | |
|---|---|
| B-6 | Approximate Location of Exploratory Boring |
| ▨ | Existing Structure |

## GEOLOGIC LEGEND

| | |
|---|---|
| **Qaf** | Artificial Fill |
| **$Qop_6$** | Old Paralic Deposits (unit 6 ) |
| **Kp** | Point Loma Formation |

# PLOT PLAN AND SITE SPECIFIC GEOLOGIC MAP

*Lee DeGuzman Residential Property*
*1855 Spindrift Drive*
*La Jolla, CA.*
*Figure No. II*
*Job No. 22-13755*

REFERENCE: 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 and existing TOPOGRAPHIC SURVEY MAP by COFFEY ENGINEERING, INC. dated 8/4/2022 and from on-site field reconnaissance performed by GEI.*

**Geotechnical Exploration, Inc.**
*June 2023*

22-13755-P2.ai

**Geotechnical Exploration, Inc.**

**DATE LOGGED:** April 11, 2023
**LOGGED BY:** MM
**REVIEWED BY:** MM

**EQUIPMENT:** Track Mini
**DIMENSION & TYPE OF EXCAVATION:** 4 1/2" SSA Cal/SPT - Continuous Core
**SURFACE ELEVATION:** +64.1' Above Mean Sea Level
**GROUNDWATER/SEEPAGE DEPTH:** Not Encountered

| DEPTH (feet) | SYMBOL | SAMPLE | BLOWS / 6" | ELEVATION (MSL) | FIELD DESCRIPTION AND CLASSIFICATION<br>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) | Phi ANGLE (deg) | COHESION (PSF) | EXPANSION INDEX | % PASSING #200 SIEVE | SAMPLE O.D. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0–3 | | | | 63.6' | 5-in. Concrete/Brick Cap.<br>SILTY SAND, very silty, fine to medium grained sand, medium dense, moist, brown, some mix of light brown sand.<br>**Artificial Fill (Qaf)** | SM | | | | | | | | | |
| 3–5 | | | 3<br>3<br>4 | 58.6' | SILTY SAND, fine to medium grained sand, medium dense, moist, light brown to brown.<br>**Highly Weathered Old Paralic Deposits (Qop$_6$)** | SM | | | | | | | | | |
| 5–9.5 | | | 2<br>4<br>8<br>6<br>11<br>15<br>14 | 54.8' | SILTY SAND, slightly silty, fine to medium grained sand, medium dense, moist, medium brown.<br>SILTY SAND, silty, fine to medium grained sand, dense, moist, dark red brown, abundant white grains, (CaCo$_3$?), no apparent bedding.<br>**Old Paralic Deposits (Qop$_6$)** | SM<br>SM | | | | | | | | | |
| 9.5–14 | | | 18<br>25<br>17<br>50/6"<br>20<br>50/6" | 50.1' | Irregular contact.<br>SILTY SAND, silty, fine to medium grained, dense SANDSTONE, moist, dark orange brown and gray, upper 8" weathered.<br>@ 10.25' Grades to a silty fine sand, very dense SANDSTONE, moist to damp, yellow brown and orange brown, iron oxide staining and light gray, ocasional thin gray fractures.<br>**Point Loma Formation (Kp)** | SM | | | | | | | | | |

Bottom of Excavation at 14 ft.
No Groundwater, No Caving, Backfilled with Cuttings
Hand Augered to 4 feet

- ▨ FOOTING
- ▼ PERCHED WATER TABLE
- ☒ BULK BAG SAMPLE
- 1 IN-PLACE SAMPLE
- ■ MODIFIED CALIFORNIA SAMPLE
- H IN-PLACE HAND-DRIVE SAMPLE
- ▨ STANDARD PENETRATION TEST

* DISTURBED BLOWCOUNT

**JOB NUMBER:** 22-13755
**JOB NAME:** Lee-DeGuzman Residence
**SITE LOCATION:** 1855 Spindrift Dr. La Jolla CA

**LOG NO. B-1**

**FIGURE NO. IIIa**

**Geotechnical Exploration, Inc.**

**EQUIPMENT: Track Mini**

**DIMENSION & TYPE OF EXCAVATION:** 4 1/2" SSA Cal/SPT - Continuous Core

**DATE LOGGED: April 11, 2023**

**LOGGED BY: MM**

**REVIEWED BY: MM**

**SURFACE ELEVATION:** +64.3' Above Mean Sea Level

**GROUNDWATER/SEEPAGE DEPTH:** Not Encountered

| DEPTH (feet) | SYMBOL | SAMPLE | BLOWS / 6" | ELEVATION (MSL) | FIELD DESCRIPTION AND CLASSIFICATION<br>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) | Phi ANGLE (deg) | COHESION (PSF) | EXPANSION INDEX | % PASSING #200 SIEVE | SAMPLE O.D. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0–3 | | | | 63.9'<br>61.3' | 4-in. Concrete/Brick Cap.<br>SILTY SAND, fine to medium grained sand, medium dense, moist, dark brown.<br>**Artificial Fill (Qaf)** | SM | | | | | | | | | |
| 3–9.5 | | ■ (4–7)<br>▨ (7–8.5)<br>■ (9–) | 3<br>4<br>5<br>6<br>9<br>14<br>9<br>13<br>16<br>14 | 54.8' | SILTY SAND, slightly silty, fine to medium grained sand, medium dense, moist, brown to dark reddish brown.<br>@ 6 ft. Very silty, abundant white grains ($CaCo_3$ ?) no apparent bedding.<br>SILTY SAND, silty, fine to medium grained sand, dense, moist, dark red brown, abundant white grains, ($CaCo_3$?), no apparent bedding.<br>**Old Paralic Deposits ($Qop_6$)**<br>Angular gravel above contact. | SM | | | | | | | | | |
| 9.5–14.5 | | ■ (–10.5)<br>■ (11–12.5)<br>▨ (12.5–14) | 16<br>23<br>11<br>14<br>16<br>6<br>9<br>20 | 49.8' | SILTY SAND, silty, fine grained sand, dense SANDSTONE, moist, dark orange brown and gray, upper 6" highly weathered.<br>SILTY SAND, silty, fine grained sand, dense to very dense SANDSTONE, damp to moist, yellow brown and orange brown, iron oxide staining, and gray, occasional thin gray fractures.<br>**Point Loma Formation (Kp)** | SM<br>SM | | | | | | | | | |

Bottom of Excavation at 14.5 ft.
No Groundwater, No Caving, Backfilled with Cuttings
Hand Augered to 3 feet

▨ FOOTING
▼ PERCHED WATER TABLE
☒ BULK BAG SAMPLE
1 IN-PLACE SAMPLE
■ MODIFIED CALIFORNIA SAMPLE
H IN-PLACE HAND-DRIVE SAMPLE
▨ STANDARD PENETRATION TEST

* DISTURBED BLOWCOUNT

**JOB NUMBER:** 22-13755

**JOB NAME:**
Lee-DeGuzman Residence

**SITE LOCATION:**
1855 Spindrift Dr. La Jolla CA

**LOG NO. B-2**

**FIGURE NO. IIIb**

**Geotechnical Exploration, Inc.**

**EQUIPMENT: Track Mini**

**DIMENSION & TYPE OF EXCAVATION:** 4 1/2" SSA Cal/SPT - Continuous Core

**DATE LOGGED: April 11, 2023**

**SURFACE ELEVATION:** +64.8' Above Mean Sea Level

**LOGGED BY: MM**

**GROUNDWATER/SEEPAGE DEPTH:** Not Encountered

**REVIEWED BY: MM**

| DEPTH (feet) | SYMBOL | SAMPLE | BLOWS / 6" | ELEVATION (MSL) | FIELD DESCRIPTION AND CLASSIFICATION<br>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) | Phi ANGLE (deg) | COHESION (PSF) | EXPANSION INDEX | % PASSING #200 SIEVE | SAMPLE O.D. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1<br>2 | ▒ | | | 64.5'<br>61.8 | 4-in. Concrete/Brick Cap.<br>SILTY SAND, silty, fine to medium grained sand, medium dense, moist, dark brown.<br>**Artificial Fill (Qaf)** | SM | | | | | | | | | |
| 3<br>4<br>5<br>6<br>7<br>8 | ░ | ■<br>■ | 7<br>10<br>12<br>10<br>15<br>16 | 55.7' | SILTY SAND, fine to medium grained sand, medium dense, moist, dark red brown.<br>**Old Paralic Deposits ($Qop_6$)**<br>SILTY SAND, silty, fine to medium grained sand, dense, moist, dark red brown, abundant white grains, ($CaCo_3$?), no apparent bedding. | SM | | | | | | | | | |
| 9<br>10 | ░ | ▨ | 13<br>20<br>21 | | SILTY SAND, slightly silty, fine grained sand, very dense SANDSTONE, damp, yellow, iron oxide staining, veining, upper 6" weathered with manganese staining, white grains ($CaCo_3$ ?). | SM | | | | | | | | | |
| 11<br>12<br>13 | ░ | ■<br>■ | 30<br>50/6"<br>24<br>50/6" | | Grades to silty fine grained sand, very dense SANDSTONE, moist, light orange brown and light gray. | SM | | | | | | | | | |
| 14<br>15 | ░ | ▨ | 19<br>20<br>45 | 48.8' | Becomes predominantly light gray silty fine grained, very dense SANDSTONE, damp.<br>**Point Loma Formation (Kp)** | SM | | | | | | | | | |
| 16<br>17<br>18<br>19<br>20<br>21 | | | | | Bottom of Excavation at 16 ft.<br>No Groundwater, No Caving, Backfilled with Cuttings<br>Hand Augered to 3 feet | | | | | | | | | | |

| | |
|---|---|
| ▨ | FOOTING |
| ▼ | PERCHED WATER TABLE |
| ☒ | BULK BAG SAMPLE |
| 1 | IN-PLACE SAMPLE |
| ■ | MODIFIED CALIFORNIA SAMPLE |
| H | IN-PLACE HAND-DRIVE SAMPLE |
| ▨ | STANDARD PENETRATION TEST |

* **DISTURBED BLOWCOUNT**

**JOB NUMBER:** 22-13755

**JOB NAME:**
Lee-DeGuzman Residence

**SITE LOCATION:**
1855 Spindrift Dr. La Jolla CA

**LOG NO. B-3**

**FIGURE NO. IIIc**

**Geotechnical Exploration, Inc.**

**EQUIPMENT: Track Mini**

**DIMENSION & TYPE OF EXCAVATION:** 4 1/2" SSA Cal/SPT - Continuous Core

**DATE LOGGED: April 11, 2023**

**LOGGED BY: HE**

**SURFACE ELEVATION:** +72.8' Above Mean Sea Level

**REVIEWED BY: MM**

**GROUNDWATER/SEEPAGE DEPTH:** Not Encountered

FIELD DESCRIPTION AND CLASSIFICATION

| DEPTH (feet) | SYMBOL | SAMPLE | BLOWS / 6" | ELEVATION (MSL) | 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) | Phi ANGLE (deg) | COHESION (PSF) | EXPANSION INDEX | % PASSING #200 SIEVE | SAMPLE O.D. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | 6-in. Concrete/Travertine Cap. | | | | | | | | | | |
| | | | | | CLAYEY SAND, medium dense, very moist, brown, some mix of light brown sand. | SC | | | | | | | | | |
| 2 | | ☒ | | | 4" Layer of lean slurry | | | | | | | | | | |
| 3 | | ☒ | | 68.8' | **Artificial Fill (Qaf)** | | | | 8.7 | 131.5 | 31.6 | 0 | 32 | 42 | |
| 4 | | | | | SANDY CLAY, stiff to very stiff, moist to very moist, mottled red-brown, dark gray and brown | CL | | | | | | | | | |
| 5 | | ■ | 10<br>19<br>26 | | | | 16.1 | 118.4 | | | | | | | |
| 7 | | ▨ | 7 | | SILTY SAND, silty, fine to medium grained sand, dense, moist, dark red brown, abundant white grains, (CaCo$_3$?), no apparent bedding. | SM | | | | | | | | | |
| 8 | | ▨ | 9<br>9 | | SILTY SAND, medium dense, very moist, mottle dark gray, red brown and brown, some clay. | SM | | | | | | | | | |
| 9 | | ■ | 11<br>12<br>17 | | | | | | | | | | | | |
| 10 | | | | | **Old Paralic Deposits (Qop$_6$)** | | | | | | | | | | |
| 11 | | ▨ | 7<br>12 | | SILTY CLAY, very stiff, very moist, mottled dark gray, red-brown, brown, | CL | | | | | | | | | |
| 12 | | ■ | 18<br>20<br>31<br>30 | | CLAYEY SAND, fine to medium grained, medium dense to dense, very moist, mottled dark gray, red brown and brown. | SC | | | | | | | | | |
| 14 | | ▨ | 17<br>25 | | SAND, fine to medium grained, dense, moist mottled red-brown and brown. | SP | | | | | | | | | |
| 15 | | ▨ | 25 | | Becomes slightly silty, moist, red brown. | | | | | | | | | | |
| 16 | | ■ | 20 | 56.8' | Becomes SILTY SAND, dense, very moist, brown with white grains. | SM | | | | | | | | | |
| 16.5 | | ■ | 26<br>34<br>50/2" | 55.2' | SILTY SAND, fine grained sand, very dense SANDSTONE, moist, mottled dark orange brown, brown and gray, moderately cemented, less mottled, more massive with depth. | SM | | | | | | | | | |
| 19 | | | | | **Point Loma Formation (Kp)** | | | | | | | | | | |

Bottom of Excavation at 17.7 ft.
No Groundwater, No Caving, Backfilled with Cuttings
Hand Augered to 5 feet

| | |
|---|---|
| ▨ | FOOTING |
| ▼ | PERCHED WATER TABLE |
| ☒ | BULK BAG SAMPLE |
| 1 | IN-PLACE SAMPLE |
| ■ | MODIFIED CALIFORNIA SAMPLE |
| H | IN-PLACE HAND-DRIVE SAMPLE |
| ▨ | STANDARD PENETRATION TEST |

* DISTURBED BLOWCOUNT

**JOB NUMBER:** 22-13755

**JOB NAME:**
Lee-DeGuzman Residence

**SITE LOCATION:**
1855 Spindrift Dr. La Jolla CA

**LOG NO. B-4**

**FIGURE NO. IIId**

**Geotechnical Exploration, Inc.**

**DATE LOGGED:** April 11, 2023
**LOGGED BY:** HE
**REVIEWED BY:** MM

**EQUIPMENT:** Track Mini
**DIMENSION & TYPE OF EXCAVATION:** 4 1/2" SSA Cal/SPT - Continuous Core
**SURFACE ELEVATION:** +73.7' Above Mean Sea Level
**GROUNDWATER/SEEPAGE DEPTH:** Not Encountered

| DEPTH (feet) | SYMBOL | SAMPLE | FTG. DEPTH | BLOWS / 6" | FIELD DESCRIPTION AND CLASSIFICATION<br>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) | Phi ANGLE (deg) | COHESION (PSF) | EXPANSION INDEX | % PASSING #200 SIEVE | SAMPLE O.D. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **Lanscape Topsoil** | | | | | | | | | | |
| 1 | | | | | CLAYEY SAND, medium dense, very moist, brown. | SC | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | |
| 3 | | | | 70.7' | **Artificial Fill (Qaf)** | | | | | | | | | | |
| 4 | | | | | SANDY CLAY, stiff to very stiff, very moist, mottled gray brown and dark red-brown. | CL | | | | | | | | | |
| 5 | | ■ | 12 | | | | | | | | | | | | |
| 6 | | ■ | 24<br>35 | | | | 12.2 | 128.9 | | | | | | | |
| 7 | | ▨ | 9<br>10 | | SILTY SAND, silty, fine to medium grained sand, dense, moist, dark red brown, abundant white grains, (CaCo$_3$?), no apparent bedding. | SP | | | | | | | | | |
| 8 | | ▨<br>■ | 15<br>13 | | @ 7 ft. 10 in. CLAYEY SAND, medium dense, moist, gray brown and red brown. | SC | | | | | | | | | |
| 9 | | ■ | 26<br>40 | | SILTY SAND, fine to medium grained, some coarse, dense, moist, gray brown and red brown, slightly clayey. | SM | | | | | | | | | |
| 10 | | ▨ | 26<br>50/6" | | | | | | | | | | | | |
| 11 | | ■ | 36<br>50/6" | | Becomes gray brown, red brown and dark olive gray, slightly clayey. | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | |
| 13 | | ▨ | 18<br>21<br>26 | | | | | | | | | | | | |
| 14 | | ■ | 23<br>26<br>37 | | **Old Paralic Deposits (Qop$_6$)** | | | | | | | | | | |
| 15 | | | | 57.8' | | | | | | | | | | | |
| 16 | | ▨ | 21<br>32<br>50/6" | 56.7' | SILTY SAND, fine grained sand, very dense SANDSTONE, moist, mottled dark orange brown, orange brown and gray, moist, very dense. | SM | | | | | | | | | |
| 17 | | | | | | | | | | | | | | | |
| 18 | | | | | **Point Loma Formation (Kp)** | | | | | | | | | | |
| 19 | | | | | | | | | | | | | | | |
| 20 | | | | | Bottom of Excavation at 17.8 ft.<br>No Groundwater, No Caving, Backfilled with Cuttings<br>Hand Augered to 5 feet | | | | | | | | | | |
| 21 | | | | | | | | | | | | | | | |

| | |
|---|---|
| ▦ | FOOTING |
| ▼ | PERCHED WATER TABLE |
| ☒ | BULK BAG SAMPLE |
| 1 | IN-PLACE SAMPLE |
| ■ | MODIFIED CALIFORNIA SAMPLE |
| H | IN-PLACE HAND-DRIVE SAMPLE |
| ▨ | STANDARD PENETRATION TEST |

* DISTURBED BLOWCOUNT

**JOB NUMBER:** 22-13755

**JOB NAME:**
Lee-DeGuzman Residence

**SITE LOCATION:**
1855 Spindrift Dr. La Jolla CA

**LOG NO.** **B-5**

**FIGURE NO.** **IIIe**

**Geotechnical Exploration, Inc.**

**DATE LOGGED:** April 11, 2023
**LOGGED BY:** HE
**REVIEWED BY:** MM

**EQUIPMENT:** Track Mini
**DIMENSION & TYPE OF EXCAVATION:** 4 1/2" SSA Cal/SPT - Continuous Core
**SURFACE ELEVATION:** +73.8' Above Mean Sea Level
**GROUNDWATER/SEEPAGE DEPTH:** Not Encountered

| DEPTH (feet) | SYMBOL | SAMPLE | FTG. DEPTH | BLOWS / 6" | FIELD DESCRIPTION AND CLASSIFICATION<br>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) | Phi ANGLE (deg) | COHESION (PSF) | EXPANSION INDEX | % PASSING #200 SIEVE | SAMPLE O.D. (in) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | **Lanscape Topsoil** | | | | | | | | | | |
| 1 | | | | | CLAYEY SAND, medium dense, very moist, brown. | SC | | | | | | | | | |
| 2 | | | | | **Artificial Fill (Qaf)** | | | | | | | | | | |
| 3 | | | | | SANDY CLAY, stiff, very moist, mottled dark gray brown and dark red-brown. | CL | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | |
| 6 | | | | | CLAYEY SAND, medium dense, very moist, mottled dark gray brown and red brown. | SC | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | |
| 10 | | | | | SILTY SAND, fine to coarse grained, medium dense, very moist, dark olive gray and red brown, slightly clayey. | SM | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | |
| 13 | | | | | **Old Paralic Deposits (Qop$_6$)** | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | |
| 15 | | | | 58.1' | | | | | | | | | | | |
| 16 | | | | 57.4' | SILTY SAND, fine grained sand, very dense SANDSTONE, very dense, moist, mottled orange brown and gray. | SM | | | | | | | | | |
| 17 | | | | | **Point Loma Formation (Kp)** | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | | |
| 19 | | | | | Bottom of Excavation at 16.3 ft.<br>No Groundwater, No Caving, Backfilled with Cuttings<br>Hand Augered to Bottom of Excavation | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | |
| 21 | | | | | | | | | | | | | | | |

| | |
|---|---|
| ▒ | FOOTING |
| ▼ | PERCHED WATER TABLE |
| ☒ | BULK BAG SAMPLE |
| 1 | IN-PLACE SAMPLE |
| ■ | MODIFIED CALIFORNIA SAMPLE |
| H | IN-PLACE HAND-DRIVE SAMPLE |
| ▒ | STANDARD PENETRATION TEST |

* DISTURBED BLOWCOUNT

**JOB NUMBER:** 22-13755

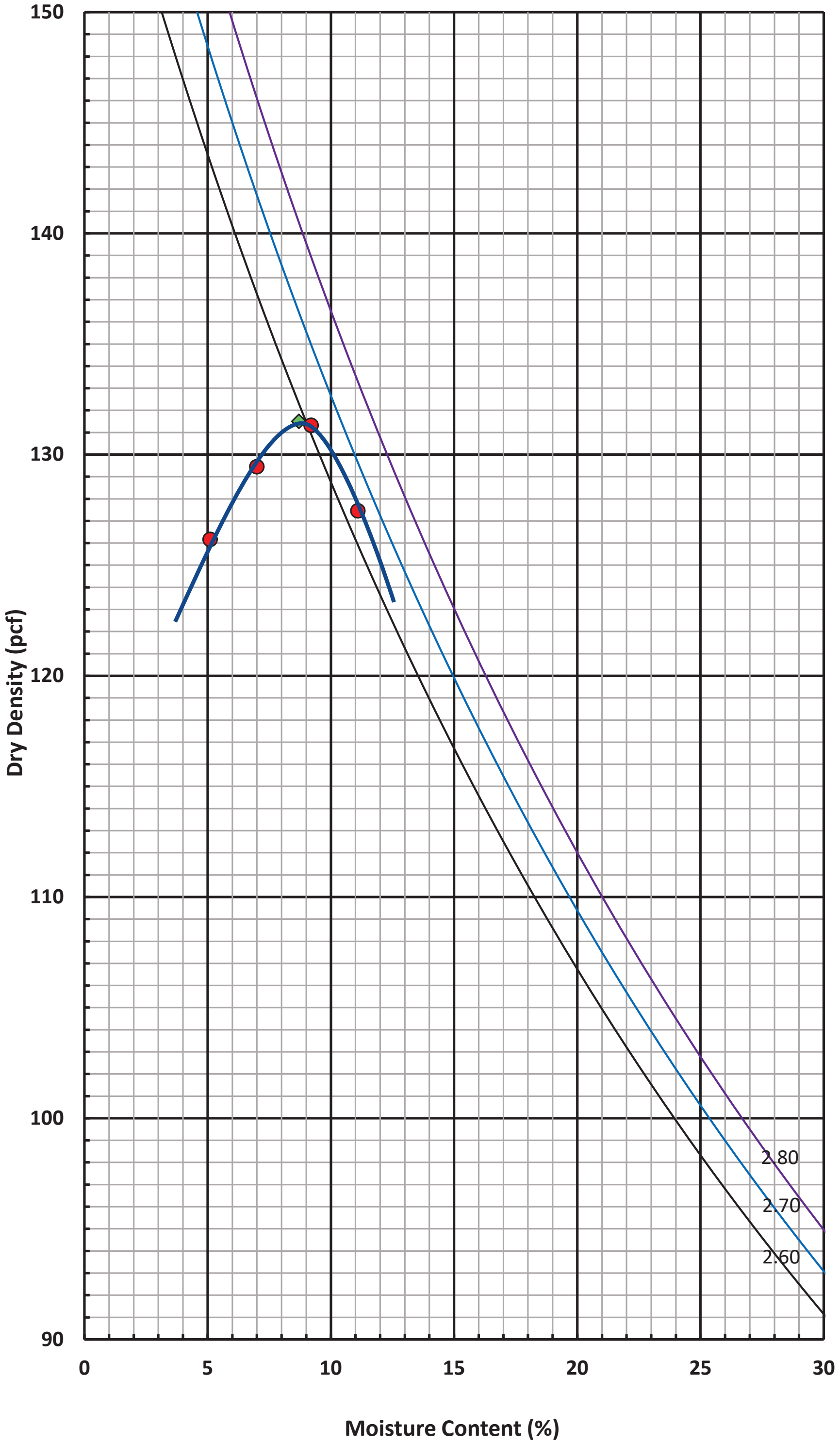
**JOB NAME:**
Lee-DeGuzman Residence

**SITE LOCATION:**
1855 Spindrift Dr. La Jolla CA

**LOG NO.** **B-6**

**FIGURE NO.** **IIIf**

# Compaction Curve



| | |
|---|---|
| Source of Material: | **B-4** |
| Depth: | **2 - 5 ft.** |
| Description of Material: | **Clayey Sand** |
| | **Dark Brown** |
| Test Method: | **ASTM D1557 Method A** |

**TEST RESULTS**

| | |
|---|---|
| Maximum Dry Density (PCF) | **131.5** |
| Optimum Water Content (%) | **8.7** |
| | |
| Expansion Index (EI) | **32** |
| % Passing #200 | **NA** |

**ROCK CORRECTION**

| | |
|---|---|
| Coarse Material (%) | **0.0** |
| Corrected Maximum Dry Density (PCF) | **0.0** |
| Corrected Optimum Water Content (%) | **0.0** |

Curves of 100% Saturation
for Specific Gravity Equal to:

2.80
2.70
2.60

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## MOISTURE-DENSITY RELATIONSHIP

Figure Number: IVa
Lee-DeGuzman Residential Project
1855 Spindrift Drive, La Jolla CA
Job No. 22-13755

Job Number: 22-13755
Job Name: Lee-DeGuzman Residence
Job Address: 1855 Spindrift Drive, La Jolla CA
Sample Number: B-4 @ 2 - 5 ft.
Sample Description: Dark Brown Clayey Sand

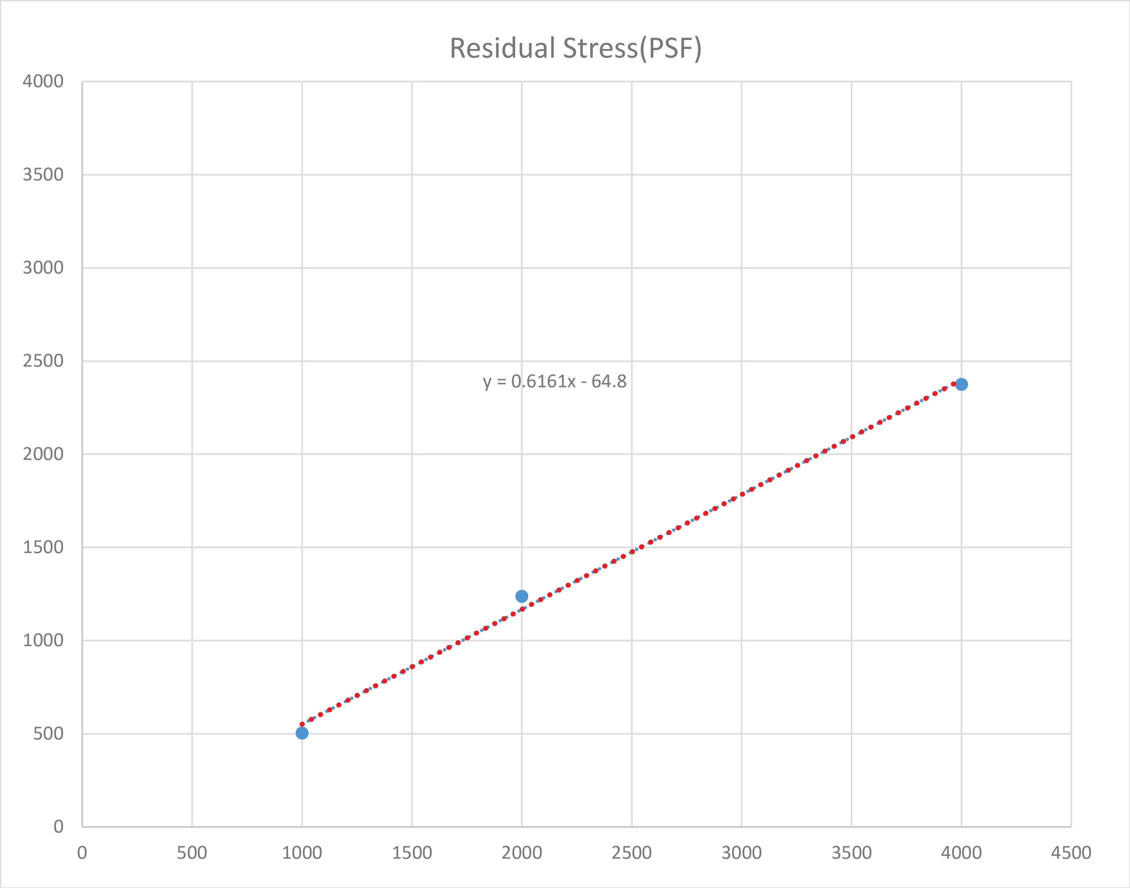
Tested By: MH
Tested Date: 6/16/2023

Test Method: REMOLDED TO 90% R.C.  Saturated

| Normal Load(PSF) | Residual Stress(PSF) |
|---|---|
| 1000 | 504 |
| 2000 | 1238.4 |
| 4000 | 2376 |

| | |
|---|---|
| Slope | 0.6161 |
| Phi in Radians | 0.552173701 |

| | |
|---|---|
| Phi in Degrees | 31.6 |
| Cohesion(PSF) | 0 |



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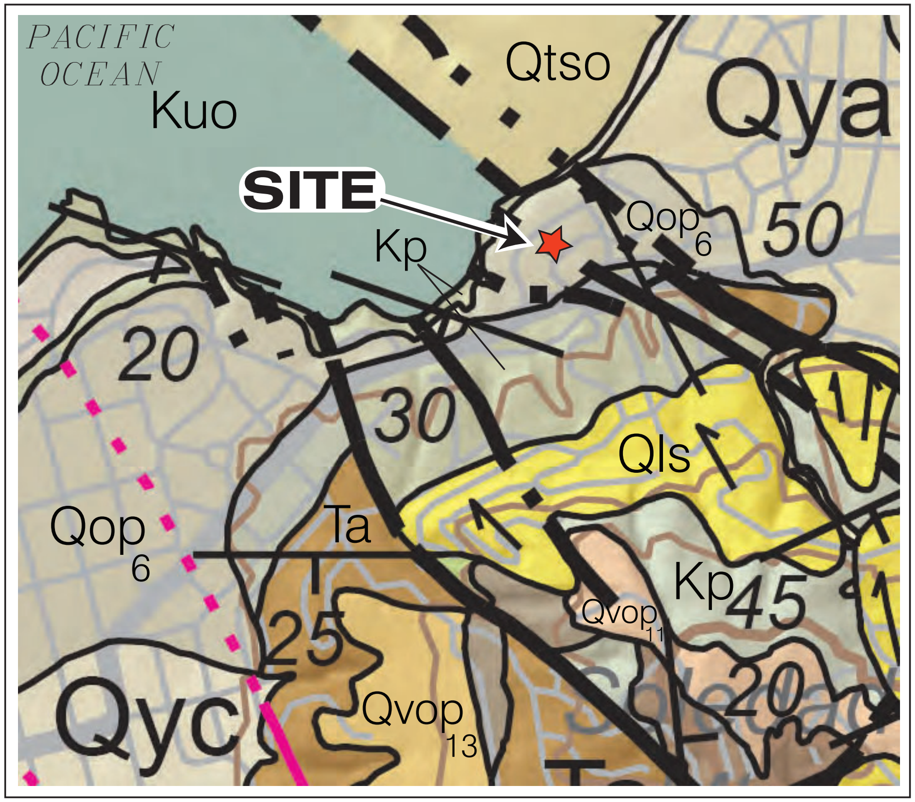
# DIRECT SHEAR TEST

Lee-DeGuzman Residence
1855 Spindrift Drive, La Jolla CA
Job No. 22-13755
Figure No. IVb



Lee-DeGuzman Residential Property
1855 Spindrift Drive
La Jolla, CA.

Base Map

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

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

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

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The Department of Conservation makes no warranties as to the suitability of this product for any particular purpose.

## EXCERPT FROM

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

By

Michael P. Kennedy[1] and Siang S. Tan[1]

2008

Digital preparation by

Kelly R. Bovard[2], Anne G. Garcia[2], Diane Burns[2], and Carlos I. Gutierrez[1]

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

## ONSHORE MAP SYMBOLS

Contact - Contact between geologic units; dotted where concealed.

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

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

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

Qls?
Landslide - Arrows indicate principal direction of movement. Quired where existence is questionable

Strike and dip of beds

70 Inclined

Strike and dip of igneous joints

60 Inclined

Strike and dip of metamorphic foliation

55 Inclined

## DESCRIPTION OF MAP UNITS

| | |
|---|---|
| Qya | Young Alluvial Flood Plain Deposits |
| Qls | **Landslide** Deposits |
| $Qop_6$ | Old Paralic Deposits, Unit 6 |
| $Qvop_{11}$ | Very Old Paralic Deposits, Unit 11 |
| $Qvop_{13}$ | Very Old Paralic Deposits, Unit 13 |
| Qtso | Undivided sediments and sedimentary rocks in offshore region |
| Ta | Ardath Shale |
| Kp | Point Loma Formation |
| Kuo | Undivided rocks of the Roserio Group in the offshore area |

*Figure No. V*
*Job No. 22-13755*

Geotechnical Exploration, Inc.

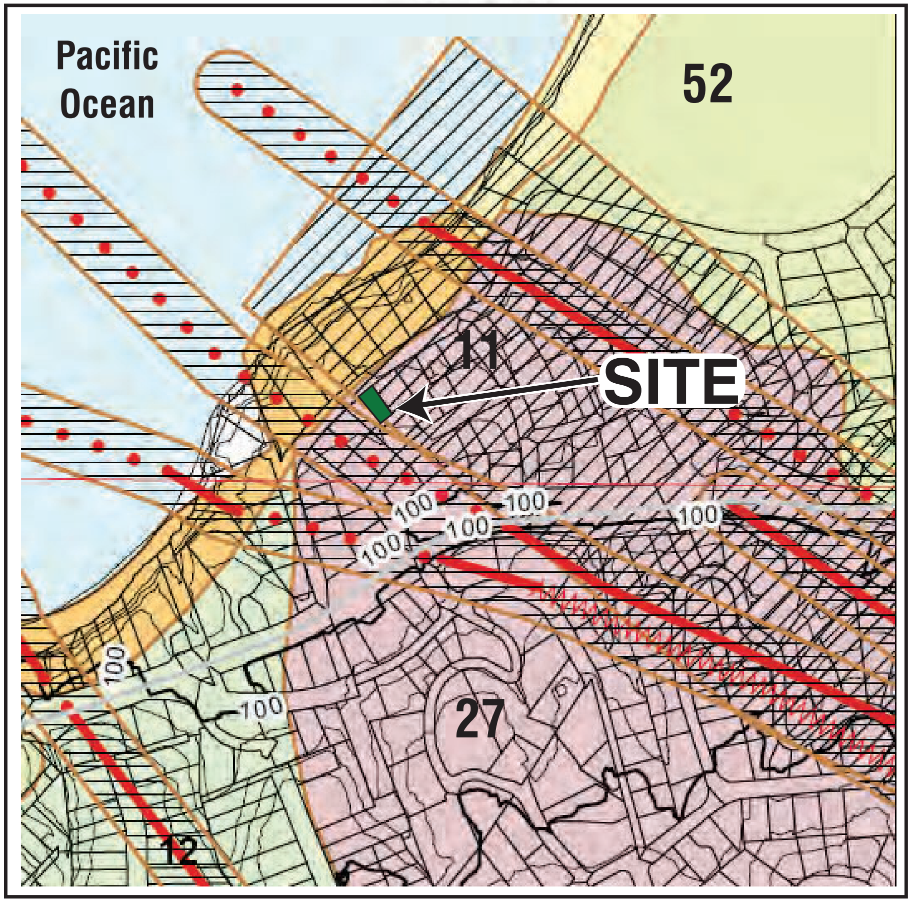
*June 2023*

OLGUIN-CHRISTIANSEN-GEO.ai

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

Development Services Department

DATE: 4/3/2008



Lee-DeGuzman Residential Property
1855 Spindrift 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)**

- 🟦

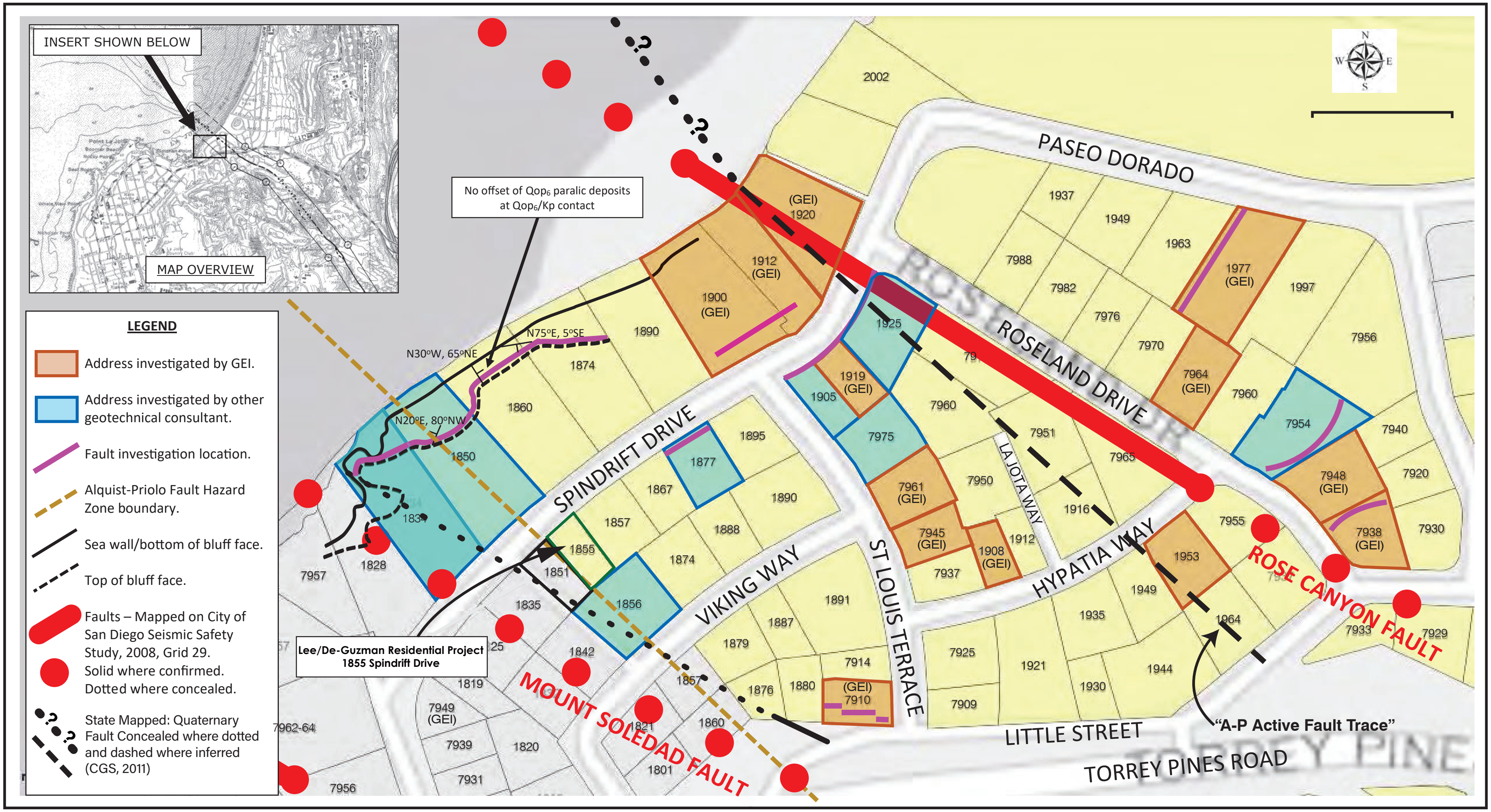
**FAULTS**

- Fault
- Inferred Fault
- Concealed Fault
- Shear Zone

*Figure No. VI*
*Job No. 22-13755*

**Geotechnical Exploration, Inc.**

*June 2023*



# PRIOR INVESTIGATION LOCATIONS ON EXPANDED ALQUIST-PRIOLO MAP

Lee-DeGuzman Residential Project
1855 Spindrift Drive
La Jolla, CA.

*Figure No. VII*
*Job No. 22-13755*

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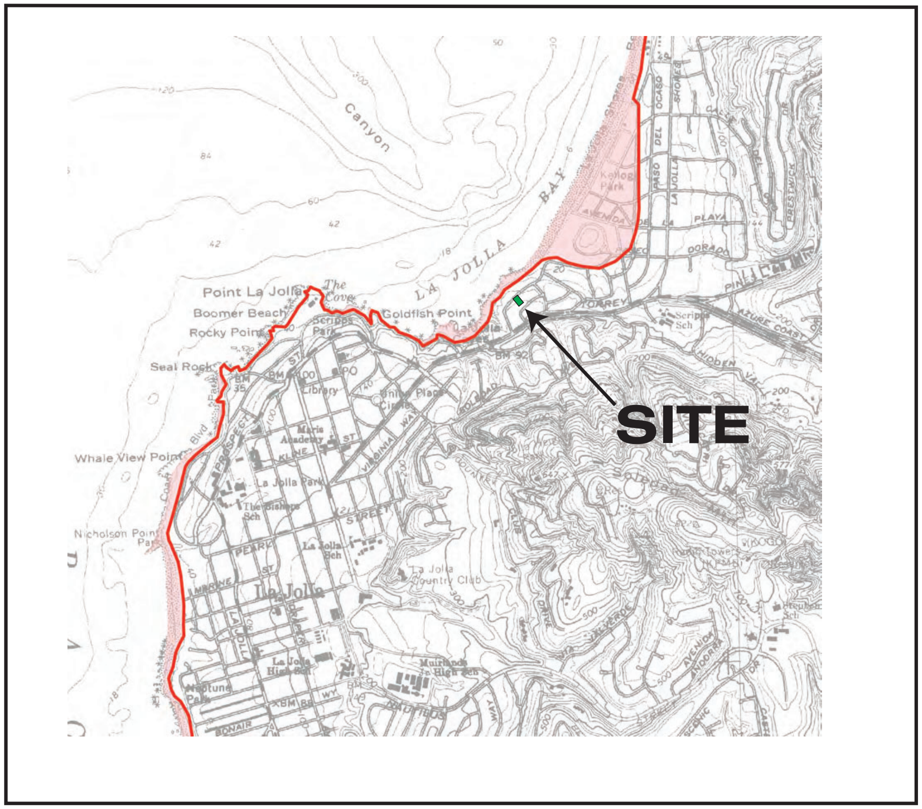
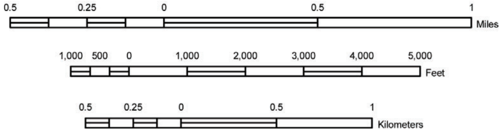
*June 2023*



Lee-DeGuzman Residential Propert
1855 Spindrift Drive
La Jolla, CA.



EXCERT FROM

# TSUNAMI INUNDATION MAP FOR EMERGENCY PLANNING

### State of California ~ County of San Diego
### LA JOLLA QUADRANGLE

June 1, 2009

## MAP EXPLANATION

- 〰 Tsunami Inundation Line
- 🟥 Tsunami Inundation Area

## MAP BASE

Topographic base maps prepared by U.S. Geological Survey as part of the 7.5-minute Quadrangle Map Series (originally 1:24,000 scale). Tsunami inundation line boundaries may reflect updated digital orthophotographic and topographic data that can differ significantly from contours shown on the base map.

## DISCLAIMER

The California Emergency Management Agency (CalEMA), the University of Southern California (USC), and the California Geological Survey (CGS) make no representation or warranties regarding the accuracy of this inundation map nor the data from which the map was derived. Neither the State of California nor USC shall be liable under any circumstances for any direct, indirect, special, incidental or consequential damages with respect to any claim by any user or any third party on account of or arising from the use of this map.

Table 1: Tsunami sources modeled for the San Diego County coastline.

| Sources (M = moment magnitude used in modeled event) | | Areas of Inundation Map Coverage and Sources Used | | |
|---|---|---|---|---|
| | | Dana Point | Oceanside | San Diego |
| Local Sources | Carlsbad Thrust Fault | | X | X |
| | Catalina Fault | X | X | X |
| | Coronado Bank Fault | | | X |
| | Lasuen Knoll Fault | X | | X |
| | San Clemente Fault Bend Region | | | X |
| | San Clemente Island Fault | | | X |
| | San Mateo Thrust Fault | X | X | |
| | Coronado Canyon Landslide #1 | | | X |
| Distant Sources | Cascadia Subduction Zone #3 (M9.2) | X | | X |
| | Central Aleutians Subduction Zone#1(M8.9) | X | X | X |
| | Central Aleutians Subduction Zone#2(M8.9) | X | | X |
| | Central Aleutians Subduction Zone#3(M9.2) | X | X | X |
| | Chile North Subduction Zone (M9.4) | X | | X |
| | 1960 Chile Earthquake (M9.3) | X | | X |
| | 1952 Kamchatka Earthquake (M9.0) | X | | |
| | 1964 Alaska Earthquake (M9.2) | X | X | X |
| | Japan Subduction Zone #2 (M8.8) | X | | X |
| | Kuril Islands Subduction Zone #2 (M8.8) | X | | X |
| | Kuril Islands Subduction Zone #3 (M8.8) | X | | X |
| | Kuril Islands Subduction Zone #4 (M8.8) | X | | X |

Cal EMA
CGS
USC UNIVERSITY OF SOUTHERN CALIFORNIA

## PURPOSE OF THIS MAP

This tsunami inundation map was prepared to assist cities and counties in identifying their tsunami hazard. It is intended for local jurisdictional, coastal evacuation planning uses only. This map, and the information presented herein, is not a legal document and does not meet disclosure requirements for real estate transactions nor for any other regulatory purpose.

The inundation map has been compiled with best currently available scientific information. The inundation line represents the maximum considered tsunami runup from a number of extreme, yet realistic, tsunami sources. Tsunamis are rare events; due to a lack of known occurrences in the historical record, this map includes no information about the probability of any tsunami affecting any area within a specific period of time.

Please refer to the following websites for additional information on the construction and/or intended use of the tsunami inundation map:

State of California Emergency Management Agency, Earthquake and Tsunami Program:
http://www.oes.ca.gov/WebPage/oeswebsite.nsf/Content/B1EC
51BA215931768825741F005E8D80?OpenDocument

University of Southern California – Tsunami Research Center:
http://www.usc.edu/dept/tsunamis/2005/index.php

State of California Geological Survey Tsunami Information:
http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/index.htm

National Oceanic and Atmospheric Agency Center for Tsunami Research (MOST model)
http://nctr.pmel.noaa.gov/time/background/models.html

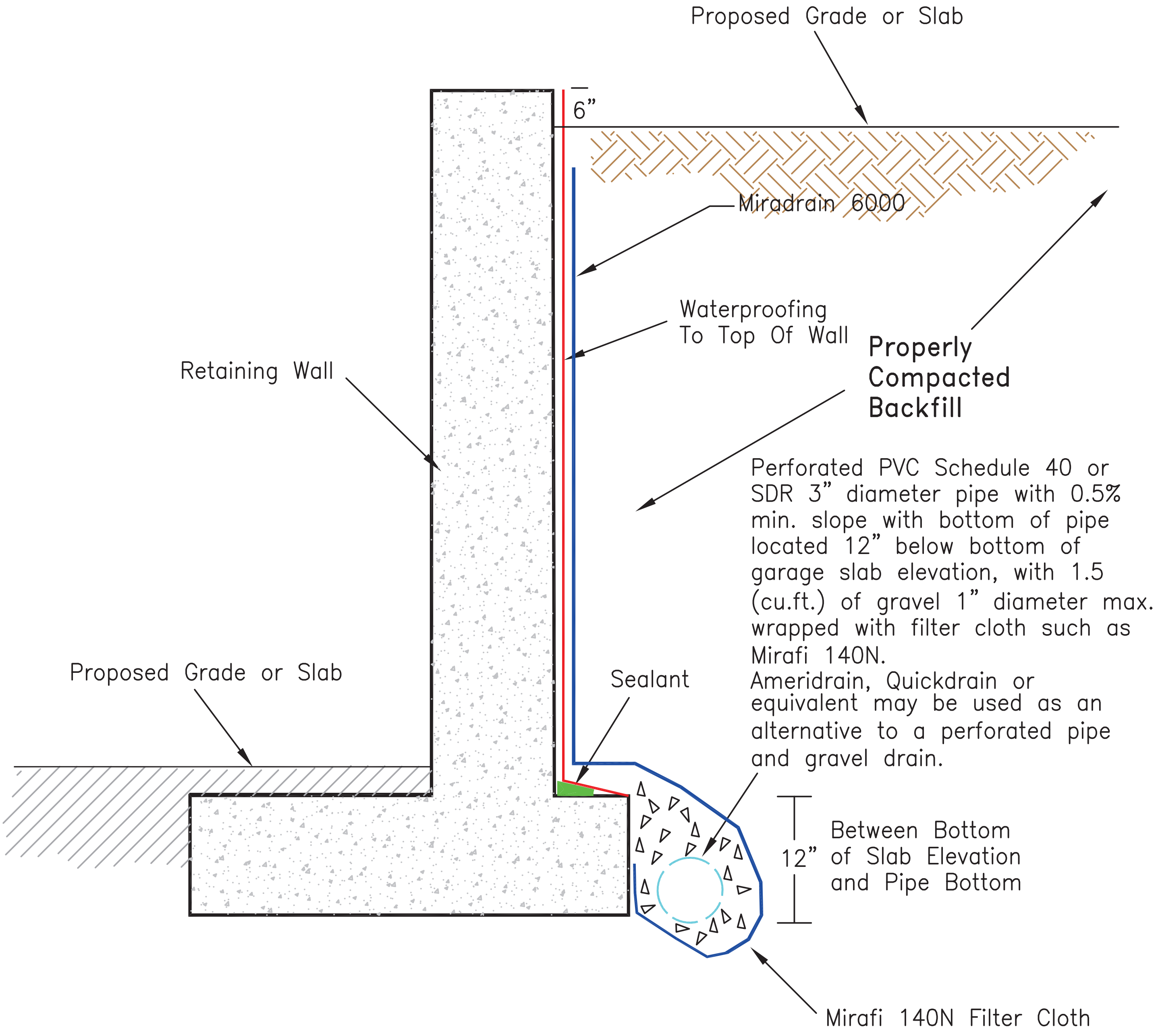
*Figure No. VIII*
*Job No. 22-13755*

**Geotechnical Exploration, Inc.**

*June 2023*

Lee-De-Guzman-tsumani.ai

# SCHEMATIC RETAINING WALL
# SUBDRAIN RECOMMENDATIONS



Perforated PVC Schedule 40 or SDR 3" diameter pipe with 0.5% min. slope with bottom of pipe located 12" below bottom of garage slab elevation, with 1.5 (cu.ft.) of gravel 1" diameter max. wrapped with filter cloth such as Mirafi 140N.
Ameridrain, Quickdrain or equivalent may be used as an alternative to a perforated pipe and gravel drain.

**NOT TO SCALE**

*Figure No. IX*
*Job No. 22-13755*

NOTE: As an option to Miradrain 6000, Gravel or Crushed rock 3/4" maximum diameter may be used with a minimum 12" thickness along the interior face of the wall and 2.0 cu.ft./ft. of pipe gravel envelope.

**Geotechnical Exploration, Inc.**

*June 2023*

*22–13755–IX.dwg*

# 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<br>(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<br>(Appreciable amount) | GC | Clay gravels, poorly graded gravel-sand-silt mixtures |
| SANDS, CLEAN SANDS<br>(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<br>(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 |

# APPENDIX B

## Regional Geologic Description

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. 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 Nación 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).

In California, major earthquakes can generally be correlated with movement on active faults. As defined by the California Division of Mines and Geology, now the California Geological Survey (CGS), an "active" fault, described by CGS (2018) as a Holocene-Active fault, is one that has had (ground) surface displacement within Holocene time, the last 11,700 (CGS, 2018). In addition, "potentially active fault" has been amended to Pre-Holocene fault: a fault whose recency of past movement is older than 11,700 years, and thus does not meet the criteria of Holocene-Active fault as defined in the State Mining and Geology Board regulations.

For the City of San Diego, the lead agency for this project, a three-tier fault classification is used, as follows:

- *Active Faults* had demonstrable surface displacement during the Holocene time, where Holocene time is the geological epoch that began 11,700 years before present (CGS,2018).
- *Potentially Active Faults* had demonstrable surface displacement during Quaternary time, but Holocene surface displacement is indeterminate.
- *Inactive Faults* are pre-Quaternary faults where the Quaternary period timeline is approximately 1.6 million years ago (CGS, 2018).

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. The youngest paleoearthquake that cuts the early historical living surface is likely the 1862 San Diego earthquake that had an estimated magnitude of M6 (Singleton et al., 2019). Paleoseismic trenches at the Presidio Hills Golf Course on the main trace of the Rose Canyon Fault contained evidence for historical ground rupturing earthquakes as recently as 1862 and the mid-1700s. Results of the study also suggest the Rose Canyon Fault has a ~700-800-year recurrence interval (Singleton et al., 2019).

Since earthquakes have been recorded by instruments (since the 1930s), the San Diego area has experienced scattered seismic events with Richter magnitudes generally less than M4.0. During June 1985, a series of small earthquakes occurred beneath San Diego Bay, three of which were recorded at M4.0 to M4.2. In addition, the Oceanside earthquake of July 13, 1986, located approximately 26 miles offshore of the City of Oceanside, had a magnitude of M5.3 (Hauksson and Jones, 1988).

On June 15, 2004, a M5.3 earthquake occurred approximately 45 miles southwest of downtown San Diego (26 miles west of Rosarito, Mexico). 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. 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.

On 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, although 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.

This event's aftershock zone extends significantly to the northwest, overlapping with the portion of the fault system that is thought to have ruptured in 1892. 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.

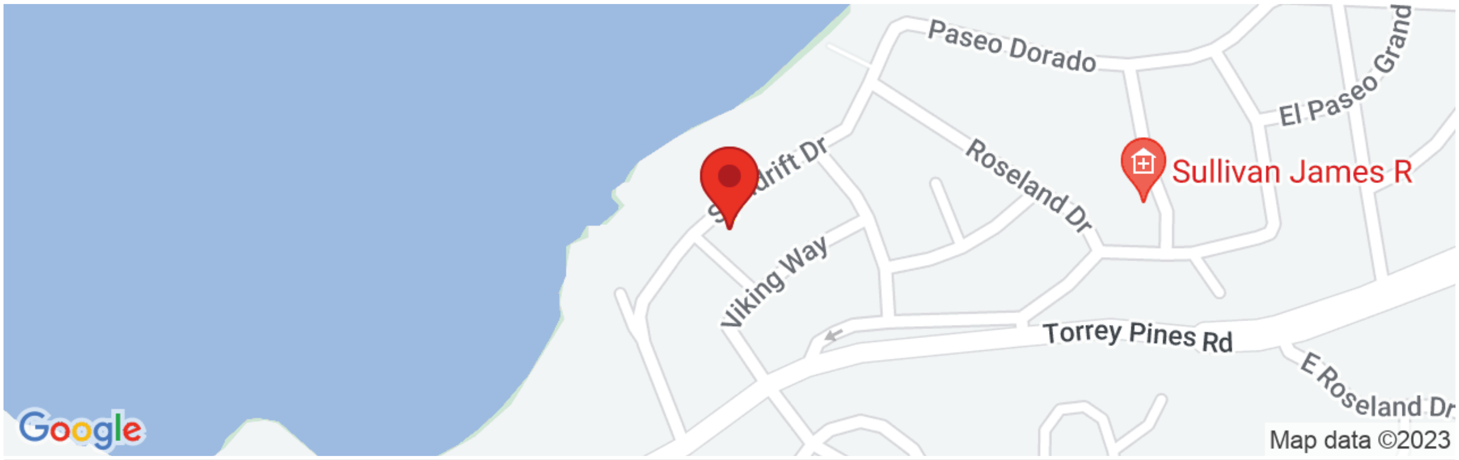
On July 7, 2010, a M5.4 earthquake occurred in Southern California at 4:53 pm (Pacific Time) about 30 miles south of Palm Springs, 25 miles southwest of Indio, and 13 miles north-northwest of Borrego Springs. The earthquake occurred near the Coyote Creek segment of the San Jacinto Fault. The earthquake exhibited right lateral slip to the northwest, consistent with the direction of movement on the San Jacinto Fault. The earthquake was felt throughout Southern California, with strong shaking near the epicenter. It was followed by more than 60 aftershocks of M1.3 and greater during the first hour.

In the last 50 years, there have been four other earthquakes in the magnitude M5.0 range within 20 kilometers of the Coyote Creek segment: M5.8 in 1968, M5.3 on 2/25/1980, M5.0 on 10/31/2001, and M5.2 on 6/12/2005. The biggest earthquake near this location was the M6.0 Buck Ridge earthquake on 3/25/1937.

# APPENDIX C

## 1855 Spindrift Dr, La Jolla, CA 92037, USA

### Latitude, Longitude: 32.8506764, -117.2620809



| | |
|---|---|
| **Date** | 6/12/2023, 4:12:00 PM |
| **Design Code Reference Document** | ASCE7-16 |
| **Risk Category** | II |
| **Site Class** | D - Stiff Soil |

| Type | Value | Description |
|---|---|---|
| $S_S$ | 1.404 | $MCE_R$ ground motion. (for 0.2 second period) |
| $S_1$ | 0.491 | $MCE_R$ ground motion. (for 1.0s period) |
| $S_{MS}$ | 1.404 | Site-modified spectral acceleration value |
| $S_{M1}$ | null -See Section 11.4.8 = **0.888** | Site-modified spectral acceleration value |
| $S_{DS}$ | 0.936 | Numeric seismic design value at 0.2 second SA |
| $S_{D1}$ | null -See Section 11.4.8 = **0.592** | Numeric seismic design value at 1.0 second SA |

| Type | Value | Description |
|---|---|---|
| SDC | null -See Section 11.4.8 = **D** | Seismic design category |
| $F_a$ | 1.0 | Site amplification factor at 0.2 second |
| $F_v$ | null -See Section 11.4.8 = **1.808** | Site amplification factor at 1.0 second |
| PGA | 0.641 | $MCE_G$ peak ground acceleration |
| $F_{PGA}$ | 1.1 | Site amplification factor at PGA |
| $PGA_M$ | 0.705 | Site modified peak ground acceleration |
| $T_L$ | 8 | Long-period transition period in seconds |
| SsRT | 1.404 | Probabilistic risk-targeted ground motion. (0.2 second) |
| SsUH | 1.62 | Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration |
| SsD | 2.269 | Factored deterministic acceleration value. (0.2 second) |
| S1RT | 0.491 | Probabilistic risk-targeted ground motion. (1.0 second) |
| S1UH | 0.554 | Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration. |
| S1D | 0.799 | Factored deterministic acceleration value. (1.0 second) |
| PGAd | 0.941 | Factored deterministic acceleration value. (Peak Ground Acceleration) |
| $PGA_{UH}$ | 0.641 | Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration |
| $C_{RS}$ | 0.866 | Mapped value of the risk coefficient at short periods |
| $C_{R1}$ | 0.886 | Mapped value of the risk coefficient at a period of 1 s |
| $C_V$ | 1.381 | Vertical coefficient |

# APPENDIX D

## SLAB MOISTURE INFORMATION

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

Specialty vapor retarding 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 E1745-09 Standard Specification for Plastic Water Vapor Retarders Used in Contact Concrete Slabs; ASTM E1643-18a Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials; and ACI 302.2R-06 Guide to Concrete Floor and Slab Construction.

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 subparagraphs 7.1.1-7.1.5) should be less than 0.01 perms (grains/square foot/hour/per inch of Mercury) and comply with the ASTM E1745-09 Class A requirements. Installation of vapor barriers should be in accordance with ASTM E1643-18a. The basis of design is 15-mil Stego Wrap vapor barrier placed per the manufacturer’s guidelines. Reef Industries Vapor Guard membrane has also been shown to achieve a permeance of less than 0.01 perms. We recommend that the slab be poured directly on the vapor barrier, which is placed directly on the prepared properly compacted smooth subgrade soil surface.

Common to all acceptable products, vapor retarder/barrier joints must be lapped at least 6 inches. Seam joints and permanent utility penetrations should be sealed with the manufacturer’s recommended tape or mastic. Edges of the vapor retarder should be extended to terminate at a location in accordance with ASTM E1643-18a or to an alternate location that is acceptable to the project’s structural engineer. All terminated edges of the vapor retarder should be sealed to the building foundation (grade beam, wall, or slab) using the manufacturer’s recommended accessory for sealing the vapor retarder to pre-existing or freshly placed concrete.

(grade beam, wall, or slab) using the manufacturer's recommended accessory for sealing the vapor retarder to pre-existing or freshly placed concrete.

Additionally, 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. Vapor barrier-safe screeding and forming systems should be used that will not leave puncture holes in the vapor barrier, such as Beast Foot (by Stego Industries) or equivalent.

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.

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.