



January 19, 2022

Project No. 20108-04

To: Newport Center Hotels, LLC  
4901 Birch Street  
Newport Beach, California 92660

Attention: Mr. Kevin Martin

Subject: Preliminary Geotechnical Exploration and Plan Review for The Ritz-Carlton Residences Tower and Parking Structures at 900 Newport Center Drive, Vesting Tentative Tract Map No. 19222, City of Newport Beach, California

In accordance with your authorization, NMG Geotechnical, Inc. (NMG) has performed a preliminary geotechnical exploration program and review of plan for the proposed residential tower and parking structures located at 900 Newport Center Drive in the city of Newport Beach, California. For this study, we reviewed Vesting Tentative Tract Map No. 19222, prepared by Fuscoe Engineering, which included one 50-scale sheet showing the layout of the proposed improvements, received by NMG on December 20, 2021. In addition, we reviewed a seven-sheet set of conceptual plans also prepared by Fuscoe that included a 30-scale map and cross-sections. The purpose of our study was to evaluate the geotechnical site conditions in light of the proposed improvements in order to provide geotechnical recommendations for the project design and grading.

The existing southern (three-story) Marriott Hotel building and the existing (tiered three-level) parking structure will be demolished. The proposed improvements include a new 22-story residential tower with subterranean parking (five levels) under the building and to the south of the building. Also, a separate six level parking structure (four levels below ground) will be constructed at the north end of the existing parking structure to service the hotel.

NMG has worked in Newport Beach and specifically Fashion Island for the past 25 years and is very familiar with the geology and geotechnical issues within the area. We have also obtained and reviewed the prior reports for the hotel site and have included relevant boring logs and laboratory test results from these prior studies by NMG and others. Our geotechnical exploration for the subject site investigation included two bucket-auger borings and two Cone Penetration Tests (CPTs) at both ends of the existing parking structure. Our preliminary exploration program was limited by the presence of the existing buildings and access constraints to the site. Additional subsurface investigation may be necessary (both hollow-stem and/or bucket-auger borings) for the purpose of final design of the proposed improvements at the site, to determine the existing fill thickness within the older canyon fill area, and to determine the geologic structure around the perimeters of the proposed subterranean parking structures.

Based on our review, we conclude that the subject property is considered suitable for the proposed improvements from a geotechnical viewpoint provided the project is designed and constructed in accordance with the geotechnical recommendations provided herein. Additional subsurface investigation will be needed to provide final recommendations and design parameters for construction.

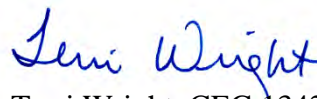
If you have any questions regarding this report, please contact our office. We appreciate the opportunity to provide our services.

Respectfully submitted,

NMG GEOTECHNICAL, INC.



Shahrooz "Bob" Karimi, RCE 54250  
Principal Engineer



Terri Wright, CEG 1342  
Principal Geologist

TD/TW/SBK/grd

Distribution: (1) Addressee (E-Mail)  
(1) Ms. Oriana Slasor, Fuscoe (E-Mail)



## TABLE OF CONTENTS

1.0	INTRODUCTION .....	1
1.1	Purpose and Scope of Work.....	1
1.2	Site Location and Description.....	1
1.3	Site History and Prior Investigations .....	2
1.4	Proposed Demolition and Development .....	3
1.5	Field Exploration .....	3
1.6	Laboratory Testing.....	4
2.0	GEOTECHNICAL FINDINGS .....	5
2.1	Geologic Setting.....	5
2.2	Earth Units .....	5
2.3	Geologic Structure .....	6
2.4	Regional Faulting, Seismicity, and Seismic Hazards .....	6
2.5	Groundwater .....	7
2.6	Geotechnical Conditions.....	7
2.7	Settlement and Foundation Considerations .....	8
3.0	CONCLUSION AND PRELIMINARY RECOMMENDATIONS.....	10
3.1	General Conclusion and Recommendation.....	10
3.2	Demolition and Excavations .....	10
3.3	Earthwork and Remedial Grading .....	10
3.4	Foundation Design and Settlement .....	11
	3.4.1 Continuous Mat Foundation .....	11
	3.4.2 Shallow Foundations.....	11
3.5	Shoring Design.....	12
3.6	Lateral Earth Pressures for Permanent Retaining Structures .....	13
3.7	Slab on Grade.....	14
3.8	Moisture Mitigation for Concrete Slabs .....	14
3.9	Infiltration .....	15
3.10	Seismic Design Guidelines .....	15
3.11	Foundation Setbacks .....	16
3.12	Utility Installation and Trench Backfill .....	16
3.13	Expansion Potential .....	17
3.14	Cement Type and Corrosivity .....	17
3.15	Exterior Concrete (Non-Structural) .....	17
3.16	Groundwater .....	19
3.17	Surface Drainage.....	19
3.18	Geotechnical Exploration and Review of Future Plans .....	20
3.19	Geotechnical Observation and Testing during Grading and Construction .....	20
4.0	LIMITATIONS.....	21

## TABLE OF CONTENTS (Continued)

### ATTACHMENTS

Figure 1 – Site Location Map – Rear of Text

Figure 2 – Retaining Wall Drainage Detail – Rear of Text

Figure 3 – Tie-Back Anchor Detail – Rear of Text

Plate 1 – Geotechnical Map

Plate 2 – Cross-Sections (A-A', B-B', C-C', D-D', E-E')

Appendix A - References

Appendix B - Boring and CPT Logs

Appendix C - Laboratory Test Results

Appendix D - Seismic Parameters

Appendix E - General Earthwork and Grading Specifications

## 1.0 INTRODUCTION

### 1.1 Purpose and Scope of Work

NMG Geotechnical, Inc. (NMG) has prepared this geotechnical exploration and preliminary conceptual plan review for the proposed residential tower and parking structures located at Block 900 Newport Center Drive, in the city of Newport Beach, California (Figure 1). The purpose of our study was to evaluate the geotechnical site conditions in light of the proposed improvements in order to provide geotechnical recommendations for the project design grading and construction.

For this study, we reviewed Vesting Tentative Tract Map No. 19222, prepared by Fuscoe Engineering, which included one 50-scale sheet showing the layout of the proposed improvements, received by NMG on December 20, 2021. In addition, we reviewed a seven-sheet set of plans also prepared by Fuscoe, including a 30-scale map and cross-sections. The recent topographic map and VTTM plan for the site were used as the base maps for the 30-scale Geotechnical Map (Plate 1) to show the geologic conditions and boring locations from this and prior studies.

Our scope of work was as follows:

- Review and compilation of available geotechnical reports and maps for the subject site and surrounding area. We also reviewed historic aerial photographs, historic topographic maps, and the prior design plans for the existing building, which were provided by you and/or obtained from the City of Newport Beach. A list of references is included in Appendix A.
- Drilling of two bucket-auger borings at either end of the existing parking structure. These borings were geotechnically down-hole logged and samples were collected for laboratory testing.
- Advancement of two Cone Penetration Tests (CPTs) adjacent to the bucket-auger borings with Shear Wave Velocity measurements.
- Laboratory testing, including in-situ moisture and density, consolidation, shear strength, grain size analysis, and Atterberg limits.
- Evaluation of faulting and seismicity in accordance with the 2019 California Building Code (CBC).
- Geotechnical review of the compiled data, including the geologic and soil conditions, settlement, retaining wall, and foundation considerations.
- Preparation of this report with our findings, conclusions, and recommendations for the proposed demolition and pad grading.

### 1.2 Site Location and Description

The Newport Marriott Hotel is located at the southwest corner of Newport Center Drive loop road and Santa Barbara Road in Newport Beach, California (Figure 1). The hotel complex is situated on a 9.53-acre property that is bounded by Santa Barbara Road on the north, Newport Center Drive on the east, the Newport Beach Golf Course on the west, and Grandview apartments to the southwest. The hotel consists of the main tower and 12-story tower for guest rooms and facilities

located to the north of the main hotel tower. This area is not a part of the subject proposed improvements and will remain in place.

The southern 2.775-acre portion of the hotel complex is the subject site for the proposed residential and parking structure improvements. Currently, there is a U-shaped three-story hotel guest room structure, with associated central pool/spa and a gazebo/patio lawn area. There is also a long, tiered, three-level garage structure that is partially subterranean located along the eastern portion of the site, parallel to Newport Center Drive. Both this hotel building and parking structure will be demolished and replaced by the proposed improvements.

### **1.3 Site History and Prior Investigations**

Based on review of historic aerial photographs and topographic maps dating back to the late 1930s, prior use of the subject site was for agricultural (ranching) activities through the mid-1960s. The Fashion Island retail center was originally graded in the mid-1960s, which included construction of the Newport Center Drive loop road. We understand that the original hotel was constructed in 1975 with at-grade parking in the area of the current day northern tower and parking structure areas. The additional parking and northern tower were added between 1984 through 1986. The front entry and the hotel building west of the proposed hotel parking lot were again modified in 2005.

We have not been able to obtain a copy of the original grading plan from the city files or other sources. Based on a review of historic topographic maps, in the area located south of the U-shaped three-story building there was a canyon swale that was filled-in as part of the original hotel grading. Comparing the original topographic contours, the fill placed in the swale during the original grading is up to 35 feet deep (below existing grade) in the area of the existing small gazebo (Cross-Section A-A').

The original geotechnical investigation for the hotel was performed by Dames and Moore (1973) and included 14 borings (DB-1 through DB-14). While the early study did not define the earth units, we were able to assign earth units based on the descriptions provided on the logs. The investigation performed for the main additions of the northern tower and garage were performed by Soils International, Inc. (1981 and 1983), and included nine borings (SI-1 through SI-9). Please note that the study by Soils International, Inc. assigned a bench mark of 100-foot elevation at the hotel sign near the intersection of Newport Center Drive and Santa Barbara, which corresponds to 182 feet above mean sea level (msl) elevation. The locations of the relevant borings are shown on Plate 1 and the logs are included in Appendix B. The relevant geotechnical laboratory test results from the prior studies are also presented in Appendix C.

## 1.4 Proposed Demolition and Development

Demolition at the site will include complete removal of the existing three-story southern hotel structure, along with the associated pool, spa, lawn and gazebo. The existing parking structure will also be demolished.

The proposed residential development includes a 25,023 square foot building above a 44,860 square foot parking structure, in plan view. The residential building will be 22-stories high to accommodate 159 hotel branded residences. The new building protrusions extends up to 295 feet above ground level. Ground level for the building will be near elevation 178 feet above mean sea level (msl). A 5-story subterranean parking structure is planned below the building and extending to the southern property line. The portion of the parking structure extending to the southern property line will have a top level of 270 feet msl and a bottom subgrade level of 119 feet msl. This portion of the parking structure will be buried with up to 5 feet of compacted fill that will be placed against a retaining wall along the west side of the structure. Landscaping and the entry drive will also be constructed over this portion of the parking structure. A drive/fire road will be constructed along the southwest side of this parking structure, with access to a loading dock area under the building. A pool/spa area and a new 8,000 square foot event lawn will be constructed to the northwest of the proposed residential building.

A separate 6-story parking structure with 4 levels below grade and two levels above grade will be constructed in the northern portion of the existing parking structure that will serve the hotel. The west side of this structure is in close proximity to a portion of the existing hotel that will remain in place. It is also immediately south of the new entry area that will need to be protected in-place.

The site grading will consist of temporary excavations for the proposed structures that will extend up to 56 feet below existing grade. The excavations below the residential building may be on the order of 10 feet deeper to accommodate a mat foundation. Shoring will be needed to protect adjacent properties, structures, and roadways.

## 1.5 Field Exploration

Exploration was conducted for the subject site from September 23, 2021. Two Cone Penetration Tests (CPTs) were advanced 24 to 39 feet deep below existing ground surface, where they encountered refusal due to the presence of hard bedrock and/or cemented concretions within the bedrock materials. The CPTs generally encountered the terrace deposit and the upper weathered portion of the Monterey bedrock. Shear wave velocity measurements collected during the testing ranged from 825 ft/sec to 1,598 ft/sec, and are included in Appendix B. Also, on October 5 and 6, 2021, two bucket-auger borings (B-1 and B-2) were drilled and down-hole logged by a Certified Engineering Geologist to depths of 68 to 74 feet below existing grade.

Prior field exploration by NMG for the adjacent hotel improvements was performed in early 2021 utilizing hollow-stem-auger borings that were drilled in the front of the adjacent hotel entry area with a truck-mounted drill rig. In late January 2021, a tri-pod hollow-stem drill rig was utilized to drill borings in the back of the adjacent hotel where access was not possible with a truck-mounted rig. These borings were drilled to depths of 10 to 31.5 feet. Borings were hand-augered in the

upper 5 feet and most encountered bedrock in the bottom of the borings. The truck-mounted drilling rig was able to drill 15 feet into bedrock and take samples; however, the tri-pod rig typically encountered refusal at ½ to 2 feet into the bedrock. The borings were geotechnically logged and in-situ and bulk samples were collected.

During the recent and prior drilling, NMG obtained relatively undisturbed soil ring samples in the exploratory borings with a 2.5-inch, inside-diameter, split-barrel sampler. The hollow-stem samplers were driven into the soil with a 140-pound automatic safety hammer, free-falling 30 inches on the truck-mounted rig, and with a cat-head and pulley on the tri-pod rig. The bucket-auger borings collected samples from the Kelly bar weighing 1,500 to 4,000 lbs and dropping 12 inches. The drive samples were also used to obtain a measure of resistance of the soil to penetration (recorded as blows-per-foot on our geotechnical boring logs). Representative bulk samples of onsite soil were collected from the drill cuttings and used for additional laboratory testing. The borings were backfilled with cuttings and tamped for compaction. Borings within the AC pavement were patched with black-dyed quickset concrete. Concrete areas were patched with quickset concrete. The approximate locations of these and prior borings are shown on the Geotechnical Map (Plate 1). The boring logs are included in Appendix B.

## **1.6 Laboratory Testing**

Laboratory tests performed on selected bulk and relatively undisturbed soil samples from this exploration and prior NMG explorations include:

- Moisture content and dry density;
- Grain size distribution;
- Atterberg Limits;
- Direct shear; and
- Consolidation.

Laboratory tests were conducted in general conformance with applicable ASTM standards. Laboratory test results for this study, as well as the tests performed for the prior studies, are presented in Appendix C. In-situ moisture and dry density results are included on the geotechnical boring logs (Appendix B).



## 2.0 GEOTECHNICAL FINDINGS

### 2.1 Geologic Setting

The site is located on the Newport Mesa, approximately 1.5 miles inland from the ocean. The mesa highland is covered with coastal terrace deposits and is located at the southwestern end of the San Joaquin Hills. Mapping by the State (CDMG, 1981) indicates the site is underlain by Quaternary-age marine terrace deposits which overlie Miocene-age sedimentary bedrock of the Monterey Formation.

The Fashion Island/Newport Center area exhibits a geologic configuration that is characteristic of a series of distinguishable elevated terraces and wave-cut platforms. The area has undergone regional uplift since deposition of the marine terrace deposits onto the ancient wave cut benches. These deposits were subsequently uplifted with the oldest deposits exposed along the higher, northern portion of the center and the lower/younger deposits located along the southern portion of the center. Based on mapping by the State, the terrace underlying the site is believed to be the second emergent terrace (Marine Isotopic Stage 7).

### 2.2 Earth Units

Our evaluation of the onsite data and our explorations indicates that the site is underlain by varying thicknesses of compacted fill overlying native marine terrace deposits and bedrock of the Monterey Formation. These units are described below, in the order of youngest to oldest.

**Artificial Fill (Af):** Based on the prior and recent geotechnical borings and historic topographic maps, there is up to 35 feet of existing artificial fill under the proposed project area. The fill materials were found to consist of brown, dark brown, gray brown, sand, silty sand and clayey sand that was generally damp to moist and medium dense. There are local abundant roots in the fill near landscape areas.

**Marine Terrace Deposit (Qtm):** Quaternary-age marine terrace deposits underlie the existing artificial fill and overlies the Monterey Formation bedrock. These deposits consist of a dark gray brown sandy clay layer (interpreted as the soil cover over the sandy terrace) that overlies yellowish-brown to reddish-brown clean fine to medium sands. The terrace material was found to be moist to locally wet near the bedrock contact and medium dense to very dense. These terrace sands were deposited on an ancient wave cut bench and unconformably overlie the bedrock.

**Monterey Formation (Tm):** Bedrock of the Miocene-age Monterey Formation underlies the marine terrace deposits and generally consists of olive, olive gray to light gray, dark brown and dark gray (unoxidized) interbedded fine siltstone/claystone and yellowish-brown sandstone beds with local chert beds and diatomaceous siltstones. Violet to light blueish-gray devitrified tuff (volcanic ash) beds were encountered in Borings B-1 and B-2 that are on the order of one inch to 1 foot thick. Bedding thickness varies from thinly laminated (less than an inch thick) to a few feet thick and locally massive.

## 2.3 Geologic Structure

The marine terrace deposits are typically massive to thickly bedded and the layers are generally flat-lying. The terrace bedrock contact is an ancient wave cut bench, with some irregularity locally. This contact is also gently sloping to near horizontal and was found in B-1 at the north end of the existing parking structure at an elevation of 158.5 feet msl and in B-2 at the south end at an elevation of 147 feet msl. The cross-sections (Plate 2, Cross-Sections A-A' and D-D') show the typical irregularity of this contact and the elevations vary between 140 and 160 feet in the area of the historic canyon swale.

Bedrock beneath the terrace deposits was found to be variable within the borings from top to bottom. In general, the geologic structure at the north end of the site generally dips 7 to 15 degrees to the north down to 65 feet. At the south end, bedding was found to generally dip 6 to 19 degrees to the south/southwest. The Monterey bedrock in this area is known to be folded and faulted, and can change orientation in a short distance both vertically and horizontally.

There was a prior canyon swale in the southwest portion of the site. The approximate original contours are shown in green on Plate 1 based on the historic U.S. Geological Survey topographic maps. This swale was graded during the original hotel grading, and the fill is believed to be up to 35 feet under the top of slope. The approximate original profile and fill condition are also shown on Cross-Section A-A' (Plate 2).

## 2.4 Regional Faulting, Seismicity, and Seismic Hazards

**Regional Faults:** The site is not located within a fault-rupture hazard zone as defined by the Alquist-Priolo Special Studies Zones Act (CGS, 2018) and no evidence of active faulting was found during our background study and site investigation. Also, based on mapping by the State (CGS, 2010), there are no active faults mapped at the site.

Using the USGS Deaggregation computer program (USGS, 2021) and the site coordinates of 33.6166 degrees north latitude and -117.8801 degrees west longitude, the closest major active faults to the site are the Newport-Inglewood Fault located 2.7 miles (4.4km) to the south of the site, and the San Joaquin Hills Blind Thrust Fault located 3.3 miles (5.3 km) north of the site.

**Seismicity:** Properties in southern California are subject to seismic hazards of varying degrees depending upon the proximity, degree of activity, and capability of nearby faults. These hazards can be primary (i.e., directly related to the energy release of an earthquake, such as surface rupture and ground shaking) or secondary (i.e., related to the effect of earthquake energy on the physical world, which can cause phenomena such as liquefaction and ground lurching). Since there are no active faults at the site, the potential for primary ground rupture is considered very low. The primary seismic hazard for this site is ground shaking due to a future earthquake on one of the major regional active faults.

The maximum moment magnitude for the Controlling Fault is 7.15, which would be generated from the Newport-Inglewood Fault. The seismic design parameters are provided in Section 3.10.

**Secondary Seismic Hazards:** The site is not located in an area classified by the State as having soils that are potentially liquefiable, nor is it mapped as susceptible to seismically induced landslides, based on the Seismic Hazard Maps (CDMG, 1998).

The potential for secondary seismic hazards, such as tsunami and seiche, are considered very low to nil as the site is located away from the ocean at an elevation of over 170 feet above msl and outside of mapped tsunami inundation zones (CGS, 2009). The site is not located adjacent to a confined body of water; therefore, the potential for seismic hazard of a seiche (an oscillation of a body of water in an enclosed basin) is considered very low to nil.

## 2.5 Groundwater

Groundwater was initially encountered as seepage through fractures in Borings B-1 and B-2 at depths of 36 to 41 feet and 57 to 58 feet, respectively. Standing groundwater was measured at the end of logging in B-1 and B-2 at depths of 73.6 and 65 feet, respectively (elevations 102.4 and 106 feet msl), although these levels may not have been stabilized. It is possible that if observation wells were installed, the groundwater levels could rise a few feet to equalize at the level of the seepage. The source of the groundwater is likely from infiltration of irrigation and rain water from onsite and upgradient sources. It is also possible that during the late winter and spring months the groundwater levels may be higher; however, there is generally more irrigation during the late summer and fall months that may keep the groundwater levels high.

During the prior investigations, groundwater was not encountered in the borings drilled to depths from 31.5 to 60 feet; however, many of these borings were drilled prior to development.

While perched groundwater is often in the terrace deposits above the bedrock contact in the Newport Beach area, the terrace/bedrock contact within B-1 and B-2 encountered only wet to saturated conditions with no seepage at or near the contact. Near the site, if irrigation water perches on the contact, it likely flows along the contact and outlets at the ground surface in the golf course or through the slope adjacent to the Grandview apartments to the southwest of the site.

## 2.6 Geotechnical Conditions

The following includes a summary of the subsurface geotechnical conditions based on the laboratory test results performed on collected samples by NMG (Appendix C). The in-situ moisture contents and dry densities are included on the boring logs in Appendix B.

**In-situ Moisture Content and Dry Density:** Undisturbed samples of the terrace materials and bedrock were collected during this investigation. During the prior investigation, the upper 5 feet of the borings were hand-augered, therefore no drive samples were collected of the fill. Blow counts in the sandy terrace deposits with the bucket-auger rig ranged from 4 to 6 blows/foot using a 4,500-pound hammer dropping 12 inches per blow. The hollow-stem blow counts varied from 17 to 48 blows/foot with the automatic 140-pound hammer dropping 30 inches per blow, and over 50 blows with the manual drop of the hammer used during drilling with the tri-pod. In-situ dry densities for terrace deposits were generally in the range of 99.2 to 117.6 pounds-per-cubic-foot (pcf) with moisture contents ranging from 2.7 to 18.6 percent. Blow counts from the bucket-auger

ranged from 3 to 5 with 4,500 lbs and 3 to 10 blows/foot with 3,500 lbs and 10 to 12 blows/foot with 2,500 lbs in the bedrock materials. The blow counts were over 50 blows per foot with both the automatic-trip hammer and manual-drop hammer used by the hollow-stem drill rig and the tripod drilling. In-situ dry densities for bedrock were generally in the range of 74.8 to 99.4 pounds-per-cubic-foot (pcf) for the siltstone and up to 114.3pcf within the sandstone. Moisture contents within the siltstone/claystone ranged from 19.0 to 45.1 percent and within the sandstone the moisture ranged from 2.1 to 10.7 percent.

**Shear Strength:** Direct shear testing was performed on representative terrace deposits and the bedrock materials. The terrace deposits exhibit ultimate friction angles in the range of 19 to 27 degrees, with cohesions varying from 100 to 300 pounds per square foot (psf). Peak values for the friction angle and cohesion were in the range of 24.5 to 31 degrees and 350 to 550 psf, respectively. The test results on samples of the bedrock indicated an ultimate friction angle of 29 to 37 degrees, with cohesion of 100 to 500 psf. Peak values for the friction angle ranged from 34 to 50 degrees and cohesions ranged from 200 to 800 psf.

**Compressibility:** Consolidation testing performed on selected relatively undisturbed ring samples collected indicate a relatively low compressibility with negligible hydro-collapse/swell potential upon addition of water at a load of 1.6 kilo-pounds per square foot (ksf).

**Atterberg Limits and Grain Size Distribution:** Laboratory testing on two small grab samples of thin clay layers during downhole logging in B-2 indicated that these samples may be classified as clay with low plasticity (CL) and clay with high plasticity (CH) in accordance with the Unified Soil Classification System (USCS), and have Liquid Limits (LL) of 47 and 75, Plasticity Indexes (PI) of 26 and 46, and the clay fraction (passing the 2 $\mu$ ) of 30 and 27, respectively.

**Expansion Potential:** Based on prior laboratory test results and our experience with the soil materials within Fashion Island, we anticipate the near-surface fill soils and the marine terrace deposits at the site have expansion potential ranging from "very low" to "medium." The anticipated expansion potential of the bedrock materials may vary from "very low" for the sandstone materials to "high" for the silty claystone and clayey siltstone materials.

**Soluble Sulfate Content:** The soluble sulfate exposure of the onsite soils is anticipated to be classified as "S0" for the existing marine terrace and sandstone bedrock materials, and as "S1" for the siltstone and claystone bedrock materials per Table 19.3.1.1 of ACI-318-14.

## 2.7 Settlement and Foundation Considerations

The site is underlain by three earth units, including: 1) compacted fill which that varies from 4 to 35 feet in thickness; 2) marine terrace deposits which are primarily sandy to near depths of 20 to 35 feet; and 3) sandstone and siltstone and diatomaceous siltstone of the Monterey Formation at depth.

The proposed structures at the site consist of subterranean parking structures that extend to 56 feet below the existing ground surface elevations. The slabs and foundations of the residential and parking structures are anticipated to be founded in the bedrock of Monterey Formation. The excavations for the subterranean structures will result in unloading of the soil materials at the

foundation levels prior to construction of the new structures. Thus, the anticipated effect of the new structural loads on the foundation bearing soils is reduced to the difference between the new structural load and the load of the hauled away soil materials. Therefore, we anticipate that the foundations for the stand-alone parking structure with 4 and/or 5-subterranean levels may consist of spread footings and isolated column footings. The foundations for the new 22-story residential structure with 5 subterranean parking/storage/office levels may consist of mat slab with variable thicknesses, or deep foundations and structural slabs to limit the anticipated settlement to within the tolerable limits required for the structures.

## **3.0 CONCLUSION AND PRELIMINARY RECOMMENDATIONS**

### **3.1 General Conclusion and Recommendation**

Based on our findings, the site is considered geotechnically feasible for the proposed improvements provided the preliminary recommendations in this report are implemented during design, grading and construction. The recommendations in this report are considered minimum and may be superseded by more stringent requirements of others. After demolition, additional subsurface exploration is recommended to supplement the existing subsurface data and verify the geologic structures related to the required excavations at the site.

### **3.2 Demolition and Excavations**

As discussed previously, the project includes demolition of the existing three-story southern hotel building, including removal of the existing pool, slab-on-grade, underground utilities and the existing parking structure. The demolished structures, footings, subsurface pipelines, and appurtenances will need to be removed and disposed offsite. The demolition of the existing parking structure will create verticals next to the existing parkway on the east and the hotel structure on the northwest. These verticals will need to be temporarily shored prior to and/or during demolition until the new structures are completed.

The proposed construction is anticipated to require excavations for the subterranean parking structures to a depth of up to 56 feet below existing grades. The excavations performed adjacent to Newport Center Drive and the existing hotel structures will likely need shoring, unless there is room to excavate temporary slopes. Excavations should conform to applicable safety requirements for Cal-OSHA as presented in Section 3.12.

Excavations in the sandy marine terrace deposits should be performed at no steeper than 1.5H:1V. Excavations in bedrock materials with favorable bedding (into slope bedding) may be at 1H:1V, and bedrock materials with adverse (out of slope bedding) and/or neutral bedding should be excavated at maximum 2H:1V or shallower. Additional site investigation is necessary to verify the geologic structure(s) within the limits of excavations and provide the necessary recommendations for design of excavations at the site. However, because of proximity of the proposed construction to the existing roadways and structures, we anticipate that shoring of the excavations will be required. Preliminary shoring design parameters are provided in Section 3.5 of this report.

### **3.3 Earthwork and Remedial Grading**

Grading and excavations should be performed in accordance with the City of Newport Beach Grading Code and NMG's General Earthwork and Grading Specifications included in Appendix E of this report. Miscellaneous trash and construction debris produced during removal of the existing improvements should be removed and disposed of offsite prior to remedial grading operations.

Onsite soils that are relatively free of organic materials and construction debris are considered suitable for fill placement (they do not need to be exported offsite).

Excavations associated with the removal of existing building, utility lines, pool and spa should be backfilled and compacted in accordance with the recommendations provided in this section.

Fill and backfill materials should be compacted to at least 90 percent of maximum dry density, as determined by ASTM Test Method D1557. Fill materials should be placed in loose lifts, no thicker than 8 inches. Materials should be moisture-conditioned and processed as necessary to achieve uniform moisture content that is within moisture limits required to assure adequate bonding and compaction. We recommend that moisture contents of the fill be approximately 1 to 2 percentage points over the optimum moisture content.

### **3.4 Foundation Design and Settlement**

New foundations for support of structures may consist of variable thickness mat slab and foundations for the residential structure and shallow foundations and slab-on-grade for the parking structures.

#### **3.4.1 Continuous Mat Foundation**

The settlement calculations for the design of mat foundation are based on the approximate dimension of 208 ft x 90 ft for the Level 1 footprint (18,810 sf) and assumed column loads on the order of 6,000 kips with combined total column loads (dead plus live) of 96,000 kips distributed evenly over the continuous mat foundation, which would result in approximately 5.1 ksf net pressure at the base of the mat foundation. Considering the depth of excavation of the materials to subgrade elevations, we anticipated the differential settlement to be on the order of ½ inch over a span of 30 feet.

The modulus of subgrade reaction for the design of the mat slab may be assumed to be 100 pci.

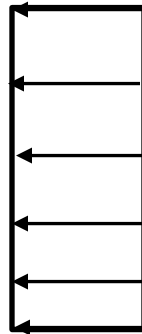
#### **3.4.2 Shallow Foundations**

The settlement calculations for the proposed parking structures are based on conventional spread footings for column loads of approximately 800 kips for the 5-story parking structure and approximately 1,000 kips for the 6-story parking structure. The shallow foundations may be designed with a net allowable bearing capacity of 1,800 psf for a 12-inch-wide footing embedded 12 inches below the lowest adjacent grade. The allowable bearing pressure may be increased by 300 psf for every additional foot of width and by 600 psf for every additional foot of embedment to a maximum allowable bearing pressure of 5,000 psf. The anticipated deep excavations to establish the subgrade elevations for the parking structures is anticipated to result in minor bedrock rebound. In order to limit the effects of bedrock rebound on the anticipated free floating lower garage slabs, we recommend that the placement of the garage slab be delayed as long as possible and the potential bedrock heave be monitored prior to placement of the garage slab. In addition, we recommend that the foundations and slab-on-grade of the residential structure and adjacent parking structure be designed with this differential heave/settlement in mind.

For lateral resistance against sliding, a friction coefficient of 0.38 may be used at the soil-foundation interface. In addition, a subgrade modulus of reaction ( $K_s$ ) of 100 pci may be used for the parking structures.

### 3.5 Shoring Design

As discussed in Section 3.2, because of the proximity of the proposed subterranean structures to the adjacent roadways and structures, shoring of the excavations are anticipated at the site. The excavations for the subterranean structures are anticipated to expose up to approximately 25 feet of artificial fill and marine terrace deposits overlying bedrock of the Monterey Formation. Due to the variable bedding attitudes in the bedrock materials, the excavations for the parking structures may exhibit adverse bedding at different elevations and along various excavation facings. Thus, for design of shoring, the following uniform load distribution may be used:



26 H

Excavations located adjacent to existing structures, roadways and utilities should be reviewed periodically by the geotechnical consultant to evaluate the conditions. If evidence of instability (such as ground cracks, etc.) is observed, then recommendations for additional shoring or other appropriate measures will be provided.

It should also be noted that due to potential presence of friable sandstone materials and presence of localized seepage, we recommend that the time between the drilling operations and installation of the steel and grout be kept to a minimum to reduce the potential for caving. The geotechnical consultant should review the conditions during drilling for the shoring piles.

As mentioned above, sandy soils may be exposed between the shoring piles as the vertical excavations are made. The sand will have the tendency to fail in both dry or wet conditions. As a result, lagging between the shoring piles is recommended in areas of clean sand. Care should be taken at all times by personnel and/or equipment operators working adjacent to these excavations.

In order to reduce the potential for uneven loading of the shoring elements, we recommend that either 1) the fill placement along the perimeter of the excavation (if any) be completed prior to excavation of temporary backcuts, or 2) that fill placement operations (if any) be performed following completion of backfilling of the building walls.



The passive earth pressure of 360 psf/ft to a maximum of 5,400 pcf, may be assumed for the design of shoring piles. The passive resistance may be doubled in value provided that the soldier piles are approximately three pile diameters or more apart from one another. Please note that the above passive pressures are ultimate pressures and do not include a factor-of-safety. In addition, the depth at which the passive resistance will be mobilized may be assumed to be approximately 3 feet for level ground in front of the soldier piles; however, the soil materials above 3 feet may be assumed as surcharge load in front of the piles.

We anticipate that shored verticals of greater than 18 feet in height will require tie-back anchor design. For pressured grouted bonded portion of the tie-back anchors, the average ultimate bond stress between the grout and the soil is 20 psi. The minimum length of the unbonded portion of tie-back strands depends on the actual location of the tie-back on the soldier pile, and may be estimated based on Figure 3 (attached). A minimum overburden of 15 feet over the center of the bond portion of anchor is required in order to reduce the potential for heave at the ground surface due to large grout pressures.

### 3.6 Lateral Earth Pressures for Permanent Retaining Structures

Recommendations for lateral earth pressures for retaining walls and structures with approved onsite drained soils are as follows:

<b>Lateral Earth Pressures</b>		
<b>Equivalent Fluid Pressure (psf/ft.)</b>		
<i>Conditions</i>	<i>Level</i>	<i>2:1 Slope</i>
Active	40	65
At Rest	60	85
Passive	360	180 (if sloping in front of wall)

These parameters are based on a soil internal friction angle of 30 degrees and soil unit weight of 120 pcf. The above parameters do not apply for backfill materials that is highly expansive.

To design an unrestrained retaining wall, such as a cantilever wall, the active earth pressure may be used. For a restrained retaining wall, the at-rest pressure should be used. Passive pressure is used to compute lateral soils resistance developed against lateral structural movement. The passive pressures provided above may be increased by one-third for wind and seismic loads. The passive resistance is taken into account only if it is ensured that the soil against embedded structure will remain intact with time. Future landscaping/planting and improvements adjacent to the retaining walls should also be taken into account in the design of the retaining walls. Excessive soil disturbance, trenches (excavation and backfill), future landscaping adjacent to footings and over-saturation can adversely impact retaining structures and result in reduced lateral resistance.

For sliding resistance, the friction coefficient of 0.38 may be used at the concrete and soil interface. The coefficient of friction may also be increased by one-third for wind and seismic loading. The retaining walls may also need to be designed for additional lateral loads if other structures or walls are planned within a 1H:1V projection.

The seismic lateral earth pressure for walls retaining more than 6 feet of soil and level backfill conditions may be estimated to be an additional 19 pcf for active and at-rest conditions. The earthquake soil pressure has a triangular distribution and is added to the static pressures. For the active and at-rest conditions, the additional earthquake loading is zero at the top and maximum at the base. The seismic lateral earth pressure does not apply to walls retaining less than, or equal to, 6 feet of soil (2019 CBC Section 1803.5.12).

Retaining structures should be waterproofed and provided with suitable backdrain systems to reduce the potential hydrostatic pressure on the walls and also to mitigate moisture seepage, efflorescence, and associated impacts to wall finishes. Figure 2 presents alternatives for wall backdrain systems. Walls that retain less than 30 inches of soil do not require a drainage system from a geotechnical standpoint; however, waterproofing and drainage may still be desirable to help mitigate nuisance water and/or moisture impacts on wall finishes.

### **3.7 Slab on Grade**

The design of the garage floor slab-on-grade is the purview of the structural engineer. From a geotechnical viewpoint, the garage slab may consist of 5½-inch-thick concrete slab reinforced with No. 4 bars at 24 inches on-center at mid-height of the slab. The slab may be underlain with a minimum of 6 inches of clean gravel, or other free draining granular material. A subdrain system should be installed below the granular materials and connected to a sump area below the lower floor slab. The subgrade soils are anticipated to consist of bedrock of Monterey Formation. Subdrains should also be placed below the parking structure subgrades. These subdrains, as designed by the civil engineer, should consist of trenches excavated to an approximate depth of 3 feet below the subgrade and should outlet into the sump areas. The subdrain trenches should be backfilled with granular material up to its connection with the free draining material below the slab. The subdrains should consist of 4-inch perforated pipe in at least 1 cubic foot per lineal foot of Class 2 permeable material or ¾- to 1½-inch gravel wrapped in filter fabric (Mirafi 140N or equivalent). The collector pipe should be installed with the perforations down and have a minimum 1 percent gradient, with the low end of the trench to outlet into the sump areas.

### **3.8 Moisture Mitigation for Concrete Slabs**

In addition to geotechnical and structural considerations, the project owner should also consider interior moisture mitigation when designing and constructing slabs-on-grade.

The intended use of the interior space, type of flooring, and the type of goods in contact with the floor may dictate the need for, and design of, measures to mitigate potential effects of moisture emission from and/or moisture vapor transmission through the slab. Typically, for human occupied structures, a vapor retarder or barrier has been recommended under the slab to help mitigate moisture transmission through slabs. The most recent guidelines by the American Concrete Institute (ACI 302.1R-04) recommend that the vapor retarder be placed directly under the slab (no sand layer). However, the location of the vapor retarder may also be subject to the builder's past successful practice. Placement of 1 or 2 inches of sand over the moisture retardant has been common practice by builders in southern California. Specifying the strength of the retarder to resist puncture and its permeance rating is important. These qualities are not necessarily a function of

the retarder thickness. A minimum of 10-mil is typical but some materials, such as 10-mil polyethylene ("Visqueen"), may not meet the desired standards for toughness and permeance.

The vapor retarder, when used, should be installed in accordance with standards such as ASTM E 1643 and/or those specified by the manufacturer.

Concrete mix design and curing are also significant factors in mitigating slab moisture problems. Concrete with lower water/cement ratios results in denser, less permeable slabs. They also "dry" faster with regard to when flooring can be installed (reduced moisture emissions quantities and rates). Rewetting of the slab following curing should be avoided since this can result in additional drying time required prior to flooring installation. Proper concrete slab testing prior to flooring installation is also important.

Concrete mix design, the type and location of the vapor retarder should be determined in coordination with all parties involved in the finished product, including the project owner, architect, structural engineer, geotechnical consultant, concrete subcontractors, and flooring subcontractors.

### **3.9 Infiltration**

The proposed structures at the site have subterranean levels extending to 56 feet below existing grades.

If surface waters are designed to infiltrate around the structures, the water would likely be collected in the subdrains around the structures and/or result in nuisance seepage for the structures or other down-gradient improvements that have subterranean levels. Thus, it is our opinion that infiltration BMPs should not be used at the subject site from a geotechnical viewpoint. We recommend other types of filtration BMPs be utilized per the County of Orange WQMP Technical Guidelines.

### **3.10 Seismic Design Guidelines**

The following table summarizes the seismic design criteria for the subject site. These seismic design parameters are developed in accordance with ASCE 7-16 and 2019 CBC, with the assumption that the fundamental period of the structure is within the "exceptions" included in Section 11.4.8 of ASCE 7-16. The seismic response coefficient,  $C_s$ , should be determined per the parameters provided below and using equation 12.8-2 of ASCE 7-16.

<i>Selected Seismic Design Parameters from 2019 CBC/ASCE 7-16</i>	<i>Seismic Design Values</i>	<i>Reference</i>
Latitude	33.6166 North	
Longitude	117.8801 West	
Controlling Seismic Source	Newport-Inglewood Fault (Offshore)	USGS, 2021
Distance to Controlling Seismic Source	2.8 mi (4.5 km)	USGS, 2021
Site Class per Table 20.3-1 of ASCE 7-16	D	SEA/OSHPD, 2021
Spectral Acceleration for Short Periods ( $S_s$ )	1.35 g	SEA/OSHPD, 2021
Spectral Accelerations for 1-Second Periods ( $S_1$ )	0.48 g	SEA/OSHPD, 2021
Site Coefficient $F_a$ , Table 11.4-1 of ASCE 7-16	1	SEA/OSHPD, 2021
Site Coefficient $F_v$ , Table 11.4-2 of ASCE 7-16	1.8	
Design Spectral Response Acceleration at Short Periods ( $S_{DS}$ ) from Equation 11.4-3 of ASCE 7-16	0.90 g	SEA/OSHPD, 2021
Design Spectral Response Acceleration at 1-Second Period ( $S_{D1}$ ) from Equation 11.4-4 of ASCE 7-16	0.57 g	
$T_S, S_{D1}/S_{DS}$ , Section 11.4.6 of ASCE 7-16	0.63 sec	
$T_L$ , Long-Period Transition Period	8 sec	SEA/OSHPD, 2021
Peak Ground Acceleration Corrected for Site Class Effects ( $PGA_M$ ) from Equation 11.8-1 of ASCE 7-16	0.65 g	SEA/OSHPD, 2021
Seismic Design Category, Section 11.6 of ASCE 7-16	D	

Please note that the fundamental period of the proposed building is unknown at this time (site-specific ground-motion hazard analysis was not performed for the site). During the design phase and upon conversation with the project structural engineer, we will perform ground motion hazard analysis as needed.

### 3.11 Foundation Setbacks

Footings of structures (including retaining walls and free-standing walls) located above a slope having a total height of 10 feet or less should have a minimum setback of 5 feet, as measured from the outside edge of the footing bottom along a horizontal line to the face of the slope. For footings above slopes having a total height greater than 10 feet but less than 30 feet, the setback should be, at minimum, equal to half the total height of the slope but need not exceed 10 feet. For slopes greater than 30 feet high, the setback should be 1/3 the height of the slope, but not to exceed 40 feet.

### 3.12 Utility Installation and Trench Backfill

Trench excavations are not anticipated to encounter groundwater at this site. Depending upon the time of year that construction is performed, there could be wet zones in the soil from the surface waters percolating down through the fill and terrace deposits. These times could be during the rainy season and also when there is heavier irrigation being performed.

Excavations should be performed in accordance with the requirements set forth by Cal-OSHA Excavation Safety Regulations (Construction Safety Orders, Section 1504, 1539 through 1547, Title 8, California Code of Regulations). The fill materials may be classified as Type B for trench excavation requirements. The terrace deposits and bedrock materials with adverse bedding would be classified as Type C. Cal-OSHA regulations indicate that for workmen in confined conditions, the steepest allowable slopes in Type B soil are 1H:1V and in Type C soil are 1.5H:1V for excavations less than 20 feet deep. Where there is no room for these layback slopes, we anticipate that shoring will be necessary. Excavations should be reviewed periodically by the contractor's qualified person to confirm compliance with Cal-OSHA requirements.

Onsite soils should be suitable for use as trench backfill. Native backfill materials should be compacted to a minimum of 90 percent relative compaction. Select granular backfill may be used in lieu of native soils, but should also be compacted.

Trenches should be either backfilled with native soil and compacted to 90 percent relative compaction, or backfilled with clean sand (SE 30 or better), which can be densified with water jetting and flooding.

Trenches excavated next to structures and foundations should be properly backfilled and compacted under the observation and testing of the geotechnical consultant to provide full lateral support and reduce settlement potential.

### **3.13 Expansion Potential**

Based on laboratory testing and prior experience, the expansion potential of onsite soils is anticipated to generally range from "Very Low" to "Medium" within the existing fill and terrace sand. The bedrock materials and the clayey terrace soils may have locally "High" expansion potential. Additional laboratory testing may be performed upon completion of grading in order to confirm the expansion potential of the near-surface subgrade soils.

### **3.14 Cement Type and Corrosivity**

Based on our experience with onsite soils, we anticipate that soluble sulfates exposure in the onsite soils may be classified as "S0" per Table 19.3.1.1 of ACI-318-14. Structural concrete elements in contact with soil include footings. The flatwork and sidewalk concrete are typically not considered structural elements. Concrete mix for these elements should be based on the "S0" soluble sulfate exposure class of Table 19.3.2.1 in ACI-318-14. Other ACI guidelines for structural concrete are recommended. Also, onsite soils are anticipated to be corrosive to metals.

### **3.15 Exterior Concrete (Non-Structural)**

Exterior concrete elements, such as curbs and sidewalks, are susceptible to lifting and cracking when constructed over expansive soils. When this occurs with highly expansive soils, the impacts to flatwork/hardscape can be significant and may require removal and replacement of the affected improvements. Please also note that reduction of slab cracking is often a function of proper slab design, concrete mix design, placement, and curing/finishing practices. Adherence to guidelines

of the American Concrete Institute (ACI) is recommended. Also, the amount of post-construction watering, or lack thereof, can have a significant impact on the adjacent concrete flatwork.

For reducing the potential adverse effects of expansive soils, we suggest a combination of presaturation of subgrade soils; reinforcement and restraint; moisture barriers/drains; and a sub-layer of granular material. Although these types of measures may not completely eliminate distress to concrete improvements, application of these measures can significantly reduce the impacts of post-construction heave of expansive soils. The degrees and combinations of these measures will depend upon:

- The expansion potential of the subgrade soils;
- The potential for moisture migration to the subgrade;
- The feasibility of the measures (especially presaturation); and
- The economics of these measures versus the benefits.

These factors should be weighed by the project owner determining the measures to be applied on a project-by-project basis, subject to the requirements of the local building/grading department.

The following table provides our guidelines. Additional considerations are also provided after the table. For this project, the soils are classified as having "**Medium**" expansion potential.

<b>TYPICAL RECOMMENDATIONS FOR CONCRETE FLATWORK/HARDSCAPE</b>					
<b>Expansion Potential (Index)</b>					
<i>Recommendations</i>	<i>Very Low (&lt; 20)</i>	<i>Low (20 – 50)</i>	<i>Medium (51 – 90)</i>	<i>High (91 – 130)</i>	<i>Very High (&gt; 130)</i>
<b>Slab Thickness (Min.):</b> Nominal thickness except where noted.	4"	4"	4"	4"	4" Full
<b>Sub base:</b> thickness of sand or gravel layer below concrete	N/A	N/A	<b>Optional</b>	2" – 4"	2" – 4"
<b>Presaturation:</b> degree of optimum moisture content (opt.) and depth of saturation	Pre-wet Only	1.1 x opt. to 6"	<b>1.2 x opt. to 12"</b>	1.3 x opt. to 18"	1.4 x opt. to 24"
<b>Joints:</b> maximum spacing of control joints. Joint should be ¼ of total thickness	10'	10'	<b>8'</b>	6'	6'
<b>Reinforcement:</b> rebar or equivalent welded wire mesh placed near mid-height of slab	N/A	N/A	<b>Optional (WWF 6 x 6 – W1.4/W1.4)</b>	No. 3 rebar, 24" O.C. both ways or equivalent wire mesh	No. 3 rebar, 24" O.C. both ways
<b>Restraint:</b> Slip dowels across cold joints; between sidewalk and curb	N/A	N/A	<b>Optional</b>	Across cold joints	Across cold joints (and into curb)

The subgrade soil for concrete sidewalk and curbs should be compacted to a minimum relative compaction of 90 percent per ASTM D1557 test method.

The more expansive soils, because of relatively high clay content, can take significantly longer to achieve recommended presaturation levels. Therefore, the procedure and timing should be carefully planned in advance of construction. For exterior slabs, the use of a granular sublayer is primarily intended to facilitate presaturation and subsequent construction by providing a better working surface over the saturated soil. It also helps retain the added moisture in the native soil in the event that the slab is not placed immediately. Where these factors are not significant, the subbase layer may be omitted. Design and maintenance of proper surface drainage is also very important.

### **3.16 Groundwater**

The groundwater table at the site is near elevations of 102.4 feet msl at the north end of the site, and 106 feet msl at the south end of the site. These levels are based on the measured levels in the bucket-auger borings at the completion of downhole logging, and may not represent the actual static groundwater levels. If the groundwater levels would equalize at the levels of seepage, it could be much higher. We recommend installation of groundwater wells at the north and south ends of the site to determine the static groundwater levels and to allow monitoring for a period of time prior to development.

The proposed lower level of the residential parking structure subgrade is near 119 feet msl elevation, and if a thick mat slab is constructed below the building, the excavation could be very close to the observed groundwater levels.

Wet soils were encountered during drilling of bucket-auger borings in the terrace deposits and bedrock. There could be wet soils or seepage encountered at this contact during excavations.

Excavations for shoring caissons, elevator pit, and the lowest level foundations may encounter the groundwater table and may require casing of the drilled holes.

### **3.17 Surface Drainage**

Maintaining adequate surface drainage, proper disposal of run-off water, and control of irrigation will help reduce the potential for future moisture-related problems and differential movements from soil heave/settlement.

Surface drainage should be carefully taken into consideration during grading, landscaping, and pavement construction. Positive surface drainage, adequate drainage devices, gradients, and curbing should be provided to prevent run-off flowing from paved areas onto adjacent unpaved areas. Ponding of water adjacent to structures should be avoided.

### **3.18 Geotechnical Exploration and Review of Future Plans**

At this time, the existing hotel and parking structure are limiting the recommended subsurface geotechnical exploration. Once the demolition of the existing parking structure and hotel has been completed, additional bucket-auger borings are recommended to be drilled approximately 80 feet deep, depending on the ground surface elevation. These borings are needed to document the geologic bedding conditions for design of the proposed subterranean structures. Also, hollow-stem borings are recommended to be drilled in the area of the historic canyon swale located in the southwest portion of the site. These borings will provide fill thickness and engineering properties of the existing fill and terrace/alluvium that may have been left in-place during the original hotel grading operations. In addition, it is important to include installation of groundwater observation wells to determine the actual depth to the groundwater table. It should be noted that the recommended additional investigation is for the purposes of completing the design and construction recommendations for the proposed improvements.

The final grading plan should be reviewed by the geotechnical consultant. A geotechnical grading plan review report should be submitted to the City for their review and approval prior to issuance of a grading and construction permit. NMG should also review the structural, shoring and foundation plans and issue a report documenting our review and confirming that the parameters used for design are in accordance with our recommendations provided herein and in the future grading plan review report.

### **3.19 Geotechnical Observation and Testing during Grading and Construction**

Geotechnical observation and testing should be performed by the geotechnical consultant during the following phases of grading and construction:

- During site preparation, demolition, clearing and backfilling;
- During earthwork operations, including remedial removals and fill placement;
- During drilling/excavation for piles (temporary/permanent);
- During installation and testing of the tieback anchors;
- Upon completion of any excavation for building or retaining walls prior to concrete placement;
- During pavement subgrade preparation (including presoaking), prior to concrete placement;
- During and after installation of subdrains for retaining walls;
- During placement of backfill for utility trenches and retaining walls; and
- When any unusual soil conditions are encountered.



## 4.0 LIMITATIONS

This report has been prepared for the exclusive use of our client, Newport Center Hotels, LLC, within the specific scope of services requested by them for the subject project at Fashion Island in the city of Newport Beach, California. This report or its contents should not be used or relied upon for other projects or purposes or by other parties without the written consent of NMG and the involvement of a geotechnical professional. The means and methods used by NMG for this study are based on local geotechnical standards of practice, care, and requirements of governing agencies. No warranty or guarantee, express or implied is given.

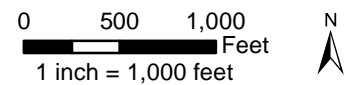
The findings, conclusions, and recommendations herein are professional opinions based on interpretations and inferences made from geologic and engineering data from specific locations and depths, observed or collected at a given time. By nature, geologic conditions can vary from point to point, can be very different in between points, and can also change over time. Our conclusions and recommendations are subject to verification and/or modification during excavation and construction when more subsurface conditions are exposed.

NMG's expertise and scope of services did not include assessment of potential subsurface environmental contaminants or environmental health hazards.

P:\2020\20108-04 Lyon Liv 900 NCD Residential\Drafting\GIS\20108-04 SiteLocation.mxd



Service Layer Credits: © 2022 Microsoft Corporation ©  
 2022 Maxar © CNES (2022) Distribution Airbus DS ©  
 2022 TomTom



## SITE LOCATION MAP

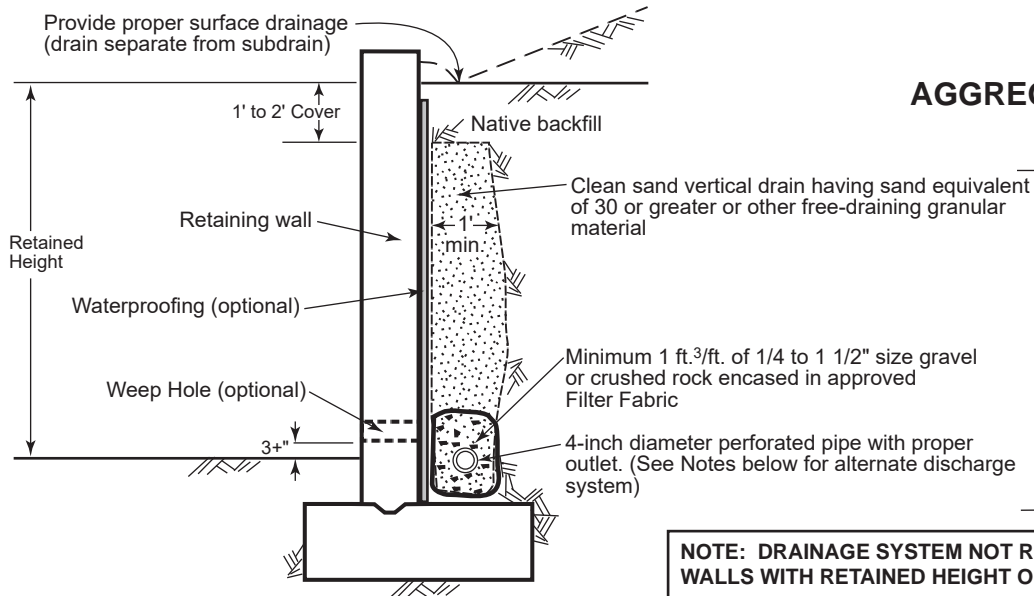
LYON RESIDENTIAL  
 900 NEWPORT CENTER DRIVE  
 NEWPORT BEACH, CALIFORNIA

Project Number: 20108-04      By: SBK/TW  
 Project Name: Lyon Living/900 NCD Residential  
 Date: 1/19/2022      Figure 1



## OPTION 1:

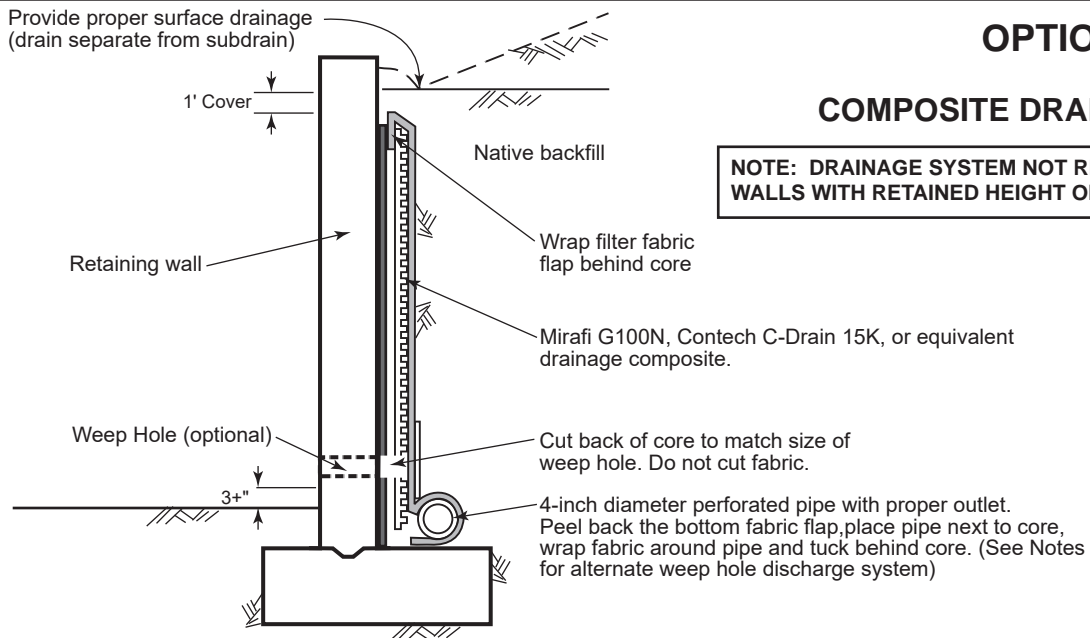
### AGGREGATE SYSTEM DRAIN



**Alternative:** Class 2 permeable filter material (Per Caltrans specifications) may be used for vertical drain and around perforated pipe (without filter fabric)

## OPTION 2:

### COMPOSITE DRAINAGE SYSTEM

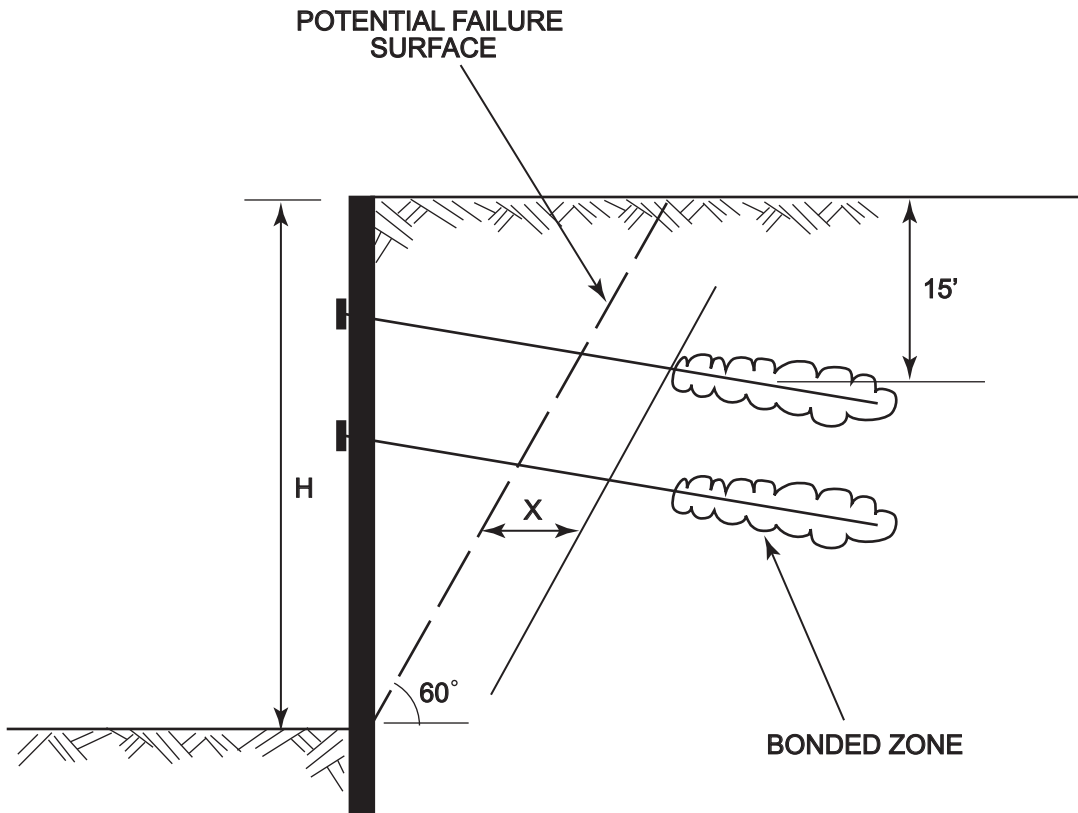


#### NOTES:

1. PIPE TYPE SHOULD BE PVC OR ABS, SCHEDULE 40 OR SDR35 SATISFYING THE REQUIREMENTS OF ASTM TEST STANDARD D1527, D1785, D2751, OR D3034.
2. FILTER FABRIC SHALL BE APPROVED PERMEABLE NON-WOVEN POLYESTER, NYLON, OR POLYPROPYLENE MATERIAL.
3. DRAIN PIPE SHOULD HAVE A GRADIENT OF 1 PERCENT MINIMUM.
4. WATERPROOFING MEMBRANE MAY BE REQUIRED FOR A SPECIFIC RETAINING WALL (SUCH AS A STUCCO OR BASEMENT WALL).
5. WEEP HOLES MAY BE PROVIDED FOR LOW RETAINING WALLS (LESS THAN 3 FEET IN HEIGHT) IN LIEU OF A VERTICAL DRAIN AND PIPE AND WHERE POTENTIAL WATER FROM BEHIND THE RETAINING WALL WILL NOT CREATE A NUISANCE WATER CONDITION. IF EXPOSURE IS NOT PERMITTED, A PROPER SUBDRAIN OUTLET SYSTEM SHOULD BE PROVIDED.
6. IF EXPOSURE IS PERMITTED, WEEP HOLES SHOULD BE 2-INCH MINIMUM DIAMETER AND PROVIDED AT 25-FOOT MAXIMUM SPACING ALONG WALL. WEEP HOLES SHOULD BE LOCATED 3+ INCHES ABOVE FINISHED GRADE.
7. SCREENING SUCH AS WITH A FILTER FABRIC SHOULD BE PROVIDED FOR WEEP HOLES/OPEN JOINTS TO PREVENT EARTH MATERIALS FROM ENTERING THE HOLES/JOINTS.
8. OPEN VERTICAL MASONRY JOINTS (I.E., OMIT MORTAR FROM JOINTS OF FIRST COURSE ABOVE FINISHED GRADE) AT 32-INCH MAXIMUM INTERVALS MAY BE SUBSTITUTED FOR WEEP HOLES.
9. THE GEOTECHNICAL CONSULTANT MAY PROVIDE ADDITIONAL RECOMMENDATIONS FOR RETAINING WALLS DESIGNED FOR SELECT SAND BACKFILL.

## RETAINING WALL DRAINAGE DETAIL

**NMG**  
Geotechnical, Inc.



NOTE: MINIMUM UNBONDED LENGTH = 15'

X = 5' OR 1/3 H, WHICH EVER IS GREATER

FIGURE 3

TIE-BACK ANCHOR DETAIL



PARCEL MAP 2004-225, BO APN: 933

W/ED BY GOLF REALTY FUND 1600 E COAST HWY, NEWPORT BEACH, CA 92660 APN: 442-011-52

N/F OWNED BY GOLF REALTY FUND 1600 E COAST HWY, NEWPORT BEACH, CA 92660 APN: 442-011-52

N/F OWNED BY HOLD PARCEL 2018-04 APN: 442-421-13

### LEGEND

SYMBOLS - LOCATIONS ARE APPROXIMATE

- B-2** (el. 172.5')  
T.D. 76'  
1" @ 57', 58', 65'  
▼ @ 70.7' @ 65' After 3Hrs  
Qtm @ 22'  
Tm @ 24' (el. 147')
- HS-7**  
T.D. 15.6'  
Af @ 0'  
Qtm @ 4'  
Tm @ 15' (el. 159.5')
- EB-2** (el. N.A.)  
T.D. 13'  
Af @ 0'  
Qtm @ 5'
- SB-9** (el. 176')  
T.D. 34.5'  
Af @ 0'  
Qtm @ 20'  
Tm @ 23.5' (el. 152.5')
- IB-15**  
T.D. 18'
- DB-14** (el. 167')  
T.D. 31'  
Af @ 0'  
Qtm @ 15' (el. 152')

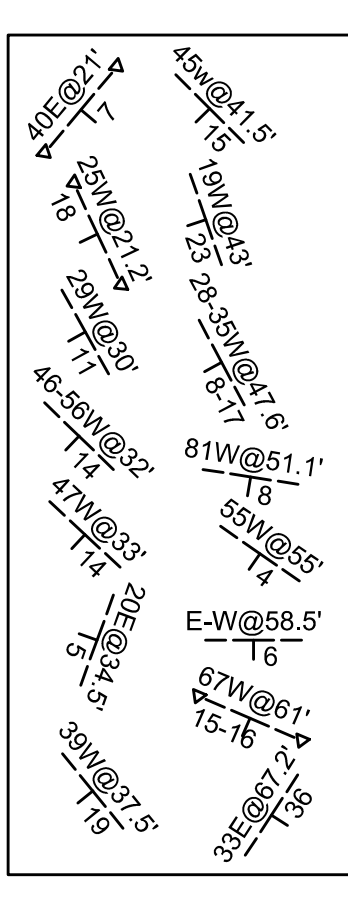
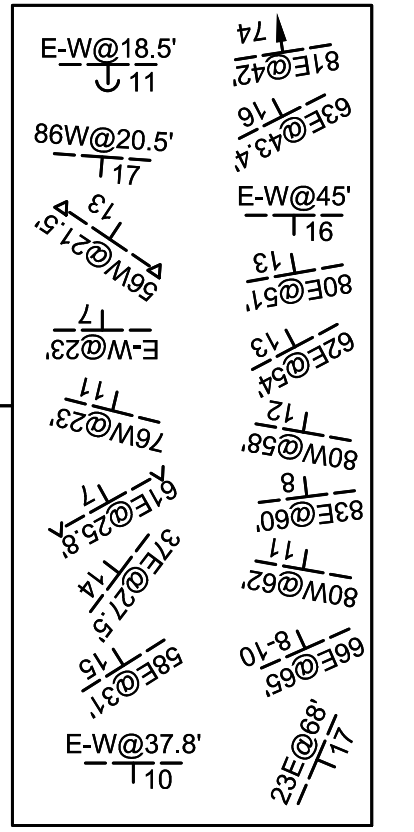
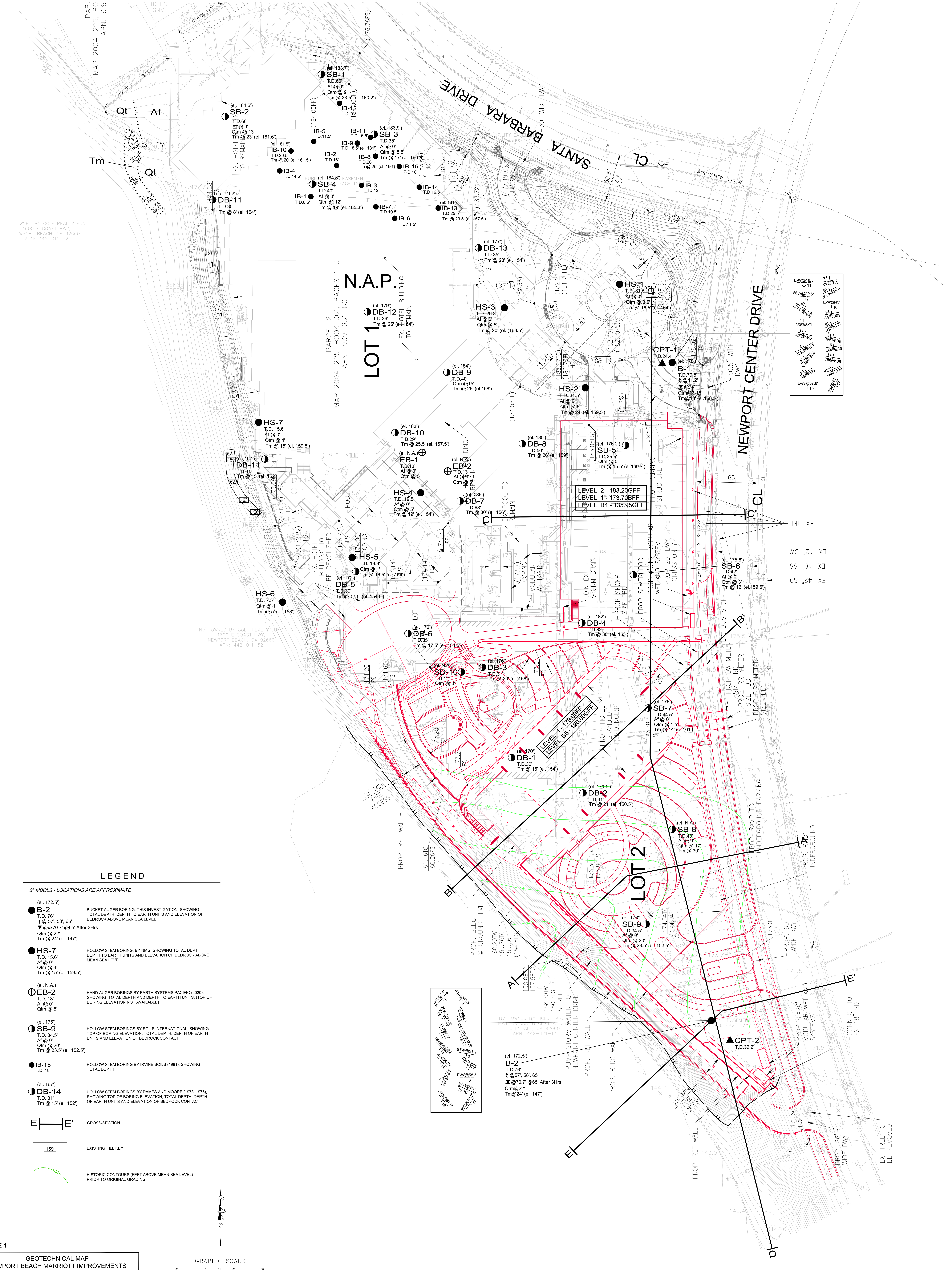
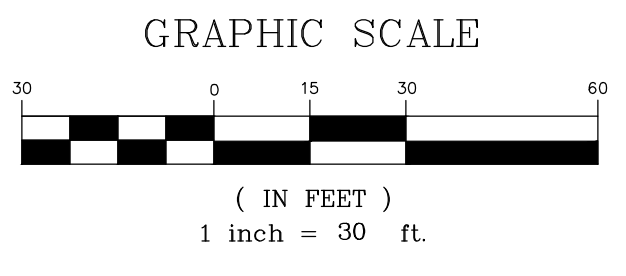
- E'—E'** CROSS-SECTION
- 159** EXISTING FILL KEY
- 160** HISTORIC CONTOURS (FEET ABOVE MEAN SEA LEVEL) PRIOR TO ORIGINAL GRADING

**PLATE 1**

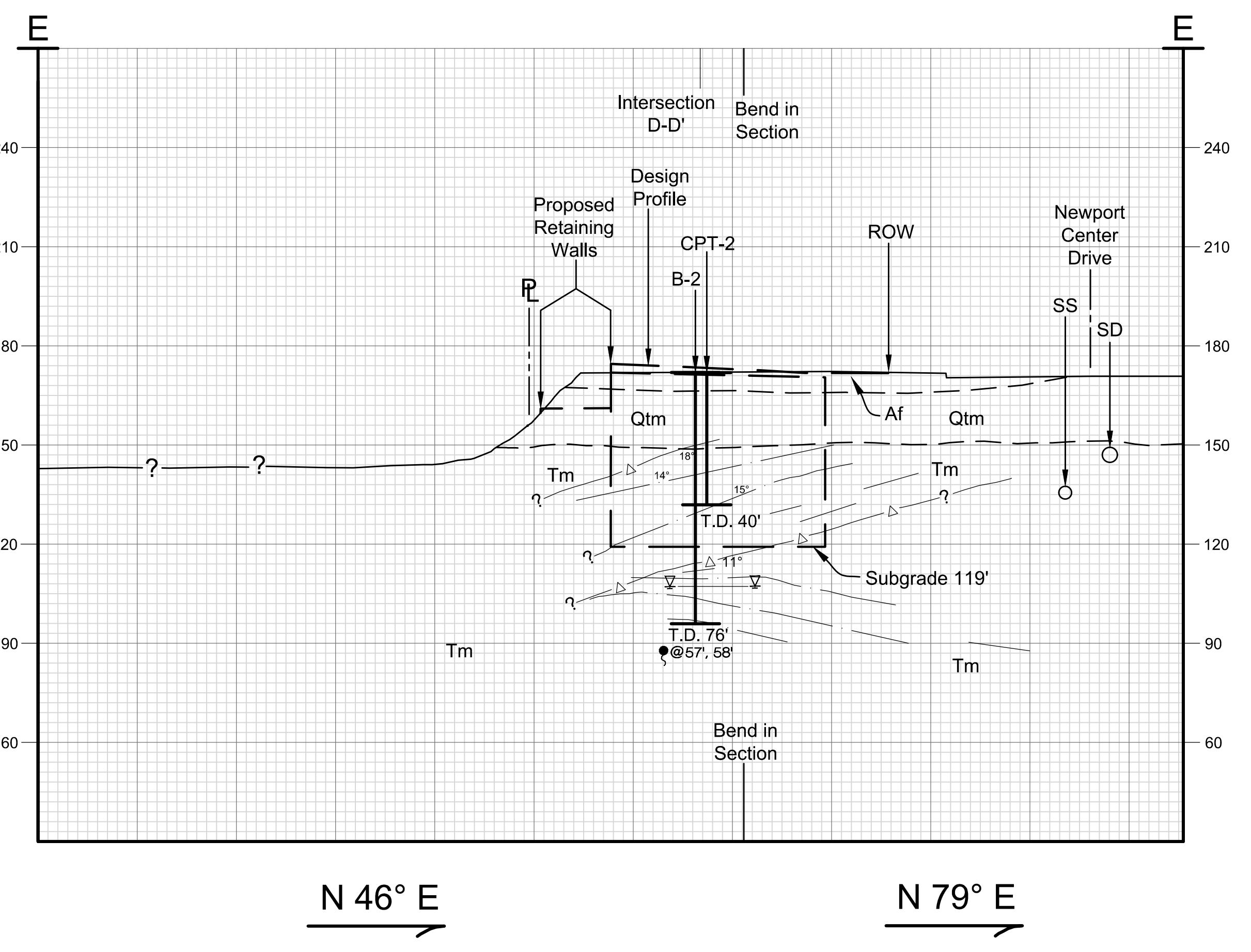
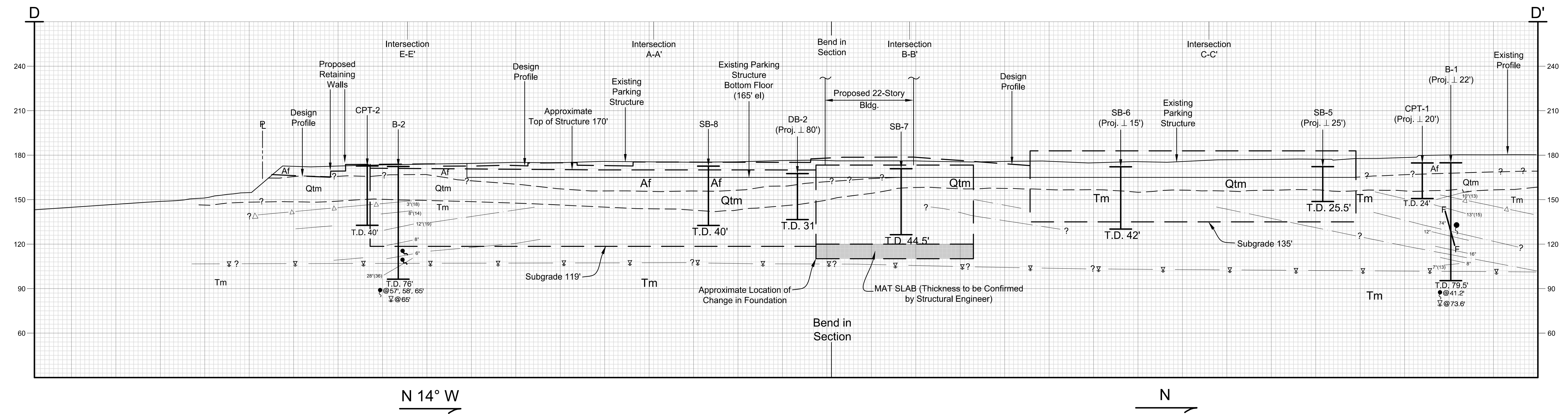
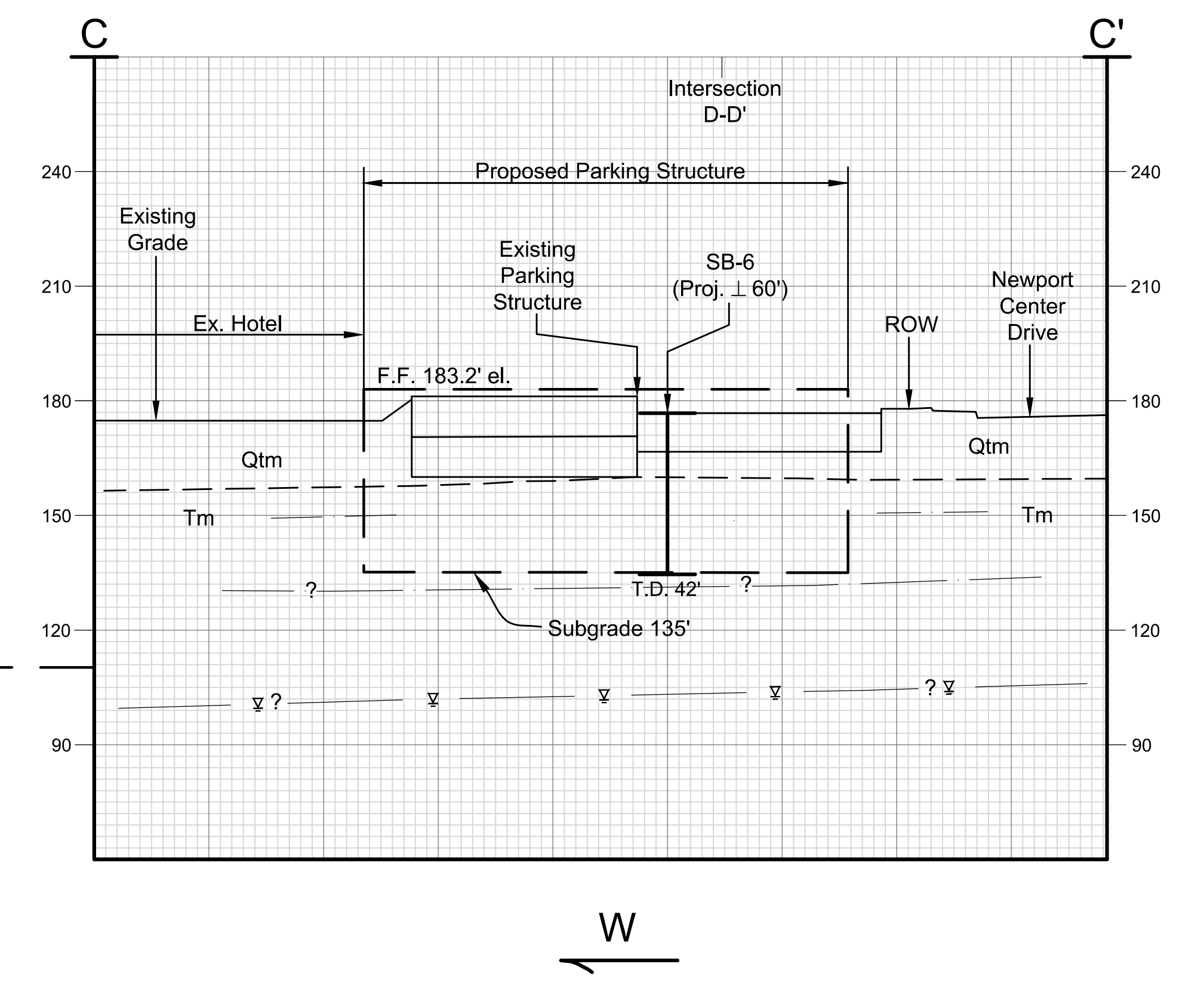
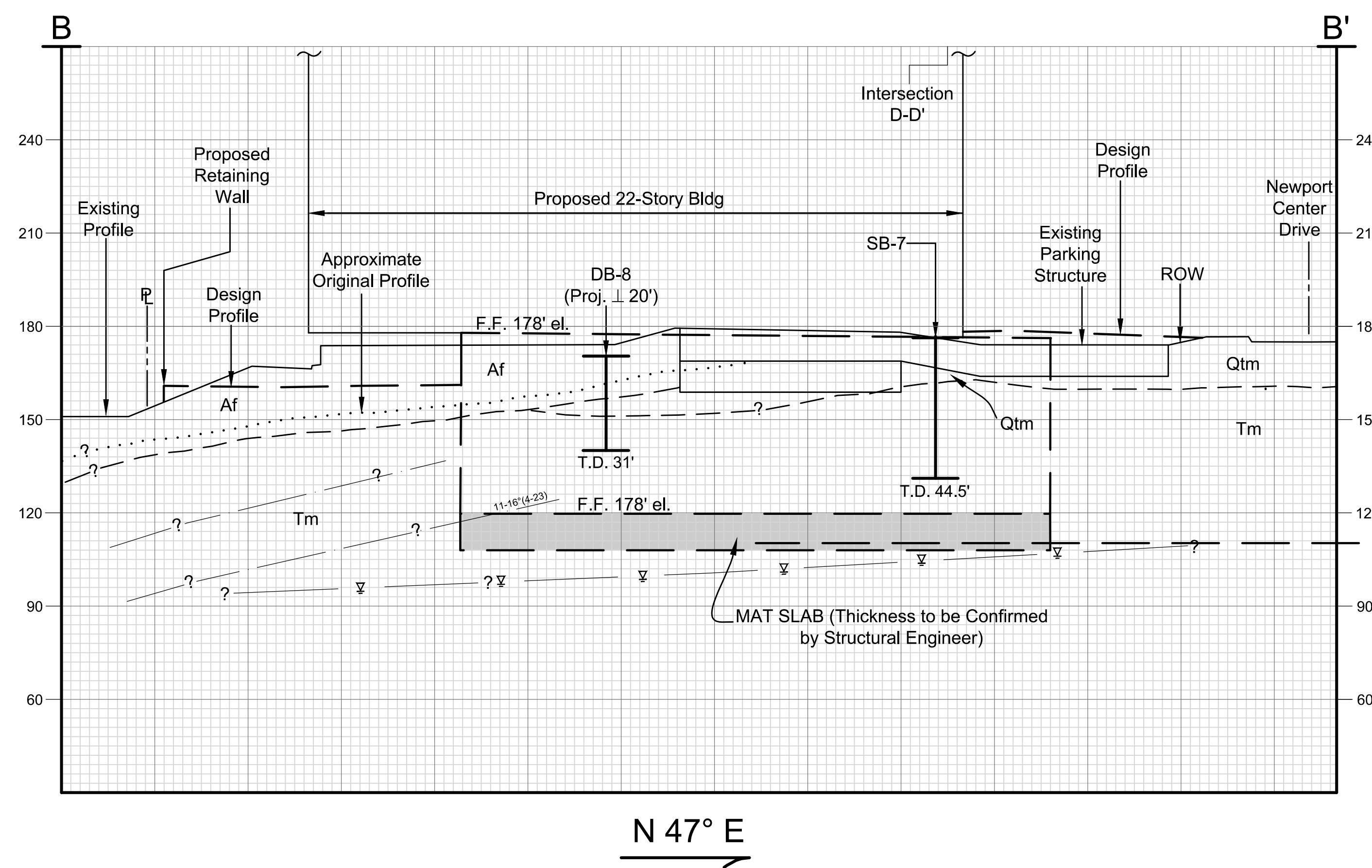
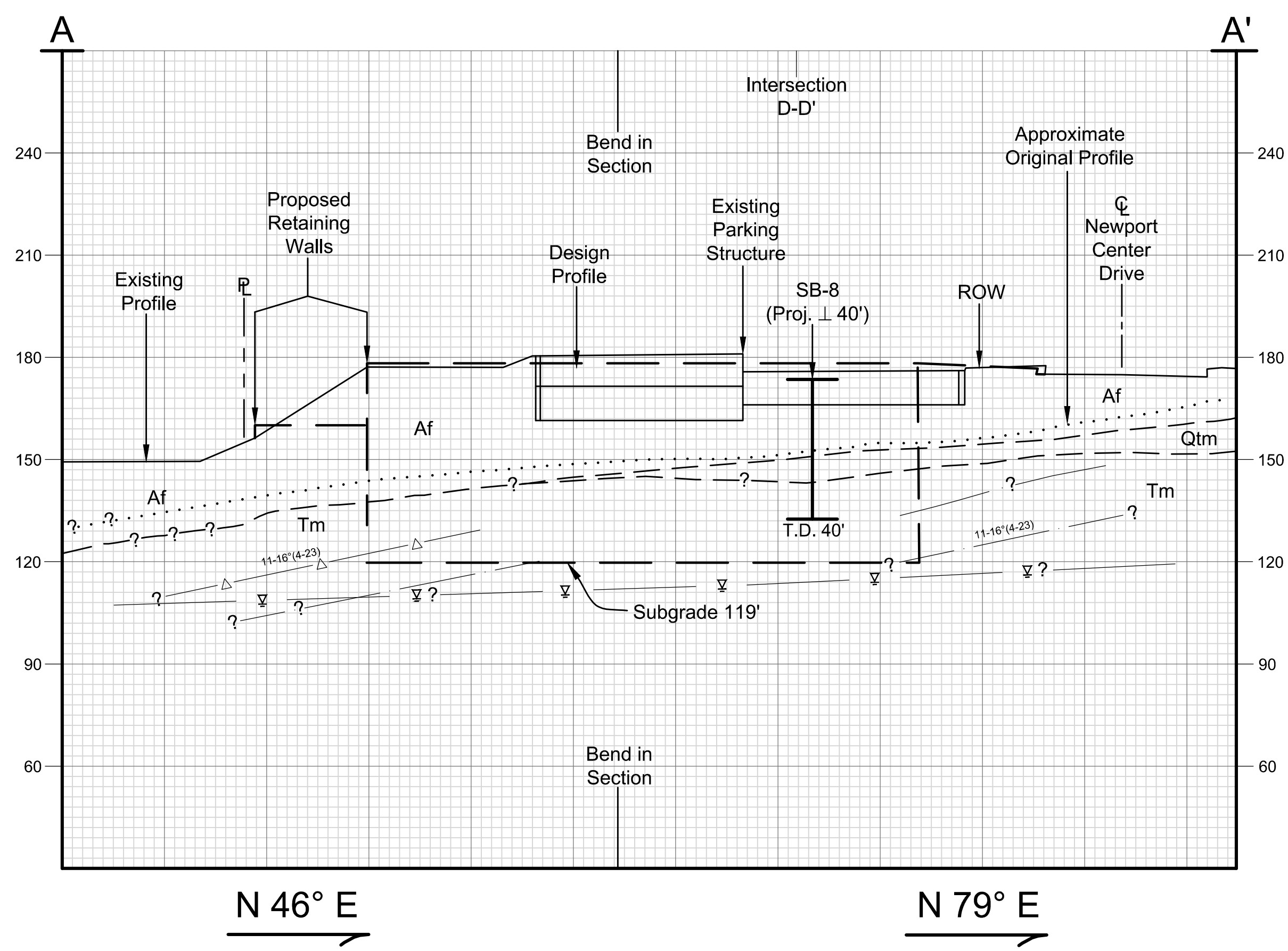
**GEOTECHNICAL MAP**  
NEWPORT BEACH MARRIOTT IMPROVEMENTS  
900 NEWPORT CENTER DRIVE  
CITY OF NEWPORT BEACH, CALIFORNIA

Project No.: 20108-04 By: SBT/KTW  
Project Name: Lyon Living/900 NCD Drive  
Date: 1/19/2022 SCALE: 1" = 30'

**NMG**  
Geotechnical, Inc.



Drawing: P:\2020\20108-04 Lyon Liv 900 NCD Residential\Drawings\WP\Geotech\20108-04\_30c.dwg Layout: Layout1 Last Saved: Wed Jan 19, 2022 - 2:34pm By: SD/Innesco



# **APPENDIX A**

## **APPENDIX A**

### **REFERENCES**

- California Division of Mines and Geology, 1997a, Seismic Hazard Zone Evaluation Report for the Anaheim and Newport Beach 7.5-Minute Quadrangles, California, Seismic Hazard Zone Report 03.
- California Division of Mines and Geology, 1997b, Seismic Hazard Zone Evaluation Report for the Laguna Beach 7.5-Minute Quadrangle, California, Seismic Hazard Zone Report 013.
- California Division of Mines and Geology, 1981, Geologic Map of Orange County, California, Showing Mines and Mineral Deposits, Bulletin 204, Plate 1.
- California Division of Mines and Geology, 1998, Seismic Hazard Zones, Newport Beach Quadrangle, Official Map dated April 15, 1998.
- California Geological Survey (CGS), 2008, Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117, Originally Adopted March 13, 1997, Revised and Re-adopted September 11, 2008.
- California Geologic Survey (CGS), 2009, Tsunami Inundation Map for Emergency Planning, Newport Beach Quadrangle, Official Map dated March 15, 2009.
- California Geological Survey (CGS), 2010, Fault Activity Map of California and Adjacent Areas (Scale 1: 750,000), Geologic Data Map No. 6, Compiled and Interpreted by Charles W. Jennings and William A. Bryant.
- California Geological Survey (CGS), 2018, Earthquake Fault Zones, A Guide for Government Agencies, Property Owners / Developers, and Geoscience Practitioners 2018. for Assessing Fault Rupture Hazards in California, Special Publication 42, Revised
- Dames and Moore, 1973, Foundation Investigation, Proposed Hotel, Corner of Newport Center Drive and Santa Barbara Drive, Newport Beach, California, dated January 4, 1973.
- Earth Systems Pacific, 2020, Preliminary Geotechnical Engineering Report, Proposed Newport Beach Marriott Hotel & Spa -M-Club Addition, Project No. 304031-001, dated September 15, 2020.
- Irvine Soils Engineering, 1986, Summary of Geotechnical Field Observations, Newport Beach Marriott Hotel Ballroom and Tower, Newport Beach, California, Job No: V535, Job No.: 2651-06, dated February 7, 1986.
- Morton, P.K., et. al., 1979, Environmental Geology of Orange County, California, California Department of Conservation, Division of Mines and Geology, OFR 79-08.



## **APPENDIX A**

### **REFERENCES (Continued)**

- NMG Geotechnical Inc., 2021a, Geotechnical Exploration and Preliminary Design Report for Proposed Improvements and Additions to the Existing Marriott Hotel, 900 Newport Center Drive, City of Newport Beach, California, Project Number 20108-01, dated April 8, 2021.
- NMG Geotechnical Inc., 2021b, Geotechnical Review of Precise Grading and Foundation Plans and Response to the City of Newport Beach Geotechnical Report Review Comments for Proposed Improvements and Additions to Existing Marriott Hotel, 900 Newport Center Drive, City of Newport Beach, California, Project Number 20108-01, dated May 14, 2021.
- NMG Geotechnical Inc., 2021c, Geotechnical Review of Temporary Access Plan at the Marriott Hotel, 900 Newport Center Drive, City of Newport Beach, California, Project Number 20108-01, dated May 14, 2021.
- NMG Geotechnical Inc., 2021bd, Response to the City of Newport Beach Comments Regarding Temporary Access Road Plan at Marriott Hotel, 900 Newport Center Drive, City of Newport Beach, California, Project Number 20108-01, dated May 21, 2021.
- Soils International, 1981, Geotechnical and Seismicity Investigation, Proposed Marriott Hotel Additions, Newport Center, Newport Beach, California, Project No. S-0693-FG, dated December 23, 1981.
- Soils International, 1983, Proposed Parking Structure Addition, Newport Center Marriott Hotel, Newport Beach, California, Project No. S-0693-FG, dated November 7, 1983.
- Soils International, Inc., 1988, Geotechnical Investigation Report, Edwards Theatre, Newport Center Drive, Newport Beach, California, Project S-1093-F, dated April 18, 1988.
- Southern California Soil and Testing, Inc., 1985, Report of Field Observation, Compaction Testing, and Paving Inspection, Site of proposed Parking Structure located at Newport Center Drive, Newport Beach, California, Project No. SCST 8441005, dated January 9, 1985.
- Structural Engineers Association/Office of Statewide Health Planning and Development, 2021, U.S. Seismic Design Maps, web site address: <https://seismicmaps.org/2021>.
- Tan, S.S., and Edgington, W.J., 1976, Geology and Engineering Geologic Aspects of the Laguna Beach Quadrangle, Orange County, California, California Division of Mines and Geology Special Report 127.

**APPENDIX A**  
**REFERENCES (Continued)**

U.S. Geological Survey, 1951, Newport Beach Quadrangle, Orange County, California, 7.5 Minute Series (Topographic).

U.S. Geological Survey, 2021, Unified Hazard Tool, NSHM 2014 Dynamic Deaggregation Program; web site address: <https://earthquake.usgs.gov/hazards/interactive/>; Date Accessed: 2021

# **APPENDIX B**

DATE STARTED: 10/5/21 DATE ENDED: 10/5/21  
 DRILLING COMPANY: Dave's Drilling  
 EQUIPMENT USED: EZ Bore 90  
 HOLE DIAMETER (in.): 30  
 DRIVE DROP (in.): 12  
 DRIVE WEIGHT (lbs.): 0-27': 4,500 lbs, 27-52': 3,500 lbs, 52-74': 2,500 lbs, 75-100': 1,000

**Boring No. B-1**  
 GROUND SURFACE ELEVATION: 176 ft  
 DATUM: msl  
 LOCATION: Newport Beach, CA  
 COORDINATION: \_\_\_\_\_

Elevation (ft.)	Depth (ft.)	Graphic Log	Attitudes	Sample Method and Number	Blows Per Foot	Soil Class. (U.S.C.S.)	DESCRIPTION			Dry Density (pcf)	Moisture Content (%)	Remarks
							Logged By: BF/TD	Sampled By: BF				
		Casing		B-1		CL	Artificial Fill (Af) @ 0': Yellowish brown silty sandy CLAY/ sandy clayey SILT, moist, disturbed. @ 0-4': Casing. @ 2': Grades, medium stiff.					B-1 @ 0-4'
170	5	Af (Qtm)		D-1	push	CL	Marine Terrace Deposits (Qtm) @ 4.5': Brown silty CLAY, moist, loose, moderately plastic. @ 5' SAMPLE: Light olive brown silty CLAY, moist to wet, medium stiff to stiff, FeO staining, MnO staining, pedogenic surfaces, plastic, thin roots, mottling in color due to weathering. @ 6': Abundant root hairs, abundant roots up to 1/4"-diameter.			101.3	22.5	B-2 @ 6.5-10'
	10		@ 10.5' GB: N67E, 8SE @ 11.5' GB: N31W, 14NE @ 12' GB: N40E, 45 NW	B-2 D-2	4	SM-SP	@ 7.2': Contact between silty CLAY and fine SAND on south wall, Low Point on north wall is at 8.2'. Sand is light yellowish brown fine SAND with silt, damp to moist, medium dense, micaceous. @ 9': Crudely layered SAND, cross-bedded, slightly dipping to the north, scattered thin roots, coarser grained at 9.6'. @ 10' SAMPLE: Light yellowish brown fine SAND with silt, damp to moist, medium dense, micaceous, highly friable. @ 11': Thinly bedded sands, about 1/2"-thick. @ 12-15': Hole belled out approximately 3 to 4 inches around hole.			100.2	4.9	
160	15	(Qtm)		D-3	4	SP	@ 15' SAMPLE: Upper: Light yellowish brown silty medium SAND, damp to moist, medium dense, micaceous, highly friable. Lower: Pale brown to very pale brown medium to coarse SAND with trace silt, damp to moist, medium dense, micaceous, highly friable.			102.9	4.6	
	20	(Tm)	@ 17.2' C: N15E, 4-5SE @ 18.5' C: N84E to E-W, 11N to NW	SB-1 D-4	3	ML-CL	Monterey Formation @ 17.2': Erosional contact High Point on NW wall, low point on NE wall at 17.3'. Below Contact: Dark yellowish brown to olive brown clayey SANDSTONE, medium dense to dense, saturated, friable, micaceous, weathered part of terrace above bedrock. @ 18.5': Chert at contact with olive brown SILTSTONE below. @ 20' SAMPLE: Light olive brown to olive gray SILTSTONE/CLAYSTONE, wet, medium stiff, fractured/jointed, FeO staining, interbedded with chert, slightly plastic to plastic. @ 20.9': Bright orange silty CLAYSTONE/ clayey SILTSTONE with trace sand, 1/2"-3" thick, highly micaceous, moderately plastic. @ 21.5': Reddish brown CLAYSTONE, soft, moderately plastic, 4"-thick, High Point on east wall at 21.5', Low Point on west wall at 21.7'. @ 23': Violet TUFF, 1" thick, waxy, devitrified, High Point on E-SE wall at 23', Low Point on N wall at 23.6'. @ 23.8': Highly broken zone to 25'. @ 25' SAMPLE: Gray silty CLAYSTONE, wet, medium stiff, abundant FeO staining, plastic, chert in tip. @ 25': Thinly bedded, interbedded waxy, devitrified violet TUFF and silty clay with trace sand, laminated with abundant FeO and jarosite staining. @ 25.8': Contact between TUFF/SILTSTONE, siltstone is olive to grayish brown with scattered chert that is discontinuous. H.P. is on SE wall at 25.8', L.P. is on NW wall at 26.4'. @ 27.5': Light gray irregular sandstone rip-up clasts in SILTSTONE.			75.3	45.1	SB-1 @ 19' DS
150	25		@ 20.5' B: N86W, 17SW @ 21.5' CB: N56W, 13NE @ 23' B: N76W to E-W, 7-11N to NE	D-5 SB-2 B-3	5					76.4	42.5	SB-2 @ 25.5' B-3 @ 26-28'
30	30		@ 25.8' CB: N61E, 7NW @ 27.5' GB: N37E, 14NW									

**GEOTECHNICAL LOG OF BORING**

20108-04  
 Lyon/ 900 NCD



Report: BUCKET AUGER; Project: 20108-04.GPJ; Data Template: NMG\_GINT 2016.GDT; Printed: 10/25/21

DATE STARTED: 10/5/21 DATE ENDED: 10/5/21  
 DRILLING COMPANY: Dave's Drilling  
 EQUIPMENT USED: EZ Bore 90  
 HOLE DIAMETER (in.): 30  
 DRIVE DROP (in.): 12  
 DRIVE WEIGHT (lbs.): 0-27': 4,500 lbs, 27-52': 3,500 lbs, 52-74': 2,500 lbs, 75-100': 1,000

# Boring No. B-1

GROUND SURFACE ELEVATION: 176 ft  
 DATUM: msl  
 LOCATION: Newport Beach, CA  
 COORDINATION: \_\_\_\_\_

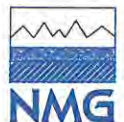
Report: BUCKET AUGER; Project: 20108-04.GPJ; Data Template: NMG\_GINT\_2016.GDT; Printed: 10/25/21

Elevation (ft.)	Depth (ft.)	Graphic Log	Attitudes	Sample Method and Number	Blows Per Foot	Soil Class. (U.S.C.S.)	DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	Remarks
							Logged By: BF/TD Sampled By: BF			
140	35		@ 31' GB: N58E, 15NW	D-6	3	ML-CL SP	@ 30' SAMPLE: Light brownish gray to grayish brown silty CLAYSTONE/SILTSTONE, moist to wet, medium stiff to stiff, FeO stained, fractures, lenses of fine gray sand.	75.4	40.7	
							@ 30.8': Erosional contact between SILTSTONE/SANDSTONE, soft sediment deformation in sandstone. SANDSTONE is gray with trace silt, slightly friable, micaceous, FeO and jarosite staining. High Point on SE wall is at 30.8', Low Point on NW wall is 31.4'.			
							@ 31.9': Lower contact of SANDSTONE over olive gray to dark brown SILTSTONE. High Point on SE wall is at 31.9', Low Point on NW wall is at 32'.			B-4 @ 33-35'
							@ 33': TUFF bed, violet, waxy, and devitrified.	74.8	45.1	
			@ 36' J: N88E, 67SE	D-7	5		@ 35' SAMPLE: Upper: Light gray to white CLAYSTONE, wet, stiff to very stiff, FeO stained fractures, pale yellow to yellow lenses. Lower: Olive gray SILTSTONE/CLAYSTONE, damp, very stiff to hard, well bedded, FeO stained along fractures, free water in fractures, MnO and Jarosite staining.			
			@ 37.8' B: E-W, 10S	B-5		SM-SP	@ 36': Clay-lined joint with free water along joint.			B-5 @ 37-39'
							@ 37.4': Contact with brown SILTSTONE above and gray silty SANDSTONE below. SANDSTONE is friable. High Point on north wall is at 37.4', Low Point on south wall is at 37.9'.			
140	40		@ 42' F: N81E, 74NW	D-8	6	ML-CL	@ 38.4': Highly cemented SILTSTONE bed, 6-7" thick, parallel to bedding. SANDSTONE below is moderately cemented. High Point on north wall is at 38.4', Low Point on south wall is at 39.2'. Interbedded SANDSTONE and SILTSTONE beds, ranging from 6" to 10".	84.1	36.8	C N
			@ 43.4' GB: N63E, 16NW			SP-SM	@ 40' SAMPLE: Upper: Dark grayish brown to grayish brown CLAYSTONE, wet, medium stiff, well bedded, plastic, FeO stained fractures, interbedded SILTSTONE. Lower: Light yellowish brown to pale brown silty SANDSTONE, moist to wet, medium dense, FeO staining, friable to highly friable.			
			@ 45' GB: E-W, 16S	D-9	8		@ 42': Fault exits hole on north wall. Seepage along fault.			
130	45						@ 43.4': Contact with SILTSTONE above the contact and gray silty fine SANDSTONE below, High Point on south wall is at 43.4', Low Point on north wall is at 44.1'. Soft sediment deformation along contact, flame structures.	105.3	7.7	
			@ 48.9' C: N62E, 13NW			ML-CL	@ 45' SAMPLE: White fine SANDSTONE, damp to moist, medium dense, FeO staining in small blebs and lenses, highly friable.			
			@ 49.6' GB: N80E, 15NW	D-10	6	SP-SM ML-CL SM-SP	@ 48.9': Contact with SANDSTONE above and chert below, High Point on southeast wall at 48.9', Low Point on northwest wall at 49.7'.			
			@ 51' GB: N80E, 15NW				@ 49.6': Bright orange SANDSTONE bed within SILTSTONE, 5" thick.	95.5	20.8	
			@ 54' GB: N62E, 13NW				@ 50' SAMPLE: Upper: Brownish yellow to yellowish brown silty fine SANDSTONE, moist, medium dense to dense, FeO staining, lenses/laminations of claystone, friable to highly friable. Lower: Olive brown silty CLAYSTONE, damp, hard, fractured to highly fractured, FeO stained around fractures, small blebs of sandstone.			
			@ 55.9' GB: N61E, 10NW				@ 51': Dark yellowish brown SANDSTONE, moist, micaceous, dense to very dense, moderately friable. Interbedded with olive brown to gray SILTSTONE, beds ranged from 4" to 12" thick down to 57.6'.			
120	55		@ 58' GB: N80W, 12NE			ML-CL	@ 57.6': Contact with brownish yellow silty fine SANDSTONE above and olive brown SILTSTONE below, High Point on south wall at 57.6', Low Point on north wall at 58'. One to 12" thick beds of bright orange SANDSTONE within SILTSTONE.			
120	60									

## GEOTECHNICAL LOG OF BORING

20108-04

Lyon/ 900 NCD



DATE STARTED: 10/5/21 DATE ENDED: 10/5/21  
 DRILLING COMPANY: Dave's Drilling  
 EQUIPMENT USED: EZ Bore 90  
 HOLE DIAMETER (in.): 30  
 DRIVE DROP (in.): 12  
 DRIVE WEIGHT (lbs.): 0-27': 4,500 lbs, 27-52': 3,500 lbs, 52-74': 2,500 lbs, 75-100': 1,000

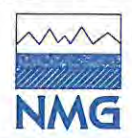
**Boring No. B-1**  
 GROUND SURFACE ELEVATION: 176 ft  
 DATUM: msl  
 LOCATION: Newport Beach, CA  
 COORD/STATION:

Elevation (ft.)	Depth (ft.)	Graphic Log	Attitudes	Sample Method and Number	Blows Per Foot	Soil Class. (U.S.C.S.)	DESCRIPTION			Dry Density (pcf)	Moisture Content (%)	Remarks
							Logged By: BF/TD	Sampled By: BF				
110	65		@ 60' GB: N83E, 8NW	D-11	10	SP	@ 60' SAMPLE: Brownish yellow and light gray fine SANDSTONE, moist, medium dense, FeO staining and FeO blebs, trace mica, friable to highly friable, trace silt.	99.0	14.7	DS		
			@ 62' GB: N80W, 11NE			ML-CL	@ 61': Olive brown SILTSTONE, moist, stiff to hard, alternating cemented beds. @ 62.4': Dark brown to dark yellowish brown highly cemented bed, 3" thick.					
			@ 65' GB: N66E, 8-10NW					@ 65': Brownish yellow SANDSTONE bed, 2" to 3" thick.				
			@ 68' GB: N23E, 17SE				SM-SP	@ 68': Contact with sandy SILTSTONE above and yellowish brown silty fine to medium SANDSTONE below, moist, dense, friable, micaceous, trace FeO and MnO staining. Contact is erosional, undulatory.				
70				D-12	12		@ 70' SAMPLE: Yellowish brown fine SANDSTONE, moist, dense, trace mica, trace silt, FeO staining, friable to highly friable, fairly massive. @ 71': Yellowish brown SANDSTONE, moist to wet, dense, slightly friable, massive.	109.5	10.7			
75												
100				SB-3		CL	@ 77': Black silty CLAYSTONE, damp to moist, very stiff to hard.  @ 79.5': Concretion, refusal.			SB-3 @ 77-78'		
80												
85												
90												
90							Notes: Total Depth: 79.5 Feet. Downhole Logged to 74 Feet. Seepage at 36, 40.5, and 41.2 Feet. Initial Groundwater at 74 Feet. Groundwater at 73.6 Feet After Logging. Backfilled With Cuttings.					

Report: BUCKET AUGER; Project: 20108-04.GPJ; Data Template: NMG\_GINT\_2016.GDT; Printed: 10/25/21

**GEOTECHNICAL LOG OF BORING**

20108-04  
 Lyon/ 900 NCD



DATE STARTED: 10/6/21 DATE ENDED: 10/6/21  
 DRILLING COMPANY: Dave's Drilling  
 EQUIPMENT USED: EZ Bore 90  
 HOLE DIAMETER (in.): 30  
 DRIVE DROP (in.): 12  
 DRIVE WEIGHT (lbs.): 0-27': 4,500 lbs, 27-52': 3,500 lbs, 52-74': 2,500 lbs, 75-100': 1,000

# Boring No. B-2

GROUND SURFACE ELEVATION: 171 ft  
 DATUM: msl  
 LOCATION: Newport Beach, CA  
 COORD/STATION:

Report: BUCKET AUGER, Project: 20108-04.GPJ, Data Template: NMG\_GINT\_2016.GDT, Printed: 11/11/21

Elevation (ft.)	Depth (ft.)	Graphic Log	Altitudes	Sample Method and Number	Blows Per Foot	Soil Class. (U.S.C.S.)	DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	Remarks
170		Casing				SM-SP	Surface: Parking Lot, 7" of AC over Fill. Casing 0-3.5'. <b>Artificial Fill (Af)</b>			B-1 @ 1-5'
	5	Af Qtm		B-1		SM	@ 3.5': Light brown to yellow brown clean SAND, micaceous, FeO staining, moderately friable, trace silt, massive, scattered small angular concretions 1" in diameter.	122.8	6.9	
			@ 6.8' CB: N15W, 5NE	D-1	5	SM-SP	<b>Marine Terrace (Qtm)</b>			
						ML	@ 3.9': Dark yellowish brown to strong brown silty fine SAND, moist, micaceous, clay blebs.			
						SP	@ 5' SAMPLE: Dark yellowish brown to strong brown silty fine SAND, moist, medium dense to dense, micaceous, FeO staining, trace root imprints, clay blebs, friable.			
							@ 5.5': Grades to light brown sandy SILT from 5.5' to 6', moist, stiff, micaceous, FeO staining.			
	10		@ 10' GB: N16E, 13NW	D-2	4	SW	@ 6.8': Undulatory, erosional contact with silt above and light yellowish brown SAND below, FeO staining, 1/4" thick CLAY along contact. High Point on southeast wall at 6.8', Low Point on northwest wall at 7'. Sand is light brown to light yellowish brown, scattered trace roots and 1/2" to 1" diameter clay blebs.	109.4	3.0	
							@ 10' SAMPLE: Yellowish brown fine SAND, damp to moist, dense, clay blebs, FeO staining, concretions up to 1" diameter, trace root, highly friable.			
							@ 10.3': 1/4" thick SILT bed within SAND, sand changes to pale brown to light brown fine SAND, micaceous, friable to highly friable. Thin discontinuous silt beds found at 11', 12', and 13'.			
	15		@ 15' B/C: N72E, 4NW	D-3	6	SP	@ 12.4 - 15': Hole belled out along north wall, 3 to 4 inches. @ 14.9': Slightly cemented fine SAND, massive below.	117.6	5.9	
							@ 15' SAMPLE: Yellowish brown to dark yellowish brown fine SAND, damp to moist, micaceous, trace root hairs, trace to few pinhole pores, FeO staining, slightly cemented, moderately friable.			
							@ 17.5': Lenses of discontinuous coarse SAND.			
	20			D-4	6		@ 20' SAMPLE: Strong brown fine to medium SAND, damp to moist, dense to very dense, micaceous, pinhole pores, highly cemented.	111.5	5.9	
			@ 21' GB: N25W, 18SW N40E, 7SE	SB-1			@ 21': CLAY beds 3" to 8" thick, pinches and swells, fine to medium SAND above, grades to coarser SAND, FeO and MnO staining, pale yellow to white very fine SAND below, moist, medium dense, FeO and jarosite staining.			SB-1 @ 21', GS, AL
	25	Qtm Tm	@ 23.8' GB: N20E, 5-28SE	D-5 B-2	5	ML	<b>Monterey Formation (Tm)</b> @ 23.8': Bedrock contact on southwest wall with sand above and highly broken violet tuff and siltstone below. Low Point on northeast wall at 24.7', erosional/ undulatory. @ 25' SAMPLE: Pale yellow SILTSTONE, damp to moist, hard, trace jointing, trace FeO and MnO staining.	107.0	13.5	DS B-2 @ 25-27'
						SM-ML	@ 27.5': Contact with highly broken zone above and interbedded SANDSTONE and SILTSTONE beds 2" to 6" thick below. SILTSTONE is olive to olive brown, damp, hard. SANDSTONE is yellowish brown with silt, damp, dense, scattered chert clasts. Zone is folded.			

## GEOTECHNICAL LOG OF BORING

20108-04

Lyon/ 900 NCD



DATE STARTED: 10/6/21 DATE ENDED: 10/6/21  
 DRILLING COMPANY: Dave's Drilling  
 EQUIPMENT USED: EZ Bore 90  
 HOLE DIAMETER (in.): 30  
 DRIVE DROP (in.): 12  
 DRIVE WEIGHT (lbs.): 0-27': 4,500 lbs, 27-52': 3,500 lbs, 52-74': 2,500 lbs, 75-100': 1,000

**Boring No. B-2**  
 GROUND SURFACE ELEVATION: 171 ft  
 DATUM: msl  
 LOCATION: Newport Beach, CA  
 GRID/STATION:

Report: BUCKET AUGER; Project: 20108-04.GPJ; Data Template: NMG\_GINT\_2016.GDT; Printed: 11/11/21

Elevation (ft.)	Depth (ft.)	Graphic Log	Altitudes	Sample Method and Number	Blows Per Foot	Soil Class. (U.S.C.S.)	DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	Remarks
140			@ 30' B: N29W, 11SW	D-6	10	SM	Logged By: BF/TD Sampled By: BF @ 30' SAMPLE: Upper: Yellowish brown silty very fine SANDSTONE, damp, dense, chert clasts, trace FeO and MnO staining, highly friable. Lower: Olive interbedded chert and SILTSTONE, damp, hard, FeO stained.	114.3	2.1	
	35		@ 32' B: N46W-N56W, 14SW @ 32.8' GB: N47W, 14SW @ 34.5' GB: N20E, 5SE	D-7	8		@ 32.8': Contact with SILTSTONE above and pale brown very fine SANDSTONE below, High Point on northeast wall at 32.8', Low Point on southwest wall at 33.9'. @ 34.5': 2" thick SILTSTONE bed, gray discontinuous, SANDSTONE below is friable. @ 35' SAMPLE: Pale yellow SANDSTONE, damp, medium dense, FeO and jarosite staining, trace MnO stains, highly friable.	102.7	2.4	
	40		@ 37.5' B: N39W-N45W, 19SW	D-8	8	SM-ML	@ 38': Discontinuous rip-up clasts of SILTSTONE up to 3" thick, continues down to 41.5'. @ 40' SAMPLE: Upper: Olive SILTSTONE, damp to moist, hard, interbedded with strong brown SANDSTONE, moderately fractured, FeO staining, FeO staining along joints, interbedded SILTSTONE and SANDSTONE. Lower: Brownish yellow SANDSTONE, damp, dense to very dense, micaceous, FeO staining, friable. @ 42.8': Erosional contact with 0.9' CLAYSTONE.	90.6	17.9	
130			@ 41.5' B: N45W, 15SW	D-9	8	SP	@ 44': 2" thick reddish brown SANDSTONE bed, SILTSTONE below. @ 45' SAMPLE: Olive gray SILTSTONE, damp to moist, hard, interbedded with thinly bedded SANDSTONE and CHERT, FeO and MnO staining.	84.6	27.5	
	45		@ 43' B: N19W, 23SW	SB-2		CL/ML-SM	@ 45.2': White very fine SANDSTONE, damp to moist, medium dense to dense, FeO and jarosite staining, slightly friable. @ 47.4': Gray CLAY bed, moist to wet, soft to medium stiff, locally brittle, polished surfaces, 1.5" thick. Gray SILTSTONE interbedded with SANDSTONE below clay.			SB-2 @ 47.4', GS, AL
	50		@ 47.6' GB: N28W-N35W, 8-17SW	D-10	10		@ 47.6' GB: N28W-N35W, 8-17SW			
120			@ 51.1' GB: N81W, 8SW				@ 50' SAMPLE: Upper: Olive gray SILTSTONE, moist, hard, small sandstone blebs, FeO staining, micaceous. Lower: Yellowish brown fine to very fine SANDSTONE, damp to moist, dense to very dense, micaceous, trace MnO staining, slightly cemented. @ 50.5': 8" thick brownish yellow very fine SANDSTONE bed, undulatory contact, moist, dense. @ 52': Cherty beds within SILTSTONE.	99.4	21.9	
	55		@ 55' B: N55W, 4SW				@ 54.6': 8" thick SANDSTONE bed, soft sediment deformation into SILTSTONE above.			
	60		@ 58.5' B: E-W, 6S			ML	@ 57': First seepage, minor, through fractures. @ 58': Unoxidated black and dark brown SILTSTONE, moist to wet, medium stiff, brittle, thinly bedded, moderately cemented. @ 59.2': Scattered yellow brown fine SANDSTONE lenses less than			

**GEOTECHNICAL LOG OF BORING**

20108-04  
 Lyon/ 900 NCD





DATE STARTED: 10/6/21 DATE ENDED: 10/6/21  
 DRILLING COMPANY: Dave's Drilling  
 EQUIPMENT USED: EZ Bore 90  
 HOLE DIAMETER (in.): 30  
 DRIVE DROP (in.): 12  
 DRIVE WEIGHT (lbs.): 0-27': 4,500 lbs, 27-52': 3,500 lbs, 52-74': 2,500 lbs, 75-100': 1,000

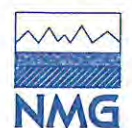
**Boring No. B-2**  
 GROUND SURFACE ELEVATION: 171 ft  
 DATUM: msl  
 LOCATION: Newport Beach, CA  
 COORD/STATION:

Report: BUCKET AUGER; Project: 20108-04.GPJ; Data Template: NMG\_GINT\_2016.GDT; Printed: 11/11/21

Elevation (ft.)	Depth (ft.)	Graphic Log	Attitudes	Sample Method and Number	Blows Per Foot	Soil Class. (U.S.C.S.)	DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	Remarks	
110			@ 61' C/B: N67W, 15-16SW  @ 67.2' C/B: N33E, 36SE	D-11	10	ML	1-inch thick. @ 59.5': Paper thin CLAY bed within SILTSTONE. @ 60' SAMPLE: Upper: Black SILTSTONE, moist, very stiff to hard, trace FeO stains, unoxidized, micaceous. Lower: Black silty SANDSTONE, damp to moist, dense, micaceous, interbedded SILTSTONE and SANDSTONE, friable. @ 61': 1" thick SANDSTONE bed. @ 61.2': Paper thin black CLAY bed. @ 62.5': Paper thin black CLAY bed within SILTSTONE, brittle, slightly polished.	93.7	25.7	B-3 @ 63-65'	
65				B-3			SP-SM ML	@ 66.7': 6" thick yellowish brown SANDSTONE, little to no fractures, slightly friable. @ 67.2': Lower contact with SANDSTONE above and black SILTSTONE below, undulatory contact, little to no fractures in sandstone.			
70				D-12	12	SM-ML ML	@ 70' SAMPLE: Upper: Interbedded black SILTSTONE and yellowish brown SANDSTONE, moist to wet, very stiff to hard/medium dense to dense, sandstone is micaceous, FeO stains along contact, thinly bedded. Lower: Olive brown SILTSTONE, moist to wet, hard, FeO staining, interbedded with sandstone.	85.3	25.4	DS	
100							@ 76': Hole caving in with water rushing into hole. Stopped drilling.				
75							Notes: Total Depth: 76 Feet. Caving From 72 to 76 Feet. Downhole logged to 68 Feet. Seepage at 57 to 58 Feet Along Fractures. Initial Groundwater at 70.7 Feet. Groundwater at 65 Feet After 3 Hours of Logging. Backfilled With Cuttings.				
80											
90											
85											
90											

**GEOTECHNICAL  
LOG OF BORING**

20108-04  
Lyon/ 900 NCD



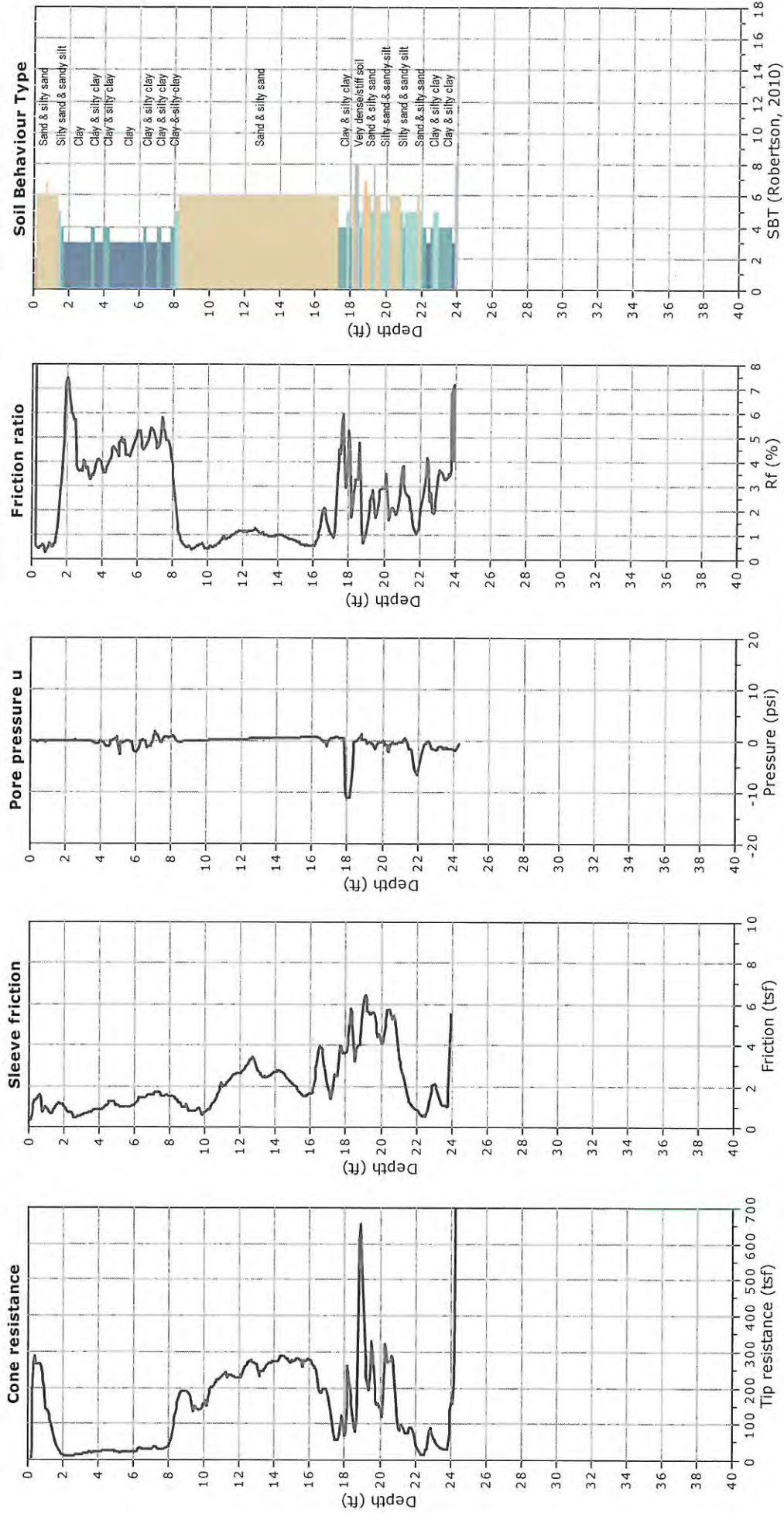


**Keohoe Testing and Engineering**  
714-901-7270  
steve@kehoetesting.com  
www.kehoetesting.com

**Project: NMG Geotechnical / Newport Marriott**  
**Location: Newport Beach, CA**

**CPT-1**

Total depth: 24.36 ft, Date: 9/23/2021



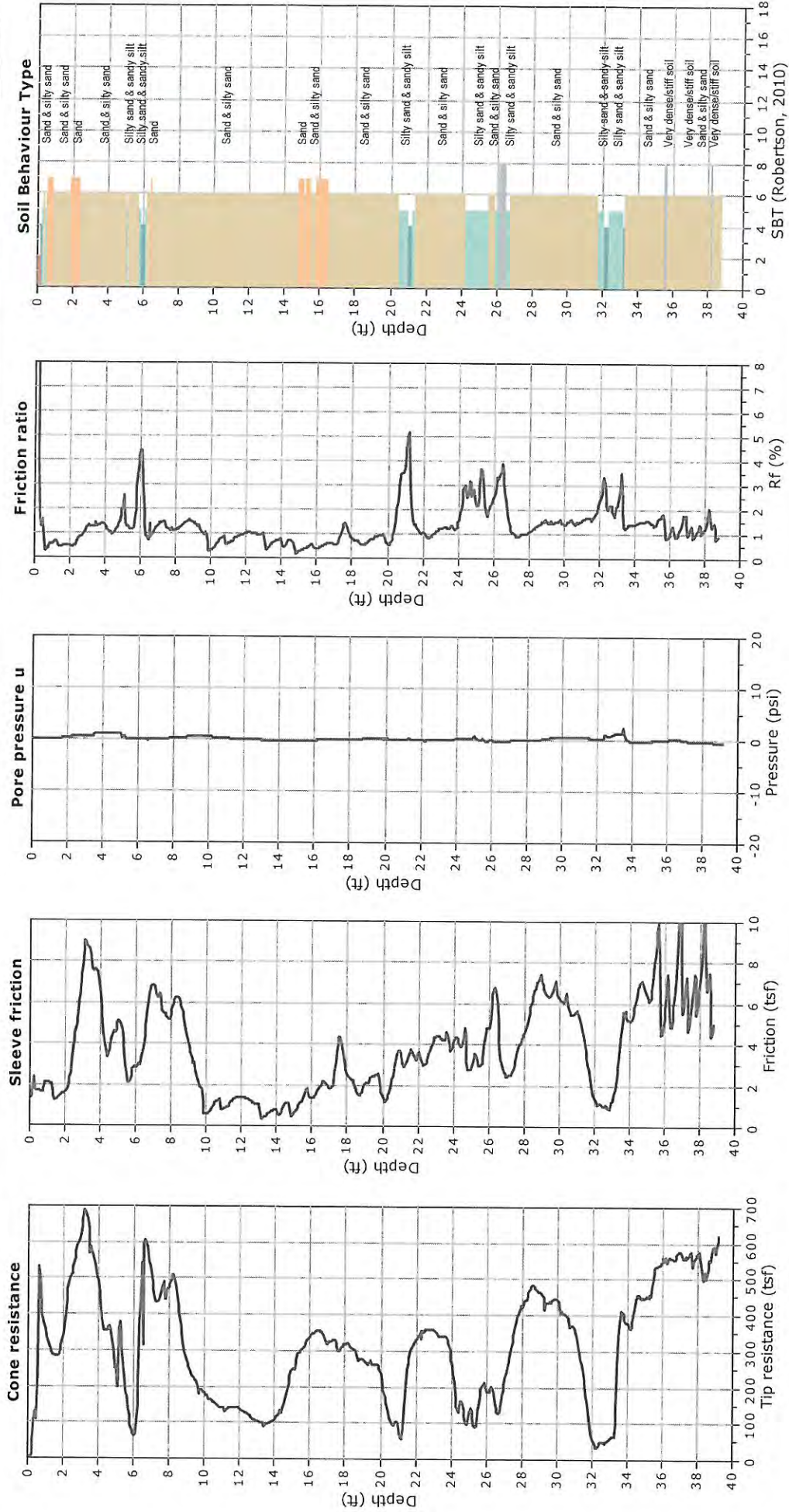


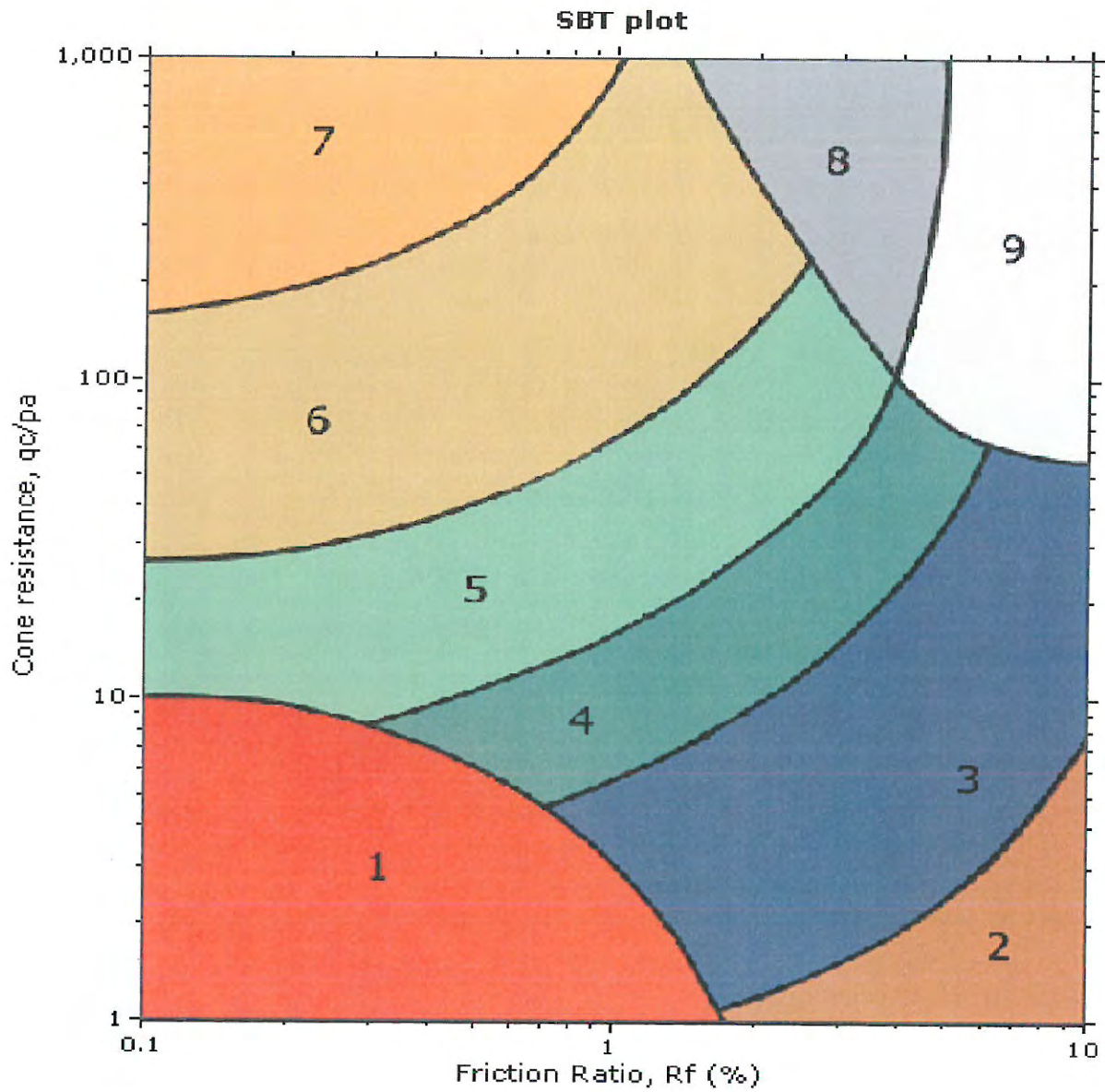
**Keohoe Testing and Engineering**  
714-901-7270  
steve@kehoetesting.com  
www.kehoetesting.com

**Project:** NMG Geotechnical / Newport Marriott  
**Location:** Newport Beach, CA

**CPT-2**

Total depth: 39.18 ft, Date: 9/23/2021





**SBT legend**

- |                           |                              |                                   |
|---------------------------|------------------------------|-----------------------------------|
| 1. Sensitive fine grained | 4. Clayey silt to silty clay | 7. Gravely sand to sand           |
| 2. Organic material       | 5. Silty sand to sandy silt  | 8. Very stiff sand to clayey sand |
| 3. Clay to silty clay     | 6. Clean sand to silty sand  | 9. Very stiff fine grained        |

NMG Geotechnical  
 Newport Marriott  
 Newport Beach, CA

CPT Shear Wave Measurements

Location	Tip Depth (ft)	Geophone Depth (ft)	Travel Distance (ft)	S-Wave Arrival (msec)	S-Wave Velocity from Surface (ft/sec)	Interval S-Wave Velocity (ft/sec)
CPT-1	10.07	9.07	9.29	13.60	683	
	20.08	19.08	19.18	22.46	854	1117
	24.34	23.34	23.43	27.60	849	825
CPT-2	5.02	4.02	4.49	3.42	1313	
	10.07	9.07	9.29	6.82	1362	1411
	15.06	14.06	14.20	12.40	1145	881
	20.05	19.05	19.15	15.50	1236	1598
	25.03	24.03	24.11	18.68	1291	1559
	30.05	29.05	29.12	23.56	1236	1026
	35.07	34.07	34.13	28.48	1198	1018
	39.17	38.17	38.22	31.36	1219	1421

Shear Wave Source Offset - 2 ft

S-Wave Velocity from Surface = Travel Distance/S-Wave Arrival  
 Interval S-Wave Velocity = (Travel Dist2-Travel Dist1)/(Time2-Time1)

Report: HOLLOW STEM - Project: 20108-01.GPJ; Data Template: NMG\_GINT\_2016.GDT; Printed: 3/19/21

Date(s) Drilled	1/28/21	Logged By	BF	<b>HS-1</b> Sheet 1 of 2		
Drilling Company	2R Drilling, Inc.	Drill Bit Size/Type	8"			
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs. @ 30-inch drop			
Sampling Method(s)	Modified California, Bulk					
Approximate Groundwater Depth:		No Groundwater Encountered			Total Depth Drilled (ft)	31.5
Comments				Approximate Ground Surface Elevation (ft)	180.7 msl	

Elevation (ft)	Depth (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number						
180	0				CL	Surface: Parking Lot, 5" of AC over 6" of AB. <b>Artificial Fill (Af)</b> @ 1': Medium brown to reddish brown silty sandy CLAY, moist, abundant roots, pinhole pores.			B-1 @ 1-5'; EI, CC
	5	B-1			CL	<b>Marine Terrace (Qtm)</b> @ 4': Dark gray sandy silty CLAY, moist, rootlets, slightly micaceous. @ 5': Yellow brown sandy silty CLAY, moist to wet, stiff, slightly micaceous, FeO staining. Upper rings have darker brown CLAY.	18.7	110.9	CN
		D-1	17						
		D-2	12		SM	@ 7.5': Upper: Yellowish brown/ reddish brown sandy CLAY, moist, medium stiff to stiff, slightly micaceous, FeO staining. Lower: Yellowish brown/ reddish brown clayey silty fine SAND, moist, loose, slightly micaceous, FeO staining.	15.6	110.8	
170	10	D-3	24		SP-SM	@ 10': Yellowish reddish brown fine to medium SAND with some silt, moist, medium dense, micaceous, friable, some FeO staining.	10.5	98.3	
	15	D-4	32		SP	@ 15': Upper: Yellow fine to medium SAND, moist, medium dense, micaceous, clean, friable. Lower: Reddish brown silty fine to medium SAND, moist, medium dense, small nodules of black material. Chert cobble in tip. <b>Monterey Formation (Tm)</b>	4.9	101.9	
160	20	D-5	73		ML	@ 20': Upper: Mottled grayish brown/ reddish brown SILTSTONE, damp, dense, interbedded siltstone and chert, less fractured, less weathered, thin bedded to laminated. Upper rings filled with fractured bedrock. Lower: Light gray to white silty very fine SANDSTONE, moist, dense, trace FeO staining, friable. Clay seam in tip.	22.2	97.1	DS
	25				SP				

**LOG OF BORING**  
Lyon Living/ 900 Newport Center Drive  
Newport Beach, CA  
PROJECT NO. 20108-01



Report: HOLLOWSTEM; Project: 20108-01.GPJ; Data Template: NMG\_GINT\_2016.GDT; Printed: 3/19/21

Elevation (ft)	Depth (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type Number	Blows per foot						
25		D-6	97/11"		ML	@ 25': Upper: Light gray SILTSTONE, moist, hard, well-bedded, FeO staining along bedding and joints, abundant FeO staining in upper rings in sandstone. Lower: Light gray to white very fine SANDSTONE, moist, very dense, abundant FeO staining, highly friable.	31.3	85.7	B-2 @ 25-30'
		B-2			SP				
150	30	D-7	65		ML	@ 30': Upper: Light grayish brown sandy SILTSTONE, moist, hard, abundant FeO staining along bedding, clayey siltstone in upper rings. Lower: Light gray fine SANDSTONE, moist, dense, slightly micaceous, abundant FeO staining, friable.	28.8	94.6	
					SP				
	35	Notes: Total Depth is 31.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped. Patched with Cold Patch AC.							
	40								
	45								
	50								
	55								

**LOG OF BORING**  
 Lyon Living/ 900 Newport Center Drive  
 Newport Beach, CA  
 PROJECT NO. 20108-01

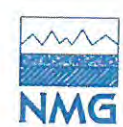


Report: HOLLOW STEM, Project: 20108-01.GPJ, Data Template: NMG\_GINT\_2016.GDT, Printed: 3/19/21

Date(s) Drilled	1/28/21	Logged By	BF	<b>HS-2</b> Sheet 1 of 2	
Drilling Company	2R Drilling, Inc.	Drill Bit Size/Type	8"		
Drill Rig Type	CME 75 Hollow Stem	Hammer Data	140 lbs. @ 30-inch drop		
Sampling Method(s)	Modified California, Bulk				
Approximate Groundwater Depth:	No Groundwater Encountered			Total Depth Drilled (ft)	31.5
Comments				Approximate Ground Surface Elevation (ft)	183.3 msl

Elevation (ft)	Depth (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number						
0					SC-CL	Surface: Parking Lot, 4" of AC over 5" of AB. <b>Artificial Fill (Af)</b> @ ~1': Reddish brown sandy silty CLAY/ clayey fine to medium SAND, moist. Some rock/concrete fragments in first location. Moved boring to avoid possible fire line utility.			
-180		B-1							B-1 @ 1-5' (mix of first hole and second hole)
5		D-1	27		CL	<b>Marine Terrace (Qtm)</b> @ 5': Upper: Light olive brown silty CLAY, moist, very stiff, slightly plastic to plastic. Upper rings have silty fine to medium SAND, FeO staining. Lower: Olive brown silty CLAY, moist, very stiff, FeO staining, plastic to highly plastic.	15.9	104.7	
		D-2	25			@ 7.5': Reddish olive brown silty CLAY, moist, very stiff, pinhole pores, trace root hairs, FeO staining, trace root staining, plastic to highly plastic.	30.4	92.7	DS
10		D-3	48		SP	@ 10': Upper: Reddish olive brown silty CLAY with some fine to medium sand, moist, hard, trace pinhole pores, FeO staining, slightly plastic. Lower: Yellow fine to medium SAND, moist, dense, some FeO staining, highly friable.	16.7	106.0	
-170									
15		D-4	38			@ 15': Light yellowish/ reddish brown fine to medium SAND, moist, medium dense, FeO staining, mafic minerals, micaceous, highly friable.	4.4	95.6	
20		D-5	42			@ 20': Reddish brown fine to coarse SAND with trace clay, moist, medium dense, slightly micaceous, possible FeO staining, highly friable.	18.9	105.7	DS
-160					ML	Monterey Formation (Tm)			
25									

**LOG OF BORING**  
Lyon Living/ 900 Newport Center Drive  
Newport Beach, CA  
PROJECT NO. 20108-01





Report: HOLLOWSTEM; Project: 20108-01.GPJ; Data Template: NMG\_GINT\_2016.GDT; Printed: 3/19/21

Elevation (ft)	Depth (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type Number	Blows per foot						
25		D-6	86/8"		ML	@ 25': Olive brown SILTSTONE, moist, hard, well-bedded. FeO staining along bedding.	23.4	78.9	
30		D-7	60		SP	@ 30': Upper: Light gray clayey SILTSTONE, moist, hard, well-bedded. Upper rings contain red sandstone, highly friable. Lower: White silty SANDSTONE, moist, dense, FeO staining on top and bottom of sandstone, highly friable.	32.8	83.5	
150						Notes: Total Depth is 31.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped. Patched with Cold Patch AC.			
35									
40									
140									
45									
50									
130									
55									

**LOG OF BORING**  
Lyon Living/ 900 Newport Center Drive  
Newport Beach, CA  
PROJECT NO. 20108-01



Report: HOLLOW STEM, Project: 20108-01.GPJ, Data Template: NMG\_GINT\_2016.GDT, Printed: 3/19/21

Date(s) Drilled	2/16/21	Logged By	BF	<b>HS-4</b> <b>Sheet 1 of 1</b>		
Drilling Company	Pacific Drilling Company	Drill Bit Size/Type	6"			
Drill Rig Type	Tripod Hollow Stem	Hammer Data	Cat-head, 140 lbs. @ 30-inch drop			
Sampling Method(s)	Modified California					
Approximate Groundwater Depth:		No Groundwater Encountered			Total Depth Drilled (ft)	19.5
Comments				Approximate Ground Surface Elevation (ft)	173.4 msl	

Elevation (ft)	Depth (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number						
0					SP	Surface: Pool Deck, concrete, clean sand under concrete. <b>Artificial Fill (Af)</b> @ 0.5': Light yellowish brown, very fine SAND, dry to damp.			
5		D-1	55		SP	<b>Marine Terrace (Qtm)</b> @ 5': Reddish yellow very fine to fine SAND, damp, dense, very clean, highly friable, possibly sand from pool deck shading.	3.1	99.2	CN
		D-2	50/6"			@ 7.5': Light yellowish/ reddish brown very fine to fine SAND, damp, very dense, very clean, highly friable, possibly slough from caving in.	4.0	96.2	
10		D-3	73/7"		SP-SC	@ 10': Reddish brown fine to medium SAND with some clay/ clayey fine to medium SAND, damp to moist, very dense, clay globules in upper rings.	9.2	110.9	
15		D-4	50/8"			@ 15': Light yellowish brown clean SAND, possibly cuttings that caved in while drilling, tip had reddish brown medium SAND with trace clay, moist, very dense.	4.5	98.0	
20		D-5 SB-1	50/1"		SILT STONE	<b>Monterey Formation (Tm)</b> @ 19': Driller hit refusal. Sampler full of slough sand. Bedrock is olive brown clayey SILTSTONE, damp to moist, hard, sample taken from shoe.	19.8		SB-1 @ 19.5'
						Notes: Total Depth is 19.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Jetted/Tamped. Patched with Quick-Set Concrete.			

**LOG OF BORING**  
Lyon Living/ 900 Newport Center Drive  
Newport Beach, CA  
PROJECT NO. 20108-01

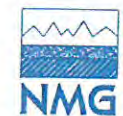


Report: HOLLOWSTEM; Project: 20108-01.GPJ; Data Template: NMG\_GINT\_2016.GDT; Printed: 3/19/21

Date(s) Drilled	2/17/21	Logged By	BF	<b>HS-5</b> Sheet 1 of 1	
Drilling Company	Pacific Drilling Company	Drill Bit Size/Type	6"		
Drill Rig Type	Tripod Hollow Stem	Hammer Data	Cat-head, 140 lbs. @ 30-inch drop		
Sampling Method(s)	Modified California				
Approximate Groundwater Depth:			No Groundwater Encountered	Total Depth Drilled (ft)	18.3
Comments				Approximate Ground Surface Elevation (ft)	170.2 msl

Elevation (ft)	Depth (ft)	SAMPLES		Graphic Log	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number						
170	0				SM	Surface: Sidewalk, concrete, ~2" of AB. <b>Marine Terrace (Qtm)</b> @ 1': Reddish brown silty fine SAND, moist to wet.  @ 3~5': Yellowish/ Reddish silty fine SAND, moist to wet.			
	5	D-1	75/12"			@ 5': Reddish brown silty fine SAND, moist, very dense, slightly micaceous, trace FeO staining, friable.	8.6	107.6	
	7.5	D-2	65/12"		SC	@ 7.5': Reddish brown silty clayey fine to medium SAND, moist, very dense, friable.	9.4	108.3	
-160	10	D-3	82/10"			@ 10': Reddish brown clayey fine to coarse SAND, moist, very dense, friable, abundant pinhole pores, trace rootlets, ~1/2" clay bed in waste barrel.	9.6	118.6	
	15	D-4	75/11"		SM-ML	@ 15': Upper: Olive brown silty fine SAND/ sandy SILT, moist to wet, very dense/ hard, friable, weathered bedrock.	19.6	88.0	
	17.5	D-5	60/10"		SILTSTONE	<b>Monterey Formation (Tm)</b> Lower: Olive brown sandy SILTSTONE, moist to wet, hard, more well-bedded than top rings, saturation around rings but no groundwater. @ 17.5': Driller hit refusal. Olive brown SILTSTONE, moist, hard, well-bedded.	27.8	79.1	2 Rings.
-150	20					Notes: Total Depth is 18.3 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped. Patched with Quick-Set Concrete.			
	25								

**LOG OF BORING**  
Lyon Living/ 900 Newport Center Drive  
Newport Beach, CA  
PROJECT NO. 20108-01



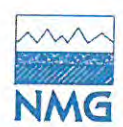
Date(s) Drilled	2/17/21	Logged By	BF
Drilling Company	Pacific Drilling Company	Drill Bit Size/Type	6"
Drill Rig Type	Tripod Hollow Stem	Hammer Data	Cat-head, 140 lbs. @ 30-inch drop
Sampling Method(s)	Modified California, Bulk		
Approximate Groundwater Depth:	No Groundwater Encountered		
Comments			

<b>HS-6</b>	
Sheet 1 of 1	
Total Depth Drilled (ft)	7.5
Approximate Ground Surface Elevation (ft)	163.0 msl

Elevation (ft)	Depth (ft)	SAMPLES			USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	OTHER TESTS and REMARKS
		Type	Number	Blows per foot					
0					SC-CL	Surface: Dirt, grassy hillside.			
					SP-SM	<b>Artificial Fill (Af)</b> @ 0-1': Brown clayey SAND/ sandy CLAY, moist to wet.			
						<b>Marine Terrace (Qtm)</b> @ 1-5': Yellowish/ Reddish brown silty fine SAND/ fine SAND with some silt, damp to moist.			B-1 @ 1-5'
-160		B-1							
	5	D-1	90/10"		SILT STONE	<b>Monterey Formation (Tm)</b> @ 5': Yellowish brown clayey SILTSTONE, damp, very stiff, weathered at top, less weathered on bottom, FeO staining, bedded bedrock in tip.	32.7	86.6	
		D-2	79/12"		SILT SAND STONE	@ 6.5': Driller hit refusal. Upper: Light reddish brown/ yellowish brown interbedded SILTSTONE and SANDSTONE, damp to moist hard/ very dense, interbedded claystone.	19.0	97.3	
-10						Notes: Total Depth is 7.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
-150									
-15									
-20									
-140									
-25									

Report: HOLLOWSTEM, Project: 20108-01.GPJ, Data Template: NMG\_GINT\_2016.GDT, Printed: 3/19/21

**LOG OF BORING**  
Lyon Living/ 900 Newport Center Drive  
Newport Beach, CA  
PROJECT NO. 20108-01



SB-5

LOG OF BORING N <sup>o</sup> 5													
DATE DRILLED 11/16/81		DRILLING EQUIPMENT 24" bucket auger											
DRIVING WEIGHT 3200 lbs. - 12" drop			SURFACE ELEVATION 94.2 76.2'										
Depth in Feet	Samples	Blows per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT LB. PER CU. FT.	SHEAR RESISTANCE @ ANTICIPATED PRESSURE - KIPS PER SQUARE FOOT					
								MOISTURE CONTENT - % DRY WEIGHT					
								0	1	2	3	4	5
								▲	10	20	30	40	50
			5" A.C./native soil										
			SAND, fine-med., v. silty										
			SILT, sandy, fine	mottl.		moist	mod. comp.						
				brown			mod. firm						
			clayey										
5	1		SAND, fine-med., sl. silty										
			clean (marine terrace beach sand)	yellow			mod. comp.						
				brown									
10	3												
15	2		SANDSTONE/SILTSTONE, clayey interbedded with silty claystone and clean sand lenses	mottl. brown			mod. hard						
20	3		SANDSTONE, some thin siltstone lenses				mod. hard						
			clean	yellow									
				brown									
23	8		SANDSTONE, cemented	gray			hard						

Marriott Hotel Additions  
Newport Beach, California

PROJECT No. S-0693-FG  
PLATE L

**SOILS INTERNATIONAL**  
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

SB-5

### LOG OF BORING N° 5 (cont.)

DATE DRILLED 11/16/81	DRILLING EQUIPMENT 24" bucket auger
DRIVING WEIGHT 2200 lbs. - 12" drop	SURFACE ELEVATION 94.2'

Depth in Feet	Samples	Blows per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT LB. PER CU. FT.	SHEAR RESISTANCE @ ANTICIPATED PRESSURE - KIPS PER SQUARE FOOT												
								●	1	2	3	4	5							
								MOISTURE CONTENT - % DRY WEIGHT												
▲	10	20	30	40	50															
			SANDSTONE, cemented			gray brown	sl. moist	very hard												
			End of Boring @ 25.5 ft.																	
			No caving No groundwater																	
30																				
35																				
40																				
45																				
50																				

Marriott Hotel Additions  
Newport Beach, California

PROJECT No.	S-0693-FG
PLATE	M

**SOILS INTERNATIONAL**  
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

SB-6

### LOG OF BORING N<sup>o</sup> 6

DATE DRILLED 11/17/81 DRILLING EQUIPMENT 8" Hollowstem Auger

DRIVING WEIGHT 140 lbs. - 30" drop SURFACE ELEVATION 93.5- 175.6

Depth in Feet	Sample Bottle per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT L.B. PER CU. FT.	SHEAR RESISTANCE @ ANTICIPATED PRESSURE - KIPS PER SQUARE FOOT	
							MOISTURE CONTENT - % DRY WEIGHT	
							1 2 3 4 5	10 20 30 40 50
231		5" A.C./native soil SAND, fine-medium FILL: SILT with silt- stone fragments	gray brown		moist	mod. comp. mod. firm	104	
22		SAND, fine, clean (non-marine terrace deposit)	yellow brown			mod. comp.	N.S.	
41			beige				93	
34								
15		medium, with clay binder	brown				100	
50		SILTSTONE/SANDSTONE interbed with shale lenses	gray brown			firm		
20		silty matrix					80	
100+								
25		SANDSTONE, clayey	red brown			mod. hard	81	

Marriott Hotel Additions  
Newport Beach, California

PROJECT No.	S-0693-FG
PLATE	N

**SOILS INTERNATIONAL**  
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

SB-6

LOG OF BORING N <sup>o</sup> 6 (cont.)													
DATE DRILLED 11/17/81		DRILLING EQUIPMENT 8" Hollowstem Auger											
DRIVING WEIGHT 140 lbs. - 30" drop			SURFACE ELEVATION 93.6'										
Depth in Feet	Samples	Blows per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT LB. PER CU. FT.	SHEAR RESISTANCE @ ANTICIPATED PRESSURE - KIPS PER SQUARE FOOT					
								MOISTURE CONTENT - % DRY WEIGHT					
								●	1	2	3	4	5
								▲	10	20	30	40	50
			SILTSTONE	gray	moist	mod. firm							
			SILTSTONE/SANDSTONE interbeds	mottl. gray brown		firm							
30	58		with clayey matrix			hard	79						
35	74		SANDSTONE, cemented, some clean sandstone beds	brown		very hard	65						
40													
45	58		SILTSTONE	gray		firm	67						
			End of Boring @ 42.0 ft.										
			No caving No groundwater										
50													

Marriott Hotel Additions  
Newport Beach, California

PROJECT No.	S-0693-PG
PLATE	0

**SOILS INTERNATIONAL**  
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS



SB-7

LOG OF BORING N <sup>o</sup> 7													
DATE DRILLED 11/17/81		DRILLING EQUIPMENT 8" Hollowstem Auger											
DRIVING WEIGHT 140 lbs. - 30" drop			SURFACE ELEVATION 93.0'										
Depth in Feet	Samples	Blows per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT LB. PER CU. FT.	SHEAR RESISTANCE @ ANTICIPATED PRESSURE - KIPS PER SQUARE FOOT					
								MOISTURE CONTENT - % DRY WEIGHT					
								0	1	2	3	4	5
								▲	10	20	30	40	50
			5" A.C./native soil FILL: SAND, fine, sl. silty		brown	moist	mod. comp.						
		35	SAND, silty, clayey		mottl.								
		34	fine-medium, clean (non-marine terrace deposit)		brown								
5		29	fine-medium, sl. silty										
			sl. clayey, fine-medium										
10		36	fine-medium, silty										
			fine, very silty		gray								
15		67	SILTSTONE, bedrock		gray		hard						
			SANDSTONE/SILTSTONE interbeds with silty clay matrix		mottl. gray brown		mod. hard						
20		44											
			SILTSTONE		gray		firm						
25		60											

Marriott Hotel Additions  
Newport Beach, California

PROJECT No.	S-0693-FG
PLATE	P

**SOILS INTERNATIONAL**  
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

SB-7

LOG OF BORING N<sup>o</sup> 7 (cont.)

DATE DRILLED 11/17/81 DRILLING EQUIPMENT 8" Hollowstem Auger

DRIVING WEIGHT 140 lbs. - 30" drop SURFACE ELEVATION 93.0'

Depth in Feet	Samples Blows per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT LB. PER CU. FT.	SHEAR RESISTANCE @ ANTICIPATED PRESSURE - KIPS PER SQUARE FOOT							
							1	2	3	4	5			
							MOISTURE CONTENT - % DRY WEIGHT							
							▲	10	20	30	40	50		
		SILTSTONE		gray	moist	firm								
		SANDSTONE (iron oxide tinge)		red brown		mod. hard								
		SILTSTONE		gray		firm								
30	57	SANDSTONE, fine grained, clean		brown		mod. hard	82							
		SILTSTONE/SANDSTONE interbeds		gray brown		hard								
35	57						75							
		SANDSTONE, fine, clean		brown		mod. hard								
40	70+						97							
		SILTSTONE		gray		firm								
		SANDSTONE, fine, clean		brown		mod. hard								
45	56						85							
		End of Boring @ 44.5 ft.												
		No caving No groundwater												
50														

Marriott Hotel Additions  
Newport Beach, California

PROJECT No. S-0693-FC

PLATE Q

SOILS INTERNATIONAL  
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

SB-8

LOG OF BORING N <sup>o</sup> 8													
DATE DRILLED 11/17/81		DRILLING EQUIPMENT 8" Hollowstem Auger											
DRIVING WEIGHT 140 lbs. - 30" drop			SURFACE ELEVATION NOT RECORDED										
Depth in Feet	Samples	Blows per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT LB. PER CU. FT.	SHEAR RESISTANCE @ ANTICIPATED PRESSURE - KIPS PER SQUARE FOOT					
								MOISTURE CONTENT - % DRY WEIGHT					
								●	1	2	3	4	5
								▲	10	20	30	40	50
			5" A.C./native soil		red brown	moist	mod. comp.						
			FILL: SAND, medium, clean										
			medium, sl. clayey										
5			medium, clean		gray brown	very moist							
			sl. silty		dark gray	sat. moist							
			with clay pockets										
10			fine-medium, sl. silty										
			fine-medium, silty		mottl. brown								
15			SAND, medium, with sl. clay binder (non-marine terrace deposit)		brown		comp.						
20			fine-medium, silty		red brown								
			fine-medium, clayey		brown								

Marriott Hotel Additions  
Newport Beach, California

PROJECT No.	S-0693-FG
PLATE	R

**SOILS INTERNATIONAL**  
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

LOG OF BORING N <sup>o</sup> 8 (cont.)												
DATE DRILLED 11/17/81		DRILLING EQUIPMENT 8" Hollowstem Auger										
DRIVING WEIGHT				SURFACE ELEVATION								
Depth in Feet	Blows per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT LB. PER CU. FT.	SHEAR RESISTANCE @ ANTICIPATED PRESSURE - KIPS PER SQUARE FOOT					
							MOISTURE CONTENT - % DRY WEIGHT					
							● 1	2	3	4	5	
							▲ 10	20	30	40	50	
		SAND, fine-medium, sl. clayey		brown	moist	comp.						
		fine, sl. silty										
30	65	CLAYSTONE, bedded, silty		yellow brown		firm	80					
		iron oxidized		red		hard						
		SANDSTONE, medium, clean		brown light brown		hard						
35	87	SANDSTONE/SILTSTONE interbeds		mottl. red brown		very hard	82					
40	80+	End of Boring @ 40.0 ft. No caving No groundwater					91					
45												
50												

Marriott Hotel Additions  
Newport Beach, California

PROJECT No.	S-0693-FG
PLATE	S

**SOILS INTERNATIONAL**  
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

SB-9

LOG OF BORING N <sup>o</sup> 9												
DATE DRILLED 11/19/81		DRILLING EQUIPMENT 24" Bucket Auger										
DRIVING WEIGHT 3200 lbs. - 12" drop			SURFACE ELEVATION <del>94.8</del> 176'									
Depth in Feet	Samples	Blows per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT LB. PER CU. FT.	SHEAR RESISTANCE @ ANTICIPATED PRESSURE - KIPS PER SQUARE FOOT				
								MOISTURE CONTENT - % DRY WEIGHT				
								1	2	3	4	5
								10	20	30	40	50
			5" A.C./ native soil			mod. comp.						
7			FILL: SAND, fine, sl. silty				113					
			medium, sl. clayey									
			with clayey pockets	mottl.								
5			sl. clayey, medium	brown			105					
			medium, sl. silty				110					
10			fine-medium, sl. silty	dark gray			119					
			fine-medium, clean	brown								
			fine-medium, sl. silty									
			fine, clean									
15			fine-medium, sl. clayey, silty	mottl. gray			110					
				brown								
			fine-med., wood frag. clean	dark gray								
			silty	mottl. brown			106					
20			SAND, fine, sl. silty (non-marine terrace deposit)	yellow brown		comp.						
				light brown								
25			SANDSTONE, fine, clean			mod. hard	100					

Marriott Hotel Additions  
Newport Beach, California

PROJECT No. S-0693-FG  
PLATE T

**SOILS INTERNATIONAL**  
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

SB-9

LOG OF BORING N <sup>o</sup> 9 (cont.)													
DATE DRILLED 11/19/81		DRILLING EQUIPMENT 24" Bucket Auger											
DRIVING WEIGHT 2200 lbs. - 12" drop			SURFACE ELEVATION 94.0'										
Depth in Feet	Samples	Blows per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT LB. PER CU. FT.	SHEAR RESISTANCE @ ANTICIPATED PRESSURE - KIPS PER SQUARE FOOT					
								MOISTURE CONTENT - % DRY WEIGHT					
								●	1	2	3	4	5
								▲	10	20	30	40	50
			SANDSTONE, fine, sl. silty	yellow brown			mod. hard						
			very fine, clean	beige									
30	10		SANDSTONE, fine, cemented, clean	light brown to mottl.			very hard	96					
			very fine, clean				mod. hard						
			cemented	light brown			very hard						
35			End of Boring @ 34.5 ft.										
			No caving No groundwater										
40													
45													
50													

Marriott Hotel Additions  
Newport Beach, California

PROJECT No. S-0693-FG  
PLATE U

**SOILS INTERNATIONAL**  
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

SB-10

LOG OF BORING N <sup>o</sup> 10														
DATE DRILLED 12/15/81		DRILLING EQUIPMENT Hand Power auger												
DRIVING WEIGHT				SURFACE ELEVATION										
Depth in Feet	Blows per foot	SOILS CLASSIFICATION	COLOR	MOISTURE	CONSISTENCY	DRY UNIT WEIGHT LB. PER CU. FT.	SHEAR RESISTANCE @ ANTICIPATED PRESSURE - KIPS PER SQUARE FOOT							
							MOISTURE CONTENT - % DRY WEIGHT							
							0	1	2	3	4	5		
							Δ	10	20	30	40	50		
1		3" Topsoil, Sand, fine SAND, fine, sl. silty	dark brown yellow brown	moist		mod. comp.								
2		fine-medium, sl. clayey	brown											
3		finer					107							
4		fine, sl. silty	yellow brown											
5		fine, clean												
6														
7		fine, sl. silty					102							
8		fine-medium, clean												
9		medium, sl. clayey												
10		medium, clean												
11							104							
12		End of Boring @ 12.0 ft.												

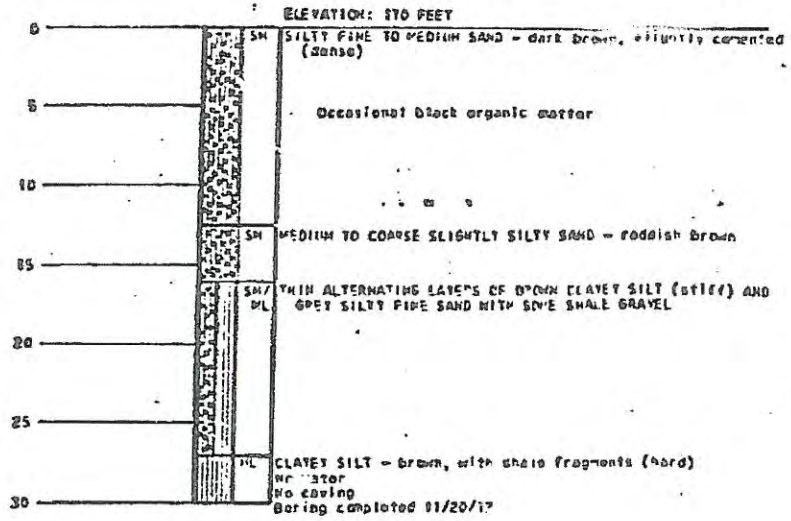
Marriott Hotel Additions  
Newport Beach, California

PROJECT No. S-0693-FG  
PLATE V

**SOILS INTERNATIONAL**  
CONSULTING FOUNDATION ENGINEERS & ENGINEERING GEOLOGISTS

DB-1

### BORING 1



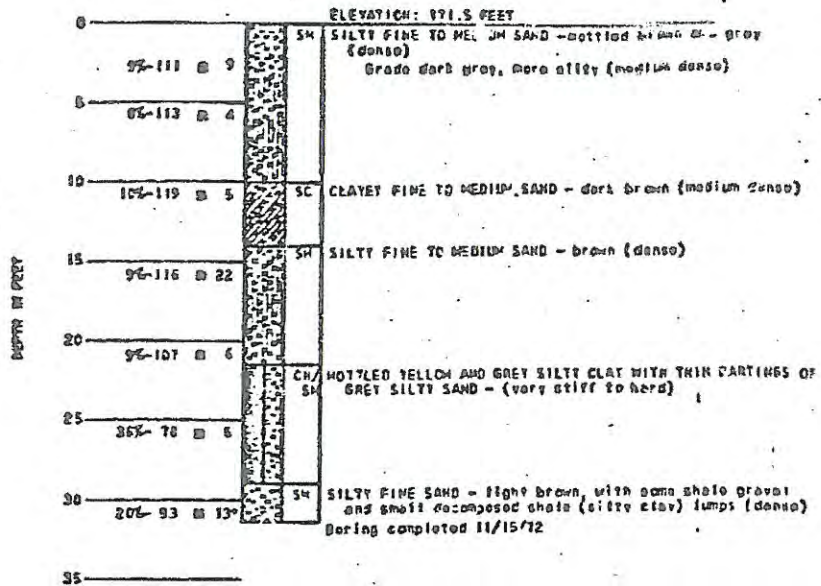
KEY:

- A - B & C
  - A FIELD MOISTURE EXPRESSED AS A PERCENTAGE OF THE DRY WEIGHT OF SOIL
  - B DRY DENSITY EXPRESSED IN LBS./CU. FT.
  - C BLOWS PER FOOT OF PENETRATION USING A 1650 LB. HAMMER DROPPING 12"
    - - A 850 LB. HAMMER WAS USED
    - - A 1250 LB. HAMMER WAS USED
  - DEPTH AT WHICH UNDISTURBED SAMPLE WAS EXTRACTED
  - DEPTH OF DISTURBED SAMPLE
- ELEVATIONS REFER TO MEAN SEA LEVEL

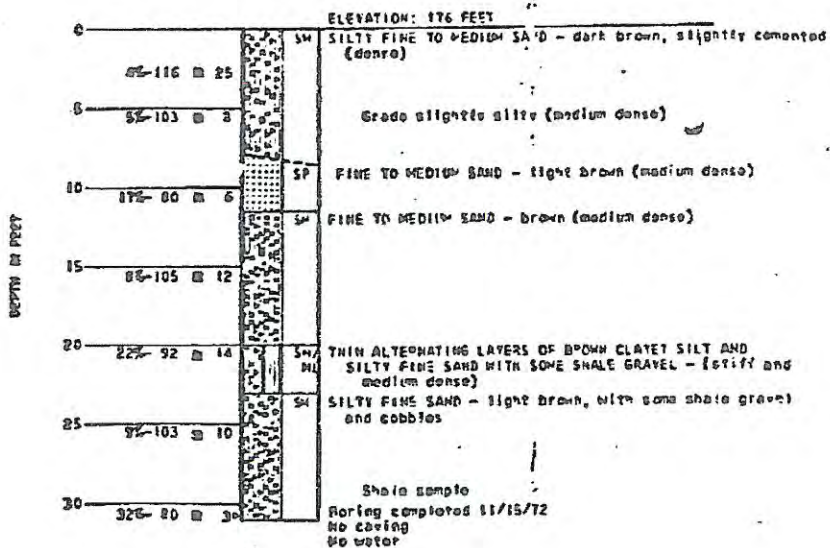
## LOG OF BORING



## BORING 2 DB-2

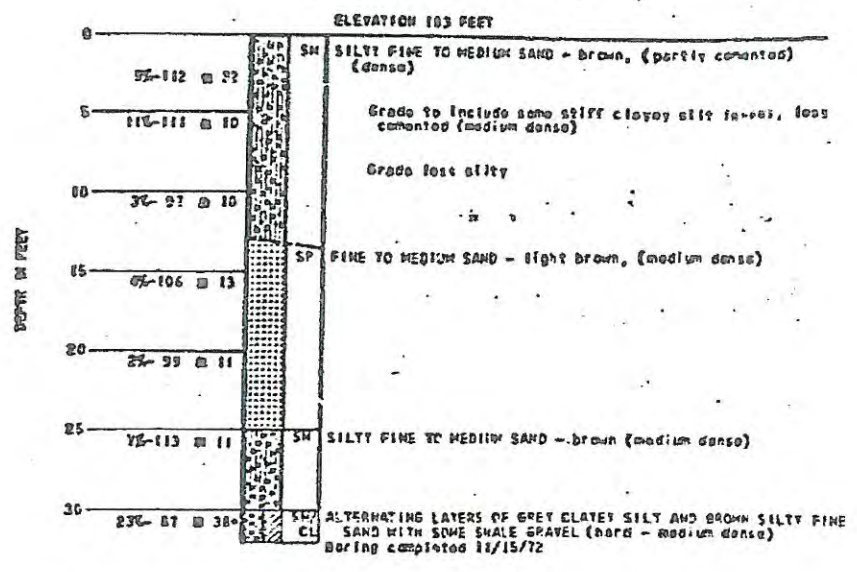


## BORING 3 DB-3

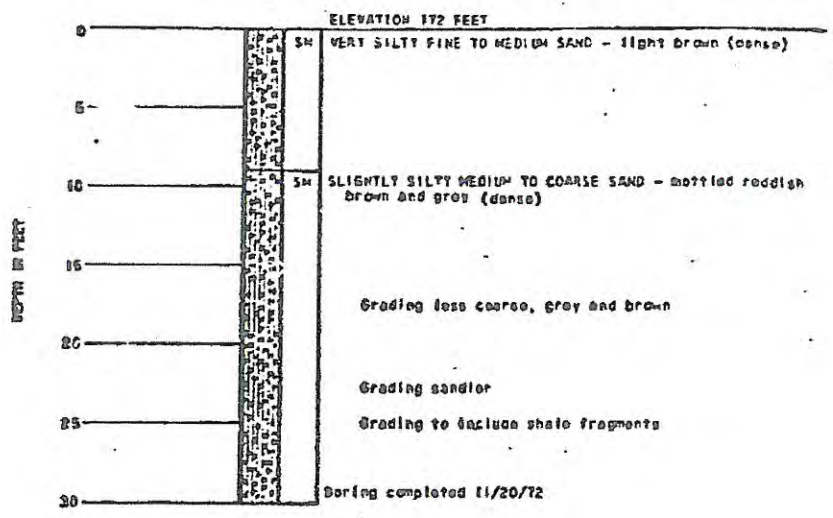


## LOG OF BORINGS

# BORING 4 DB-4



# BORING 5 DB-5



## LOG OF BORINGS

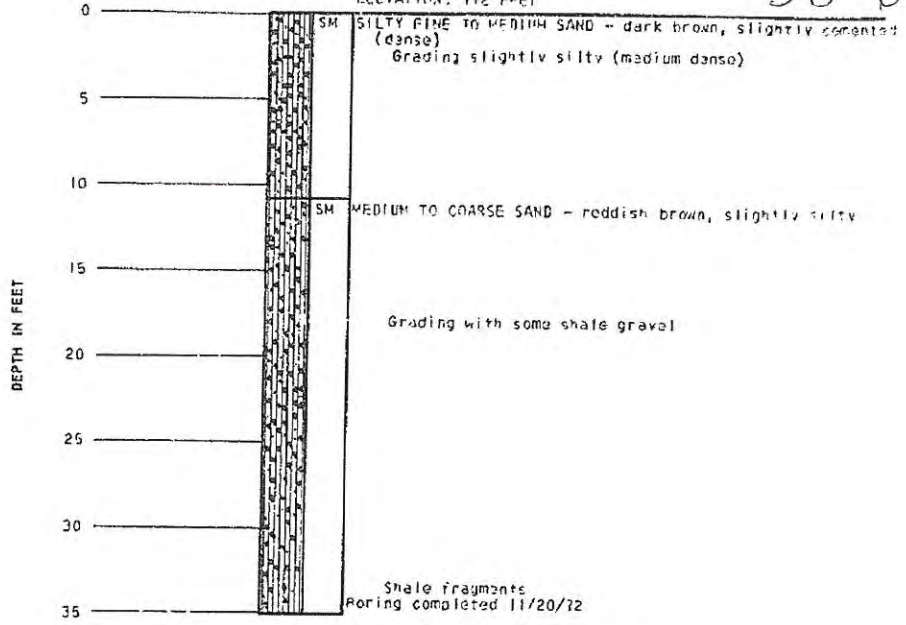
DAMES & MOOR:

DRAWN BY: [Name] DATE: [Date]  
 CHECKED BY: [Name] DATE: [Date]  
 APPROVED BY: [Name] DATE: [Date]

# BORING 6

DB-6

ELEVATION: 172 FEET



## LOG OF BORING

DAMES & MOORE

PLATE A-ID

REVISIONS  
BY DATE  
BY DATE  
BY DATE

NO. 1172-04C-42  
PROJECT  
DATE 11/22/72  
DATE 11/72

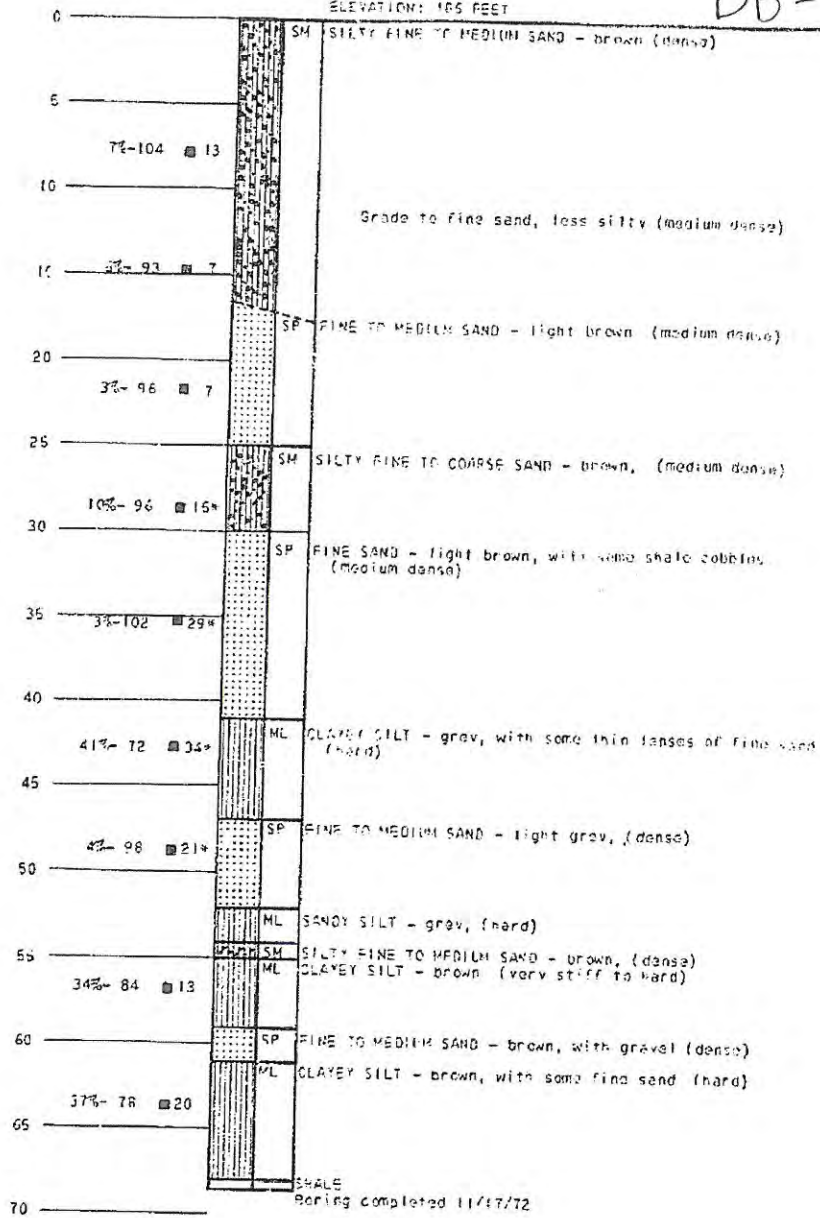
488 10 14 687

# BORING 7

DB-7

ELEVATION: 165 FEET

DEPTH IN FEET



## LOG OF BORING

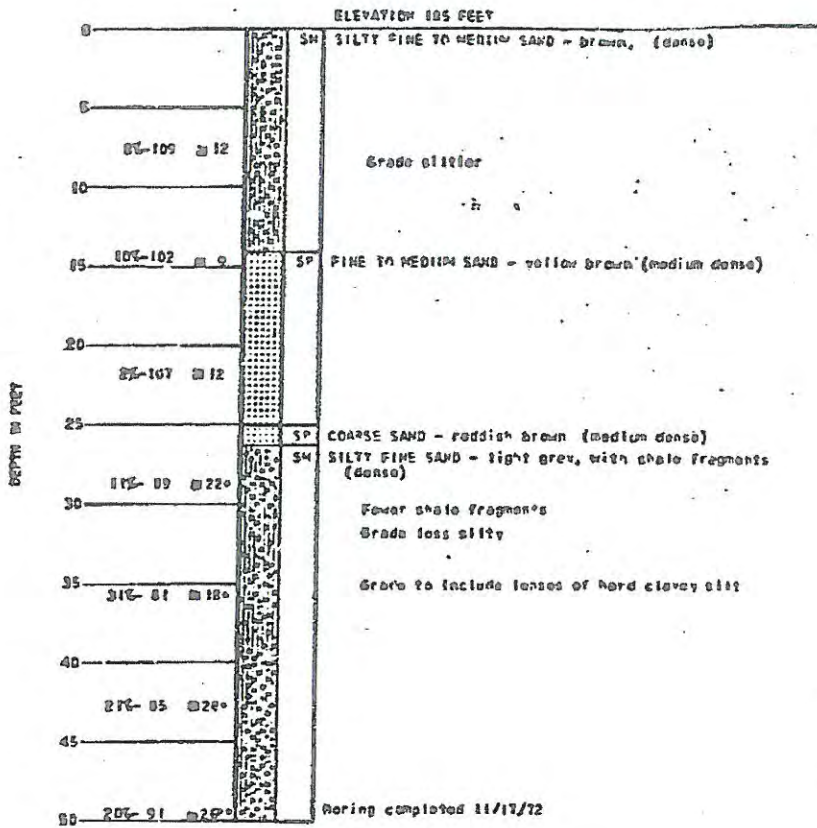
DAMES & MOORE

PLATE A-1E

PREPARED BY: J.A.S. DATE: 11/17/72  
 CHECKED BY: J.A.S. DATE: 11/17/72  
 APPROVED BY: J.A.S. DATE: 11/17/72

DB-8

### BORING 8



### LOG OF BORING

DAMES & MOOR

PROJECT: \_\_\_\_\_  
 DRAWN BY: \_\_\_\_\_  
 CHECKED BY: \_\_\_\_\_  
 DATE: \_\_\_\_\_

DB-8

# **APPENDIX C**



**APPENDIX**

**SUMMARY OF SOIL LABORATORY DATA**

**Project Number:**

Boring/Sample Information						Field Wet Density (pcf)	Field Dry Density (pcf)	Field Moisture Content (%)	Degree of Sat. (%)	Sieve/ Hydrometer		Atterberg Limits		USCS Group Symbol	Direct Shear				Compaction		Expansion Index	R-Value	Soluble Sulfate Content (% by wt)	Remarks	
Boring No.	Sample No.	Depth (feet)	End Depth (feet)	Elevation (feet)	Blow Count (N)					Fines Content (% pass. #200)	Clay Content (% pass. 2µ)	LL (%)	PI (%)		Ultimate		Peak		Maximum Dry Density (pcf)	Optimum Moisture Content (%)					
															Cohesion (psf)	Friction Angle (°)	Cohesion (psf)	Friction Angle (°)							
HS-6	B-1	1.0		162.0																					
HS-6	D-1	5.0		158.0	90/10"	114.9	86.6	32.7	93.3																
HS-6	D-2	6.5		156.5	79/12"	115.8	97.3	19.0	70.0																
HS-7	D-1	5.0		170.0	33	122.7	115.4	6.3	36.7					ML											
HS-7	D-2	7.5		167.5	70/9"	110.3	107.4	2.7	12.7																
HS-7	D-3	10.0		165.0	50/6"	119.1	112.3	6.1	32.9																
HS-7	D-4	15.0		160.0	50/5.5"	118.7	110.2	7.7	39.5																
B-1	B-1	0.0		176.0																					
B-1	D-1	5.0		171.0	push	124.0	101.3	22.5	91.5																
B-1	B-2	7.0		169.0																					
B-1	D-2	10.0		166.0	4	105.1	100.2	4.9	19.4																
B-1	D-3	15.0		161.0	4	107.6	102.9	4.6	19.4																
B-1	SB-1	19.0		157.0																					
B-1	D-4	20.0		156.0	3	109.3	75.3	45.1	98.6					ML	300	37	800	39.0							
B-1	D-5	25.0		151.0	5	108.8	76.4	42.5	95.2																
B-1	SB-2	25.5		150.5																					
B-1	B-3	26.0		150.0																					
B-1	D-6	30.0		146.0	3	106.0	75.4	40.7	88.9																
B-1	B-4	33.0		143.0																					
B-1	D-7	35.0		141.0	5	108.5	74.8	45.1	97.2																
B-1	B-5	37.0		139.0																					
B-1	D-8	40.0		136.0	6	115.0	84.1	36.8	99.0					CL											
B-1	D-9	45.0		131.0	8	113.4	105.3	7.7	34.5																
B-1	D-10	50.0		126.0	6	115.3	95.5	20.8	73.5																
B-1	D-11	60.0		116.0	10	113.6	99.0	14.7	56.6					SM	200	29	450	36.0							
B-1	D-12	70.0		106.0	12	121.1	109.5	10.7	53.3																
B-1	SB-3	77.0		99.0																					
B-2	B-1	1.0		170.0																					
B-2	D-1	5.0		166.0	5	131.3	122.8	6.9	50.1																
B-2	D-2	10.0		161.0	4	112.7	109.4	3.0	14.9																
B-2	D-3	15.0		156.0	6	124.5	117.6	5.9	36.7																
B-2	D-4	20.0		151.0	6	118.2	111.5	5.9	31.3																
B-2	SB-1	21.0		150.0						75	27	75	46	CH											
B-2	D-5	25.0		146.0	5	121.5	107.0	13.5	63.5					ML	500	28	800	50.0							
B-2	B-2	25.1		145.9																					



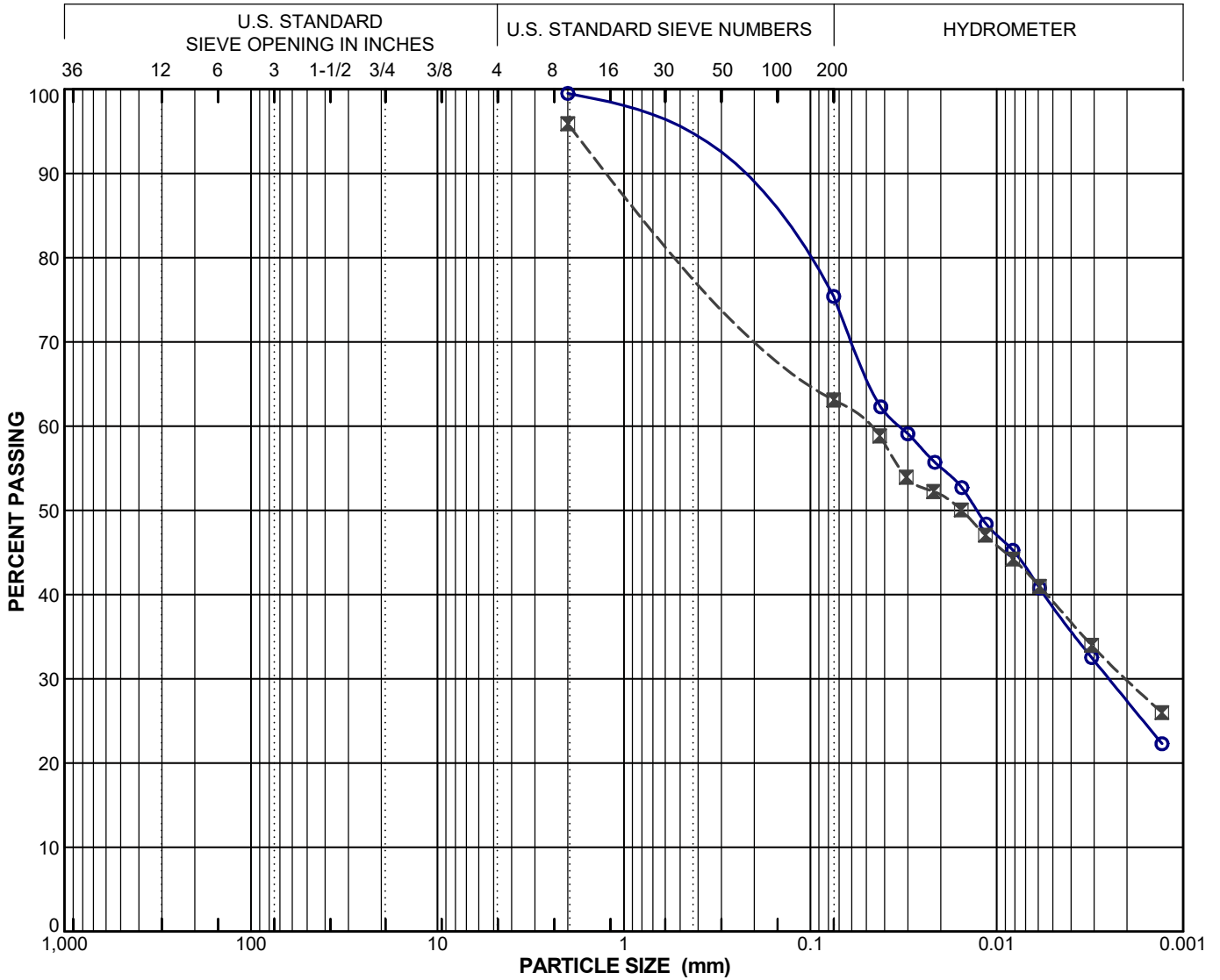
## APPENDIX

### SUMMARY OF SOIL LABORATORY DATA

Project Number:

Boring/Sample Information						Field Wet Density (pcf)	Field Dry Density (pcf)	Field Moisture Content (%)	Degree of Sat. (%)	Sieve/Hydrometer		Atterberg Limits		USCS Group Symbol	Direct Shear				Compaction		Expansion Index	R-Value	Soluble Sulfate Content (% by wt)	Remarks	
Boring No.	Sample No.	Depth (feet)	End Depth (feet)	Elevation (feet)	Blow Count (N)					Fines Content (% pass. #200)	Clay Content (% pass. 2µ)	LL (%)	PI (%)		Ultimate		Peak		Maximum Dry Density (pcf)	Optimum Moisture Content (%)					
															Cohesion (psf)	Friction Angle (°)	Cohesion (psf)	Friction Angle (°)							
B-2	D-6	30.0		141.0	10	116.7	114.3	2.1	12.1																
B-2	D-7	35.0		136.0	8	105.2	102.7	2.4	10.3																
B-2	D-8	40.0		131.0	8	106.8	90.6	17.9	56.2																
B-2	D-9	45.0		126.0	8	107.8	84.6	27.5	74.7															CN	
B-2	SB-2	47.5		123.5						63	30	47	26	CL											
B-2	D-10	50.0		121.0	10	121.2	99.4	21.9	85.3																
B-2	D-11	60.0		111.0	10	117.8	93.7	25.7	87.1																
B-2	B-3	63.0		108.0																					
B-2	D-12	70.0		101.0	12	106.9	85.3	25.4	70.3					ML	200	34	200	45.0							

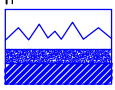
BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		coarse	fine	coarse	medium	fine	



Symbol	Boring Number	Sample Number	Depth (feet)	Field Moisture (%)	LL	PI	Activity PI/-2 $\mu$	C <sub>u</sub>	C <sub>c</sub>	Passing No. 200 Sieve (%)	Passing 2 $\mu$ (%)	USCS
○	B-2	SB-1	21.0		75	46	1.70			75	27	CH
⊠	B-2	SB-2	47.5		47	26	0.87			63	30	CL

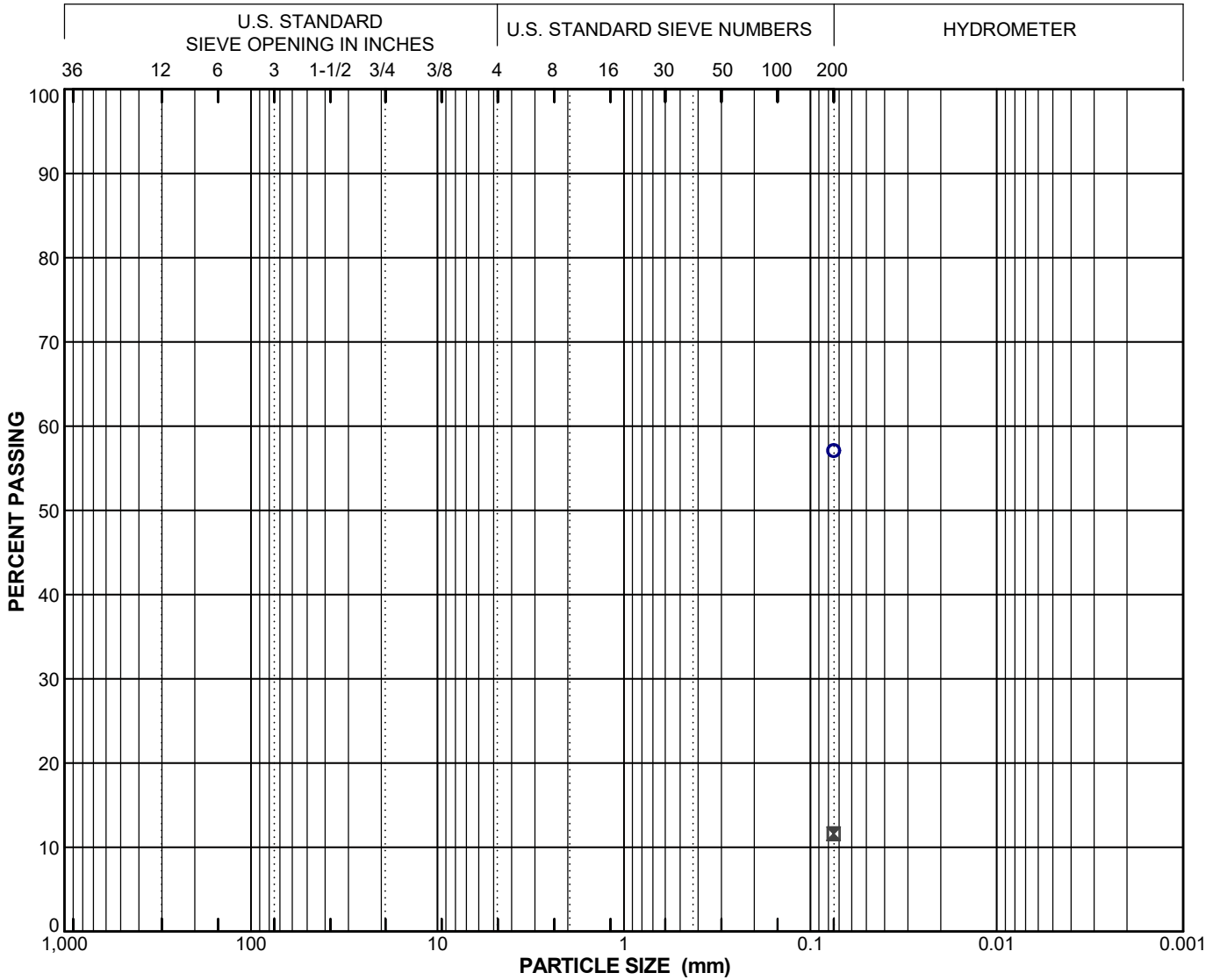
### PARTICLE SIZE DISTRIBUTION

Lyon/ 900 NCD  
 Newport Beach, California  
 PROJECT NO. 20108-04



**NMG** Geotechnical, Inc.

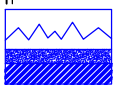
BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		coarse	fine	coarse	medium	fine	



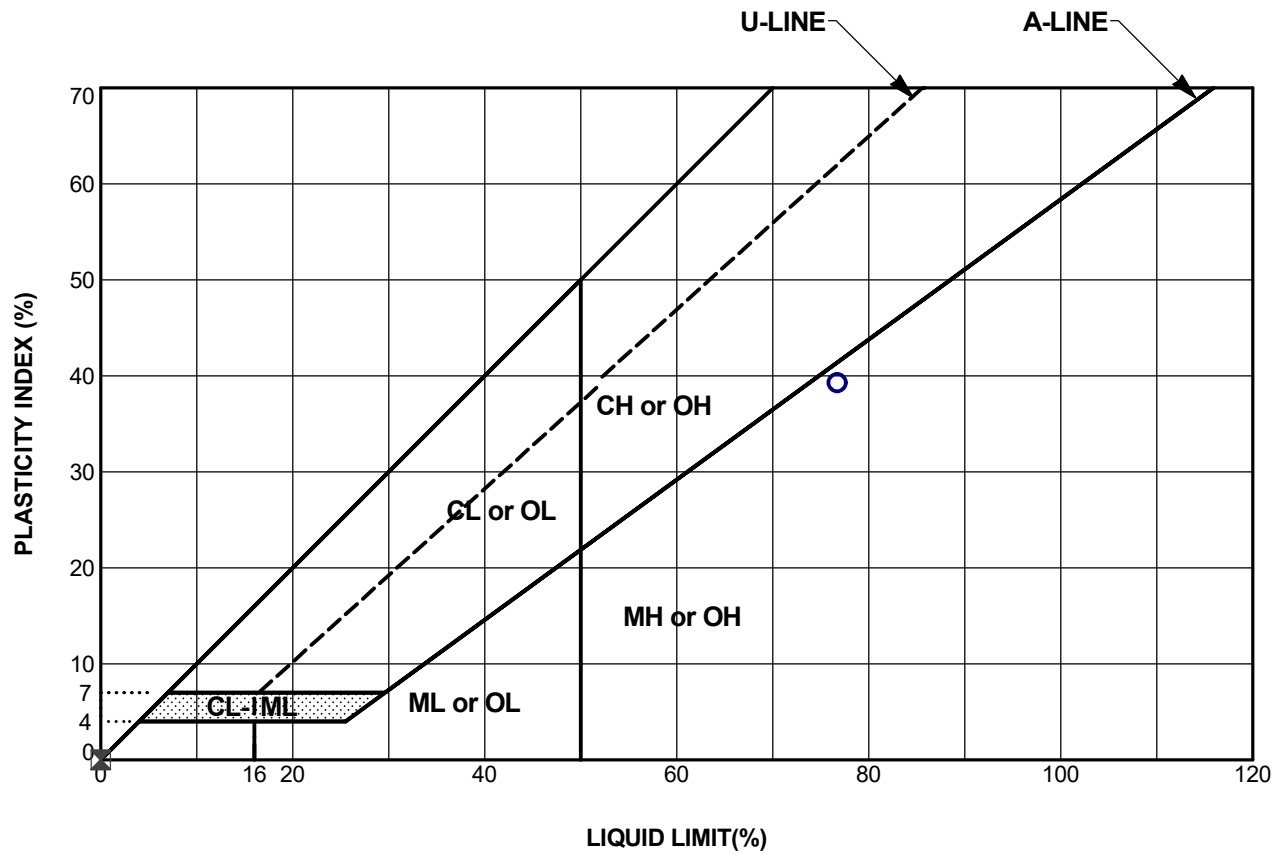
Symbol	Boring Number	Sample Number	Depth (feet)	Field Moisture (%)	LL	PI	Activity PI/-2 $\mu$	C <sub>u</sub>	C <sub>c</sub>	Passing No. 200 Sieve (%)	Passing 2 $\mu$ (%)	USCS
○	B-1	D-4	20.0	45	77	40				57		MH
⊠	B-1	D-11	60.0	15	NP	NP				12		SP-SM

### PARTICLE SIZE DISTRIBUTION

Lyon/ 900 NCD  
 Newport Beach, California  
 PROJECT NO. 20108-04

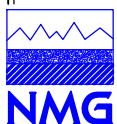


**NMG** Geotechnical, Inc.

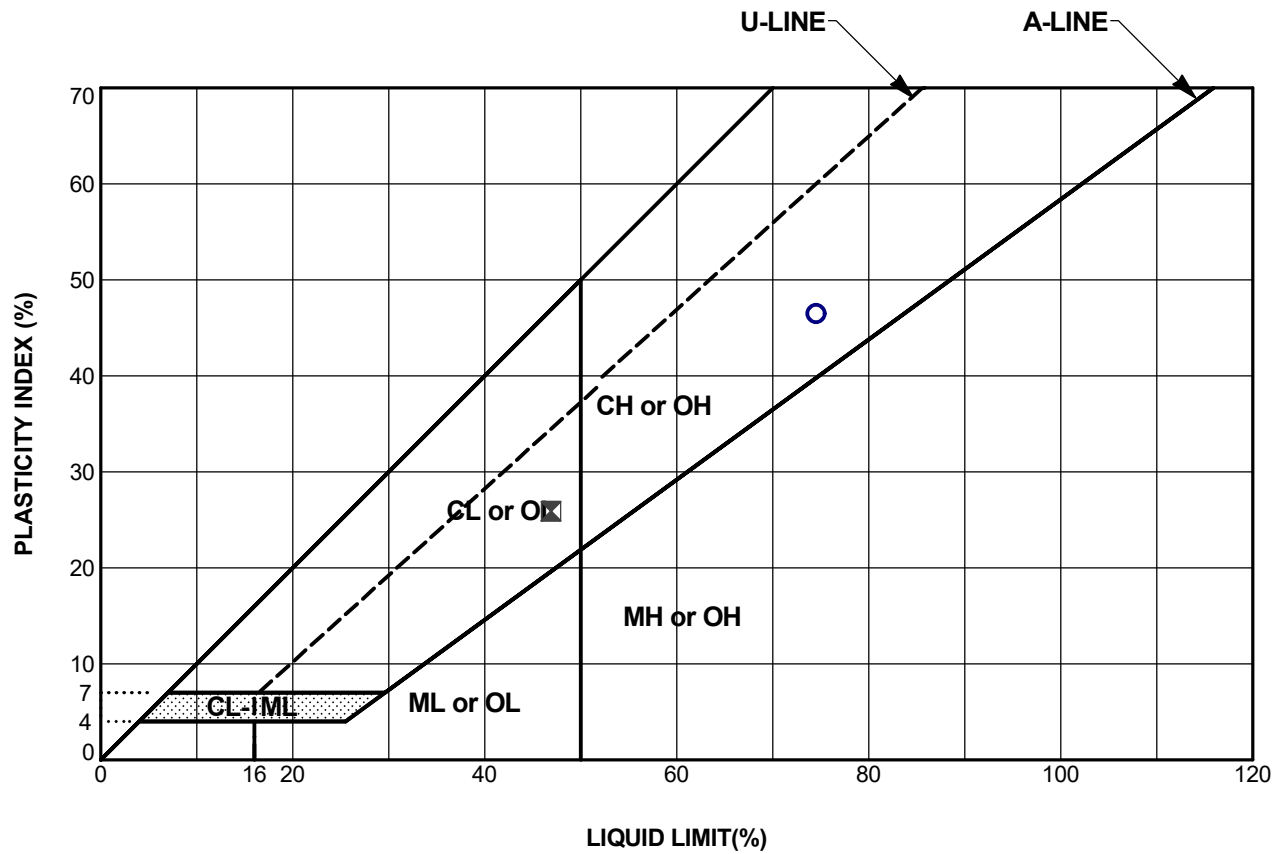


Symbol	Boring Number	Sample Number	Depth (feet)	Passing No. 200 Sieve (%)	LL	PI	USCS	Description
○	B-1	D-4	20.0	57	77	40	MH	(Tm) Gray sandy ELASTIC SILT
⊠	B-1	D-11	60.0	12	NP	NP	SP-SM	(Tm) Yellowish brown SANDSTONE with silt

**PLASTICITY CHART**  
 Lyon/ 900 NCD  
 Newport Beach, California  
 PROJECT NO. 20108-04

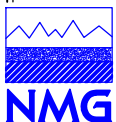


Geotechnical, Inc.

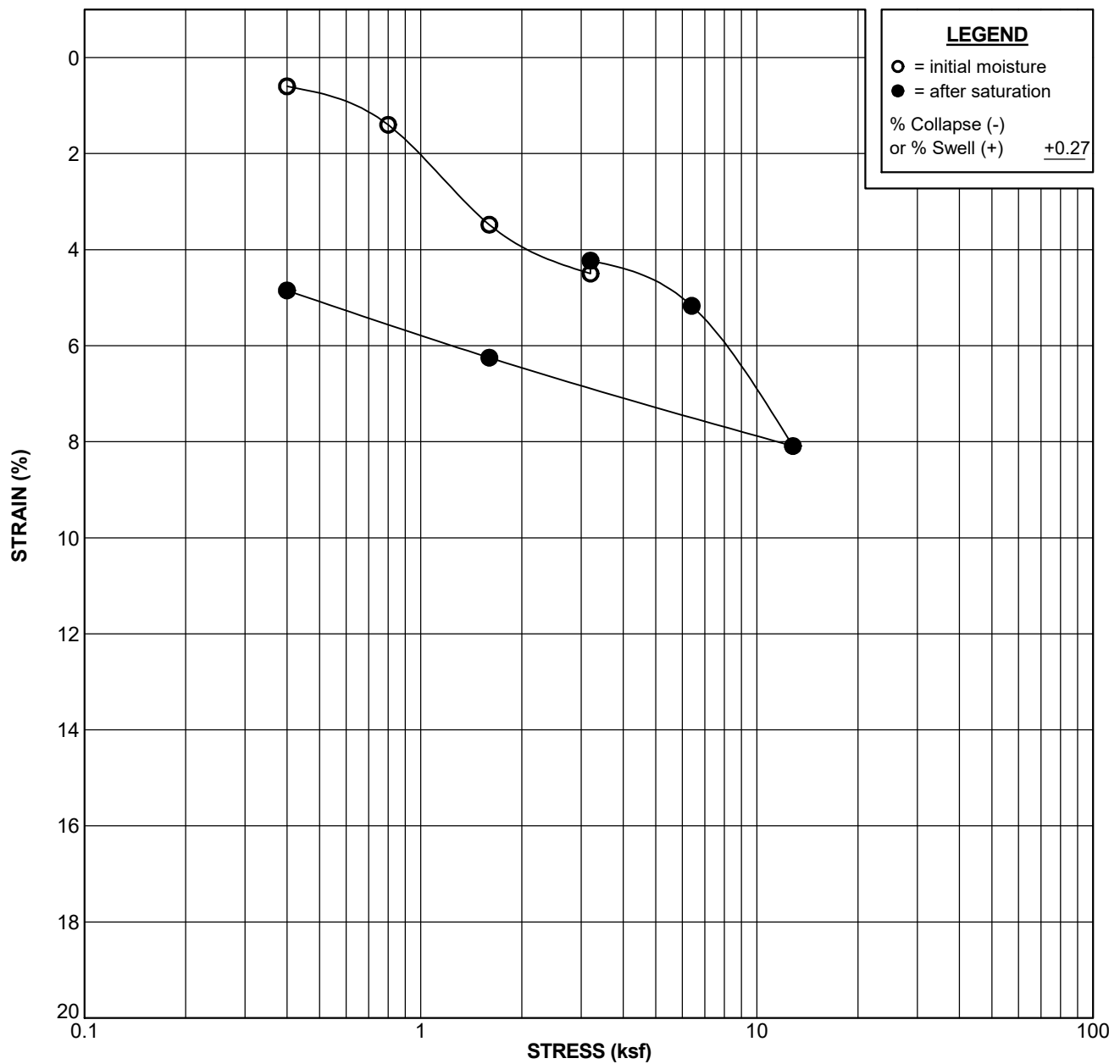


Symbol	Boring Number	Sample Number	Depth (feet)	Passing No. 200 Sieve (%)	LL	PI	USCS	Description
○	B-2	SB-1	21.0	75	75	46	CH	(Qtm) Olive fat CLAY with sand
⊠	B-2	SB-2	47.5	63	47	26	CL	(Tm) Olive gray sandy CLAY

**PLASTICITY CHART**  
 Lyon/ 900 NCD  
 Newport Beach, California  
 PROJECT NO. 20108-04



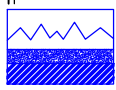
Geotechnical, Inc.



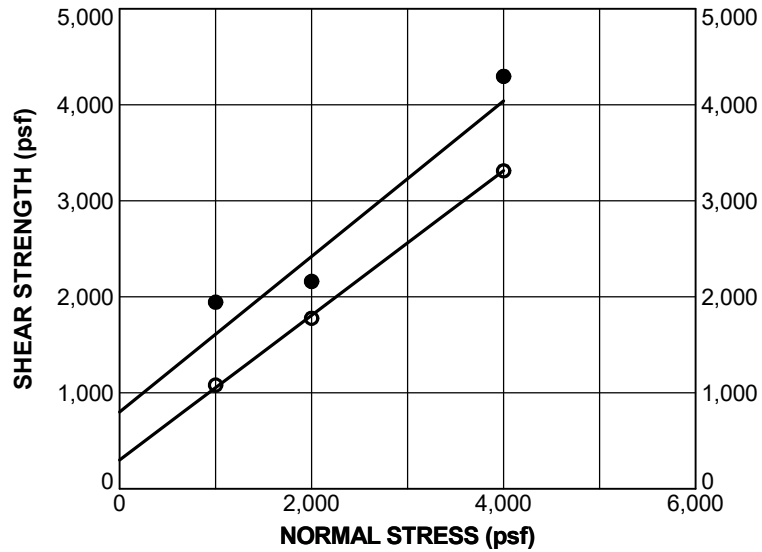
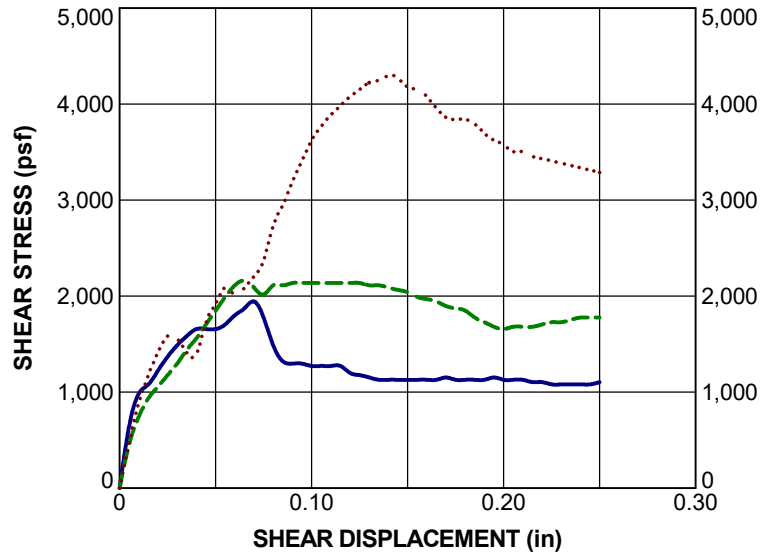
<b>Boring No. B-1</b>		<b>Sample No. D-8</b>		<b>Depth: 40.0 ft</b>	
<b>Sample Description:</b> (Tm) Dark grayish brown sandy CLAYSTONE				<b>USCS:</b> CL	
<b>Liquid Limit:</b>		<b>Plasticity Index:</b>		<b>Percent Passing No. 200 Sieve:</b>	
<b>Test Stage</b>	<b>Moisture Content (%)</b>	<b>Dry Density (pcf)</b>	<b>Degree of Saturation (%)</b>	<b>Void Ratio</b>	
Initial	49.3	67.4	92.7	1.349	
Final	48.8	70.7	99.9	1.239	

### CONSOLIDATION TEST RESULTS

Lyon/ 900 NCD  
 Newport Beach, California  
 PROJECT NO. 20108-04



Geotechnical, Inc.

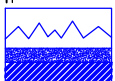


<b>Boring No. B-1</b>		<b>Sample No. D-4</b>		<b>Depth: 20.0 ft</b>	
<b>Sample Description:</b> (Tm) Light yellowish brown clayey SILTSTONE				<b>USCS:</b> ML	
<b>Liquid Limit:</b>		<b>Plasticity Index:</b>		<b>Percent Passing No. 200 Sieve:</b>	
<b>Final Moisture Content (%):</b> 45.0		<b>Final Dry Density (pcf):</b> 77.2		<b>Degree of Saturation (%):</b> 98	
<b>Sample Type:</b> Undisturbed			<b>Rate of Shear (in./min.):</b> 0.005		

SHEAR STRENGTH PARAMETERS		
Parameter	Peak ●	Ultimate ○
Cohesion (psf)	800	300
Friction Angle (degrees)	39.0	37.0

### DIRECT SHEAR TEST RESULTS

Lyon/ 900 NCD  
Newport Beach, California  
PROJECT NO. 20108-04



NMG Geotechnical, Inc.

Sample	Compacted Moisture (%)	Compacted Dry Density (pcf)	Final Moisture (%)	Volumetric Swell (%)	Expansion Index <sup>1</sup>		Expansive Classification <sup>2</sup>	Soluble Sulfate (%)	Sulfate Exposure <sup>3</sup>
					Value	Method			
HS-1 B-1 1-5'	10.0	110.7	21.4	6.23	62	A	Medium	0.06	S0

Test Method:  
ASTM D4829  
  
HACH SF-1 (Turbidimetric)

Notes:  
1. Expansion Index (EI) method of determination:  
  [A] E.I. determined by adjusting water content to achieve a 50 ±2% degree of saturation  
  [B] E.I. calculated based on measured saturation within the range of 40% and 60%  
2. ASTM D4829 (Classification of Expansive Soil)  
3. ACI-318-14 Table 19.3.1.1 (Requirement for Concrete Exposed to Sulfate-Containing Solutions)

**Expansion Index  
and Soluble  
Sulfate  
Test Results**  
(FRM001 Rev.5)

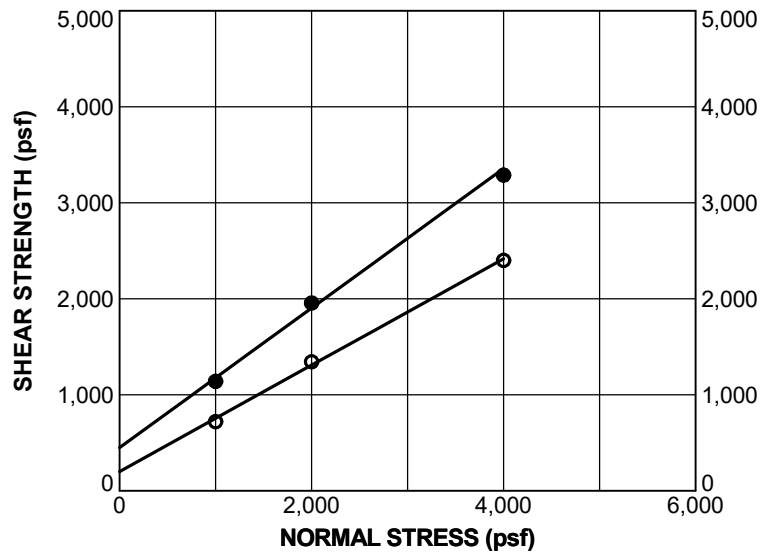
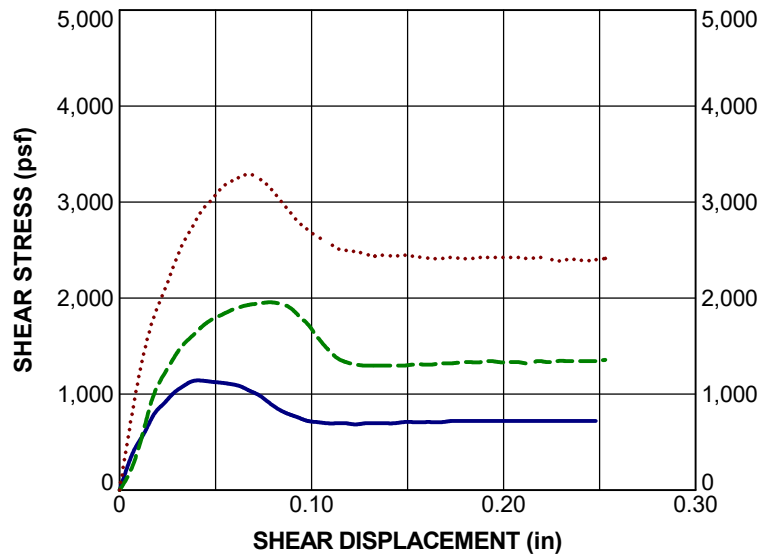
Project No. 20108-01  
Project Name: Lyon Living/ 900 Newport Center Drive



NMG



N = 1,000 psf ———  
 N = 2,000 psf - - - -  
 N = 4,000 psf ·····

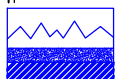


<b>Boring No. B-1</b>		<b>Sample No. D-11</b>		<b>Depth: 60.0 ft</b>	
<b>Sample Description:</b> (Tm) Yellowish olive silty SANDSTONE				<b>USCS:</b> SM	
<b>Liquid Limit:</b>		<b>Plasticity Index:</b>		<b>Percent Passing No. 200 Sieve:</b>	
<b>Final Moisture Content (%):</b>	30.2	<b>Final Dry Density (pcf):</b>	97.1	<b>Degree of Saturation (%):</b>	99
<b>Sample Type:</b> Undisturbed			<b>Rate of Shear (in./min.):</b> 0.05		

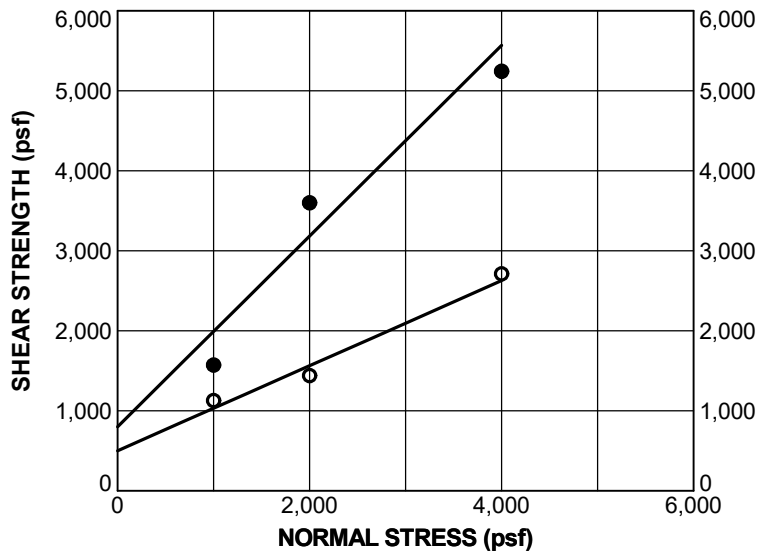
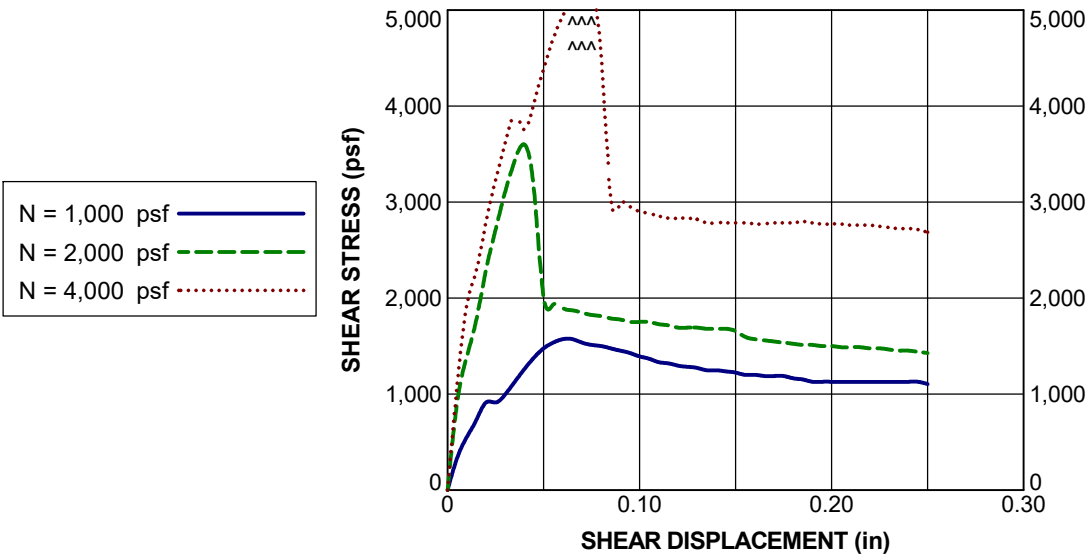
<b>SHEAR STRENGTH PARAMETERS</b>		
<b>Parameter</b>	<b>Peak ●</b>	<b>Ultimate ○</b>
<b>Cohesion (psf)</b>	450	200
<b>Friction Angle (degrees)</b>	36.0	29.0

### DIRECT SHEAR TEST RESULTS

Lyon/ 900 NCD  
 Newport Beach, California  
 PROJECT NO. 20108-04



**NMG Geotechnical, Inc.**

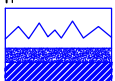


<b>Boring No. B-2</b>		<b>Sample No. D-5</b>		<b>Depth: 25.0 ft</b>	
<b>Sample Description:</b> (Tm) Pale yellow sandy SILTSTONE				<b>USCS:</b> ML	
<b>Liquid Limit:</b>		<b>Plasticity Index:</b>		<b>Percent Passing No. 200 Sieve:</b>	
<b>Final Moisture Content (%):</b>	31.9	<b>Final Dry Density (pcf):</b>	100.6	<b>Degree of Saturation (%):</b>	99
<b>Sample Type:</b> Undisturbed			<b>Rate of Shear (in./min.):</b> 0.005		

<b>SHEAR STRENGTH PARAMETERS</b>		
<b>Parameter</b>	<b>Peak ●</b>	<b>Ultimate ○</b>
<b>Cohesion (psf)</b>	800	500
<b>Friction Angle (degrees)</b>	50.0	28.0

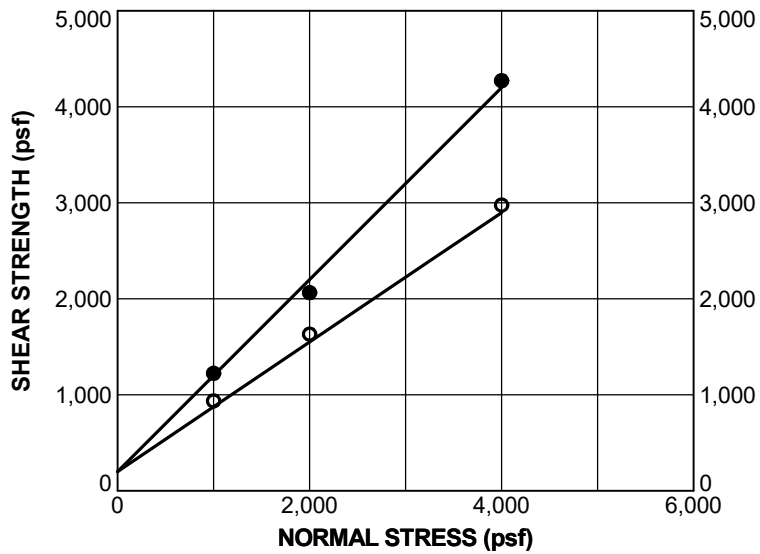
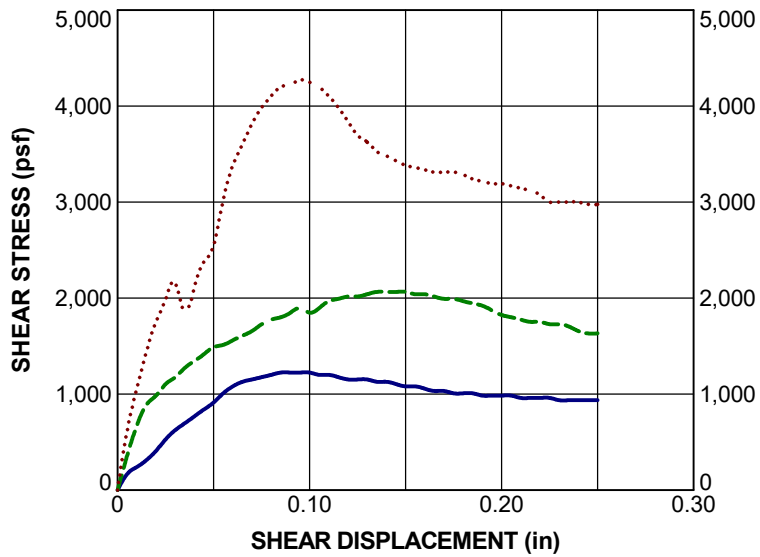
### DIRECT SHEAR TEST RESULTS

Lyon/ 900 NCD  
Newport Beach, California  
PROJECT NO. 20108-04



Geotechnical, Inc.

N = 1,000 psf ———  
 N = 2,000 psf - - - -  
 N = 4,000 psf ·····

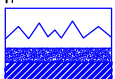


<b>Boring No. B-2</b>		<b>Sample No. D-12</b>		<b>Depth: 70.0 ft</b>	
<b>Sample Description:</b> (Tm) Dark yellowish brown SILTSTONE				<b>USCS:</b> ML	
<b>Liquid Limit:</b>		<b>Plasticity Index:</b>		<b>Percent Passing No. 200 Sieve:</b>	
<b>Final Moisture Content (%):</b> 48.2		<b>Final Dry Density (pcf):</b> 75.1		<b>Degree of Saturation (%):</b> 99	
<b>Sample Type:</b> Undisturbed			<b>Rate of Shear (in./min.):</b> 0.005		

SHEAR STRENGTH PARAMETERS		
Parameter	Peak ●	Ultimate ○
Cohesion (psf)	200	200
Friction Angle (degrees)	45.0	34.0

### DIRECT SHEAR TEST RESULTS

Lyon/ 900 NCD  
 Newport Beach, California  
 PROJECT NO. 20108-04



NMG Geotechnical, Inc.

# **APPENDIX D**



Latitude, Longitude: 33.616617, -117.880125



<b>Date</b>	3/8/2021, 5:15:58 PM
<b>Design Code Reference Document</b>	ASCE7-16
<b>Risk Category</b>	II
<b>Site Class</b>	D - Stiff Soil

Type	Value	Description
S <sub>S</sub>	1.349	MCE <sub>R</sub> ground motion. (for 0.2 second period)
S <sub>1</sub>	0.479	MCE <sub>R</sub> ground motion. (for 1.0s period)
S <sub>MS</sub>	1.349	Site-modified spectral acceleration value
S <sub>M1</sub>	null -See Section 11.4.8	Site-modified spectral acceleration value
S <sub>DS</sub>	0.899	Numeric seismic design value at 0.2 second SA
S <sub>D1</sub>	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F <sub>a</sub>	1	Site amplification factor at 0.2 second
F <sub>v</sub>	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.587	MCE <sub>G</sub> peak ground acceleration
F <sub>PGA</sub>	1.1	Site amplification factor at PGA
PGA <sub>M</sub>	0.645	Site modified peak ground acceleration
T <sub>L</sub>	8	Long-period transition period in seconds
SsRT	1.349	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.479	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.607	Factored deterministic acceleration value. (0.2 second)
S1RT	0.479	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.52	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.827	Factored deterministic acceleration value. (1.0 second)
PGAd	1.054	Factored deterministic acceleration value. (Peak Ground Acceleration)
C <sub>RS</sub>	0.912	Mapped value of the risk coefficient at short periods
C <sub>R1</sub>	0.923	Mapped value of the risk coefficient at a period of 1 s

## DISCLAIMER

While the information presented on this website is believed to be correct, SEAOC / OSHPD and its sponsors and contributors assume no responsibility or liability for its accuracy. The material presented in this web application should not be used or relied upon for any specific application without competent examination and verification of its accuracy, suitability and applicability by engineers or other licensed professionals. SEAOC / OSHPD do not intend that the use of this information replace the sound judgment of such competent professionals, having experience and knowledge in the field of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the results of the seismic data provided by this website. Users of the information from this website assume all liability arising from such use. Use of the output of this website does not imply approval by the governing building code bodies responsible for building code approval and interpretation for the building site described by latitude/longitude location in the search results of this website.

# Unified Hazard Tool



Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the [U.S. Seismic Design Maps web tools](#) (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

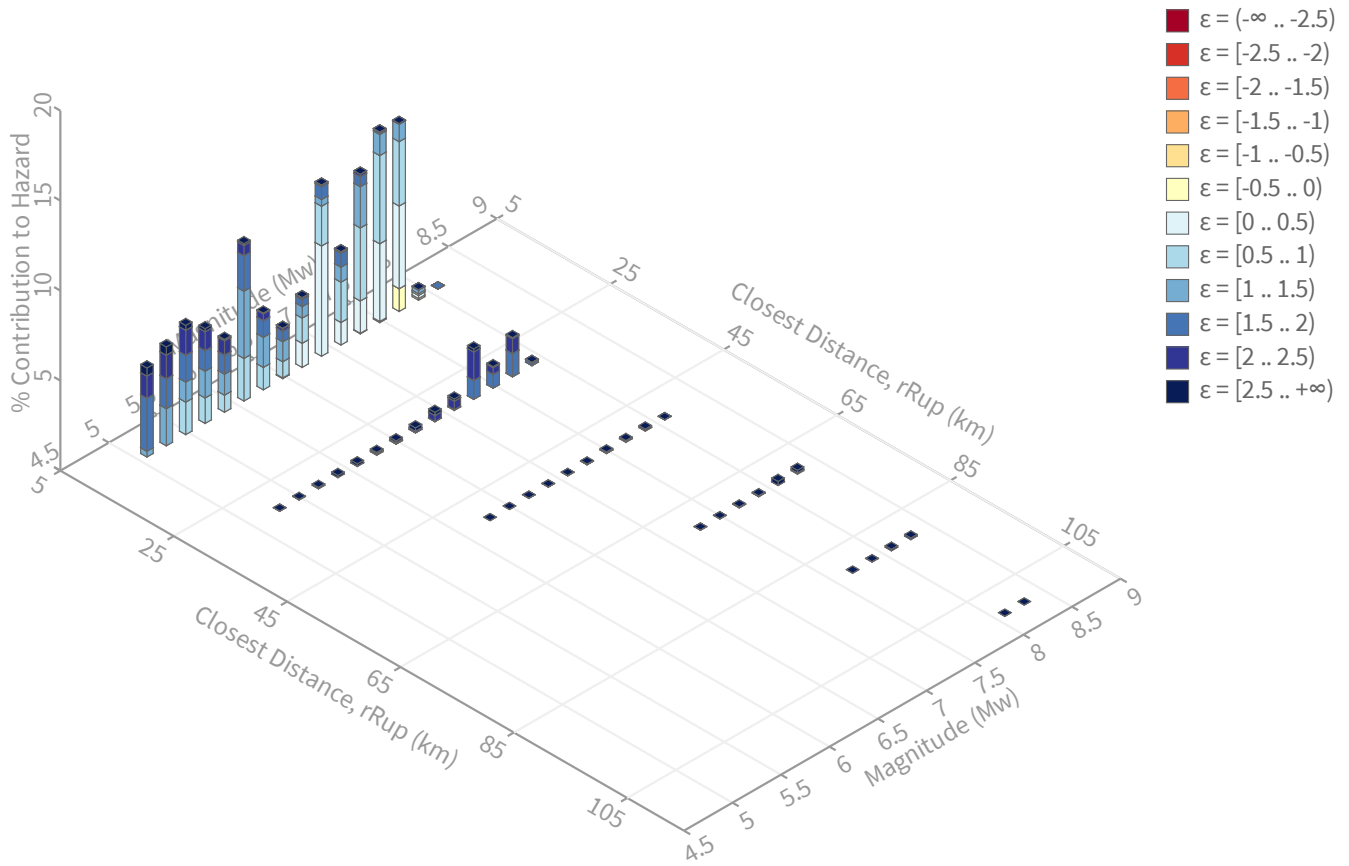
^ Input

<b>Edition</b> Dynamic: Conterminous U.S. 2014 (update...)	<b>Spectral Period</b> Peak Ground Acceleration
<b>Latitude</b> Decimal degrees 33.616617	<b>Time Horizon</b> Return period in years 2475
<b>Longitude</b> Decimal degrees, negative values for western longitudes -117.880125	
<b>Site Class</b> 259 m/s (Site class D)	

# ^ Deaggregation

Component

Total





## Summary statistics for, Deaggregation: Total

### Deaggregation targets

---

**Return period:** 2475 yrs  
**Exceedance rate:** 0.0004040404 yr<sup>-1</sup>  
**PGA ground motion:** 0.6628395 g

### Recovered targets

---

**Return period:** 2883.9998 yrs  
**Exceedance rate:** 0.00034674066 yr<sup>-1</sup>

### Totals

---

**Binned:** 100 %  
**Residual:** 0 %  
**Trace:** 0.09 %

### Mean (over all sources)

---

**m:** 6.66  
**r:** 9.44 km  
**ε<sub>0</sub>:** 1.15 σ

### Mode (largest m-r bin)

---

**m:** 7.5  
**r:** 5.27 km  
**ε<sub>0</sub>:** 0.59 σ  
**Contribution:** 10.58 %

### Mode (largest m-r-ε<sub>0</sub> bin)

---

**m:** 6.89  
**r:** 5.27 km  
**ε<sub>0</sub>:** 0.26 σ  
**Contribution:** 6.13 %

### Discretization

---

**r:** min = 0.0, max = 1000.0, Δ = 20.0 km  
**m:** min = 4.4, max = 9.4, Δ = 0.2  
**ε:** min = -3.0, max = 3.0, Δ = 0.5 σ

### Epsilon keys

---

**ε0:** [-∞ .. -2.5)  
**ε1:** [-2.5 .. -2.0)  
**ε2:** [-2.0 .. -1.5)  
**ε3:** [-1.5 .. -1.0)  
**ε4:** [-1.0 .. -0.5)  
**ε5:** [-0.5 .. 0.0)  
**ε6:** [0.0 .. 0.5)  
**ε7:** [0.5 .. 1.0)  
**ε8:** [1.0 .. 1.5)  
**ε9:** [1.5 .. 2.0)  
**ε10:** [2.0 .. 2.5)  
**ε11:** [2.5 .. +∞]

## Deaggregation Contributors

Source Set ↴	Source	Type	r	m	$\epsilon_0$	lon	lat	az	%
UC33brAvg_FM32		System							33.41
	Newport-Inglewood (Offshore) [0]		4.37	7.15	0.75	117.907°W	33.585°N	215.49	11.32
	San Joaquin Hills [0]		5.28	6.96	0.33	117.875°W	33.671°N	4.62	8.29
	Newport-Inglewood alt 2 [0]		4.55	7.41	0.33	117.925°W	33.606°N	254.03	4.58
	Palos Verdes [6]		23.37	7.46	1.93	118.104°W	33.521°N	243.02	2.10
	Compton [0]		18.92	7.36	1.49	118.043°W	33.702°N	302.36	2.01
	San Joaquin Hills [1]		5.41	6.92	0.36	117.845°W	33.669°N	29.11	1.44
UC33brAvg_FM31		System							28.71
	Newport-Inglewood (Offshore) [0]		4.37	7.09	0.77	117.907°W	33.585°N	215.49	11.91
	Newport-Inglewood alt 1 [0]		5.19	7.51	0.41	117.934°W	33.613°N	265.41	7.21
	Palos Verdes [6]		23.37	7.29	2.03	118.104°W	33.521°N	243.02	2.00
	Compton [0]		18.92	7.29	1.53	118.043°W	33.702°N	302.36	1.89
UC33brAvg_FM32 (opt)		Grid							19.08
	PointSourceFinite: -117.880, 33.639		5.74	5.58	1.22	117.880°W	33.639°N	0.00	4.44
	PointSourceFinite: -117.880, 33.639		5.74	5.58	1.22	117.880°W	33.639°N	0.00	4.44
	PointSourceFinite: -117.880, 33.684		8.81	5.69	1.66	117.880°W	33.684°N	0.00	1.34
	PointSourceFinite: -117.880, 33.684		8.81	5.69	1.66	117.880°W	33.684°N	0.00	1.34
	PointSourceFinite: -117.880, 33.720		11.34	5.93	1.86	117.880°W	33.720°N	0.00	1.34
	PointSourceFinite: -117.880, 33.720		11.34	5.93	1.86	117.880°W	33.720°N	0.00	1.34
UC33brAvg_FM31 (opt)		Grid							18.80
	PointSourceFinite: -117.880, 33.639		5.74	5.59	1.22	117.880°W	33.639°N	0.00	4.25
	PointSourceFinite: -117.880, 33.639		5.74	5.59	1.22	117.880°W	33.639°N	0.00	4.25
	PointSourceFinite: -117.880, 33.684		8.81	5.69	1.66	117.880°W	33.684°N	0.00	1.37
	PointSourceFinite: -117.880, 33.684		8.81	5.69	1.66	117.880°W	33.684°N	0.00	1.37
	PointSourceFinite: -117.880, 33.720		11.31	5.94	1.85	117.880°W	33.720°N	0.00	1.31
	PointSourceFinite: -117.880, 33.720		11.31	5.94	1.85	117.880°W	33.720°N	0.00	1.31

# **APPENDIX E**

## APPENDIX E

### GENERAL EARTHWORK AND GRADING SPECIFICATIONS

#### 1.0 General

1.1 Intent: These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these more general Specifications. Observations of the earthwork by the project Geotechnical Consultant during the course of grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

1.2 Geotechnical Consultant: Prior to commencement of work, the owner shall employ a geotechnical consultant. The geotechnical consultant shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During the grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include natural ground after it has been cleared for receiving fill but before fill is placed, bottoms of all "remedial removal" areas, all key bottoms, and benches made on sloping ground to receive fill.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to determine the attained level of compaction. The Geotechnical Consultant shall provide the test results to the owner and the Contractor on a routine and frequent basis.

- 1.3 The Earthwork Contractor: The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the plans and specifications.

The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "spreads" of work and the estimated quantities of daily earthwork contemplated for the site prior to commencement of grading. The Contractor shall inform the owner and the Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified.

## 2.0 Preparation of Areas to be Filled

- 2.1 Clearing and Grubbing: Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). No fill lift shall contain more than 5 percent of organic matter. Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed

immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

- 2.2 Processing: Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.
- 2.3 Overexcavation: In addition to removals and overexcavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be overexcavated to competent ground as evaluated by the Geotechnical Consultant during grading.
- 2.4 Benching: Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be stepped or benched. Please see the Standard Details for a graphic illustration. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise overexcavated to provide a flat subgrade for the fill.
- 2.5 Evaluation/Acceptance of Fill Areas: All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

### 3.0 Fill Material

- 3.1 General: Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.
- 3.2 Oversize: Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 12 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.
- 3.3 Import: If importing of fill material is required for grading, proposed import material shall meet the requirements of Section 3.1. The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

### 4.0 Fill Placement and Compaction

- 4.1 Fill Layers: Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.
- 4.2 Fill Moisture Conditioning: Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557-91).
- 4.3 Compaction of Fill: After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557-91). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

- 4.4 Compaction of Fill Slopes: In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557-91.
- 4.5 Compaction Testing: Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).
- 4.6 Frequency of Compaction Testing: Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.
- 4.7 Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than 5 feet apart from potential test locations shall be provided.

## 5.0 Subdrain Installation

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.



## 6.0 Excavation

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

## 7.0 Trench Backfills

- 7.1 Contractor shall follow all OSHA and Cal/OSHA requirements for safety of trench excavations.
- 7.2 Bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 ( $SE > 30$ ). The bedding shall be placed to 1 foot over the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum 90 percent of maximum from 1 foot above the top of the conduit to the surface, except in traveled ways (see Section 7.6 below).
- 7.3 Jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.
- 7.4 Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.
- 7.5 Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.
- 7.6 Trench backfill in the upper foot measured from finish grade within existing or future traveled way, shoulder, and other paved areas (or areas to receive pavement) should be placed to a minimum 95 percent relative compaction.