APPENDIX D

GROUP DELTA

GEOTECHNICAL INVESTIGATION REPORT
THE CANOPY 2 SITE AT THE IRVINE GREAT PARK
HORNET & BEACON INTERSECTION
IRVINE, CALIFORNIA 92618

Prepared for

CITY OF IRVINE
1 Civic Center Plaza
Irvine, CA 92606

Prepared by

GROUP DELTA CONSULTANTS, INC.
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Irvine, California 92618

Group Delta Project No. IR855
June 5, 2025

GROUP DELTA

CITY OF IRVINE
1 Civic Center Plaza
Irvine, CA 92606

June 5, 2025
Group Delta Project No. IR855

Attention: Mr. Brian Polivka

Subject: Geotechnical Investigation Report – Revision 2
The Canopy 2 Site at the Irvine Great Park
Hornet & Beacon Intersection
Irvine, California 92618

Dear Mr. Polivka:

Group Delta Consultants (Group Delta) is pleased to submit geotechnical recommendations for the above referenced project. This study was performed in general accordance with Group Delta's proposal, dated December 17, 2024, provided the City of Irvine (City). This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs and pavements for the proposed project. Per Mr. David Kelly request, Pavement section of the report has been revised in this revision.

We appreciate the opportunity to provide geotechnical services for this project. If you have any questions pertaining to this report, or if we can be of further service, please do not hesitate to contact us.

Sincerely,

GROUP DELTA CONSULTANTS, INC.

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HORNET & BEACON INTERSECTION, IRVINE, CALIFORNIA

1 INTRODUCTION

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the proposed development to be located at the Hornet and Beacon intersection in Great Park, Irvine, Orange County, California (GPS coordinates Latitude: 33.6770 Longitude: -117.7392).

1.1 Project Description

Project site is a tract of land with an approximate area of 6.5 acre and is located at Hornet and Beacon intersection in Great Park, Irvine, California (GPS coordinates Latitude: 33.6770 Longitude: -117.7392). Currently the project site is covered with vegetation and trees. ETR Hanger located to the northeast boundary and existing POP-UPS in the park buildings located to the southeast boundary of the project site. Project site is relatively flat.

Based on our review of provided site plan and RFP (Request for Proposal), The City is in the conceptual design phase for the subject project, which will include a new food and beverage (F&B) development near the intersection of Beacon and Hornet. The project site is home to what is identified as existing Hangar 10, which will undergo seismic retrofit and tenant improvements to support the future F&B site development. There are also what are identified as existing "pop up structures" consisting of retrofitted cargo containers that have been converted to retail and F&B structures that will be reactivated. In addition to reactivation of Hangar 10 and the pop-up structures, three new building pads will be constructed at this site. A parking lot will also be constructed to support the site development. The site development will also include new sidewalks, curb ramps, and other hardscape will be constructed throughout the site, along with lighting and landscaping. Site construction will include demolition and mass grading not only for the F&B and parking site, but the adjacent City operations office site and the abandoned playground site southeast of Hangar 10.

1.2 Objectives and Scope of Work

The objective of this report is to provide recommendations for grading and foundation design for the proposed improvements. Our scope of work for the project site includes the following tasks:

- Review of available conceptual plans, geotechnical and geologic data, maps, and reports;
- Perform a geotechnical field investigation to evaluate subsurface conditions, which included the advancement of thirteen (13) hollow-stem auger (HSA) borings to depths ranging from approximately 10 to 41 ½ feet below ground surface (bgs);
- Perform laboratory tests on selected soil samples to evaluate physical, engineering, and chemical (corrosion) properties of the onsite soils;

- Evaluate geologic and seismic hazards including local seismicity, surface fault rupture, ground shaking, liquefaction, and other considered geologic hazards;
- Providing Mapped 2022 California Building Code (CBC) seismic design parameters for new structures (ASCE 7-16) and existing structures (ASCE 41-17);
- Evaluate geotechnical data and perform geotechnical analyses to provide recommendations for foundation type and design parameters (allowable capacity, minimum size, and anticipated settlement);
- Provide geotechnical recommendations for site development earthwork, including removal of unsuitable soils, excavations, placement of compacted fill/backfill, and reuse of excavated materials;
- Provide recommendations for pavement and underground utilities; and
- Prepare this report presenting the results of our investigation, conclusions, and recommendations.

2 FIELD INVESTIGATION AND LABORATORY TESTING PROGRAM

2.1 Drilling and Soil Sampling

Prior to beginning the field investigation, Underground Service Alert (USA) was notified at each exploration location to check subsurface utilities.

A field investigation was performed by Group Delta on January 23 and 24, 2025. Field investigation consisted of drilling thirteen (13) borings by a truck-mounted drilling rig using hollow-stem augers to a maximum depth of approximately 41 ½ feet bgs. The locations of these explorations are shown in Figure 2. The detailed field investigation and observation procedures along with the boring logs are presented in Appendix A, and the laboratory testing results are presented in Appendix B.

Bulk samples and relatively undisturbed drive samples of representative soil layers were obtained during drilling at appropriate 5-feet intervals. Blow counts were recorded for both standard penetration test (SPT-N value) and California Modified Samplers. Upon withdrawal from borings, the samples were cleaned, the material was classified visually, and the information was entered on a field boring log by the field engineer or geologist. Visual descriptions and classifications of samples was performed in accordance with ASTM D2488 procedures. Samples were sealed to prevent moisture loss, packed in appropriate protective containers, and transported to the laboratory for further evaluation. Soil samples were handled and transported to our laboratory in accordance with ASTM D4220 guidelines.

Completed borings were backfilled with tamped soil cuttings. Excess soil cuttings were dispersed in the vicinity of borings.

2.2 Laboratory Testing Program

Laboratory testing tests on samples of the soils obtained from the borings were performed in accordance with ASTM specifications for laboratory testing. The laboratory testing program consisted of the following:

- In-Situ Moisture Content and Dry Density
- Grain Size Analysis and Percent Passing #200 Sieve
- Atterberg Limits
- Modified Proctor
- Expansion Index
- R-Value and
- Soil Corrosivity

The performed tests are identified on the boring logs in Appendix A and a brief description of the laboratory test results are presented in Appendix B.

3 SITE AND SUBSURFACE CONDITIONS

3.1 Surface Conditions

The project site is generally flat with approximate elevations between 285 feet to 305 feet. A site reconnaissance was performed on January 15, 2025 to observe the existing condition of the subject site and to determine the suitability of the site for the proposed construction. Currently the project site is covered with vegetation and trees. An existing Hanger is located to the northeast boundary and existing POP-UPS in the park buildings are located to the southeast boundary of the project site.

3.2 Subsurface Conditions

The subsurface materials encountered in our borings generally consisted of interbedded layers of clayey sand, silty sand and sandy silty clay extending to the maximum depth of borings approximately 41 ½ feet bgs.

3.3 Geology

The subject site is located within the Peninsular Ranges geomorphic province of southern California. The Peninsular Ranges are characterized by a series of northwest trending mountain ranges separated by valleys, with a coastal plain of subdued landforms. The mountain ranges are underlain primarily by Mesozoic metamorphic rocks that were intruded by plutonic rocks of the southern California batholith, while the coastal plain is underlain by subsequently deposited marine and nonmarine sedimentary formations.

A regional published map of the site geology is presented in Figure 3, and the tectonic fault setting of the site is illustrated in Figure 4. In general the project surface geology is mapped as Holocene age Young Alluvial fan deposits (Qyfa).

3.4 Groundwater

The borings were advanced using a hollow-stem-auger drilling technique that allows short term groundwater observations to be made while drilling. Groundwater seepage was not encountered within the maximum drilled depth of 41 ½ feet below ground surface (bgs) at the time of our field exploration. Our review of historical information regarding groundwater levels indicates that historical high groundwater levels are about 40 feet bgs. Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed.

3.5 Expansive Soils

The near surface materials are generally low-expansive. Atterberg test results indicate that the near surface on-site soils generally have Plasticity Indices (PI) of 14 to 27 (characterized as non-expansive to moderately expansive). An Expansion Index (EI) test conducted in accordance with ASTM D4829 on a near surface sample from boring B-3 resulted in an EI value of 8 (characterized as “very low” potential).

3.6 Soil Corrosion Potential

One representative sample of the near surface soils from Boring B-1 at depths of 2 to 5 feet was tested to evaluate corrosion characteristics. The test included pH, electrical resistivity, soluble chloride, and soluble sulfate concentrations. Test results are summarized in Table 1 below and are provided in Appendix B.

Table 1 Corrosion Potential Test Results

Sample/Depth	pH	Resistivity [Ohm-cm]	Sulfate Content [%]	Chloride Content [%]
B-1 @ 2’ - 5’	8.15	1,887	0.03	<0.01

Based on pH and sulfate content of the test sample, the near surface soils are not corrosive to concrete. The correlation below can generally be used between electrical resistivity (ER) and corrosion potential to ferrous metals. Based on the electrical resistivity result, the test sample is classified as corrosive to buried metals. Further evaluation/testing and recommendations for corrosion protection should be provided by a corrosion consultant.

Table 2 Correlation Between ER and Ferrous Metal Corrosion Potential

Electrical Resistivity (Ohm-Cm)	Corrosion Potential
Less than 1,000	Severe
1,000 to 2,000	Corrosive
2,000 to 10,000	Moderate
Greater than 10,000	Mild

4 POTENTIAL SEISMIC AND GEOLOGIC HAZARDS

The project site is in a seismically active region of Southern California and is expected to be subjected to seismic hazards during its design life. The structural design of the buildings should be performed by an experienced structural engineers in accordance with the governing seismic codes. Potential seismic hazards include strong ground shaking, ground surface rupture due to faulting, liquefaction and seismic settlement, slope instability, flooding, and tsunami. The following sections discuss these potential seismic and geologic hazards with respect to the proposed development.

4.1 Ground Surface Rupture

The potential hazard for ground rupture is evaluated through consideration of distance to active earthquake faults. Active earthquake faults are faults which have evidence of surface rupture in the last approximate 11,700 years. The State of California provides the location of potential active faults and zone them under the Alquist-Priolo Act. The project site is not located within a State identified Earthquake Fault Zone of Required Investigation. The closest active fault is the San Joaquin Hills fault located at about 6.05 kilometers (3.7 miles) southwest of the project site, as shown in Figure 4. Therefore, the potential hazard of ground surface rupture at the site is considered low.

4.2 Seismic Design Parameters

4.2.1 New Structures (ASCE 7-16)

New structures should be designed in general accordance with the seismic provisions of the 2022 California Building Code and ASCE 7-16 for Seismic Design Category D. Based on the subsurface exploration and underlying geology, the site classification for seismic design is Site Class D, in accordance with Chapter 20 of ASCE 7-16.

Per Section 11.4.8 of ASCE 7-16 and Supplement 3, a site-specific ground motion hazard analysis is required for "structures on Site Class D sites with S_1 greater than or equal to 0.2", unless the exception of Section 11.4.8 of Supplement 3 of ASCE 7-16 is met. Per this exception, a ground motion hazard analysis is not required where the mapped value of S_{M1} is increased by 50%.

Mapped seismic design parameters are provided below, incorporating the exception of Section 11.4.8 (S_{M1} is increased by 50%) of Supplement 3. Note that the corresponding S_{D1} and T_S are also increased as a result. The parameters tabulated below were developed using the referenced ASCE 7 Hazard Tool (ASCE, 2023).

Table 3 Mapped Seismic Design Acceleration Parameters (New Structures)

Design Parameters	Seismic Design Parameter Mapped Value (ASCE 7-16 Section 11.4)
Site Latitude	33.6770
Site Longitude	-117.7392
S_s (g)	1.248
S_1 (g)	0.446
Site Class	D
F_a	1.001
F_v	1.854
T_S (sec)	0.993
T_L (sec)	8.0
S_{MS} (g)	1.249
S_{M1} (g)	1.240
S_{DS} (g)	0.833
S_{D1} (g)	0.827
PGA_M (g)	0.571

4.2.2 Existing Structures (ASCE 41-17)

Existing structures (such as Hangar 10) should be evaluated in general accordance with the seismic provisions of the 2022 California Existing Building Code and ASCE 41-17. The parameters tabulated below were developed using the referenced ASCE 7 Hazard Tool (ASCE, 2023).

Table 4 Mapped Seismic Design Acceleration Parameters (Existing Structures)

Hazard Level	Design Parameters	Seismic Design Parameter Mapped Value (ASCE 41-17 Section 2.4.1)
BSE-1E	S_s (g)	0.511
	S_1 (g)	0.177
	F_a	1.392
	F_v	2.247
	S_{XS} (g)	0.711
	S_{X1} (g)	0.397
BSE-2E	S_s (g)	0.95
	S_1 (g)	0.337
	F_a	1.12
	F_v	1.963
	S_{XS} (g)	1.064
	S_{X1} (g)	0.661

4.3 Liquefaction and Seismic Settlement

Liquefaction involves the sudden loss in strength of a saturated, cohesionless soil (sand and non-plastic silts) caused by the build-up of pore water pressure during cyclic loading, such as produced by an earthquake. This increase in pore water pressure can temporarily transform the soil into a fluid mass, resulting in vertical settlement and can also cause lateral ground deformations. The following three simultaneous conditions are required for liquefaction:

- Loose to medium dense cohesionless soils;
- Groundwater within 50 feet of the surface; and
- Strong shaking, such as caused by an earthquake.

The project site is not located within a mapped liquefaction hazard zone and based on the encountered subsurface soil, the potential for liquefaction and its related effects, including seismically induced settlement (dry and liquefaction settlement), lateral spreading and soil strength loss, is considered low.

4.4 Landslides and Lateral Spreads

Project site is relatively flat, there are no soft or liquefiable soils, and no permanent cut slopes are anticipated for the proposed improvements. Therefore, lateral spreading is not a design concern.

5 FOUNDATION RECOMMENDATIONS

5.1 General

Development of the site is feasible from a geotechnical standpoint, provided that the recommendations presented in this report are implemented during design and construction of the project. Shallow foundation recommendations provided at the below can be employed for new building structures and existing Hanger 10 improvements.

5.2 Shallow Foundations

Conventional spread and continuous footings can be utilized to support new building structures and existing hangar 10 at the site if the project site is developed as discussed in Section 6.3. Foundation design parameters are provided in Table 5.

Table 5 Foundation Design Parameters

Item	Description
Foundation Type	Shallow Spread Footings
Net Allowable Bearing Pressure[1]	3,000 psf
Foundation Support[2]	Engineered fill extending 2 feet below the bottom of foundations
Minimum Foundation Dimensions	Continuous: 18 inches Columns: 24 inches
Minimum Embedment below Finished Grade	18 inches
Ultimate Passive Resistance[3] **(Equivalent fluid pressures)**	360 pcf
Ultimate Coefficient of Sliding Friction[4]	0.57
Estimated Static Settlement from Structural Loads[5]	About 1 inch
Estimated Differential Settlement [4]	About ½ of total settlement

Notes:

1. Allowable bearing pressure may be increased by 1/3 for transient loads unless those loads have been factored to account for transient conditions. Allowable bearing pressure is based on 1-inch settlement and maximum column width of 10 feet and maximum strip footing width of 5 feet.
2. In Hangar 10, engineered fill below new foundations may be reduced to 1 foot.
3. A factor of safety of 2.0 is recommended.
4. A factor of safety of 1.5 is recommended. Ultimate assumes concrete is cast against the soil.
5. In Hangar 10 differential settlement between the new and existing foundations is expected to approach the magnitude of the total settlement of the new footings. The structural engineer should account for the anticipated differential settlement between new and existing footings in the design of the improvements.

In Hangar 10, new footings should bear at or near the bearing elevation of immediately adjacent existing foundations. If this depth varies from the minimum footing depth required herein, Group Delta should be notified to adjust our recommendations as needed. Depending upon their locations and current loads on the existing footings, footings for the wall and/or columns could cause settlement of adjacent walls. To reduce this concern and risk, clear distances at least equal to the new footing widths should be maintained between the new footings and footings supporting the existing hangar.

We understand existing foundations for hangar may support additional load from the improvements. It is likely additional loads on the existing foundations could cause other building settlements to occur. The structural capacity of existing foundations should be evaluated by a licensed structural engineer, where increases in loading are planned.

5.3 Slab-on-Grade

5.3.1 Interior Slabs

Concrete slabs should have a minimum thickness of 4 inches and should have a minimum reinforcement with 6” x 6” W2.9/2.9 welded wire mesh or equivalent. All slab reinforcement should be properly supported to ensure the desired placement. The actual slab thickness and reinforcement should be designed by the project structural engineer.

To reduce the potential for moisture transmission through slabs where moisture sensitive floor covering will be installed, we recommend that a vapor barrier be used. In accordance with ACI 302.2R-06, the material must comply with the requirements of ASTM E1745, “Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs,” and have a permeance of less than 0.01 perms per ASTM E96. The installation of the moisture barrier should comply with ASTM E1643. Concerning whether to place two inches of sand over the retarder, reference is made to ACI 302.2R, Section 7.2, which states that the anticipated benefits and risks associated with the location of the vapor retarder should be reviewed on a case by case basis with all appropriate parties, considering anticipated project conditions and the potential effects of concrete curing, cracking, and curling.

An estimated modulus of subgrade reaction of 150 pounds per square inch per inch (psi/in) can be used for slab design. The modulus was obtained based on estimates obtained from NAVFAC 7.1 design charts. This value is for a small loaded area (1 Sq. ft or less) such as for forklift wheel loads or point loads and should be adjusted for larger loaded areas. Below equations can be used for adjustment.

$$K_{(BxB)} = K_1 \left(\frac{B+1}{2B}\right)^2$$

$$K_{(BxL)} = \frac{K_{BxB}\left(1 + 0.5 * \left(\frac{B}{L}\right)\right)}{1.5}$$

Where:

k_1 = Coefficient of subgrade reaction of foundations measuring 1 ft. x 1ft.

$K_{(BxB)}$ = Coefficient of subgrade modulus for a square foundation having dimensions BxB.

$K_{(BxL)}$ = Coefficient of subgrade modulus for a rectangular foundation having dimensions BxL.

5.3.2 Exterior Slabs

Exterior slabs-on-grade, exterior architectural features, and utilities founded on, or in backfill may experience some movement due to the volume change of the backfill. To reduce the potential for damage caused by movement, we recommend:

- Minimizing moisture increases in the backfill;
- Placement of effective control joints on relatively close centers and isolation joints between slabs and other structural elements;
- The adjacent area should be slope at 2 percent, or greater, to provide adequate drainage away from slabs;
- Use of designs which allow vertical movement between the exterior slabs and adjoining structural elements;

Concrete slabs for walkways and hardscapes can be supported on at least 2 feet of properly compacted fill to at least 90% relative compaction. Slabs should be designed for the anticipated loading. We recommend that such slabs be at least 4-inchs thick and reinforced with at least 6-inch by 6-inch, W2.9 by W2.9 welded wire fabric placed at slab mid-height with crack control joints with a maximum spacing of 5-foot centers each way for sidewalks and 10-foot centers each way for slabs. Actual crack control joint spacing should be designed by the project structural engineer or architect in conformance with the requirements of the 2022 CBC.

6 CONSTRUCTION CONSIDERATIONS

6.1 Plan Review

The foundation and grading plans should be reviewed by Group Delta prior to beginning construction to confirm conformance with the geotechnical recommendations.

6.2 Construction Observation and Testing

The Geotechnical Engineer’s representative should observe subgrade preparation, backfill and fill placement. Excavation bottoms should be observed and approved by the Geotechnical Engineer’s representative prior to placement of concrete, steel, piping, or backfill materials. The project Geotechnical Engineer's representative may perform compaction tests, probing, or use other methods, to verify that the foundations will be supported in competent soils. Sufficient in-place field density tests should be performed during fill placement to verify that the entire fill is placed in accordance with the recommendations provided in the geotechnical report and applicable codes.

If disturbed, wet, or otherwise unsuitable soils are encountered, or if water saturates the soils, the soils shall be excavated or stabilized as recommended by the representative of the Geotechnical Engineer.

6.3 Earthwork and Grading

Grading and earthwork should be conducted in general accordance with the applicable local grading ordinance and the requirements of the 2022 California Building Code. The following recommendations are provided regarding specific aspect of the proposed earthwork construction.

6.3.1 Site Preparation

6.3.1.1 Clearing and Grubbing

The area that will be developed should be cleared and grubbed of all existing footings, pavements, other improvements, and vegetation in general accordance with Section 300-1 of the Standard Specifications for Public Works Construction (Green Book, 2018).

The Civil Engineer should identify the presence and location of all existing utilities on and adjacent to the project site. Precautions will be required to remove, relocate or protect existing structures, as appropriate. After clearing and grubbing the site, remedial grading should be performed in the building and other general improvement areas as recommended in the following sections. Existing subsurface utilities that are to be abandoned should be removed and the excavations backfilled and compacted as described in the following sections. Alternatively, abandoned utilities may be grouted with a two-sack sand-cement slurry under the observation of Group Delta.

6.3.1.2 Remedial Grading

While not encountered in our borings, undocumented fill soils are likely present at the site that are associated with the construction of the existing development. We recommend that all fill and disturbed soils encountered during grading within the proposed building footprint, be removed, and the excavation thoroughly cleaned prior to backfill placement and/or construction.

Within areas of new footings in the interior of the existing Hangar 10, we recommend that the existing slab and subgrade soils be removed to a minimum depth of at least 1 foot below bottom of proposed new footings. Within areas of new buildings, we recommend that the proposed new buildings be supported on engineered fill extending to a minimum depth of 2 feet below the bottom of foundations, or 5 feet below existing grades, whichever is greater. Engineered fill placed beneath the entire footprint of the structure should extend horizontally a minimum distance of 5 feet beyond the outside edge of perimeter footings. The engineered fill should be compacted to a minimum of 95 percent of its maximum dry density at slightly above optimum moisture content (as determined by ASTM D1557).

In general the exposed subgrade at the bottom of overexcavation should be proof rolled with loaded heavy equipment under Group Delta's observation to disclose any areas of deeper unsuitable soils. Areas of soft, loose, wet, pumping, or otherwise unsuitable soils should be further excavated or stabilized as recommended by Group Delta in the field. Subgrade stabilization may consist of the placement of a granular working mat consisting of gravel with or without geogrid, replacement with compacted dried soil, or lime/cement treatment. After proof-rolling the exposed subgrade which will receive fill, once properly cleared and benched where necessary, should be scarified to a minimum depth of 8-inches, brought to slightly above optimum moisture content, and compacted as described in the next section. The excavation may then be backfilled from bottom of overexcavation to the planned finish subgrade with compacted fill. All backfill below lightly loaded footings and slabs should consist of "Very Low" expansion potential soils (EI<20 based on ASTM D489).

6.3.2 Fill Compaction

All fill and backfill should be placed in horizontal lifts, not to exceed 10-inches in loose thickness, at slightly above optimum moisture content and compacted with equipment that is capable of producing a uniformly compacted product. In general, the minimum recommended relative compaction is 90 percent of the maximum dry density based on ASTM D1557. All fill placed within the proposed building areas and below foundation should be compacted to at least 95% relative compaction. In pavement area, the upper 12 inches of subgrade soils and all aggregate base material should be brought to a minimum relative compaction of 95% prior to paving. Within utility trenches, upper 12 inches should be compacted to 95% within pavement and structural areas. Sufficient observation and testing should be performed by Group Delta so that an opinion can be rendered as to the compaction achieved. Rocks or concrete fragments greater than 4-inches in maximum dimension should not be used in structural fill.

6.4 On-Site and Imported Fills

The on-site native material that consist of low expansive clayey sand and silty sand can be used as engineered fill at the site if compacted in accordance with Section 6.3.2.

Import fill sources, in any, should be observed and tested prior to hauling onto the site to evaluate the suitability for use. Imported fills materials should consist of granular soil with less than 35 percent passing the No. 200 sieve based on ASTM D 1140 and an EI less than 20 based on ASTM D4829. More stringent requirements may apply for soils to be sued for specific purposes. Samples of the proposed import should be tested by Group Delta in order to evaluate the suitability of these soils for their proposed use. During grading operations, soil types may be encountered by the contractor that do not appear to conform to those discussed in this report. In the case, Group Delta should be notified in order to evaluate the suitability of these soils for their proposed use.

6.5 Excavation

The contractor is responsible for excavation safety, and all excavations should comply with the current California and Federal Occupational Safety and Health Administration (CALOSHA) requirements (29 CFR-Part 1926, Subpart P), as applicable. Temporary slopes, up to 20 feet high, may be cut at a gradient of 1.5H:1V (horizontal : vertical). Unshored excavations should not extend below a 1H:1V imaginary plane extending down from any foundations to be protected in place.

If sloping or benching is not practical due to space constraints, temporary shoring may be used. Vertical temporary excavations deeper than 5 feet should be shored. No surcharge loads should be permitted within a horizontal distance equal to the height of cut or 5 feet, whichever is greater from the top of the excavation, unless the shoring is designed for surcharge loading. All shoring should comply with OSHA regulations and 29 CFR Part 1926 guidelines and be observed and deemed safe by the designated competent person on site. The designated competent person should observe all excavations to determine the safety prior to excavation.

For design of cantilevered temporary shoring, where the surface of the backfill is level, it can be assumed that drained soils will exert a lateral pressure equal to that developed by a fluid with a density of 37 pcf. Surcharge loads from equipment or stockpiled material should be kept behind the top of the temporary excavations a horizontal distance of at least twice the depth of the excavation, or the shoring should be designed for the additional pressure. Foundation and traffic loads from adjacent areas should also be added to the lateral earth pressures.

For design of temporary rigid shoring such as braced shoring or trench shields in sandy soils, we recommend the use of a rectangular lateral pressure of 25H psf, where H is the height of the shoring in feet. In addition, 46 percent of any surcharge load should be included as a uniform rectangular loading on the shoring. For traffic loads no larger than highway trucks, the lateral pressure from traffic surcharge may be taken as a uniform lateral pressure of 100 psf. Other surcharge loads may be evaluated by Group Delta on a case-by-case basis.

Surface drainage should be controlled and prevented from running down the temporary excavations or down the face of the shoring. Ponding water should not be allowed within the excavation.

6.6 Utility Trenches

Excavations for utility trenches should be readily accomplished with conventional excavating equipment. All shoring and excavation should comply with current OSHA regulations and be observed by the designated competent person on site. Excavations should extend to firm and unyielding subgrade prior to backfill.

Bedding material and placement should generally comply with Section 306-6 of Green book (2018). The bedding for any new service line should be a minimum of 4 inches thick and should consist of clean sand, No. 4 concrete aggregate or gravel, and should have a sand equivalent of not less than 30. The pipe zone material, which extends to a level 12 inches above the pipe should have a sand equivalent of no less than 30, and a maximum rock size of 3/4 inch. All imported materials should be approved by the project geotechnical engineer before being brought on site.

Trench zone backfill extends from a level 12 inches above the pipe to the finished subgrade. In general, on-site excavated materials are suitable as backfill. Any boulders or cobbles larger than 3 inches in any dimensions, or any organics or other deleterious materials, should be removed before backfilling. We recommend that all backfill should be placed in lifts not exceeding six to eight inches in thickness and be compacted to at least 90% of relative compaction as determined by the ASTM D1557. Mechanical compaction will be required to accomplish compaction above the bedding along the entire pipeline alignments. Jetting or flooding of backfill should not be permitted.

In backfill areas, where mechanical compaction of soil backfill is impractical due to space constraints, 2-sack slurry (CLSM) may be substituted for compacted backfill.

6.7 Pavement Design

6.7.1 Hot-Mix Asphalt Pavement

Near surface materials in the site are generally clayey sand soils. During the field investigation at the site, one sample of the near surface soil taken from our borings was tested in our laboratory to determine the Hveem Stabilometer Value (R-value). The test produced an R-value of 20 and a design R-value of 20 was used to calculate the Asphalt Concrete (AC) pavement thickness sections.

Provided that our fill compaction recommendations will be followed. Table 6 provides AC pavement recommendations for a 20-year design life in accordance with the Caltrans Highway Design Manual (Caltrans 2022) for Traffic Index (TI) values of 4, 5, 5.5 and 7.

Table 6 Pavement Sections

Traffic Index	AC Pavement Thickness (in)	Class 2 Aggregate Base Thickness (in)
4	3.0	6
5	4	6
5.5	4.5	6
7.0	5.5	9

It is recommended that the Civil Engineer select an appropriate design TI based on anticipated vehicular loading. The upper 10-inches of subgrade supporting pavements should be compacted to at least 95 percent relative compaction (ASTM D1557).

6.7.2 Concrete Pavement

PCC design was conducted in accordance with the simplified design procedure (Chapter 4) of the Portland Cement Association. This methodology is based on a 20-Year design life. For design, it was assumed that aggregate interlock would be used for load transfer across control joints. For light duty drive aisles, we recommend 5 inches of concrete over 6-inch Class II Aggregate Base. For heavy loaded areas, we recommend 6 inches of concrete over 8-inch Class II Aggregate Base.. The concrete should have a modulus of rupture equal to a minimum of 600 psi. Crack control joints should be constructed for all PCC slabs on a maximum spacing of 12 feet, each way. Concrete pavement with concentrated truck traffic should be reinforced with number 4 bars at 18-inch center-to-center in each direction.

6.7.3 Paver Recommendations

Interlocking concrete pavers can be used for both vehicular and pedestrian traffic. Interlocking concrete pavers should be designed and installed in accordance with the manufactures recommendations. A class II aggregate base or crushed miscellaneous base should be placed below the pavers. The thickness of base should be at least 6 inches for walkways. The sand used for bedding and jointing should be clean concrete sand, free of clay or other deleterious materials. The sand should conform to ASTM C-33. Masonry sand, conforming to ASTM C-144, can be used to complete filling of the joints after initial compaction. The subgrade soils should be scarified to a depth of 8-inches, moisture conditioned near optimum moisture content and recompacted to a minimum of 95% relative compaction in accordance with ASTM D-1557. All aggregate bases should also be compacted to at least 95 percent relative compaction. Aggregate base should confirm to Section 200-2 of the Standard Specifications for Public Works Construction.

Table 7 provides paver sections for a 20-year design life for Traffic Index (TI) values of 4, 5, 5.5 and 7.

Table 7 Vehicular Paver Sections

Traffic Index	Paver Design Section
4	Pavers over 8" AB (Aggregate Base)
5	Pavers over 10.5" AB
5.5	Pavers over 12" AB
7.0	Pavers over 16" AB

7 LIMITATIONS

This report has been prepared for the exclusive use of City of Irvine and their design partners for the proposed project development. The findings, conclusions, and recommendations presented in this report were prepared in a manner consistent with the level of care and skill ordinarily exercised by other members of the geotechnical engineering profession currently practicing under similar conditions subject to the time limits and financial, physical, and other constraints applicable to the scope of work. No warranty, express or implied, is made.

The recommendations for this project are dependent upon proper quality control of grading and construction. If parties other than Group Delta are engaged to provided observation of the grading and improvement operations, they should be notified that they will be required to assume responsibility for the geotechnical phase of the project by concurring with the recommendations in this report or provide alternate recommendations as deemed appropriate.

8 REFERENCES

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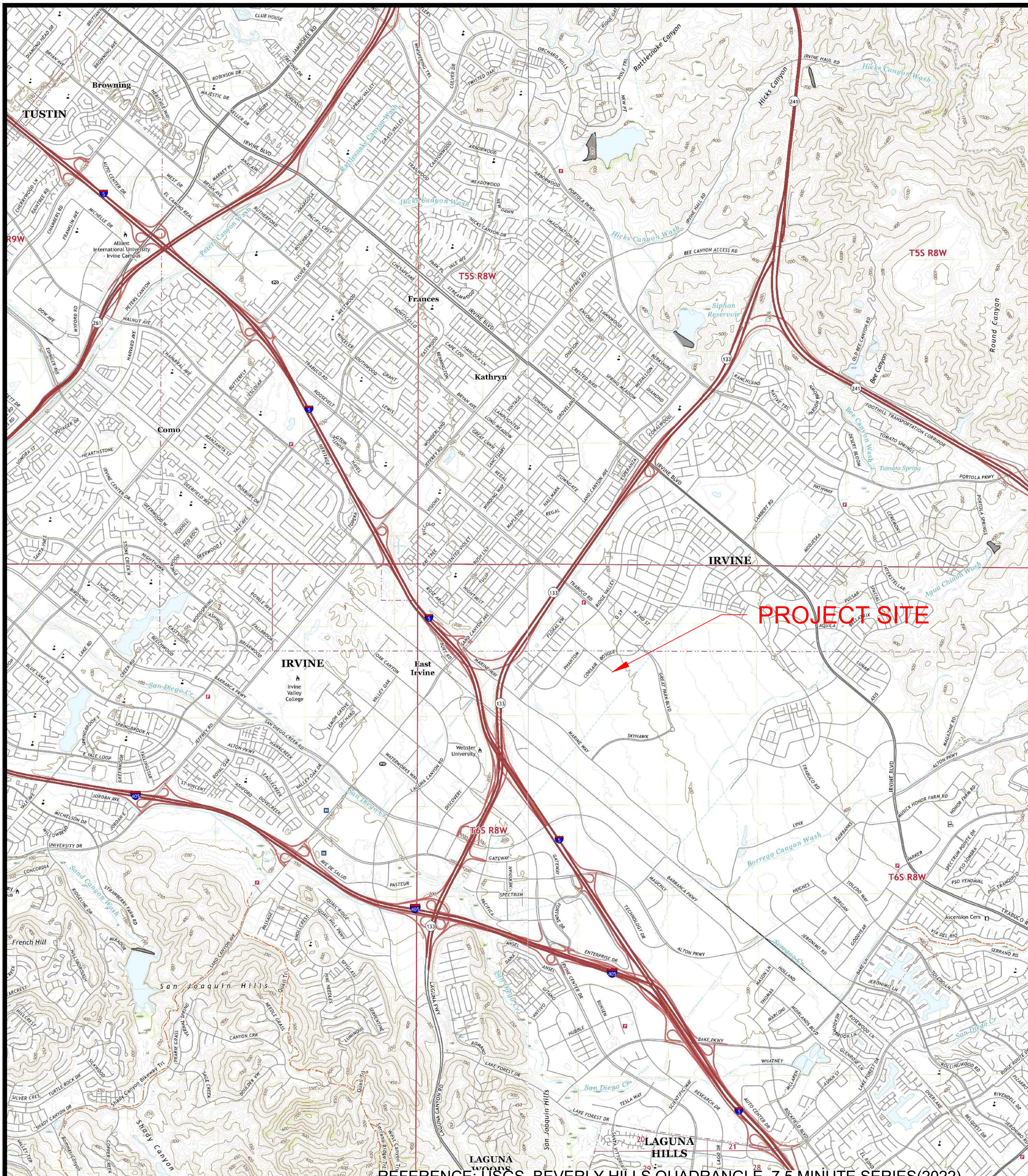
FIGURES



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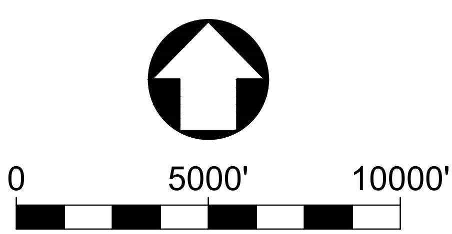

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PREPARED BY: JMT/BA	PROJECT NAME: GREAT PARK HORNET AND BEACON INTERSECTION IRVINE, CALIFORNIA	PROJECT NUMBER: IR855
REVIEWED BY: AT	SITE LOCATION MAP	

FILE PATH: \\192.168.100.6\Files$\Projects_AVI800\IR855 City of Irvine_The Canopy 2 Site at the Irvine Great Park\08_Drafting\IR855-Fig 1.dwg
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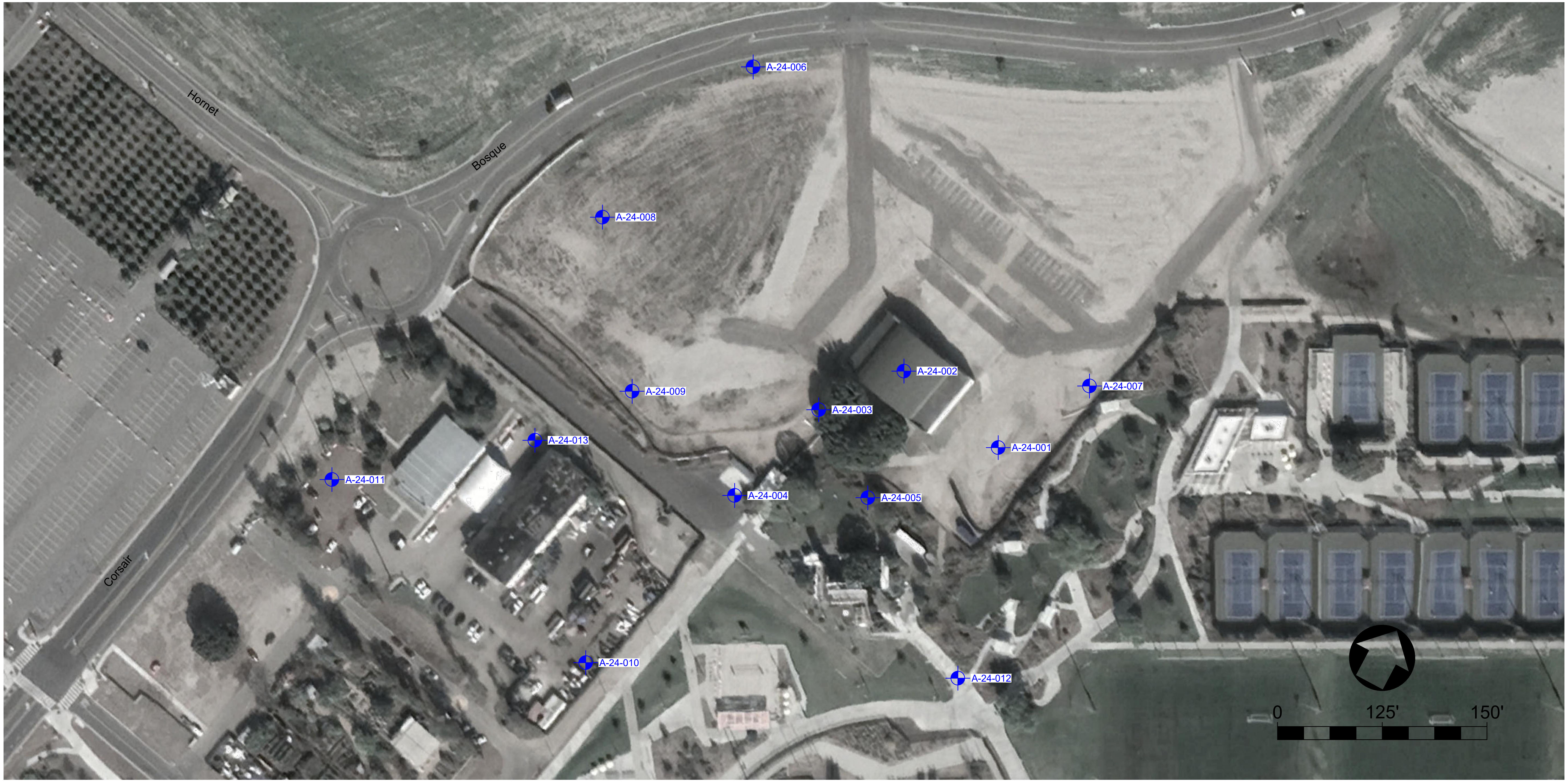

REFERENCE: GOOGLE, INC (2025) GOOGLE EARTH PRO, AERIAL IMAGERY DATED: DECEMBER, 2022

EXPLANATION:

A-25-004 APPROXIMATE BORING LOCATION

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	REVIEWED BY: AT	EXPLORATION LOCATION PLAN	

FILE PATH: \\192.168.100.6\Files$\Projects_AV\800\IR855 City of Irvine_The Canopy 2 Site at the Irvine Great Park\08_Drafting\IR855-Fig 2.dwg
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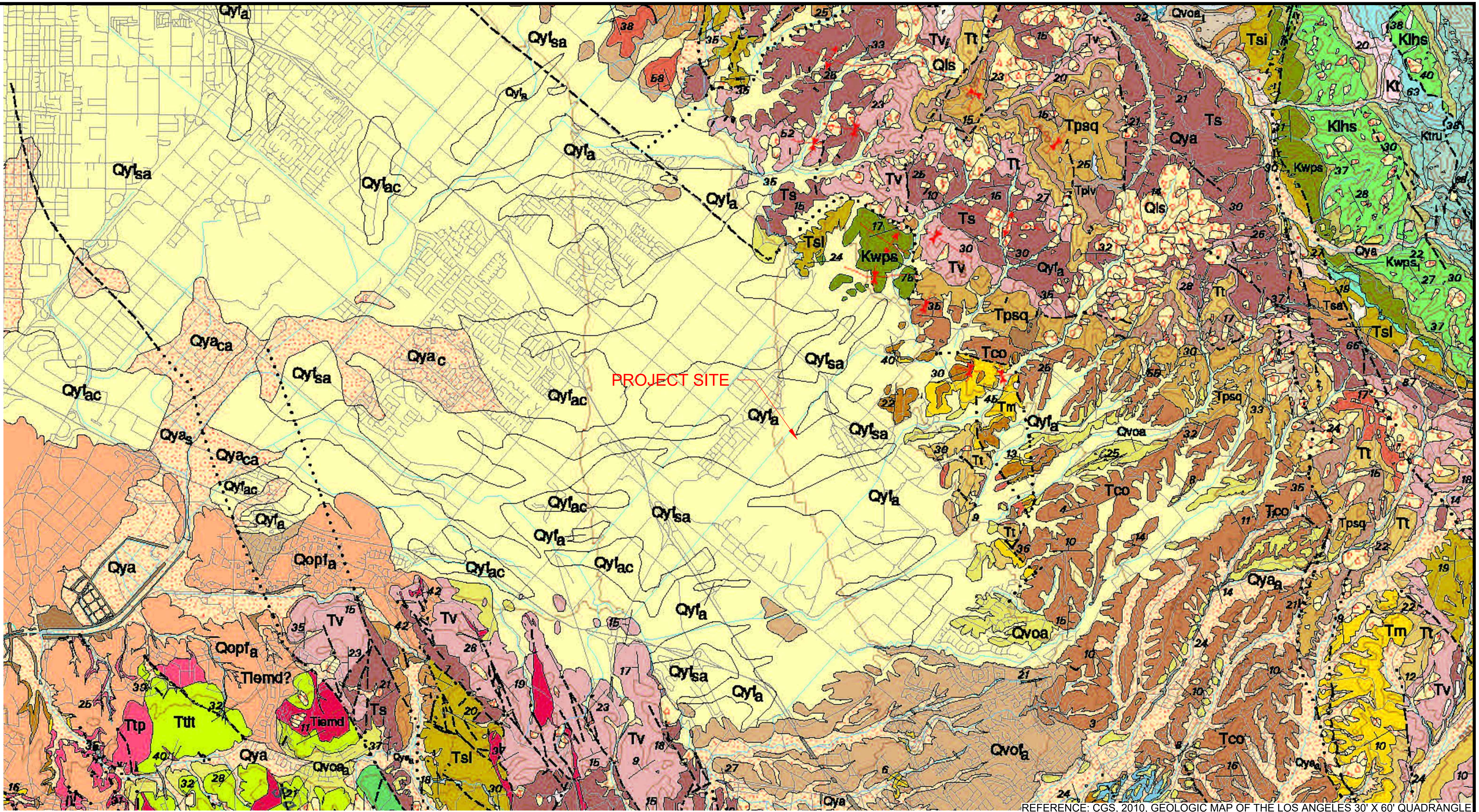

REFERENCE: CGS, 2010, GEOLOGIC MAP OF THE LOS ANGELES 30' X 60' QUADRANGLE

EXPLANATION:

Qyf_a Holocene Young Alluvial Fan

0 5000' 10000'

GROUP DELTA	GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 32 MAUCHLY, SUITE B IRVINE, CALIFORNIA (949) 450-2100	FIGURE NUMBER: 3
DRAFTED BY: JMT / BA	PROJECT NAME: GREAT PARK HORNET AND BEACON INTERSECTION IRVINE, CALIFORNIA	PROJECT NUMBER: IR855
REVIEWED BY: AT	REGIONAL GEOLOGIC MAP	

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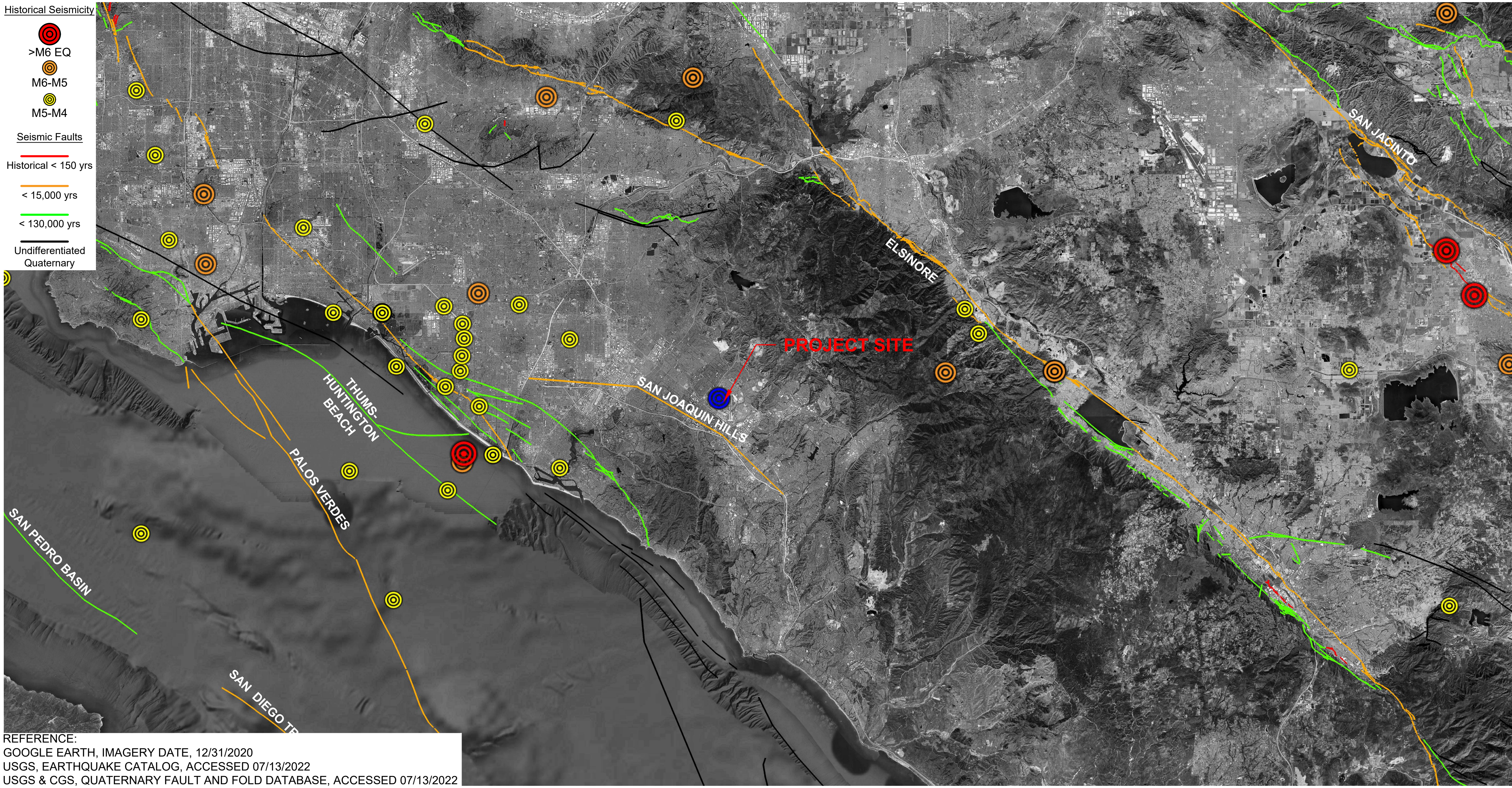
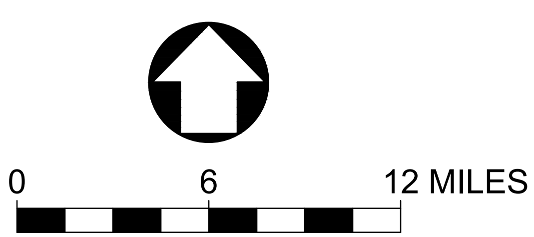


REFERENCE:
GOOGLE EARTH, IMAGERY DATE, 12/31/2020
USGS, EARTHQUAKE CATALOG, ACCESSED 07/13/2022
USGS & CGS, QUATERNARY FAULT AND FOLD DATABASE, ACCESSED 07/13/2022



GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
32 MAUCHLY, SUITE B
IRVINE, CALIFORNIA (949) 450-2100

FIGURE NUMBER: 4

DRAFTED BY: JMT / BA

PROJECT NAME:
GREAT PARK
HORNET AND BEACON INTERSECTION
IRVINE, CALIFORNIA

PROJECT NUMBER: IR855

REVIEWED BY: AT

REGIONAL FAULT AND SEISMICITY MAP

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APPENDIX A
FIELD EXPLORATION

APPENDIX A
FIELD INVESTIGATION

INTRODUCTION

The subsurface conditions at the project site were investigated by performing borings as described below. A summary of field explorations (Table A-1), boring record legend, key for soil classification, boring records, records of other explorations, drive hammer energy calibrations, and other relevant information are presented in the attachments to this appendix. Specific details for each boring are presented in the title block of each boring record.

Prior to beginning the exploration program, access permission and drilling permits were obtained as necessary. Subsurface utility maps were reviewed prior to selecting locations for subsurface investigations. Underground Service Alert (USA) was notified, and each exploration location was cleared for underground utilities using geophysical techniques as needed. Approved traffic control plans were implemented where necessary during field activities. The exploration methods are described in the following sections.

SOIL DRILLING AND SAMPLING

Drilling, Logging, and Soil / Rock Classification

Borings were performed by Group Delta's drilling subcontractors under the continuous technical supervision of a Group Delta field engineer or geologist, who visually inspected the soil samples, maintained detailed records of the borings, measured groundwater levels, and visually / manually classified the soils in accordance with the ASTM D 2488 and the Unified Soil Classification System (USCS). Logging and classification was performed in general accordance with Caltrans "Soil and Rock Logging, Classification, and Presentation Manual (2022 Edition)". A Boring Record Legend, Key for Soil Classification, and boring records are presented in the attachments to this appendix.

Sampling

Bulk samples of soil cuttings were collected at selected depths and drive and/or push samples were collected at a typical interval of 5 feet from the borings (closer or wider sample spacing was employed where considered necessary or appropriate). The sampling was performed using Standard Penetration Test (SPT) samplers in accordance with ASTM D 1586, Ring-Lined "California" Split Barrel samplers in accordance with ASTM D 3550, and/or Thin-Walled "Shelby" Tube Samplers in accordance with ASTM D 1587.

Bulk samples were collected from auger cuttings and placed in plastic bags.

SPT drive samples were obtained using a 2-inch outside diameter and 1.375-inch inside diameter split-spoon sampler without lining. The soil recovered from the SPT sampling was sealed in plastic bags to preserve the natural moisture content.

Modified California ("MODCAL") drive samples were collected with a 3.0 inch outside diameter (OD) (unless indicated otherwise on the boring record) ring-lined split barrel sampler with a 2.42-inch inside diameter (ID) cutting shoe. The sampler barrel is lined with 18-inches of metal rings for sample collection and has an additional length of waste barrel. Stainless steel or brass liner rings for sample collection are 1-inch high, 2.42-inch inside diameter, and 2.5-inch outside diameter. California samples were removed from the sampler, retained in the metal rings, and placed in sealed plastic canisters to prevent loss of moisture.

At each sampling interval, the drive samplers were fitted onto sampling rod, lowered to the bottom of the boring, and driven 18 inches or to refusal (50 blows per 6 inches) with a 140-lb hammer free-falling a height of 30-inches (unless otherwise indicated on the boring record).

Compared to the SPT, the California sampler provides less disturbed samples.

Penetration Resistance

SPT blow counts adjusted to 60% hammer efficiency (N_{60}) are routinely used as an index of the relative density of coarse-grained soils, and are sometimes used (but less reliable) to estimate consistency of cohesive soils. For samples collected using non-SPT samplers, different hammer weight and drop height, and/or efficiency different than 60%, correction factors can be applied to estimate the equivalent SPT N60 value following the approach of Burmister (1948) as follows:

$$N^*_{60} = N_R * C_E * C_H * C_S$$

where

N^*_{60} = equivalent SPT N_{60}

N_R = Raw Field Blowcount (blows per foot)

C_E = Hammer Efficiency Correction = Er_i / 60%

C_H = Hammer Energy Correction = (W * H) / (140 lb * 30 in)

C_S = Sampler Size Correction = $[(2.0\text{ in})^2-(1.375\text{ in})^2]/[D_o^2-D_i^2]$

Er_i = hammer efficiency, %

W= actual drive hammer weight, lbs

H = actual drive hammer drop, inch

D_o, D_i = actual sampler outside and inside diameter, respectively, inches

Burmister's correction assumes that penetration resistance (blowcount) is inversely proportional to the hammer energy. For a hammer other than a 140# hammer with 30" drop the hammer energy correction is equal to the ratio of the theoretical hammer energy (weight times drop) to the theoretical SPT hammer energy, or C_H = (W * H) / (140 lb * 30 in).

Burmister's correction assumes that penetration resistance (blowcount) is proportional to the annular end area of the drive sampler. For example, California drive samplers with Do=3 inch and Di=2.42 inch the sampler size correction factor is the ratio of the annular area of an SPT split spoon to that of the California Sampler, or $C_S = [2.0^2 - 1.375^2]/[3^2 - 2.42^2] = 0.67$.

To normalize the field SPT and California blowcounts to a hammer with 60% efficiency, an energy correction factor equal to Hammer Efficiency (%) / 60% was applied to the field blowcounts. Hammer efficiency was determined by Pile Driving Analyzer (PDA) measurement and/or by published correlations with the CME Automatic Hammer blow count rate (USBR, 1999). Hammer efficiency measurements are presented in the attachments to this appendix.

The correction factors applied to obtain N^*_{60} are shown in the "NOTES" section of the boring record title block. Corrected N^*_{60} are primarily used, with due engineering judgment, for qualitative assessment of in place density or consistency.

Relative Density and Consistency

Equivalent SPT N^*_{60} values were used as the basis for classifying relative density of granular/cohesionless soils. Wherever possible consistency classification of cohesive soils was based on undrained shear strength estimated in the field with a pocket penetrometer and/or Torvane or by testing in the laboratory. Where pocket penetrometer or other tests could not be performed, consistency of cohesive soils was estimated by correlations to Equivalent SPT N^*_{60}. The correlations for consistency and relative density are shown in the Boring Record Legend in the attachments to this appendix. Drive sample field blow counts, SPT N^*_{60} values, pocket penetrometer/Torvane readings, and corresponding density/consistency classifications are presented on the boring records.

Borehole Abandonment

At the completion of the drilling groundwater was measured (where possible) and the borings were abandoned by backfilling the borehole with as indicated on the records. The paved surfaces were patched with dyed quickset concrete. Notes describing the borehole abandonment are presented in the title block of each boring record.

Sample Handling and Transport

Geotechnical samples were sealed to prevent moisture loss, packed in appropriate protective containers, and transported to the geotechnical laboratory for further examination and geotechnical testing.

Laboratory Testing

The soil samples were further examined and tested in the laboratory and classified in accordance with the Unified Soil Classification System following ASTM D 2487 and D 2488 (see the Key for Soil Classification in the attachments to this appendix). Field classifications presented on the records were modified where necessary on the basis of the laboratory test results. Descriptions of the laboratory tests performed and a summary of the results are presented in Appendix B.

LIST OF ATTACHMENTS

Tables

Summary of Field Explorations

Figures

Boring Record Legend

Key for Soil Classification

Boring Records

Hammer Efficiency Calibrations

Table A-1: Summary of Field Explorations

Exploration No.	Ground Surface Elevation (feet)	Total Depth (feet)	Groundwater	
			Depth (feet)	Elevation (feet)
B-1	297	41.5	NE	NE
B-2	296	21.5	NE	NE
B-3	297	21.5	NE	NE
B-4	292	31.5	NE	NE
B-5	295	10	NE	NE
B-6	299	10	NE	NE
B-7	298	10	NE	NE
B-8	294	10	NE	NE
B-9	293	10	NE	NE
B-10	288	10	NE	NE
B-11	284	10	NE	NE
B-12	292	10	NE	NE
B-13	285	10	NE	NE

Notes:

NE = Not Encountered

SOIL IDENTIFICATION AND DESCRIPTION SEQUENCE

Sequence		Refer to Section: Field	Refer to Section: Lab	Required	Optional
1	Group Name	2.5.2	3.2.2	●	
2	Group Symbol	2.5.2	3.2.2	●	
	Description Components				
3	Consistency of Cohesive Soil	2.5.3	3.2.3	●	
4	Apparent Density of Cohesionless Soil	2.5.4		●	
5	Color	2.5.5		●	
6	Moisture	2.5.6		●	
7	Percent or Proportion of Soil	2.5.7	3.2.4	●	◉
	Particle Size	2.5.8	2.5.8	●	◉
	Particle Angularity	2.5.9			○
	Particle Shape	2.5.10			○
8	Plasticity (for fine-grained soil)	2.5.11	3.2.5		○
9	Dry Strength (for fine-grained soil)	2.5.12			○
10	Dilatency (for fine-grained soil)	2.5.13			○
11	Toughness (for fine-grained soil)	2.5.14			○
12	Structure	2.5.15			○
13	Cementation	2.5.16		●	
14	Percent of Cobbles and Boulders	2.5.17		●	
	Description of Cobbles and Boulders	2.5.18		●	
15	Consistency Field Test Result	2.5.3		●	
16	Additional Comments	2.5.19			○

Describe the soil using descriptive terms in the order shown

Minimum Required Sequence:

USCS Group Name (Group Symbol); Consistency or Density; Color; Moisture; Percent or Proportion of Soil; Particle Size; Plasticity (optional).

◉ = optional for non-Caltrans projects

Where applicable:

Cementation; % cobbles & boulders;
Description of cobbles & boulders;
Consistency field test result

Ref.: Caltrans Soil and Rock Logging Classification, and Presentation Manual (2010)

HOLE IDENTIFICATION

Holes are identified using the following convention:

H-YY-NNN

Where:
H: Hole Type Code
YY: 2-digit year
NNN: 3-digit number (001-999)

Hole Type Code	Description
A	Auger boring (hollow or solid stem, bucket)
R	Rotary drilled boring (conventional)
RC	Rotary core (self-cased wire-line, continuously-sampled)
RW	Rotary core (self-cased wire-line, not continuously sampled)
P	Rotary percussion boring (Air)
HD	Hand driven (1-inch soil tube)
HA	Hand auger
D	Driven (dynamic cone penetrometer)
CPT	Cone Penetration Test
O	Other (note on LOTB)

Description Sequence Examples:

SANDY lean CLAY (CL); very stiff; yellowish brown; moist; mostly fines; some SAND, from fine to medium; few gravels; medium plasticity; PP=2.75.

Well-graded SAND with SILT and GRAVEL and COBBLES (SW-SM); dense; brown; moist; mostly SAND, from fine to coarse; some fine GRAVEL; few fines; weak cementation; 10% GRANITE COBBLES; 3 to 6 inches; hard; subrounded.

Clayey SAND (SC); medium dense, light brown; wet; mostly fine sand,; little fines; low plasticity.

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BORING RECORD LEGEND #1

GROUP SYMBOLS AND NAMES

Graphic / Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly graded SAND Poorly graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic / Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTS

C	Consolidation (ASTM D 2435-04)
CL	Collapse Potential (ASTM D 5333-03)
CP	Compaction Curve (CTM 216 - 06)
CR	Corrosion, Sulfates, Chlorides (CTM 643 - 99; CTM 417 - 06; CTM 422 - 06)
CU	Consolidated Undrained Triaxial (ASTM D 4767-02)
DS	Direct Shear (ASTM D 3080-04)
EI	Expansion Index (ASTM D 4829-03)
M	Moisture Content (ASTM D 2216-05)
OC	Organic Content (ASTM D 2974-07)
P	Permeability (CTM 220 - 05)
PA	Particle Size Analysis (ASTM D 422-63 [2002])
PI	Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89-02, AASHTO T 90-00)
PL	Point Load Index (ASTM D 5731-05)
PM	Pressure Meter
PP	Pocket Penetrometer
R	R-Value (CTM 301 - 00)
SE	Sand Equivalent (CTM 217 - 99)
SG	Specific Gravity (AASHTO T 100-06)
SL	Shrinkage Limit (ASTM D 427-04)
SW	Swell Potential (ASTM D 4546-03)
TV	Pocket Torvane
UC	Unconfined Compression - Soil (ASTM D 2166-06) Unconfined Compression - Rock (ASTM D 2938-95)
UU	Unconsolidated Undrained Triaxial (ASTM D 2850-03)
UW	Unit Weight (ASTM D 4767-04)
VS	Vane Shear (AASHTO T 223-96 [2004])

SAMPLER GRAPHIC SYMBOLS

- Standard Penetration Test (SPT)
- Standard California Sampler
- Modified California Sampler
- Shelby Tube
- Piston Sampler
- NX Rock Core
- HQ Rock Core
- Bulk Sample
- Other (see remarks)

DRILLING METHOD SYMBOLS

- Auger Drilling
- Rotary Drilling
- Dynamic Cone or Hand Driven
- Diamond Core

WATER LEVEL SYMBOLS

- First Water Level Reading (during drilling)
- Static Water Level Reading (after drilling, date)

Ref.: Caltrans Soil and Rock Logging Classification, and Presentation Manual (2010)

DEFINITIONS FOR CHANGE IN MATERIAL

Term	Definition	Symbol
Material Change	Change in material is observed in the sample or core, and the location of change can be accurately measured.	———————
Estimated Material Change	Change in material cannot be accurately located because either the change is gradational or because of limitations in the drilling/sampling methods used.	- - - - - - - - -
Soil/Rock Boundary	Material changes from soil characteristics to rock characteristics.	

GROUP DELTA

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BORING RECORD LEGEND #2

CONSISTENCY OF COHESIVE SOILS

Descriptor	Shear Strength (tsf)	Pocket Penetrometer, PP Measurement (tsf)	Torvane, TV. Measurement (tsf)	Vane Shear, VS. Measurement (tsf)
Very Soft	< 0.12	< 0.25	< 0.12	< 0.12
Soft	0.12 - 0.25	0.25 - 0.50	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.50	0.50 - 1.0	0.25 - 0.50	0.25 - 0.50
Stiff	0.50 - 1.0	1.0 - 2.0	0.50 - 1.0	0.50 - 1.0
Very Stiff	1.0 - 2.0	2.0 - 4.0	1.0 - 2.0	1.0 - 2.0
Hard	> 2.0	> 4.0	> 2.0	> 2.0

APPARENT DENSITY OF COHESIONLESS SOILS

Descriptor	SPT N_{60} - Value (blows / foot)
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	> 50

MOISTURE

Descriptor	Criteria
Dry	No discernable moisture
Moist	Moisture present, but no free water
Wet	Visible free water

PERCENT OR PROPORTION OF SOILS

Descriptor	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

PARTICLE SIZE

Descriptor		Size (in)
Boulder		> 12
Cobble		3 - 12
Gravel	Coarse	3/4 - 3
	Fine	1/5 - 3/4
Sand	Coarse	1/16 - 1/5
	Medium	1/64 - 1/16
	Fine	1/300 - 1/64
Silt and Clay		< 1/300

PLASTICITY OF FINE-GRAINED SOILS

Descriptor	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled, and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll, and not much time is required to reach the plastic limit; it cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

CONSISTENCY OF COHESIVE SOILS VS. N_{60}

Description	SPT N_{60} (blows / foot)
Very Soft	0 - 2
Soft	2 - 4
Medium Stiff	4 - 8
Stiff	8 - 15
Very Stiff	15 - 30
Hard	> 30

Ref: Peck, Hansen, and Thornburn, 1974, “Foundation Engineering”, Second Edition

Note: Only to be used (with caution) when pocket penetrometer or other data on undrained shear strength are unavailable. Not allowed by Caltrans Soil and Rock Logging and Classificaton Manual, 2010

CEMENTATION

Descriptor	Criteria
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

Ref.: Caltrans Soil and Rock Logging Classification, and Presentation Manual (2010), with the exception of consistency of cohesive soils vs. N_{60}.

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BORING RECORD LEGEND #3

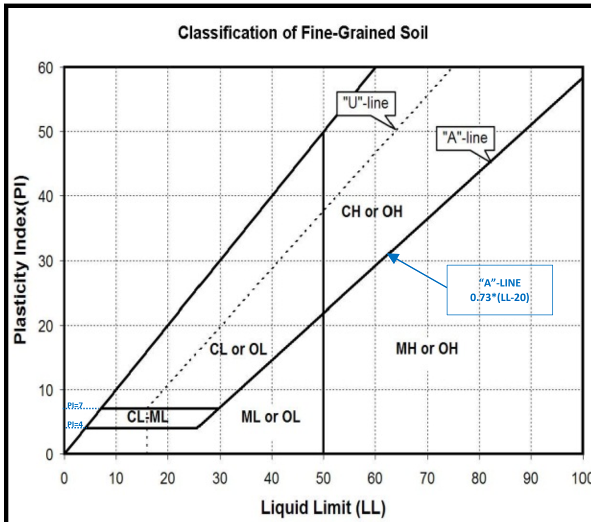
CLASSIFICATION OF INORGANIC FINE GRAINED SOILS (Soils with >50% finer than No. 200 Sieve)

GROUP SYMBOL				GROUP NAME
CL	<30% plus No. 200	<15% plus No. 200		Lean clay
		15-25% plus No. 200	%sand ≥%gravel	Lean clay with sand
			%sand <%gravel	Lean clay with gravel
	≥30% plus No. 200	% sand ≥ % gravel	<15% gravel	Sandy lean clay
			≥15% gravel	Sandy lean clay with gravel
		% sand < % gravel	<15% sand	Gravelly lean clay
			≥15% sand	Gravelly lean clay with sand
ML	<30% plus No. 200	<15% plus No. 200		Silt
		15-25% plus No. 200	%sand ≥%gravel	Silt with sand
			%sand <%gravel	Silt with gravel
	≥30% plus No. 200	% sand ≥ % gravel	<15% gravel	Sandy silt
			≥15% gravel	Sandy silt with gravel
		% sand < % gravel	<15% sand	Gravelly silt
			≥15% sand	Gravelly silt with sand
CH	<30% plus No. 200	<15% plus No. 200		Fat clay
		15-25% plus No. 200	%sand ≥%gravel	Fat clay with sand
			%sand <%gravel	Fat clay with gravel
	≥30% plus No. 200	% sand ≥ % gravel	<15% gravel	Sandy fat clay
			≥15% gravel	Sandy fat clay with gravel
		% sand < % gravel	<15% sand	Gravelly fat clay
			≥15% sand	Gravelly fat clay with sand
MH	<30% plus No. 200	<15% plus No. 200		Elastic silt
		15-25% plus No. 200	%sand ≥%gravel	Elastic silt with sand
			%sand <%gravel	Elastic silt with gravel
	≥30% plus No. 200	% sand ≥ % gravel	<15% gravel	Sandy elastic silt
			≥15% gravel	Sandy elastic silt with gravel
		% sand < % gravel	<15% sand	Gravelly elastic silt
			≥15% sand	Gravelly elastic silt with sand

Reference:
ASTM D 2487 and 2488

Laboratory Classification of Clay and Silt

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).



CL: LL<50; above A-Line.

CH: LL>50; above A-Line.

ML: LL<50; below A-Line, or PI<4, or Non-Plastic

MH: LL>50; below A-Line.

CL-ML: above A-Line and PI=4 to 7

CL/CH, ML/MH: at or near LL=50

ML/CL, MH/CH: at or near the A-Line

Field Identification of Clays and Silts

Group Symbol	Dry Strength	Dilatancy	Toughness	Plasticity
ML	None to low	Slow to rapid	Low or thread cannot be formed	Low to nonplastic
CL	Medium to high	None to slow	Medium	Medium
MH	Low to medium	None to slow	Low to medium	Low to medium
CH	High to very high	None	High	High

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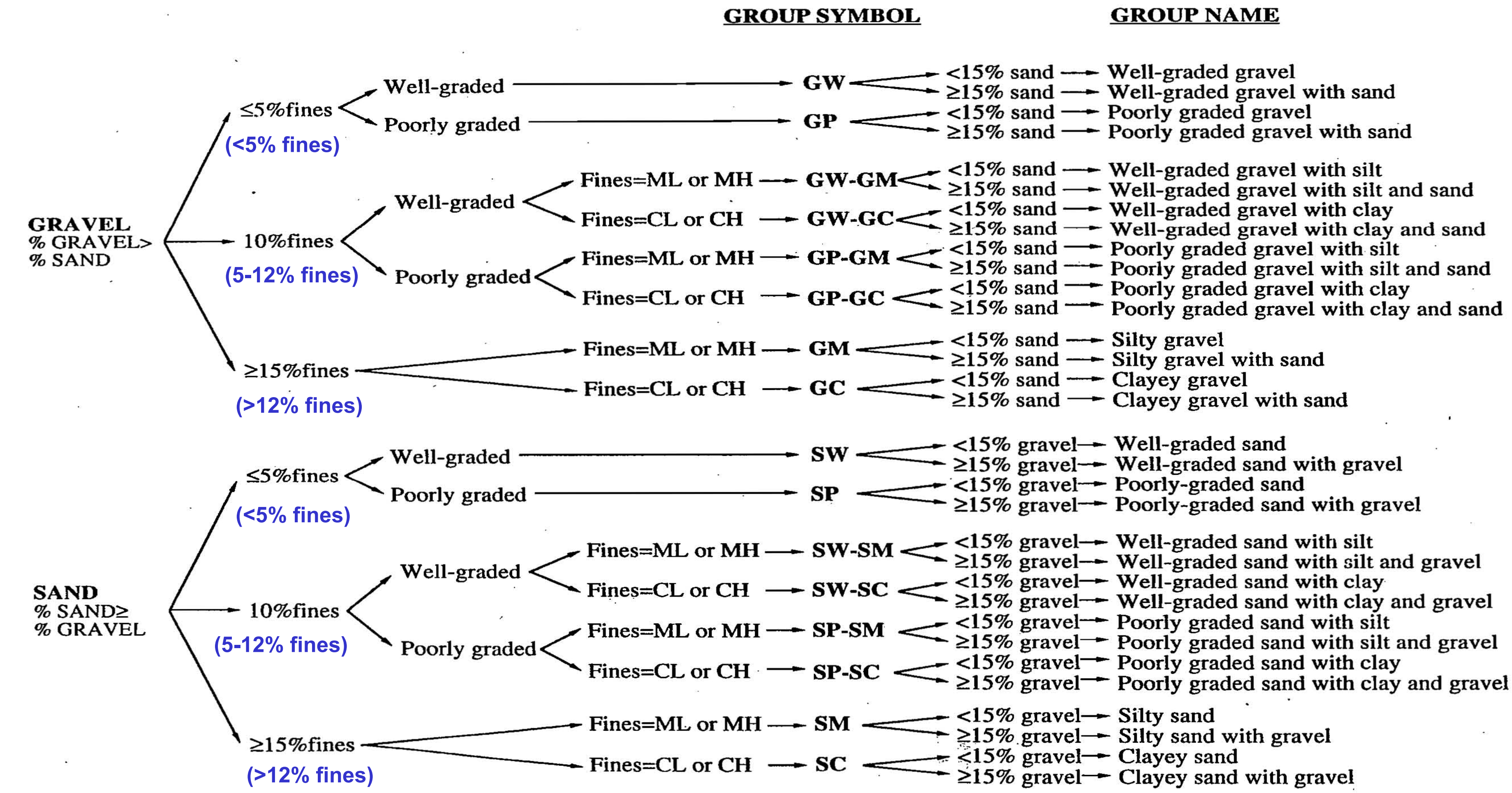
KEY FOR SOIL CLASSIFICATION #1

CLASSIFICATION OF COARSE-GRAINED SOILS (Soils with <50% “fines” passing No. 200 Sieve)



Reference:

ASTM D 2487 and 2488

Note: Values estimated to nearest 5% to be used for visual identification, values in parentheses to be used for classification when based on laboratory grain size data.

Granular Soil Gradation Parameters

Coefficient of Uniformity: $C_u = D_{60}/D_{10}$

Coefficient of Curvature: $Cc = D_{30}^2 / (D_{60} \times D_{10})$

D_{10} = 10% of soil is finer than this diameter

D_{30} = 30% of soil is finer than this diameter

D_{60} = 60% of soil is finer than this diameter

Group Symbol	Gradation or Plasticity Requirement
SW	$C_u > 6$ and $1 \le C_c \le 3$
GW	$C_u > 4$ and $1 \le C_c \le 3$
GP or SP	Clean gravel or sand not meeting requirement for SW or GW
SM or GM	Non-plastic fines or below A-Line or PI<4
SC or GC	Plastic fines or above A-Line and PI>7

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KEY FOR SOIL CLASSIFICATION #2

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Canopy 2 Site Great Park	IR855	**B-1**

SITE LOCATION	START	FINISH	SHEET NO.
Great Park, Irvine	1/23/2025	1/23/2025	1 of 3

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
2R Drilling	Simco 2800 HT	Hollow Stem Auger	I. Ewing	A. Tabatabaei

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Bulk, MC (2.4"), SPT (1.4")	84%	8	41.5	297	▽ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	
Automatic (140 lbs, 30 inch)	N_{60} =1.4 N_{SPT} =0.94N_{MC}	▼ NE / *NE* AFTER DRILLING

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TEST	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
															CLAYEY SAND (SC); medium dense; brown; moist; mostly fine and medium grained SAND; some fines. medium plasticity
			B-1												
	295														(Fines=37%, SAND=60%, GRAVEL=3%).
			S-2	11 8 9	17	24					39:17				
5			R-3	6 6 7	13	12			9.8	104.6					
	290														
10															SILTY SAND (SM); loose; dark yellowish brown; moist; mostly fine to medium grained SAND; little fines. (Fines=21%, SAND=79%).
			S-4	4 4 3	7	10									
	285														
15															SANDY SILTY CLAY (CL-ML); medium stiff; brown; moist, some fine to medium grained SAND; thin lenses of dark brown Lean CLAY (CL). (Fines=53%, SAND=47%).
			R-5	6 4 5	9	8			15.0	93.9					
	280														

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FIGURE

A-3 a

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Canopy 2 Site Great Park	IR855	B-1

SITE LOCATION	START	FINISH	SHEET NO.
Great Park, Irvine	1/23/2025	1/23/2025	2 of 3

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
2R Drilling	Simco 2800 HT	Hollow Stem Auger	I. Ewing	A. Tabatabaei

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Bulk, MC (2.4"), SPT (1.4")	84%	8	41.5	297	▽ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	AFTER DRILLING
Automatic (140 lbs, 30 inch)	N_{60} =1.4 N_{SPT} =0.94N_{MC}	▼ NE / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TEST	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S-6	3 4 5	9	13									
	275														
25			R-7	6 5 7	12	11									(Fines=59%, SAND=41%).
	270														
30			S-8	3 5 8	13	18									CLAYEY SAND (SC); medium dense; brown; moist; mostly fine to medium grained SAND; some fines; trace coarse grained SAND.
	265														
35			R-9	6 9 12	21	20									CLAYEY SAND (SC); medium dense; yellowish brown; moist; mostly medium grained SAND; little fines.
	260														

GDC_LOG_BORING_2016 IR855.GPJ GDC2013.GDT 2/28/25

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FIGURE A-3 b

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Canopy 2 Site Great Park	IR855	**B-1**

SITE LOCATION	START	FINISH	SHEET NO.
Great Park, Irvine	1/23/2025	1/23/2025	3 of 3

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
2R Drilling	Simco 2800 HT	Hollow Stem Auger	I. Ewing	A. Tabatabaei

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Bulk, MC (2.4"), SPT (1.4")	84%	8	41.5	297	∇ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	
Automatic (140 lbs, 30 inch)	N_{60} =1.4 N_{SPT} =0.94N_{MC}	AFTER DRILLING ▼ NE / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TEST	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S-10	11 17 24	41	57									CLAYEY SAND (SC); dense; reddish brown; moist; mostly fine grained SAND; some fines.
	255														Boring terminated at 41.5 feet below ground surface. No groundwater was encountered. Backfilled with tamped soil cutings.
45															
	250														
50															
	245														
55															
	240														

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FIGURE

A-3 c

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Canopy 2 Site Great Park	IR855	**B-2**

SITE LOCATION	START	FINISH	SHEET NO.
Great Park, Irvine	1/24/2025	1/24/2025	1 of 2

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
2R Drilling	Simco 2800 HT	Hollow Stem Auger	I. Ewing	A. Tabatabaei

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Bulk, MC (2.4"), SPT (1.4")	84%	8	21.5	296	▽ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	AFTER DRILLING
Automatic (140 lbs, 30 inch)	N_{60} =1.4 N_{SPT} =0.94N_{MC}	▼ NE / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
															Concrete Floor Slab, approximately 5-inches thick
	295														SILTY SAND (SM); dark brown; moist; fine to medium grained SAND.
			B-1									C			CLAYEY SAND (SC); light brown; moist; mostly medium grained SAND; little fines.
															Lean clay with sand (CL); stiff; dark brown; moist; some fine grained sand, medium plasticity.
5															
	290		R-2	9 7 8	15	14			12.9	87.6	46:27				
															CLAYEY SAND (SC); medium dense; brown; moist; mostly medium grained SAND; some fines, trace gravel.(Fines=46%, SAND=53%, GRAVEL=1%).
10															
	285		S-3	5 5 6	11	15									(Fines=28%, SAND=71%, GRAVEL=2%).
15															SILTY SAND (SM); medium dense; yellowish brown; moist; mostly medium grained SAND; some fines. (Fines=34%, SAND=66%)
	280		R-4	4 7 11	18	17			4.7	97.4					

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FIGURE

A-4 a

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Canopy 2 Site Great Park	IR855	**B-2**

SITE LOCATION	START	FINISH	SHEET NO.
Great Park, Irvine	1/24/2025	1/24/2025	2 of 2

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
2R Drilling	Simco 2800 HT	Hollow Stem Auger	I. Ewing	A. Tabatabaei

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Bulk, MC (2.4"), SPT (1.4")	84%	8	21.5	296	∇ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	
Automatic (140 lbs, 30 inch)	N_{60} =1.4 N_{SPT} =0.94N_{MC}	AFTER DRILLING ▼ NE / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	275		S-5	4 4 6	10	14									SILTY SAND (SM) (continued)
															Boring terminated at 21.5 feet below ground surface. No groundwater was encountered. Backfilled with tamped soil cutings.
25															
	270														
30															
	265														
35															
	260														

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FIGURE

A-4 b

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Canopy 2 Site Great Park	IR855	**B-3**

SITE LOCATION	START	FINISH	SHEET NO.
Great Park, Irvine	1/23/2025	1/23/2025	1 of 2

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
2R Drilling	Simco 2800 HT	Hollow Stem Auger	I. Ewing	A. Tabatabaei

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Bulk, MC (2.4"), SPT (1.4")	84%	8	21.5	297	⊻ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	
Automatic (140 lbs, 30 inch)	$N_{60} = 1.4\ N_{SPT} = 0.94 N_{MC}$	AFTER DRILLING ▼ NE / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TEST	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			B-1									EI			SILTY-CLAYEY SAND with GRAVEL (SC-SM); brown; moist; mostly medium grained SAND; some fines; little GRAVEL.
	295		R-2	11 8 9	17	16			10.1	100.6					CLAYEY SAND (SC); medium dense; brown; moist; mostly medium grained SAND; some fines; few GRAVEL. (Fines=37%, SAND=56%, GRAVEL=7%).
5			S-3	4 3 4	7	10									Loose.
	290		R-4	5 6 8	14	13			11.3	87.6					CLAYEY SAND (SC); medium dense; brown; moist; mostly medium grained SAND; some fines. (Fines=47%, SAND=53%).
			S-5	4 5 5	10	14									(Fines=33%, SAND=67%).
10															
	285														
15			R-6	8 13 12	25	23									CLAYEY SAND (SC) medium dense; brown; slightly moist; mostly fine grained SAND; some fines.
	280														

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FIGURE

A-5 a

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Canopy 2 Site Great Park	IR855	**B-3**

SITE LOCATION	START	FINISH	SHEET NO.
Great Park, Irvine	1/23/2025	1/23/2025	2 of 2

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
2R Drilling	Simco 2800 HT	Hollow Stem Auger	I. Ewing	A. Tabatabaei

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Bulk, MC (2.4"), SPT (1.4")	84%	8	21.5	297	⊻ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	
Automatic (140 lbs, 30 inch)	N_{60} =1.4 N_{SPT} =0.94N_{MC}	AFTER DRILLING ▼ NE / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TEST	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S-7	4 5 6	11	15									Clayey Sand (SC) (continued)
	275														Boring terminated at 21.5 feet below ground surface. No groundwater was encountered. Backfilled with tamped soil cuttings.
25															
	270														
30															
	265														
35															
	260														

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FIGURE

A-5 b

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Canopy 2 Site Great Park	IR855	B-4

SITE LOCATION	START	FINISH	SHEET NO.
Great Park, Irvine	1/23/2025	1/23/2025	1 of 2

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
2R Drilling	Simco 2800 HT	Hollow Stem Auger	I. Ewing	A. Tabatabaei

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Bulk, MC (2.4"), SPT (1.4")	84%	8	31.5	292	⊻ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	AFTER DRILLING
Automatic (140 lbs, 30 inch)	N_{60} =1.4 N_{SPT} =0.94N_{MC}	▼ NE / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TEST	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		Bulk	B-1												SILTY-CLAYEY SAND (SM); yellowish brown; moist; mostly fine grained SAND; some fines. (Fines=44%, SAND=55%, GRAVEL=1%).
	290														
		MC	R-2	9 7 7	14	13			6.4	93.1					Medium dense.
5		SPT	S-3	4 5 5	10	14									CLAYEY SAND (SC); medium dense; reddish brown; moist; mostly fine to medium grained SAND; some fines.
	285														
10		MC	R-4	6 6 7	13	12									
	280														
15		SPT	S-5	3 3 4	7	10									Loose.
	275														

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FIGURE

A-6 a

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Canopy 2 Site Great Park	IR855	**B-4**

SITE LOCATION	START	FINISH	SHEET NO.
Great Park, Irvine	1/23/2025	1/23/2025	2 of 2

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
2R Drilling	Simco 2800 HT	Hollow Stem Auger	I. Ewing	A. Tabatabaei

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Bulk, MC (2.4"), SPT (1.4")	84%	8	31.5	292	⊻ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	
Automatic (140 lbs, 30 inch)	N_{60} =1.4 N_{SPT} =0.94N_{MC}	AFTER DRILLING ▼ NE / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TEST	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R-6	10 12 9	21	20									Lean CLAY (CL); stiff; brown; moist; some fine grained SAND; trace coarse grained SAND.
	270														
25			S-7	4 4 6	10	14									CLAYEY SAND (SC); medium dense; reddish brown; moist; mostly fine grained SAND; some fines.
	265														
30			R-8	6 8 10	18	17									
	260														Boring terminated at 31.5 feet below ground surface. Groundwater not encountered. Backfilled with tamped soil cuttings.
35															
	255														

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Canopy 2 Site Great Park	IR855	B-5

SITE LOCATION	START	FINISH	SHEET NO.
Great Park, Irvine	1/24/2025	1/24/2025	1 of 1

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
2R Drilling	Simco 2800 HT	Hollow Stem Auger	I. Ewing	A. Tabatabaei

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Bulk, SPT (1.4")	84%	8	10	295	⊻ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	
Automatic (140 lbs, 30 inch)	N_{60} =1.4 N_{SPT} =0.94N_{MC}	▼ NE / *NE* AFTER DRILLING

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TEST	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			B-1												CLAYEY SAND (SC); brown; moist; mostly fine grained SAND; some fines.
5	290		S-2	4 3 3	6	8.4									Loose. (Fines=44%, SAND=57%).
															CLAYEY SAND (SC); dark brown; moist; mostly medium grained SAND; some fines.
10	285														Boring terminated at 10 feet below ground surface. No groundwater was encountered. Backfilled with tamped soil cuttings.
15	280														

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FIGURE

A-7

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Canopy 2 Site Great Park	IR855	B-6

SITE LOCATION	START	FINISH	SHEET NO.
Great Park, Irvine	1/23/2024	1/23/2024	1 of 1

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
2R Drilling	Simco 2800 HT	Hollow Stem Auger	I. Ewing	A. Tabatabaei

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Bulk, MC (2.4")	84%	8	10	299	⊻ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	AFTER DRILLING
Automatic (140 lbs, 30 inch)	N_{60} =1.4 N_{SPT} =0.94N_{MC}	▼ NE / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TEST	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	299	Bulk	B-1												CLAYEY SAND (SC): dark brown; moist; mostly fine grained SAND; some fines; trace GRAVEL.
		MC	R-2	12 14 17	31	29			9.4	113.3					Medium dense.
	295														
5															Medium grained SAND.
	290														Few GRAVEL.
10															Boring terminated at 10 feet below ground surface. No groundwater was encountered. Backfilled with tamped soil cuttings.
	285														
15															
	280														

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FIGURE A-8

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Canopy 2 Site Great Park	IR855	B-7

SITE LOCATION	START	FINISH	SHEET NO.
Great Park, Irvine	1/23/2024	1/23/2024	1 of 1

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
2R Drilling	Simco 2800 HT	Hollow Stem Auger	I. Ewing	A. Tabatabaei

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Bulk, MC (2.4")	84%	8	10	298	∇ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	AFTER DRILLING
Automatic (140 lbs, 30 inch)	N_{60} =1.4 N_{SPT} =0.94N_{MC}	▼ NE / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TEST	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	298	Bulk	B-1												CLAYEY SAND (SC); dark brown; moist; mostly fine to medium SAND; some fines, trace gravel.
	295	MC	R-2	14 18 24	32	30				34					Medium dense. (Fines=34%, SAND=65%, GRAVEL=2%).
5															Trace coarse SAND and fine GRAVEL.
	290														Reddish brown; mostly fine grained SAND.
10															Boring terminated at 10 feet below ground surface. No groundwater was encountered. Backfilled with tamped soil cuttings.
	285														
15															
	280														

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BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Canopy 2 Site Great Park	IR855	B-8

SITE LOCATION	START	FINISH	SHEET NO.
Great Park, Irvine	1/23/2024	1/23/2024	1 of 1

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
2R Drilling	Simco 2800 HT	Hollow Stem Auger	I. Ewing	A. Tabatabaei

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Bulk, MC (2.4")	84%	8	10	294	∇ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	
Automatic (140 lbs, 30 inch)	N_{60} =1.4 N_{SPT} =0.94N_{MC}	▼ NE / *NE* AFTER DRILLING

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TEST	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	294														SILTY-CLAYEY SAND (SC-SM); very dense; brown; moist; mostly fine to medium grained SAND.
		Bulk	B-1									R			
2.5		MC	R-2	12 28 22	50	47			11.6	119.3	32:14				CLAYEY SAND (SC); dense; dark brown; moist; mostly fine to medium grained SAND; some fines.
	290														
5															
	285														
10															Boring terminated at 10 feet below ground surface. No groundwater was encountered. Backfilled with tamped soil cutings.
	280														
15															
	275														

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FIGURE

A-10

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Canopy 2 Site Great Park	IR855	B-9

SITE LOCATION	START	FINISH	SHEET NO.
Great Park, Irvine	1/24/2025	1/24/2025	1 of 1

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
2R Drilling	Simco 2800 HT	Hollow Stem Auger	I. Ewing	A. Tabatabaei

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Bulk, SPT (1.4")	84%	8	10	293	▽ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	
Automatic (140 lbs, 30 inch)	N_{60} =1.4 N_{SPT} =0.94N_{MC}	▼ NE / *NE* AFTER DRILLING

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TEST	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	293	Bulk	B-1												CLAYEY SAND (SC); light brown; moist; mostly fine grained SAND; some fines.
3	290	SPT	S-2	5 4 4	8	11									Medium dense. (Fines=31%, SAND=67%, GRAVEL=1%).
6	287														CLAYEY SAND (SC); medium brown; moist; mostly medium grained SAND; some fines.
10	283														Boring terminated at 10 feet below ground surface. No groundwater was encountered. Backilled with tamped soil cutings.

Depth scale: 5, 10, 15. Elevation scale: 290, 285, 280, 275.

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FIGURE A-11

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Canopy 2 Site Great Park	IR855	B-10

SITE LOCATION	START	FINISH	SHEET NO.
Great Park, Irvine	1/24/2025	1/24/2025	1 of 1

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
2R Drilling	Simco 2800 HT	Hollow Stem Auger	I. Ewing	A. Tabatabaei

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Bulk, MC (2.4")	84%	8	10	288	⊻ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	AFTER DRILLING
Automatic (140 lbs, 30 inch)	N_{60} =1.4 N_{SPT} =0.94N_{MC}	▼ NE / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	288														Asphalt Concrete (AC), approximately 2-in thick.
															Aggregate Base (AB), approximately 4-in thick.
															CLAYEY SAND (SC); dark brown; moist; mostly fine to medium grained SAND; some fines. (Fines=48%, SAND=50%, GRAVEL=2%). Light brown.
	285	Bulk	B-1												
5		MC	R-2	4 5 6	11	10			12.1	111.2					CLAYEY SAND (SC); loose; dark brown; moist; mostly fine to medium grained SAND; some fines. Clods of dark brown lean CLAY (CL).
	280														
10															Boring terminated at 10 feet below ground surface. No groundwater was encountered. Backfilled with tamped soil cuttings.
	275														
15															
	270														

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Canopy 2 Site Great Park	IR855	**B-11**

SITE LOCATION	START	FINISH	SHEET NO.
Great Park, Irvine	1/24/2025	1/24/2025	1 of 1

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
2R Drilling	Simco 2800 HT	Hollow Stem Auger	I. Ewing	A. Tabatabaei

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Bulk, MC (2.4")	84%	8	10	284	▽ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	AFTER DRILLING
Automatic (140 lbs, 30 inch)	N_{60} =1.4 N_{SPT} =0.94N_{MC}	▼ NE / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TEST	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	284	Bulk	B-1												CLAYEY SAND (SC); dark brown; moist; mostly medium grained SAND; some fines; trace rootlets.
															Layer of cobbles.
5	280	MC	R-2	6 4 7	11	10			10.5	105.0					Loose. (Fines=34%, SAND=66%).
10	275														Boring terminated at 10 feet below ground surface. No groundwater was encountered. Backfilled with tamped soil cuttings.
15	270														
	265														

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FIGURE
A-13

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Canopy 2 Site Great Park	IR855	**B-12**

SITE LOCATION	START	FINISH	SHEET NO.
Great Park, Irvine	1/24/2025	1/24/2025	1 of 1

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
2R Drilling	Simco 2800 HT	Hollow Stem Auger	I. Ewing	A. Tabatabaei

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Bulk, MC (2.4"), SPT (1.4")	84%	8	10	292	▽ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	AFTER DRILLING
Automatic (140 lbs, 30 inch)	N_{60} =1.4 N_{SPT} =0.94N_{MC}	▼ NE / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TEST	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	292														CLAYEY SAND (SC); light brown; mostly fine grained sand; little fines.
	290	Bulk	B-1												
5															
		MC	R-2	7 11 23	34	32			8.1	87.5					CLAYEY SAND (SC); medium dense; dark brown; mostly fine to medium grained SAND; some fines; trace GRAVEL; trace rootlets.
	285														Loose; brown; mostly fine grained SAND.
		SPT	S-3	3 3 3	6	8									
10															Boring terminated at 10 feet below ground surface. No groundwater was encountered. Backfilled with tamped soil cuttings.
	280														
15															
	275														

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FIGURE

A-14

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Canopy 2 Site Great Park	IR855	B-13

SITE LOCATION	START	FINISH	SHEET NO.
Great Park, Irvine	1/24/2025	1/24/2025	1 of 1

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
2R Drilling	Simco 2800 HT	Hollow Stem Auger	I. Ewing	A. Tabatabaei

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Bulk, MC (2.4"), SPT (1.4")	84%	8	10	285	⊻ NE / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	AFTER DRILLING
Automatic (140 lbs, 30 inch)	N_{60} =1.4 N_{SPT} =0.94N_{MC}	▼ NE / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	285														Asphalt Concrete (AC), approximately 5-in thick
															CLAYEY SAND (SC); dark brown; moist; mostly fine to medium grained SAND; some fines; trace fine to medium GRAVEL.
		Bulk	B-1												
5	280														
		SPT	S-2	2 2 4	6	8									Lean CLAY with SAND (CL); medium stiff; brown; moist; little fine grained SAND.
		MC	R-3	4 4 7	11	10									
10	275														Boring terminated at 10 feet below ground surface. No groundwater was encountered. Backfilled with tamped soil cuttings.
15	270														

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FIGURE A-15

SPT HAMMER ENERGY MEASUREMENTS

Prepared by;

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Prepared for;

2R Drilling Inc
6939 Schaefer Ave Ste D304
Chino, CA 91710

Date: 11/16/24

Project Title: 2R Rig 10

Testing was performed on November 16, 2024 in Ontario, CA

Hammer Energy Measurements performed in accordance to ASTM D4633 using an approved and calibrated SPT Analyzer from Pile Dynamics, Inc.

Hammer Energy Measurements were performed per ASTM D4633 using an approved and calibrated SPT Analyzer from Pile Dynamics, Inc., meeting the criteria of ASTM D4633-05 and per the process defined in ASTM D4633-05. The process and equipment requirements followed per ASTM D4633-05 meet the criteria of ASTM D4633-16.

Energy Transfer Ratio = 84.2% @ 54.8 blows per minute

PRESENTATION OF SPT ANALYZER TEST DATA

1. Introduction

This report presents the results of SPT Hammer Energy Measurements recorded with an SPT Analyzer from Pile Dynamics carried out on F April 21, 2023 in Ontario, CA..

2. Field Equipment and Procedures

The drill used was a truck mounted Simco 2800 HT. It is known as Rig 10 at 2R Drilling. It has a mounted CME SPT Automatic Hammer. The operator was Adrian Lara of 2R Drilling

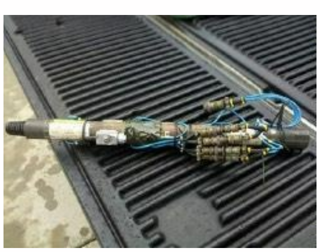
The Automatic Hammer uses a 140 lb. weight dropped 30” on to an anvil above the bore hole. The drill rod connects the anvil to a split spoon type soil sampler inside an 8” o.d. hollow stem auger at the designated sample depth. After a seeding blow the sampler is driven 18”. The number of blows required to penetrate the last 12" is referred to as the “N value”, which is related to soil strength.

The first recording was taken at 5’ below ground surface and then every 5’ to final recording at 25’.

3. Instrumentation

An SPT Analyzer from Pile Dynamics was used to record and the process the data. The raw data was stored directly in the SPT Analyzer computer with subsequent analysis in the office with PDA-W and PDIPlot software. Hammer Energy Measurements performed per ASTM D4633 using an approved and calibrated SPT Analyzer from Pile Dynamics, Inc. meeting the criteria of ASTM D4633-05 and per the process defined in ASTM D4633-05, The process and equipment requirements followed per ASTM D4633-05 meet the criteria of ASTM D4633-16 .

SPT Analyzer is fully compliant with the minimum digital sampling frequency requirements of ASTM D4633-05 (50 kHz) and EN ISO 22476-3:2005 (100 kHz), as well as with the low pass filter, (cutoff frequency of 5000 Hz instead of 3000 Hz) requirements of ASTM D4633-05. All equipment and analysis also conform to ASTM D6066.



A 2' instrumented section of AWJ rod, with two sets of accelerometers and strain gage bridges were mounted on opposite sides of the drill rod and was placed below the anvil. It measured strain and acceleration of every hammer blow. The SPT Analyzer then calculates the amount of energy transferred to the rod by force and velocity measurements.

4. Observations

The drill engine is diesel-fueled with an electronically controlled throttle. The drill and sample equipment looked to be well-operated and well-maintained.

5. Results

SPT Hammer Energy Measurement detailed results are included in the following pages. They are also summarized in the table below. It shows the Energy Transfer Ratio (ETR) at each sampling depth. ETR is the ratio of the measured maximum transferred energy to rated energy of the hammer which is the product of the weight of the hammer times the height of the fall. 140 lb x 30" = 4200 lb-in = 0.350 kip-ft.

6. Recommendations

Recalibration of the auto hammer is recommended annually. Recalibration is also recommended for change of operator, engine modifications and repair, hydraulic system modifications and repair, auto hammer adjustments and repair and anything else that may affect speed and function of the auto-hammer

Energy Transfer Ratio = 84.2% @ 54.8 blows per minute

N60=(ETR/60)N

Depth	ETR%	BPM
5	84.1	54.1
10	83.9	54.9
15	83,7	55.2
20	84.5	55.0
25	84.2	54.6
Average	**84.2**	**54.8**

If you have any questions please do not hesitate to call or email.
Thank you,
Brian Serl
Calibration Engineer for SPT CAL
909-730-2161
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APPENDIX B
LABORATORY TESTING

APPENDIX B
LABORATORY TESTING

B.1 General

The laboratory testing was performed using appropriate American Society for Testing and Materials (ASTM) and Caltrans Test Methods (CTM).

Modified California drive samples, Standard Penetration Test (SPT) drive samples and bulk samples collected during the field investigation were carefully sealed in the field to prevent moisture loss. The samples of earth materials were then transported to the laboratory for further examination and testing. Tests were performed on selected samples as an aid in classifying the earth materials and to evaluate their physical properties and engineering characteristics. Laboratory testing for this investigation included:

- Soil Classification: USCS (ASTM D 2487) and Visual Manual (ASTM D 2488)
- Moisture content (ASTM D 2216) and Dry Unit Weight (ASTM D 2937)
- Grain Size Distribution (ASTM D 422) & % Passing #200 Sieve (ASTM D 1140)
- Atterberg Limits (ASTM D 4318)
- Modified Proctor (ASTM D 1557)
- Expansion Index (ASTM D 4829)
- R-value (ASTM D 2844)

Brief descriptions of the laboratory testing program and test results are presented below.

B.2 Soil Classification

Earth materials recovered from subsurface explorations were classified in general accordance with Caltrans' "Soil and Rock Logging Classification Manual, 2010". The subsurface soils were classified visually / manually in the field in accordance with the Unified Soil Classification System (USCS) following ASTM D 2488; soil classifications were modified as necessary based on testing in the laboratory in accordance with ASTM D 2487. The details of the soil classification system and boring records presenting the classifications are presented in Appendix A.

B.3 Moisture Content and Dry Unit Weight

The in-situ moisture content of selected bulk, SPT, and Ring samples was determined by oven drying in general accordance with ASTM D 2216. Selected California Ring samples were trimmed flush in the metal rings and wet weight was measured. After drying, the dry weight of each sample was measured, volume and weight of the metal containers was measured, and moisture content and dry density were calculated in general accordance with ASTM D 2216 and D 2937. Results of these tests are presented on the boring records in Appendix A.

B.4 Atterberg Limits

Characterization of the fine-grained fractions of soils was evaluated using the Atterberg Limits. This test includes Liquid Limit and Plastic Limit tests to determine the Plasticity Index in accordance with ASTM D 4318. Results of these tests are presented on the boring records in Appendix A are plotted on a Plasticity Chart in this Appendix.

B.5 Grain Size Distribution and Percent Passing No. 200 Sieve:

Representative samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. The percentage of fines (soil passing No. 200 sieve) was determined for selected samples in accordance with ASTM D 1140. For selected samples the washed fraction retained on the No. 200 sieve was then screened on a No. 4 sieve, and the fraction retained on No. 4 was weighed to determine the percentage of gravel. For selected samples, the washed material retained on No. 200 sieve was shaken through a standard stack of sieves in accordance with ASTM D 422 to determine the grain size distribution. The results of grain size distribution tests are plotted in this appendix. The relative proportion (or percentage) by dry weight of gravel (retained on No. 4 sieve), sand (passing No. 4 and retained on No. 200 sieve), and fines (passing No. 200 sieve) are listed on the boring records in Appendix A.

B.6 Modified Proctor Compaction Test

Compaction testing was performed on a selected bulk sample of the surficial soils in accordance with ASTM D1557. Specimens were prepared at different water contents and compacted. Dry densities were measured for each specimen. The optimum moisture content and maximum dry density were determined using the modified compacting effort. The test results are attached to this appendix.

B.7 Soil Expansion Index

The expansion potential of the site soils was estimated using the Expansion Index Test per ASTM D4829. The results of these tests are presented in Figure B-6.

B.8 R-Value

Resistance "R" value tests were performed using the stabilometer method on a selected bulk sample of the subgrade soils. The tests were conducted in general accordance with CTM 301. The test results are attached to this appendix.

B.9 List of Attached Figures

The following figures are attached and complete this appendix:

List of Figures

Boring No.	Sample No.	Depth (ft)	Sample Type	Geologic Unit	USCS Group Symbol	SPT N*60 (blows/ft)	Undrained Shear Strength, Su (ksf)			Moisture Content (%)	Dry Unit Weight (pcf)	Total Unit Wt (pcf)	Atterberg Limits			Grain Size Distribution (%) by dry weight			Clay	Other Tests
							Pocket Pen.	Mini Vane	UU Test				LL	PL	PI	Gravel	Sand	Fines		
B-1	B-1	0.0	BULK		SC															
B-1	S-2	2.5	SPT		SC	24							39	17	22					
B-1		4.0	BULK		SC															
B-1	R-3	5.0	MC		SC	12				9.8	105	115								
B-1	S-4	10.0	SPT		SM	10														
B-1	R-5	15.0	MC		CL-ML	8				15.0	94	108								
B-1	S-6	20.0	SPT		CL-ML	13														
B-1	R-7	25.0	MC		CL-ML	11														
B-1	S-8	30.0	SPT		SC	18														
B-1	R-9	35.0	MC		SC	20														
B-1	S-10	40.0	SPT		SC	57														
B-10	B-1	0.0	BULK		SC													48		
B-10	R-2	5.0	MC		SC	10				12.1	111	125								
B-11	B-1	0.0	BULK		SC															
B-11	R-2	5.0	MC		SC	10				10.5	105	116						34		
B-12	B-1	0.0	BULK		SC															
B-12	R-2	5.0	MC		SC	32				8.1	88	95								
B-12	S-3	7.5	SPT		SC	8														
B-13	B-1	0.0	BULK		SC															
B-13	S-2	5.0	SPT		CL	8														
B-13	R-3	7.5	MC		CL	10														
B-2	B-1	0.0	BULK		SC															C
B-2	R-2	5.0	MC		SC	14				12.9	88	99						46		
B-2	S-3	10.0	SPT		SC	15												28		
B-2	R-4	15.0	MC		SM	17				4.7	97	102						35		
B-2	S-5	20.0	SPT		SM	14														
B-3	B-1	0.0	BULK		SC-SM															EI
B-3	R-2	2.0	MC		SC	16				10.1	101	111						37		
B-3		3.5	BULK		SC															
B-3	S-3	4.0	SPT		SC	10														

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TABLE B-1: Summary of Laboratory Results

Project: Canopy 2 Site Great Park

Location: Great Park, Irvine

Number: IR855

Boring No.	Sample No.	Depth (ft)	Sample Type	Geologic Unit	USCS Group Symbol	SPT N*60 (blows/ft)	Undrained Shear Strength, Su (ksf)			Moisture Content (%)	Dry Unit Weight (pcf)	Total Unit Wt (pcf)	Atterberg Limits			Grain Size Distribution (%) by dry weight			Clay	Other Tests
							Pocket Pen.	Mini Vane	UU Test				LL	PL	PI	Gravel	Sand	Fines		
B-3	R-4	6.0	MC		SC	13				11.3	88	97						47		
B-3	S-5	8.0	SPT		SC	14												33		
B-3	R-6	15.0	MC		SC	23														
B-3	S-7	20.0	SPT		SC	15														
B-4	B-1	0.0	BULK		SM													44		
B-4	R-2	2.5	MC		SM	13				6.4	93	99								
B-4		4.0	BULK		SM															
B-4	S-3	5.0	SPT		SC	14														
B-4	R-4	10.0	MC		SC	12														
B-4	S-5	15.0	SPT		SC	10														
B-4	R-6	20.0	MC		CL	20														
B-4	S-7	25.0	SPT		SC	14														
B-4	R-8	30.0	MC		SC	17														
B-5	B-1	0.0	BULK		SC															
B-5	S-2	5.0	SPT		SC	8.4												44		
B-6	B-1	0.0	BULK		SC															
B-6	R-2	2.5	MC		SC	29				9.4	113	124								
B-6		4.0	BULK		SC															
B-7	B-1	0.0	BULK		SC															
B-7	R-2	2.5	MC		SC	30					34									
B-7		4.0	BULK		SC															
B-8	B-1	0.0	BULK		SC-SM															R
B-8	R-2	2.5	MC		SC	47				11.6	119	133								
B-8		4.0	BULK		SC															
B-9	B-1	0.0	BULK		SC															
B-9	S-2	2.5	SPT		SC	11												31		
B-9		4.0	BULK		SC															

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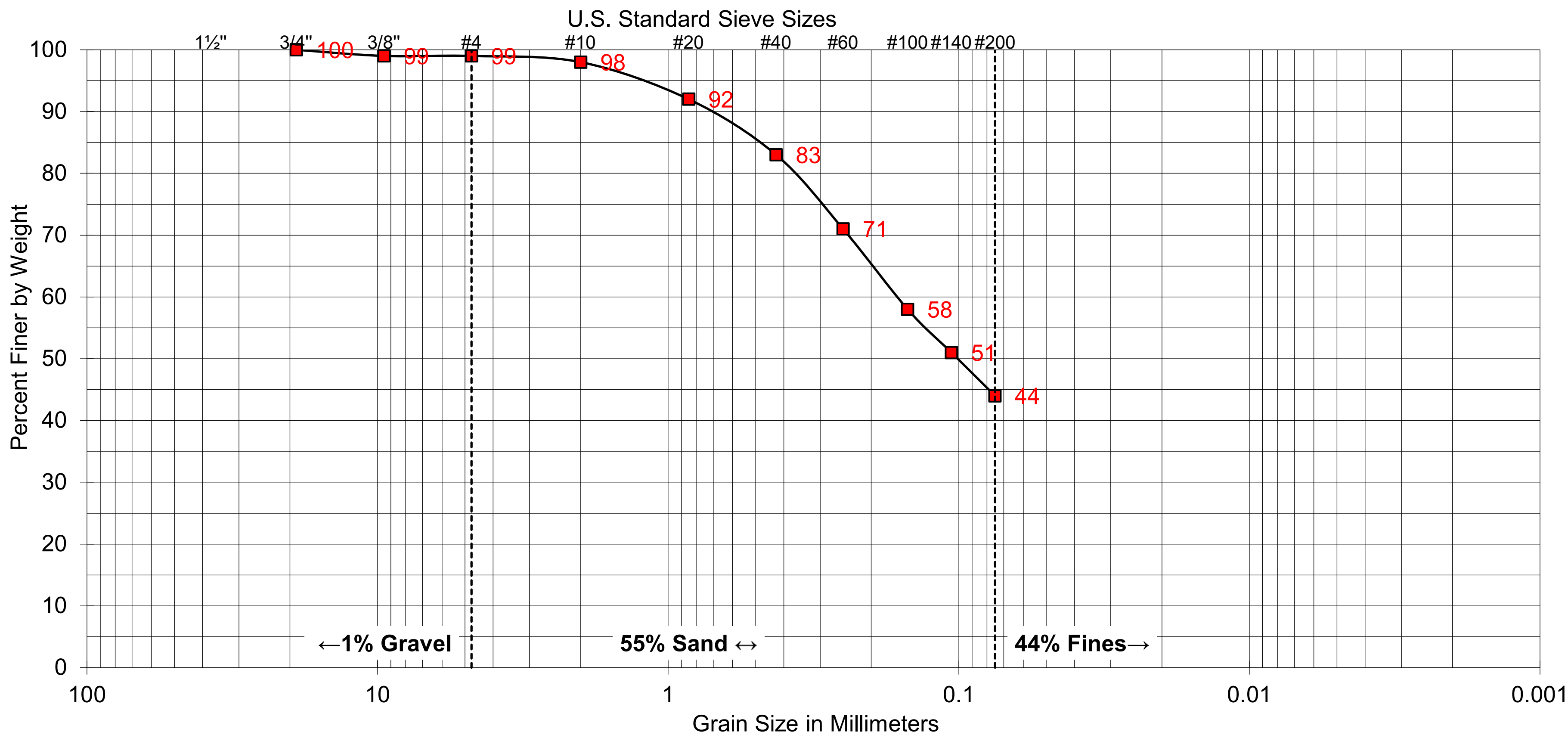
TABLE B-1: Summary of Laboratory Results

Project: Canopy 2 Site Great Park

Location: Great Park, Irvine

Number: IR855



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND
GRAVEL		SAND			CLAY

SAMPLE	Bulk-1
EXPLORATION ID:	B-4
SAMPLE DEPTH:	5'

UNIFIED SOIL CLASSIFICATION: SM/SC

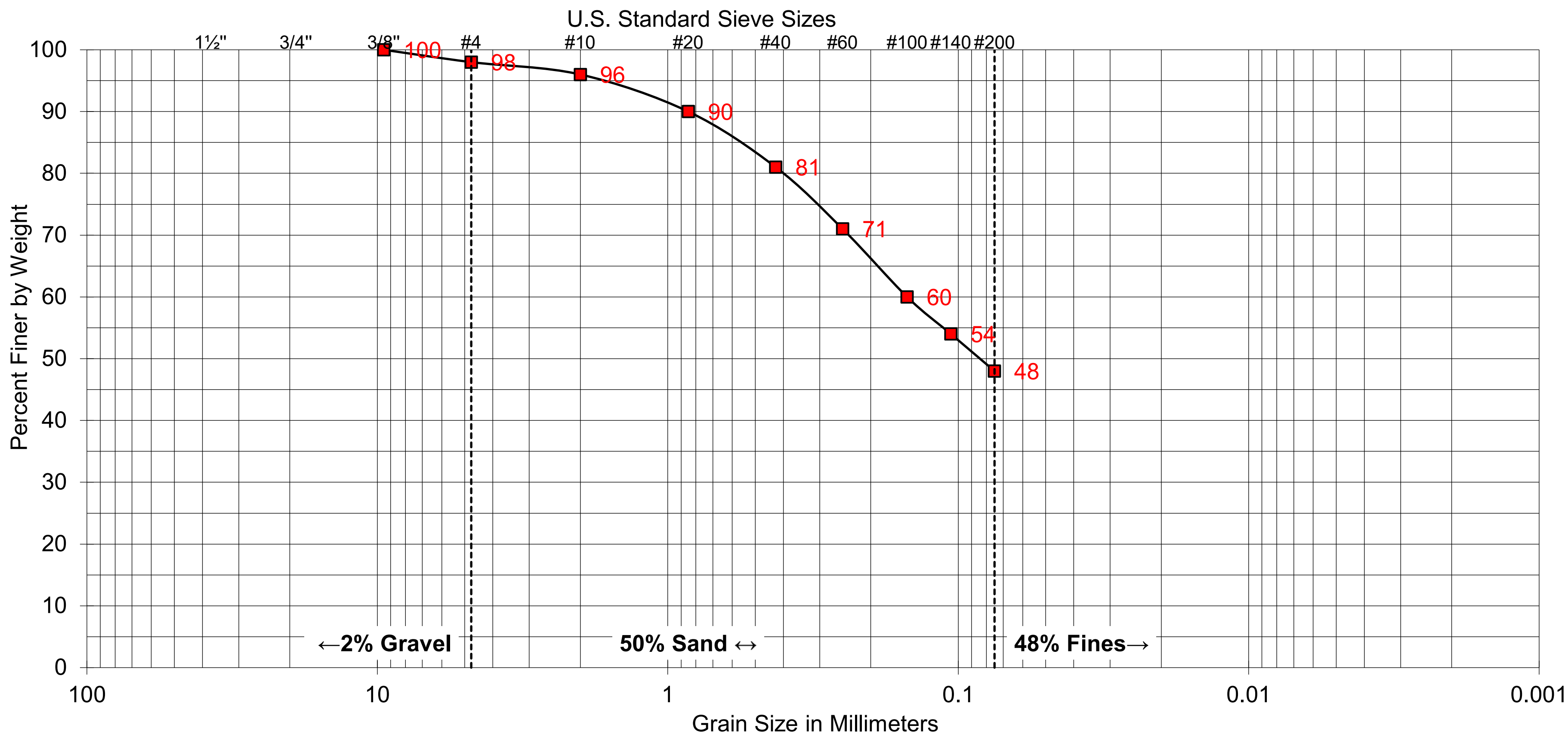
DESCRIPTION: Silty /Clayey Sand

ATTERBERG LIMITS	
LIQUID LIMIT:	---
PLASTIC LIMIT:	---
PLASTICITY INDEX:	---

GROUP DELTA

SOIL CLASSIFICATION

The Canopy 2 Sites
Project No. IR855



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND
GRAVEL		SAND			CLAY

SAMPLE	Bulk-1
EXPLORATION ID:	B-10
SAMPLE DEPTH:	5'

UNIFIED SOIL CLASSIFICATION: SC

DESCRIPTION: Clayey Sand

ATTERBERG LIMITS	
LIQUID LIMIT:	---
PLASTIC LIMIT:	---
PLASTICITY INDEX:	---

GROUP DELTA

SOIL CLASSIFICATION

The Canopy 2 Sites
Project No. IR855

ATTERBERG LIMITS

ASTM D-4318 / AASHTO T-89 / CTM 204

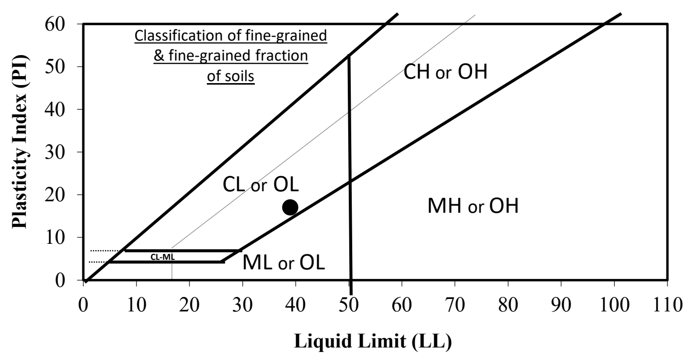
Project Name:	The Canopy 2 Sites	Tested By :	Eric Y.	Date:	2/4/2025
Project No. :	IR855	Data Input By:	Eric Y.	Date:	2/5/2025
Boring No.:	B-1	Checked By:		Date:	
Sample No. :	S-2	Depth (ft.) :	2.5		
Initial Moisture:		Container No.:	AL-1		
Description.:	Brown Clayey Sand - SC				

	PLASTIC LIMIT		LIQUID LIMIT			
TEST NO.	1	2	1	2	3	4
Number of Blows [N]			33	25	17	
Container No.	A	B	C	D	E	
Wet Wt. of Soil + Cont. (gm.)	22.92	22.86	28.43	29.41	30.26	
Dry Wt. of Soil + Cont. (gm.)	21.55	21.48	24.86	25.50	25.81	
Wt. of Container (gm.)	15.26	15.16	15.22	15.37	14.99	
Moisture Content (%) [Wn]	21.78	21.84	37.03	38.60	41.13	

LIQUID LIMIT	**39**
PLASTIC LIMIT	**22**
PLASTICITY INDEX	**17**

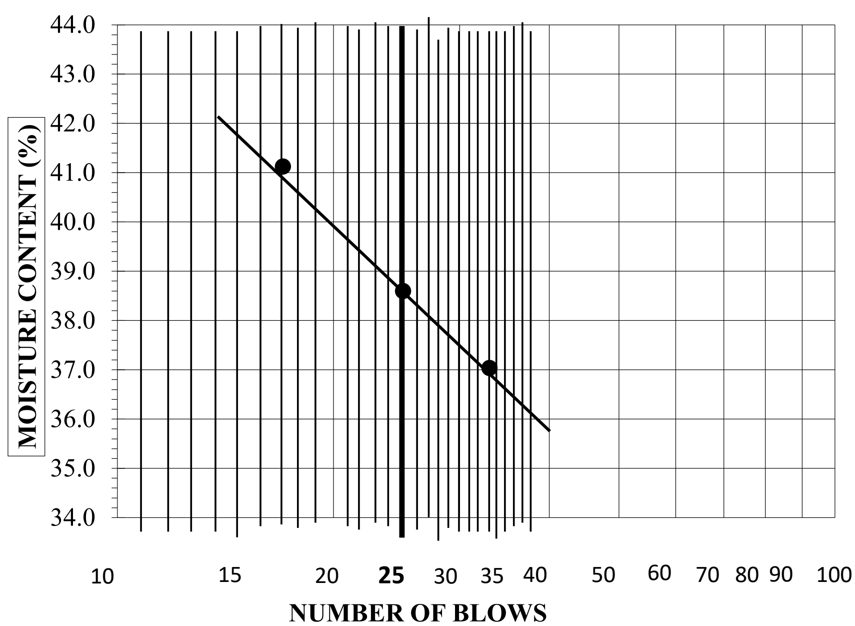
PI at "A" - Line = 0.73(LL-20) = **13.9**

One - Point Liquid Limit Calculation $LL=Wn(N/25)^{0.121}$



PROCEDURES USED

- [ ] Wet Preparation — Multipoint Wet Preparation
- [x] Dry Preparation — Multipoint Dry Preparation
- [x] Procedure A — Multipoint Test
- [ ] Procedure B — One-point Test



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GROUP DELTA

ATTERBERG LIMITS

ASTM D-4318 / AASHTO T-89 / CTM 204

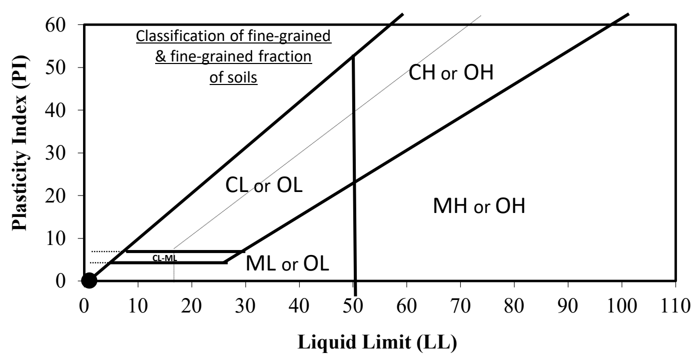
Project Name:	*The Canopy 2 Sites*	Tested By :	*Eric Y.*	Date:	*2/4/2025*
Project No. :	*IR855*	Data Input By:	*Eric Y.*	Date:	*2/5/2025*
Boring No.:	*B-1*	Checked By:		Date:	
Sample No. :	*S-4*	Depth (ft.) :	*10*		
Initial Moisture:		Container No.:	*AL-2*		
Description.:	*Dark Yellowish Brown Silty Sand - SM ;* ***Non Plastic***				

	PLASTIC LIMIT		LIQUID LIMIT			
TEST NO.	1	2	1	2	3	4
Number of Blows [N]						
Container No.						
Wet Wt. of Soil + Cont. (gm.)						
Dry Wt. of Soil + Cont. (gm.)						
Wt. of Container (gm.)						
Moisture Content (%) [Wn]						

LIQUID LIMIT	**NP**
PLASTIC LIMIT	**NP**
PLASTICITY INDEX	**NP**

PI at "A" - Line = 0.73(LL-20) =

One - Point Liquid Limit Calculation $LL=Wn(N/25)^{0.121}$



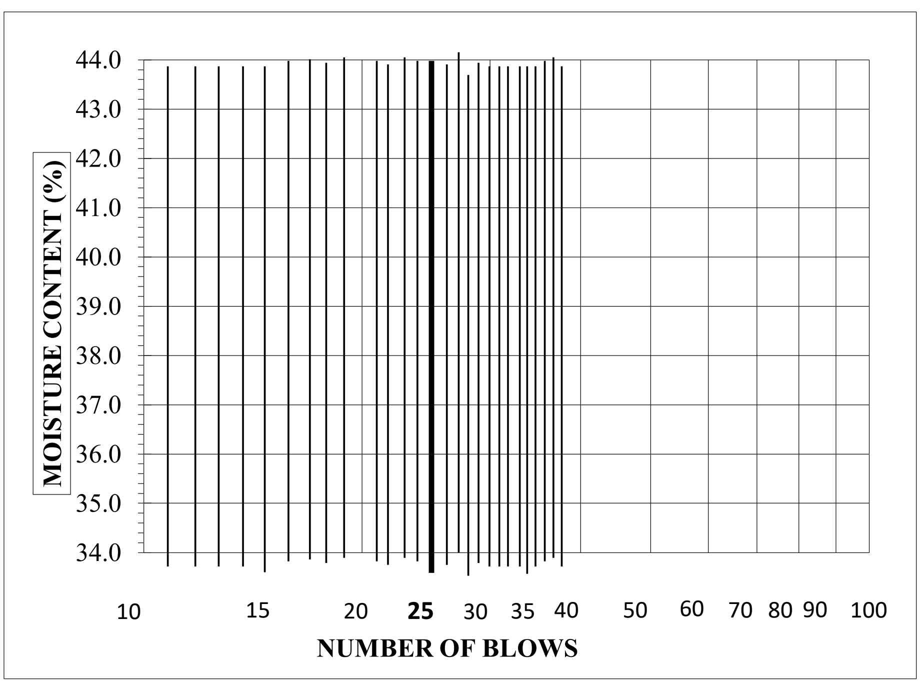
PROCEDURES USED

☐ Wet Preparation
Multipoint Wet Preparation

☒ Dry Preparation
Multipoint Dry Preparation

☒ Procedure A
Multipoint Test

☐ Procedure B
One-point Test



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ATTERBERG LIMITS

ASTM D-4318 / AASHTO T-89 / CTM 204

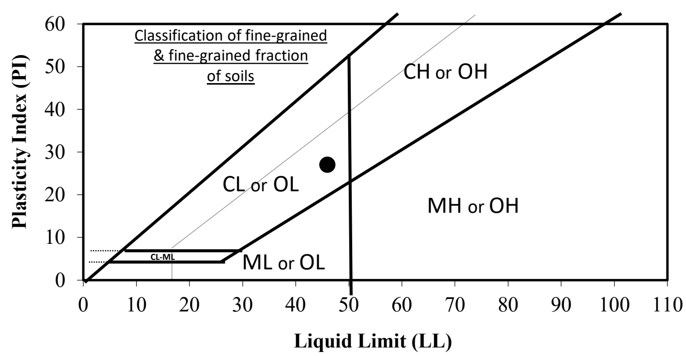
Project Name:	*The Canopy 2 Sites*	Tested By :	*Eric Y.*	Date:	*2/4/2025*
Project No. :	*IR855*	Data Input By:	*Eric Y.*	Date:	*2/5/2025*
Boring No.:	*B-2*	Checked By:		Date:	
Sample No. :	*R-2*	Depth (ft.) :	*5*		
Initial Moisture:		Container No.:	*AL-3*		
Description.:	*Brown Clayey Sand - SC*				

	PLASTIC LIMIT		LIQUID LIMIT			
TEST NO.	1	2	1	2	3	4
Number of Blows [N]			32	25	18	
Container No.	#5	#6	#7	#8	#9	
Wet Wt. of Soil + Cont. (gm.)	23.29	23.18	28.36	29.55	30.21	
Dry Wt. of Soil + Cont. (gm.)	21.98	21.88	24.36	25.09	25.33	
Wt. of Container (gm.)	15.24	15.20	15.26	15.28	14.98	
Moisture Content (%) [Wn]	19.44	19.46	43.96	45.46	47.15	

LIQUID LIMIT	**46**
PLASTIC LIMIT	**19**
PLASTICITY INDEX	**27**

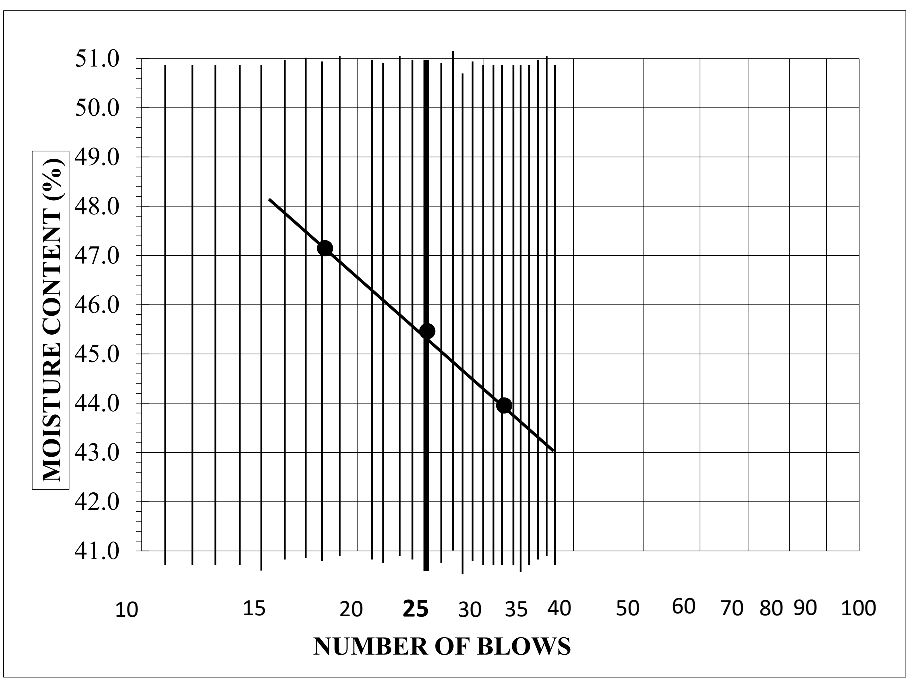
PI at "A" - Line = 0.73(LL-20) = **19.0**

One - Point Liquid Limit Calculation $LL=Wn(N/25)^{0.121}$



PROCEDURES USED

- [ ] Wet Preparation
  Multipoint Wet Preparation
- [x] Dry Preparation
  Multipoint Dry Preparation
- [x] Procedure A
  Multipoint Test
- [ ] Procedure B
  One-point Test



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ATTERBERG LIMITS

ASTM D-4318 / AASHTO T-89 / CTM 204

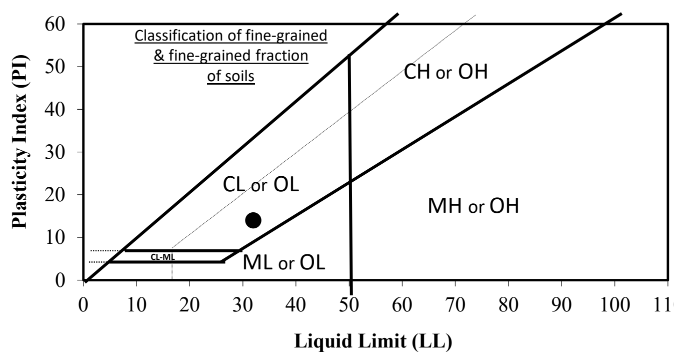
Project Name:	*The Canopy 2 Sites*	Tested By :	*Eric Y.*	Date:	*2/4/2025*
Project No. :	*IR855*	Data Input By:	*Eric Y.*	Date:	*2/5/2025*
Boring No.:	*B-8*	Checked By:		Date:	
Sample No. :	*R-2*	Depth (ft.) :	*2.5*		
Initial Moisture:		Container No.:	*AL-4*		
Description.:	*Brown Clayey Sand - SC*				

	PLASTIC LIMIT		LIQUID LIMIT			
TEST NO.	1	2	1	2	3	4
Number of Blows [N]			34	25	16	
Container No.	A-16	A-17	A-18	A-19	A-20	
Wet Wt. of Soil + Cont. (gm.)	22.35	22.54	29.51	30.48	31.30	
Dry Wt. of Soil + Cont. (gm.)	21.22	21.39	26.18	26.72	27.21	
Wt. of Container (gm.)	14.96	15.04	15.29	14.95	15.18	
Moisture Content (%) [Wn]	18.05	18.11	30.58	31.95	34.00	

LIQUID LIMIT	**32**
PLASTIC LIMIT	**18**
PLASTICITY INDEX	**14**

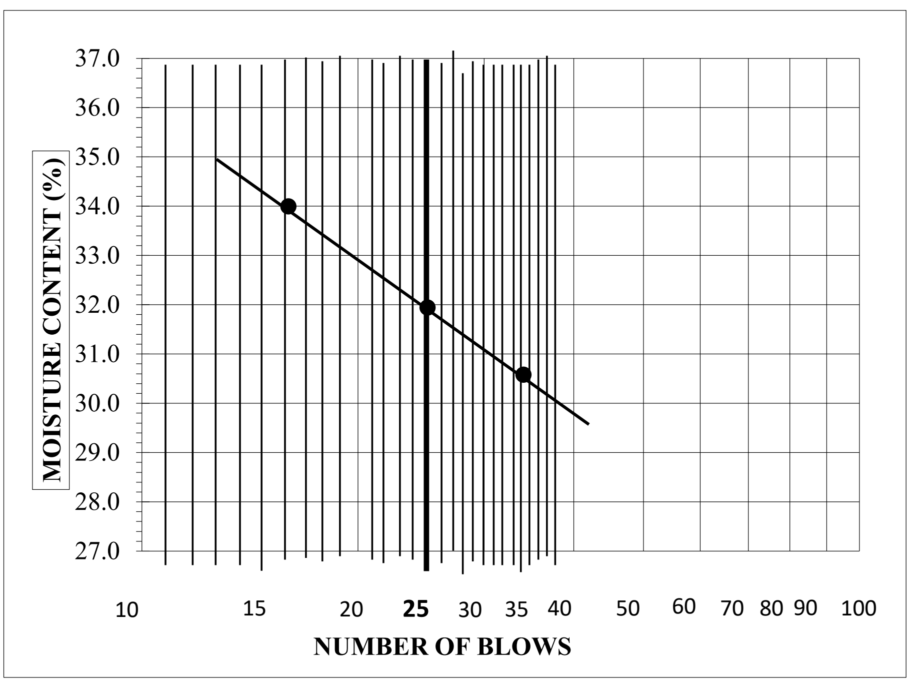
PI at "A" - Line = 0.73(LL-20) = **8.8**

One - Point Liquid Limit Calculation $LL=Wn(N/25)^{0.121}$



PROCEDURES USED

- [ ] Wet Preparation
  Multipoint Wet Preparation
- [x] Dry Preparation
  Multipoint Dry Preparation
- [x] Procedure A
  Multipoint Test
- [ ] Procedure B
  One-point Test



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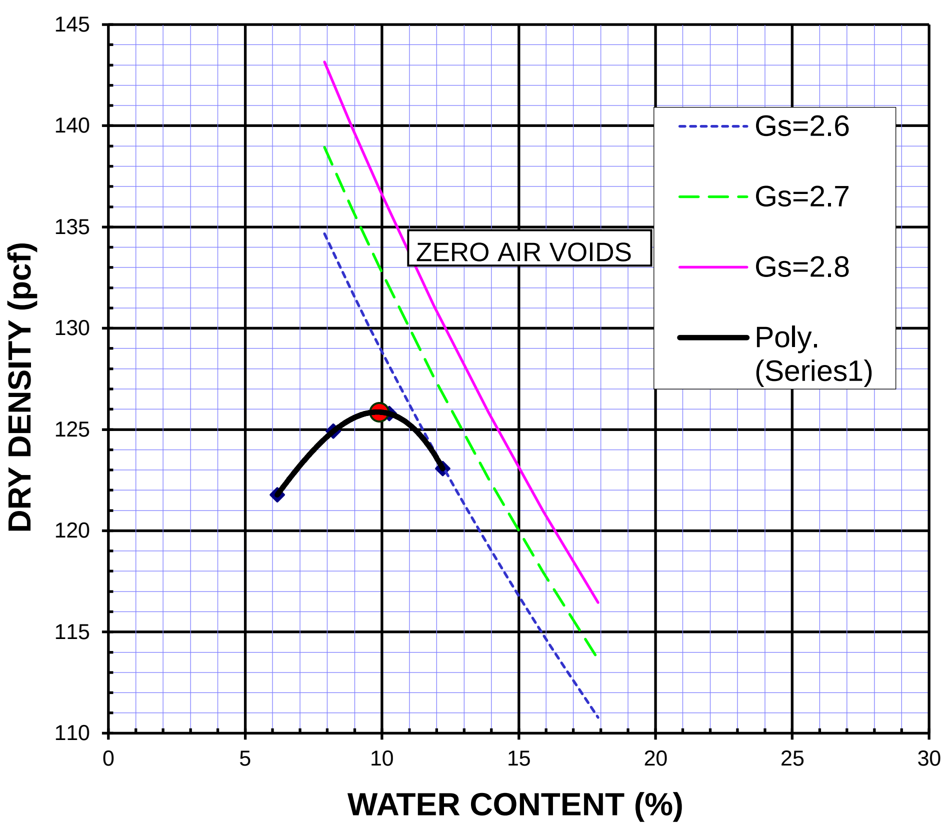
GROUP DELTA CONSULTANTS, INC ENGINEERS AND GEOLOGISTS 1320 S. SIMPSON CIRCLE ANAHEIM, CA 92806	**STANDARD TEST METHOD FOR MOISTURE - DENSITY RELATIONSHIP (ASTM D1557)** REV. 1, DATED 09/19/19

PROJECT: The Canopy 2 Sites at the Irvine Great Park
SAMPLE ID: SO7393
PROJECT NO.: IR855
DATE: February 3, 2025
TESTED BY: Eric Y.
CHECKED BY:
SAMPLE DESCRIPTION: Yellowish Brown Silty / Clayey Sand
LOCATION: B-2 Bulk-1 @ 5'

Method: Mechanical ☐ Manual ☑ **Hammer:** 10lb. ☑ 5.5 lb. ☐

A) WATER ADDED	0	2	4	-2			%
B) MOLD TARE WEIGHT	2048.0	2048.0	2048.0	2048.0			grams
C) WEIGHT OF WET SOIL AND MOLD	4091.8	4145.0	4136.2	4002.8			grams
D) WET SOIL WEIGHT (C - B)	2043.8	2097.0	2088.2	1954.8			grams
E) WET DENSITY (D / V)	135.2	138.7	138.1	129.3			pcf
F) DRY DENSITY (E / [(L/100) + 1])	124.9	125.8	123.1	121.8			pcf

G) TARE WEIGHT	222.3	233.3	229.0	226.6			grams
H) WEIGHT OF WET SOIL AND TARE	1536.4	1640.6	1697.4	1510.0			grams
I) WEIGHT OF DRY SOIL AND TARE	1436.6	1509.6	1537.5	1435.4			grams
J) WEIGHT OF WATER (H - I)	99.8	131.0	159.9	74.6			grams
K) DRY WEIGHT OF SOIL (I - G)	1214.3	1276.3	1308.5	1208.8			grams
L) MOISTURE CONTENT (J / K)* 100)	8.2	10.3	12.2	6.2			percent



4 inch: V= 15.12 pcf/gm
6 inch: V= 33.98 pcf/gm

B	METHOD USED (A,B or C)

4 inch	MOLD USED
15.12	MOLD VOLUME CORRECTION (V)
-3/8"	SIEVE NUMBER
9.0%	PERCENT RETAINED

WITH ROCK CORRECTION

128.3	**MAXIMUM DENSITY [PCF]**
9.2	**OPTIMUM MOISTURE [%]**

WITHOUT ROCK CORRECTION

125.9	**MAXIMUM DENSITY [PCF]**
9.9	**OPTIMUM MOISTURE [%]**

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EXPANSION INDEX OF SOIL

ASTM D-4829-10 / UBC 29-2

Lab Number: SO7393

Project Name	: The Canopy 2 Sites at the Irvine Great Park	Sampled By :		Date :	
Project No.	: IR855	Prepared By :	Eric Y.	Date :	1/31/2025
Boring No.	: B-3	Tested By :	Eric Y.	Date :	2/3/2025
Sample No.	: Bulk-1	Calculated By :	Eric Y.	Date :	2/5/2025
Depth (ft.)	: 5'	Checked By :		Date :	
Description	: Brown Silty-Clayey Sand with Gravel				

Sample Preparation

Weight of Total Soil	5518.50	Weight of Soil Retained on No. 4 Sieve	1389.00	% Passing No. 4 Sieve	74.83

Trail	1	2	3	4	Tested	M & D After Test	
Container No.	SB-2					Container No.	
Weight of Wet Soil + Container (gm)	946.00					Wet Soil+Cont.+Ring	
Weight of Dry Soil + Container (gm)	885.40					Dry Soil+Cont.+Ring	
Weight of Container (gm)	228.55					Wt. of Container	
Moisture Content (%)	9.23				9.23	Moisture Content	
Weight of Wet Soil + Ring (gm)	610.18						
Weight of Ring (gm) No. 2.0	198.58				198.58		
Weight of Wet Soil (gm)	411.60						
Wet Density of Soil (pcf)	124.16					Wet Density (pcf)	
Dry Density of Soil (pcf)	113.67					Dry Density (pcf)	
Precent Saturation of Soil $S_{(Meas.)}$	51.58				51.58	(%) Saturation	

Loading Machine No.			2	
Date	Reading Time	Elapsed Time	Dial Reading	Expansion
02/03/25	13:00:00	0:10:00		0.0000
02/03/25				
02/03/25	13:10:00	**0:00:00**	**0.3000**	**0.0000**
Add Distilled Water to Sample				
02/03/25	14:10:00	1:00:00	0.3065	0.0065
02/03/25	15:10:00	2:00:00	0.3068	0.0068
02/03/25	16:10:00	3:00:00	0.3070	0.0070
02/03/25	17:10:00	4:00:00	0.3071	0.0071
02/04/25	7:10:00	18:00:00	0.3074	0.0074
02/04/25	9:10:00	20:00:00	0.3074	0.0074
02/04/25	11:10:00	22:00:00	0.3074	0.0074
02/04/25	13:10:00	0:00:00	0.3074	0.0074

Remark :

1. Screen sample through **No. 4** *Sieve*

2. Sample should be compacted into a metal ring of the Degree of Saturation of ***50 +/- 2% (48 - 52).***

3. Inundated sample in distilled water to 24 h, or until the rate of expansion > (0.0002 in./h), no less than 3 h.

Volume of Mold (ft^3)	0.00731	Specific Gravity	2.70
Rammer Weight (lb.)	5.0	Blows/Layer	15
Vertical Confining Pressure	1.0 (lbf/in^2) / 6.9 (kPa)		

$$(\%)\ S = \frac{S.G. \times W \times Dd}{Wd \times S.G. - Dd}$$

S.G.=Specific Gravity, **W**=Water Content

Dd=Dry Soil Density, **Wd**=Unit Wt. of Water

$$E.I._{(meas)} = \frac{\text{Change in High}}{\text{Initial Thickness}} \times 1000 = 7.40$$

$$\text{Expansion Index}_{(50)} = EI_{(meas.)} - (50 - S_{(meas.)}) \times \frac{65 + EI_{(meas.)}}{220 - S_{(meas.)}}$$

8	Very Low

Expansion Index	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
> 130	Very High

SAMPLE NO.: SO7393 **SAMPLE DATE:**

SAMPLE LOCATION: B-8 Bulk-1 @ 0 - 5' **TEST DATE:** 2/3/2025

SAMPLE DESCRIPTION: Brown Silty-Clayey Sand

LABORATORY TEST DATA

	TEST SPECIMEN	**1**	**2**	**3**	**4**	**5**	
A	COMPACTOR PRESSURE	325	250	200			[PSI]
B	INITIAL MOISTURE	8.5	8.5	8.5			[%]
C	BATCH SOIL WEIGHT	1200	1200	1200			[G]
D	WATER ADDED	40.0	50.3	60.0			[ML]
E	WATER ADDED (D*(100+B)/C)	3.6	4.5	5.4			[%]
F	COMPACTION MOISTURE (B+E)	12.1	13.0	13.9			[%]
G	MOLD WEIGHT	2066.2	2066.2	2063.8			[G]
H	TOTAL BRIQUETTE WEIGHT	3292.3	3298.2	3303.1			[G]
I	NET BRIQUETTE WEIGHT (H-G)	1226.1	1232.0	1239.3			[G]
J	BRIQUETTE HEIGHT	2.64	2.67	2.69			[IN]
K	DRY DENSITY (30.3*I/((100+F)*J))	125.5	123.7	122.6			[PCF]
L	EXUDATION LOAD	7230	5020	2420			[LB]
M	EXUDATION PRESSURE (L/12.54)	577	400	193			[PSI]
N	STABILOMETER AT 1000 LBS	67	70	74			[PSI]
O	STABILOMETER AT 2000 LBS	100	113	124			[PSI]
P	DISPLACEMENT FOR 100 PSI	3.43	3.51	4.10			[Turns]
Q	R VALUE BY STABILOMETER	30	23	15			
R	CORRECTED R-VALUE (See Fig. 14)	31	24	16			
S	EXPANSION DIAL READING	0.0000	0.0000	0.0000			[IN]
T	EXPANSION PRESSURE (S*43,300)	0	0	0			[PSF]
U	COVER BY STABILOMETER	0.65	0.71	0.79			[FT]
V	COVER BY EXPANSION	0.00	0.00	0.00			[FT]

TRAFFIC INDEX:	4.5
GRAVEL FACTOR:	1.53
UNIT WEIGHT OF COVER [PCF]:	130
R-VALUE BY EXUDATION:	20
R-VALUE BY EXPANSION:	N/A
R-VALUE AT EQUILIBRIUM:	20

*Note: Gravel factor estimated from pavement section using CTM 301, Section C, Part b.

REV. 2, DATED 1/31/15

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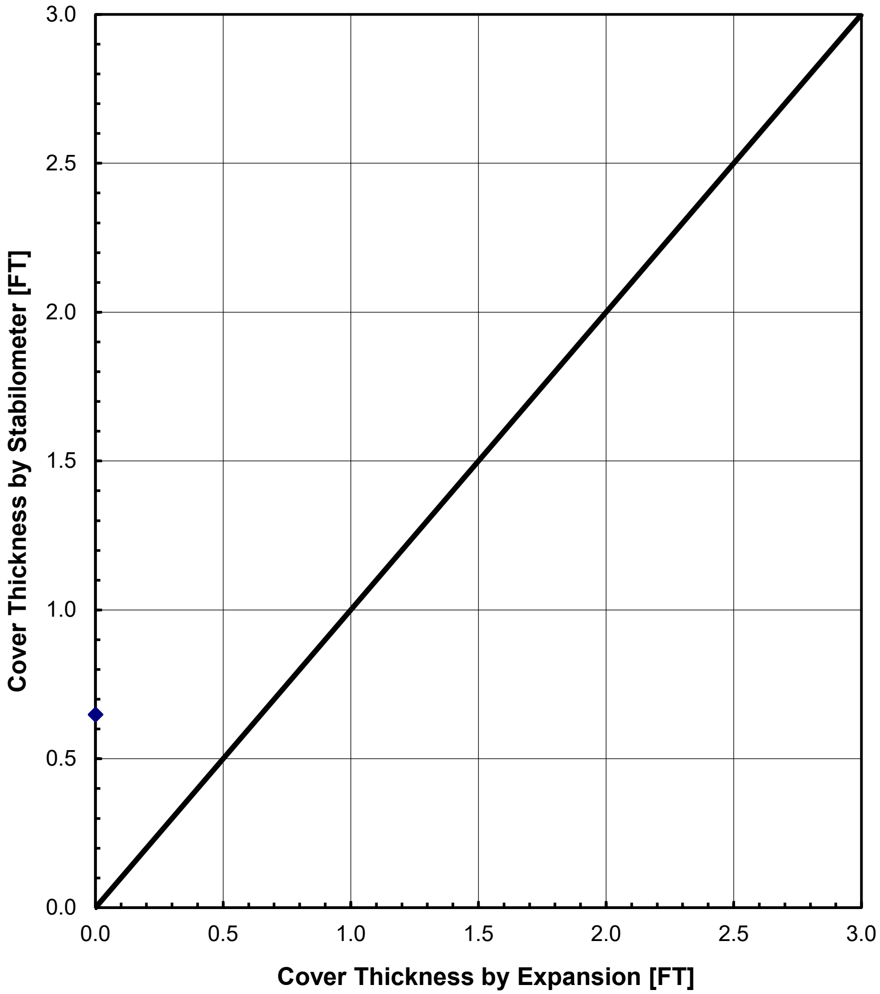
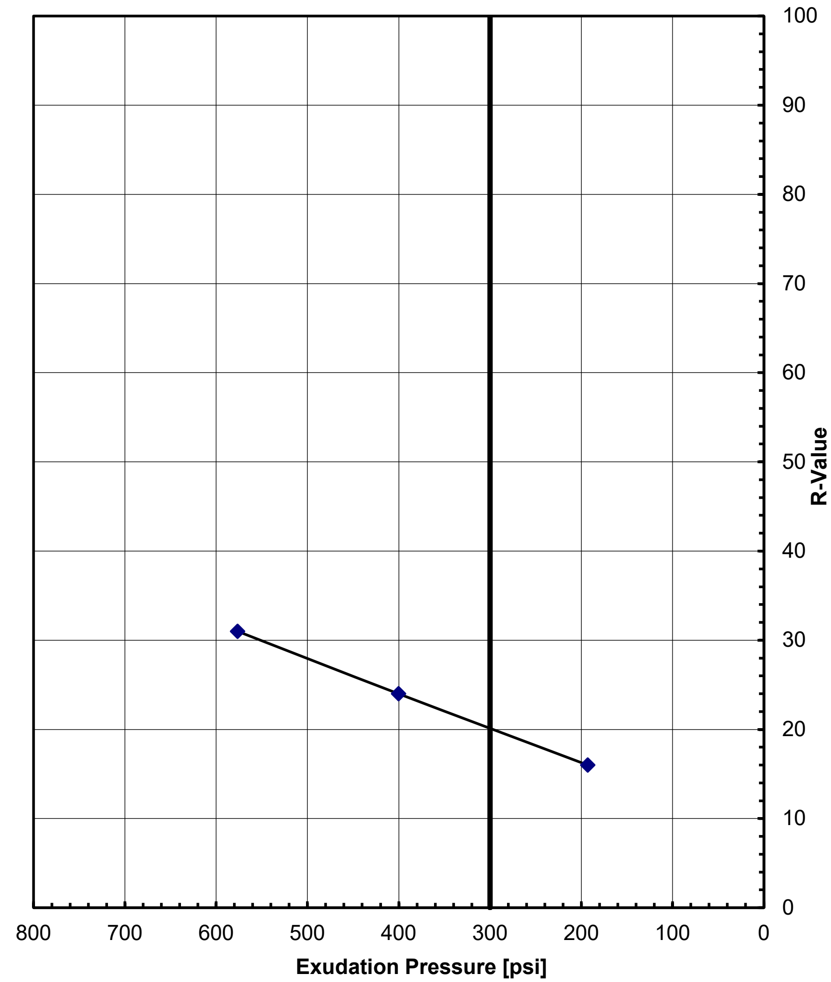
R-VALUE TEST RESULTS
CT301

The Canopy 2 Sites at the Irvine
Project No. IR855
FIGURE 1.1

Sample: SO7393, B-8 Bulk-1 @ 0 - 5'

R-Value at Equilibrium: 20





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COVER AND EXUDATION CHARTS

The Canopy 2 Sites at the Irvine
Project No. IR855

CORROSIVITY TEST RESULTS
(ASTM D516, CTM 643)

SAMPLE	pH	RESISTIVITY (OHM-CM)	SULFATE CONTENT (%)	CHLORIDE CONTENT (%)
B-1 @ 2' - 5'	*8.15*	*1,887*	*0.03*	*<0.01*

CORROSIVITY PARAMETERS

SULFATE CONTENT (%)	SULFATE EXPOSURE	CEMENT TYPE
0.00 to 0.10	Negligible	--
0.10 to 0.20	Moderate	II, IP(MS), IS(MS)
0.20 to 2.00	Severe	V
Above 2.00	Very Severe	V plus pozzolan

SOIL RESISTIVITY (OHM-CM)	GENERAL DEGREE OF CORROSIVITY TO FERROUS METALS
0 to 1,000	Very Corrosive
1,000 to 2,000	Corrosive
2,000 to 5,000	Moderately Corrosive
5,000 to 10,000	Mildly Corrosive
Above 10,000	Slightly Corrosive

CHLORIDE (Cl) CONTENT (%)	GENERAL DEGREE OF CORROSIVITY TO METALS
0.00 to 0.03	Negligible
0.03 to 0.15	Corrosive
Above 0.15	Severely Corrosive