Attachment 5

Report of Geotechnical Investigation

ESA

REPORT OF GEOTECHNICAL INVESTIGATION

OAKMONT SENIOR LIVING OF LA CAÑADA FLINTRIDGE

600 FOOTHILL BOULEVARD

LA CAÑADA FLINTRIDGE, CALIFORNIA

FOR

OAKMONT SENIOR LIVING

APRIL 21, 2017

JOB NO. 2017-005-001

RTF&A

GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

RTF&A
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

April 21, 2017

Oakmont Senior Living
9240 Old Redwood Hwy, Suite 200
Windsor, California 95492

Job No. 2017-005-001

Attention: Mr. Ken Kidd

Subject: Geotechnical Investigation
Oakmont Senior Living of La Cañada Flintridge
600 Foothill Boulevard
La Cañada Flintridge, California

Ladies/Gentlemen:

Transmitted herewith is our Report of Geotechnical Investigation prepared for the Oakmont Senior Living proposed to be constructed at the subject site. As discussed later in this submittal, the recommendations presented herein are considered to be preliminary and subject to revision pending the preparation of detailed plans indicating final grades for the proposed development. The investigation was performed in general accordance with the scope of services outlined in our "Proposal – Geotechnical Investigation," dated February 14, 2017 (P014-2017-001). Copies of this report have been distributed to others as indicated below.

It is our understanding that the project is currently in the design phase and plans indicating specifics of the proposed development, such as final grades, are not presently available. The results of our investigation indicate that fill soils, ranging in depth from about 1 to 4 feet, were observed in each of our subsurface explorations. The fill soils were underlain by naturally deposited alluvial soils. The naturally deposited soils were generally observed to be slightly moist to moist and medium dense. Groundwater was not encountered during the subsurface exploration of the site.

The results of our geotechnical investigation and engineering analysis indicate that the existing fill should be removed and recompacted in areas where buildings, pavement, and related improvements will be constructed. In addition, it will be required to remove and recompact the naturally deposited alluvial soils that occur within 3 feet of the bottoms of proposed foundations.

The areas and depths of the recommended removal and recompaction are discussed in the "Recommendations" section of this report. Conventional spread foundations seated in the recompacted fill may be used to provide support for the proposed buildings, pavement, and related improvements. Recommendations for grading in areas where improvements are planned are presented in the "Recommendations" section of this report.

As part of our geotechnical investigation and as discussed in our authorized proposal, an infiltration study was performed at the site. Further information regarding the results of our infiltration study is presented in the "Infiltration Testing" section of the report.

If you should have questions regarding this report, please do not hesitate to contact our firm.

REGISTERED PROFESSIONAL ENGINEER
ALAN W. RASPLICKA
No. GE 2558
GEOTECHNICAL
STATE OF CALIFORNIA

Yours very truly,

R. T. FRANKIAN & ASSOCIATES

Alan W. Rasplicka

by: Alan W. Rasplicka
Principal Geotechnical Engineer

PROFESSIONAL GEOLOGIST NO. 3749
TIMOTHY P. LATIOLAIT
#1140
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Timothy P. Latiolait

and: Timothy P. Latiolait
Principal Engineering Geologist

BKP/AWR/TLP/jh

PDF Distribution via Email:
– Oakmont Senior Living, Attn: Mr. Ken Kidd and Mr. Gregg Wanke
– Alliance Land Planning and Engineering, Attn: Mr. Jason Vroom

TABLE OF CONTENTS

ATTACHMENTS:

Plot Plan
Appendix A – Explorations
Appendix B – Laboratory Tests
Appendix C – Boring Percolation Testing Procedures and Results

REPORT OF GEOTECHNICAL INVESTIGATION

OAKMONT SENIOR LIVING OF LA CAÑADA FLINTRIDGE

600 FOOTHILL BOULEVARD

LA CAÑADA FLINTRIDGE, CALIFORNIA

FOR

OAKMONT SENIOR LIVING

APRIL 21, 2017

JOB NO. 2017-005-001

SCOPE

This report presents the results of our geotechnical investigation performed for the proposed Oakmont Senior Living facility to be constructed at the subject site. The purpose of the investigation was to determine the general engineering characteristics of the soil underlying the area of proposed construction and to provide specific recommendations for the design of foundations and related improvements. Included in this report are the results of our infiltration study for the site, as well as grading and construction-related recommendations for the development of the proposed project.

The Plot Plan included with this report indicates the site location and the locations of the four test borings that were drilled to explore the site as part of the investigation. The boring logs in Appendix A present a detailed description of the soils encountered. The results of laboratory tests performed on samples of the soil obtained from the test borings, and a description of the methods of performing the tests, are presented in Appendix B to this report.

SITE CONDITIONS

We were recently provided with a plan, prepared by Landesign Group, drawn at a scale of 1 inch = 16 feet, that indicates the proposed development. The plan is dated August, 2016. The

Landesign Group plan has been used as the base map for the attached Plot Plan.

For the purposes of discussion, it will be assumed that Foothill Boulevard is oriented in a northwest to southeast direction. It will further be assumed that Woodleigh Lane is oriented in a north-south direction. The subject site is located at the southwest corner of Woodleigh Lane and Foothill Boulevard.

The subject site consists of an existing church and associated parking and improvements. We understand that a portion of the existing church includes a partial basement. Drainage across the site is towards the southeast. There is an elevation change of 6 to 8 feet along Woodleigh Lane, from Foothill Boulevard to the southern property line.

PROPOSED CONSTRUCTION

The proposed development will consist of a senior living facility. As previously mentioned, we received the attached Landesign Group plan that indicates the locations of proposed improvements. The Landesign Group plan has been utilized as the base map for the attached Plot Plan. We understand that the proposed Care Center building will be up to 3 stories in height, of wood-frame construction, and partially underlain by a single-level, subterranean parking garage. The plan also indicates that a detached, proposed church building will be constructed in the northwestern portion of the site. Infiltration into the subgrade soils, as part of Low Impact Design requirements, is also proposed. Although the plan we received shows the locations of the proposed buildings and proposed pavement areas, the final grades for the development are not indicated on the plan.

We have not been provided with structural load data for the proposed buildings. For the purposes of preparing this report, it will be assumed that the proposed Care Center building will have typical foundation loads for the type of proposed structure, with loads not exceeding 250 kips at isolated column locations and no more than 3 kips per lineal foot along continuous foundation lines. It will be further assumed that the proposed church building will have isolated loads not exceeding 150 kips at column locations and continuous foundation loads not exceeding 2 kips per lineal foot.

The project described above and indicated on the attached Plot Plan was the basis for the preparation of the recommendations presented in this report. We should be notified if the description of the project is inaccurate or if significant changes to the development are proposed.

FIELD EXPLORATIONS

Four separate test borings were drilled to explore the site as part of the subject investigation. In addition, two relatively shallow infiltration borings were also excavated within planned areas of potential infiltration. A truck-mounted, hollow-stem auger drill rig was used to excavate the test borings and the infiltration borings were excavated with a hand auger. Relatively undisturbed “ring” samples and bulk bag samples were obtained during the drilling of the test borings and transported to our laboratory for testing. The boring logs are presented in Appendix A of this report. The approximate locations of the four test borings and two infiltration borings that were drilled for the subject investigation are indicated on the attached Plot Plan.

SOIL CONDITIONS

The results of our investigation indicate that fill soils, ranging from about 1 to 4 feet in depth were observed in each of our test and infiltration borings, with the exclusion of IB-2 which was entirely within native alluvial soils. The fill soils were generally medium dense and moist. The fill soils, where observed, did not contain any significant amounts of debris. The fill soils were underlain by naturally deposited alluvial soils. The naturally deposited alluvial soils were generally observed to be slightly moist to moist and medium dense. Variations of the materials encountered are indicated in the attached boring logs in Appendix A of this report. Groundwater was not encountered during the subsurface exploration of the site.

GEOLOGIC CONDITIONS

The site is in the Crescenta Valley, between the San Gabriel Mountains on the north and the San Rafael Hills to the south. This valley is mantled by alluvial fan deposits derived from the adjacent hills. The fan deposits are composed of Pleistocene age yellow to yellowish brown, unconsolidated fine to medium sand and gravel with abundant cobbles and boulders (Crook et. al., 1987; Dibblee, 1989), and are estimated to extend to a depth of approximately 150 feet beneath the site (Smith, 1986). The alluvial fan deposits are underlain by Plio-Pleistocene age sedimentary rock units which overlie granitic crystalline basement rocks at an estimated depth of approximately 500 feet beneath the site (Smith, 1986).

The Tujunga fault of the Sierra Madre fault zone is located approximately 3,500 feet northeast of the site. The Sierra Madre fault zone is considered active which, based on definitions developed by the California Geological Survey (Hart and Bryant, 1999), is a fault that has moved in the last 11,000 years. The active San Gabriel fault is situated 2.5 miles to the northeast. The potentially active (defined as movement in the last 11,000 to 1.6 million years ago) Verdugo-Eagle Rock fault is located approximately 4 miles to the southwest. No known active or potentially active faults underlie the site, and the site is not located within an Alquist-Priolo Earthquake Fault Zone.

Water well records from the Los Angeles County Department of Public Works (LACDPW) indicate one active well located approximately ¼-mile west of the site. This well is designated as Well No. 4000A (State Identification No. 1N13W01F01). Water level measurements have been recorded for this well since October, 1971. During that time, the highest recorded water level was 62.3 feet below ground surface, corresponding to a water surface elevation of 1122.7 feet above mean sea level (msl) measured on April 6, 1973. The last measurement recorded in this well was 78.5 feet below ground surface (water surface elevation of 1106.5 feet msl) on October 17, 2007.

Groundwater was not encountered in our exploratory borings, drilled to a maximum depth of 26 feet below existing ground surface.

LABORATORY TESTS

Laboratory tests were performed on selected samples that were obtained from the test borings to aid in the classification of the soils and to determine the pertinent engineering properties of the soils. The following tests were performed:

- moisture content and dry density determinations;
- direct shear tests;
- consolidation tests;
- expansion index tests; and
- maximum dry density tests.

The results of the moisture and density tests are indicated on the boring logs and the remaining test results are presented in Appendix B of this report.

SEISMIC DESIGN PARAMETERS

As with virtually all property in southern California, the site may be subjected to strong ground shaking during earthquakes on nearby or distant faults, and the improvements should be designed to resist such shaking in accordance with current codes.

The following coefficients and factors apply to seismic force design of structures at the subject site. The parameters were determined using the Ground Motion Parameter Calculator (Version 5.0.9a) at the United States Geological Survey (USGS) Earthquake Hazards website.

Latitude	34.200250
Longitude	-118.191941
Site Class	D
S_S	2.661
S_1	0.952
S_{MS}	2.661
S_{M1}	1.428
S_{DS}	1.774
S_{D1}	0.952
PGA_M	0.979

LIQUEFACTION

The Seismic Hazard Zone Map for the subject site indicates that the subject site is not classified as being potentially susceptible to liquefaction. Accordingly, a liquefaction evaluation was not performed at the subject site.

INFILTRATION TESTING

Infiltration testing was performed within Borings IB-1 through IB-2. Monitoring wells were installed in each of the borings and tests were conducted to determine the rate at which water infiltrates into the soil within the lower 12 inches of the boring. The tests were performed within the alluvial soils at a depth of approximately 4 feet below the existing site grades.

The tests were performed in accordance with the Boring Percolation Test Procedure method presented in the County of Los Angeles Department of Public Works (LACDPW), "Guidelines for Design, Investigation, and Reporting Low Impact Development Stormwater Infiltration" (Form GS200.1, dated December 31, 2014). The boring percolation testing procedures and results have been summarized in Appendix C of this report.

Field infiltration rates were obtained from each of the tests and then corrected for borehole diameter. The rates were then adjusted for LACDPW required reduction factors for site variability and number of tests (CFv) and long-term siltation, plugging, and maintenance (CFs), which further reduces the field infiltration rate. A value of 2 was used for CFv and a value of 2 was used for long-term siltation, plugging, and maintenance (CFs). RTF&A does not take responsibility for these factors as they are dependent upon the future infiltration design details, future maintenance, and number and location of future site infiltration. These reduction factors may be increased or decreased by the infiltration designer based upon their experience and specific design details of the infiltration system, including maintenance frequency.

When the corrections for borehole diameter and LACDPW required reduction factors are applied, the corrected field infiltration rate of the alluvial soils was 0.5 in/hr within Boring IB-1 and 1.9 in/hr with Boring IB-2.

LACDPW requires a minimum field infiltration rate, with consideration of applicable correction factors, of 0.3 in/hr. The field infiltration testing at each of the borings resulted in infiltration rates that exceed the minimum required by LACDPW at the locations and depths tested within native soils. It is recommended that infiltration at the site only be within alluvial soils and not within future compacted fills. Groundwater was not encountered in any of the test borings that were drilled for the subject investigation and extended to depths of as much as 26 feet below the existing grade. It is recommended that the invert elevation for infiltration be no lower than about 15 feet below existing site grades. Once infiltration locations and elevations are determined, we can provide additional geotechnical input relative to infiltration rates and elevations.

Boring Location	Material	Field Infiltration Rate (in/hr)	Borehole Corrected Field Infiltration (in/hr)	CF_v	CF_s	Calculated Field Infiltration (in/hr)
IB-1	Alluvium (native)	12.0	2.1	2	2	0.5
IB-2	Alluvium (native)	42.2	7.52	2	2	1.9

The design of the on-site infiltration should take into consideration the following Los Angeles County setbacks:

- the infiltration basin should maintain a setback of at least 5 feet from adjacent property lines and public right-of-way;
- the infiltration basin should be located at least 15 feet from, or beyond a 1:1 plane drawn down from, the bottom of any existing or future foundations;
- the infiltration point of discharge should be set back at least 10 feet (measured horizontally) from existing drainage courses; and
- the infiltration basin should be set back a horizontal distance of 5 feet or H/2, where H equals the slope height, whichever is greater, from the face of any descending slope.

RECOMMENDATIONS

GENERAL

The recommendations presented in this report are applicable to the planned construction and loading conditions described in the previous sections of this report. If our description of the proposed development is inaccurate because of revisions to the planned construction or for other reasons, we should be informed so that we may review our recommendations and determine if they will remain applicable for development purposes. All design and grading work at the subject site should be conducted in accordance with the recommendations of this report and the requirements of the 2016 California Building Code (CBC).

GRADING

Grading will be required to provide a uniform subgrade below the proposed building areas and areas of proposed improvements. As discussed below, removal and recompaction of the existing fill should be performed below areas where it is being proposed to construct buildings, pavement, and related improvements. In addition, it will be required to remove and recompact the naturally deposited alluvial soils that occur within 3 feet of the bottoms of the proposed foundations as discussed below.

All existing fill materials should be removed prior to placement of new compacted fill. In addition, existing naturally deposited alluvial soils that occur within 3 feet of the bottoms of proposed foundations should be removed and recompacted. With the exception of the subterranean garage, the removal of existing fill and alluvial soils should extend beyond the perimeters of proposed buildings a lateral distance of at least 5 feet outside the perimeter foundations for the buildings. It will not be required to extend the lateral over-excavation of soil beyond the perimeter of the subterranean garage foundations, only directly below the “footprint” of the subterranean garage foundations.

The over-excavation and recompaction of soil beneath the proposed subterranean garage foundations could be performed in association with the grading for the building and/or pavement areas. Alternatively, the over-excavation and recompaction of soil could be performed during the construction phase of the project. If constructed in this manner, the excavations for the subterranean garage foundations would be extended an additional 3 feet below the design bottom-of-footings and the resulting excavations would subsequently be backfilled in lifts, with compacted fill soil, to the design bottom-of-footing elevations. A hand-held whacker, or sheepsfoot compactor mounted on a backhoe, could presumably be used to attain the required compaction.

Removal of alluvial soil is not anticipated to be required below proposed pavement areas. As previously discussed, it will be required to remove and recompact existing fill that occurs in proposed pavement areas.

Once the existing alluvial soils and/or fill has been removed in accordance with the recommendations specified above, the exposed soils should be “proof-rolled” with relatively heavy grading equipment to determine if the exposed soils are satisfactory or if additional removals will be required. The “proof-rolling” of the exposed soils should be performed under the observation of a representative of the Geotechnical Engineer of Record.

The bottoms of areas to be filled should be processed prior to placement of compacted fill. Processing of soil should consist of scarifying the upper 6 to 12 inches of the exposed grade, adjusting the moisture content of the scarified soil to approximately two percent above optimum moisture content, and compacting the exposed soil to at least 90 percent of the maximum dry density of the soil. The bottoms of areas to be filled should be observed and approved by a representative of the Geotechnical Engineer of Record prior to fill placement. It may be required to have a representative from the governing agency observe bottom areas prior to fill placement; the contractor selected for the project should be familiar with the requirements for regulatory inspections.

Fill should be placed in layers not exceeding 8 inches in loose thickness, adjusted to approximately optimum moisture content, and compacted to at least 90 percent of the maximum dry density of the soil as determined by the current ASTM Soil Compaction Method D1557. Organic and decomposable material should be excluded from the fill, as should solid material exceeding 8 inches in maximum dimension. Fill soils should be placed and compacted under the observation and testing of a representative of the Geotechnical Engineer of Record.

If it is required to import soil for use as compacted fill, the imported soil should be relatively non-expansive and similar to the on-site soil. A 40-pound sample of proposed import soil should be submitted to the Geotechnical Engineer of Record at least 48 hours prior to importing to the job site to determine if the soil would be acceptable for use on the project.

GENERAL GRADING REQUIREMENTS

1. All fills, unless otherwise specifically designed, shall be compacted to at least 90 percent of the maximum dry unit weight as determined by ASTM D1557 Method of Soil Compaction.

2. No fill shall be placed until the area to receive the fill has been adequately prepared and subsequently approved by the Geotechnical Engineer of Record or his representative.

3. Fill soils should be kept free of debris and organic material.

4. Rocks or hard fragments larger than 8 inches may not be placed in the fill without approval of the Geotechnical Engineer of Record or his representative, and in a manner specified for each occurrence.

5. The fill material shall be placed in layers which, when compacted, shall not exceed 8 inches per layer. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to ensure uniformity of material and moisture.

6. When moisture content of the fill material is too low to obtain adequate compaction, water shall be added and thoroughly dispersed until the soil is approximately two percent over optimum moisture content.

7. When the moisture content of the fill material is too high to obtain adequate compaction, the fill material shall be aerated until the soil is approximately two percent over optimum moisture content.

8. Fill and cut slopes should not be constructed at gradients steeper than 2:1 (horizontal:vertical).

TEMPORARY EXCAVATIONS

It will be required to make temporary excavations during the grading and construction phases of the subject development. Temporary excavations are anticipated to be required during the grading phase of the project when removing existing soil, as discussed in the previous "Grading" section of this report. Temporary excavations to be made during the construction phase of the project will include those made for the construction of the subterranean garage level, foundations for other improvements, and utility line trenches.

As previously mentioned, the attached site plan we received does not indicate the existing site grades or the limits of the subterranean garage area. Accordingly, it is not possible to determine the exact heights of the proposed temporary excavations. Based on our review of the plan, it is assumed that the most significant temporary excavations will occur during grading when unsuitable soils are removed, and subsequently recompacted, below the subterranean garage level.

Vertical excavations should not be permitted to exceed 5 feet in height. Excavations up to 12 feet in height may be excavated at gradients no steeper than ¾:1 (horizontal:vertical). Excavations that exceed 12 feet in height should be excavated at gradients no steeper than 1:1. It may be possible to make compound excavations that incorporate a combination of sloped and vertical excavations. If insufficient room exists, it may become necessary to utilize shoring and/or slot cut excavations to make the required excavations. Temporary excavation recommendations may be amended once final development plans are prepared and/or because of field conditions and are subject to approval by the Geotechnical Engineer of Record. All regulations of state or federal OSHA should be followed. More specific temporary excavation recommendations can be provided once we have been provided with plans indicating the existing and proposed grades.

The tops of excavations should be barricaded to prevent vehicles and storage loads from being within 10 feet of the top of an excavation. A greater setback may be necessary when considering heavy vehicles, such as concrete trucks and cranes. The Geotechnical Engineer of Record should be advised of such heavy vehicle loadings so that specific setback requirements can be established.

Berms should be constructed along the tops of excavations, where necessary, to prevent run-off water from flowing over the excavations. This recommendation would be particularly important during the rainy season (normally from November through April), when run-off water can cause erosion of excavations. Excavations should be observed by the Geotechnical Engineer of Record so that any necessary modifications, based on variations in the soil conditions encountered, can be made.

CORROSION TESTS

A soil corrosion study was not performed as part of the scope of this investigation. A sample of the near-surface soil should be obtained at the conclusion of grading and be submitted to a corrosion consultant for testing. The purpose of performing the tests would be to determine if the site soils are corrosive to concrete or underground utilities in contact with the soil.

FOUNDATIONS

The recommendations presented in this section are based on the assumption that the proposed buildings will have foundation loads similar to those described in the "Proposed Construction" section of this report. Spread foundations may be used to provide support for the proposed buildings. The bearing soil should consist of compacted fill soil placed in accordance with the recommendations presented in this report.

Foundations should be a minimum of 18 inches in depth and 12 inches in width, and be designed in accordance with the CBC. The recommended foundation depths should be measured from the lowest adjacent final grade. Foundations constructed in accordance with these recommendations may be designed using a bearing value of 2,500 pounds per square foot (psf) for combined dead and frequently applied live loads. This bearing value applies to both continuous and isolated footings and may be increased by one-third for the total of all loads, including those attributed to seismic and wind forces. The recommended bearing value is a net value, i.e., the mass of concrete in footing pads may be neglected when computing the footing dimensions.

The attached Plot Plan indicates that incidental structures such as a lightly loaded garden shed and shade structures are being proposed as part of the site development. The following foundation recommendations would also be applicable to incidental structures such as trash enclosures or similar construction. Foundations for incidental structures and related construction can be founded entirely in either native alluvial soils or compacted fill. It may become necessary to deepen and/or compact the bottoms of foundations that are founded in native alluvial soils if those soils are determined to be unsatisfactory. A bearing value of 1,500 psf may be used for the design of foundations for incidental structures, provided the recommendations of this report have been implemented.

Foundations should be deepened, where necessary, to prevent surcharge loads from being imposed upon adjacent foundations or utilities. However, it will be necessary to maintain at least 3 feet of compacted fill (placed under the observation/testing of the Geotechnical Engineer of Record) beneath foundations for the proposed buildings. Surcharge loads should be assumed to be distributed out from the bottom edges of foundations at 45-degree angles. Foundation excavations should be cleaned of all loose material and be observed and approved by a representative of the Geotechnical Engineer of Record prior to casting concrete.

The foundation and grading plans for the proposed development should be reviewed by this office prior to the start of construction. The Geotechnical Engineer of Record should sign and stamp the plans, provided the plans have been found to conform to the geotechnical recommendations presented in this report.

LATERAL DESIGN

Lateral resistance at the bases of footings or slabs may be assumed to be the product of the dead load and a coefficient of friction of 0.40. Passive pressure on the faces of footings and grade beams may also be used to resist lateral forces. A passive pressure of zero at the surface of finished grade, increasing at the rate of 250 psf per foot of depth, to a maximum of 2,500 psf, may be used for this project. Passive pressure and friction may be combined without reduction when evaluating the lateral resistance.

SETTLEMENT

Provided that the proposed structures do not exceed the assumed structural loads and are founded entirely in properly compacted fill soil as recommended, we estimate that the total static settlement will be up to about 1.0 inches. Static differential settlement is expected to be less than 0.75 inches within a horizontal distance of 30 feet.

FLOOR SLABS

General: The floor slab recommendations presented in this section are based on the assumption that the soil subgrade will consist of compacted fill soil and that concrete slabs will be subjected to normal loads with no special requirements. Any near-surface soils that become dried or disturbed during construction should be moisture-conditioned and compacted prior to casting slabs.

Conventional Floor Slabs: Concrete floor slabs should have a thickness of at least 5 inches and be reinforced with No. 4 reinforcing bars spaced 18 inches, on center, in orthogonal directions. It is recommended that the soil subgrade be thoroughly moistened prior to casting the concrete slabs. Thicker slabs and additional reinforcement may be required, depending on the floor loads and the structural requirements. The slab thicknesses and reinforcing may be increased or decreased at the direction of the Project Structural Engineer.

Post-Tensioned Floor Slabs: Post-tensioned floor slabs should be designed per the recommendations of the CBC. Perimeter edge footings should have a minimum depth of 12 inches. Footing depths should be measured from the lowest adjacent grade or from the top of the floor slab for interior footings.

Net Bearing Value:	An allowable net bearing value of 2.500 psf for footings with a minimum width and depth of 12 inche below the top of slab or lowest adjacent grade may be used.
Coefficient of Friction:	0.75 for pre-stressing, 0.40 for slab friction
Passive Pressure:	250 pcf for level ground condition
Modulus of Subgrade Reaction (K):	150 pounds per cubic inch (pci) for a footing width of one foot. For larger footings or floor slabs, this value should be reduced using the following equation: $Kr = K\left[\frac{(B+1)}{2B}\right]^2$ where: Kr = Reduced Modulus Value K = Modulus of Subgrade Reaction for a One-Foot-Wide Plate B = Width of Large Footing or Slab
Modulus of Elasticity:	1,000 pounds per square inch (psi)
Edge Moisture Variation Distance	
Me (Center Lift):	5.25 feet
Me (Edge Lift):	2.5 feet
Estimated Differential Movement	Very low to Low
My (swelling):	0.4
My (shrink):	0.3

Expansive Soil Conditions: The soils encountered during our investigation primarily consisted of clean to silty sands with a very low potential for expansion. The results of Expansion Index tests, performed on two separate samples, are presented in Appendix B. Accordingly, no special treatment of the soils, relative to expansive soil conditions, is anticipated to be required.

As previously mentioned in the "Grading" section of this report, import soils used to establish final grade, if required, should consist of relatively non-expansive soils. The expansion potential of the soils exposed at final grade should be determined upon completion of the proposed grading operations.

Moisture-Sensitive Flooring: Water vapor transmitted through floor slabs is a common cause of floor covering problems. An impermeable membrane "vapor barrier" should be installed to reduce excess vapor drive through floor slabs. The function of the impermeable membrane is to reduce the amount of water vapor transmitted through the floor slab. Vapor-related impacts should be expected in areas where a vapor barrier is not installed.

Floor slabs should be underlain by a vapor barrier surrounded by 2 inches of sand above and below the barrier. The vapor barrier should be at least 10 millimeters thick; care should be taken to preserve the continuity and integrity of the barrier beneath the floor slab. The sand should be sufficiently moist to remain in place and be stable during construction; however, if the sand above the barrier becomes saturated before placing concrete, the moisture in the sand can become a source of water vapor.

Another factor affecting vapor transmission through floor slabs is a high water-to-cement ratio in the concrete used for the floor slab. A high water-to-cement ratio increases the porosity of the concrete, thereby facilitating the transmission of water and water vapor through the slab. The Project Structural Engineer or a concrete mix specialist should provide recommendations for the design of concrete for footings and floor slabs in accordance with the CBC, with consideration of the above comments.

RETAINING WALLS

General: The attached site plan does indicate that retaining walls, separate from the building areas, will be constructed as part of the proposed development. Retaining walls should be designed with consideration of the recommendations presented in this submittal. As discussed in the "Foundations" section of this report, a bearing value of 2,500 psf may be used in the design of foundations for retaining walls, separate from the proposed buildings, provided the earthwork recommended in the "Grading" section of this report is performed. Our office should review and approve retaining wall plans prior to the initiation of construction.

Although the existing and proposed grades are not indicated on the attached Site Plan, we understand that portions of the walls for the proposed buildings will function as retaining walls associated with the subterranean garage level. Building walls that retain soil should be designed in accordance with the recommendations presented herein.

Lateral Earth Pressure: Where cantilevered retaining walls, separate and independent of the buildings, are to retain level backfill soils with a retained height of less than 15, it may be assumed that drained soils will exert a lateral pressure equal to that developed by a fluid with a density of 35 pounds per cubic foot (pcf). Where the surface of the retained backfill is inclined at a gradient of 2:1, it may be assumed that drained soils will exert a lateral pressure equal to that developed by a fluid with a density of 48 pcf.

For the design of a rigid wall where rotation and lateral movement are not acceptable, as in the case of the building walls, it may be assumed that level, drained, non-expansive soils will exert a lateral pressure equal to that of a fluid with a density of 50 pcf. The pressure value and distribution may vary significantly when considering wall rigidity and restraining conditions. The structural characteristics of the wall are referred to the Project Structural Engineer. If requested, we can provide additional geotechnical design parameters for specific restrained conditions.

In addition to the recommended earth pressure, the walls should be designed to resist any applicable surcharges due to buildings, walls, and storage. A drainage system should be provided to prevent the development of hydrostatic pressure behind the walls. If a drainage system is not installed, the walls should be designed to resist an additional hydrostatic pressure equal to that developed by a fluid with a density of 62.4 pcf against the full height of the wall.

In addition to the recommended earth, hydrostatic, and applicable surcharge loads, the upper 10 feet of walls adjacent to vehicular traffic areas should be designed to resist a uniform lateral pressure of 100 psf, acting as a result of an assumed 300 psf surcharge behind the walls due to normal traffic. If the traffic is kept back at least 10 feet from the walls, the traffic surcharge may be neglected.

Seismic Lateral Earth Pressure: The preceding recommended values indicate earth pressures for conventional static loading conditions. Ground shaking associated with earthquakes may cause additional pressure on walls. In addition to the previously mentioned lateral earth pressures, it is recommended that all rigid (building) walls of any height, and cantilevered retaining walls greater than 6 feet in height, be designed to support an additional seismic earth pressure equal to an inverted equivalent fluid pressure of 24 pcf.

Wall Backfill: Backfill placed behind retaining walls should be compacted to a minimum of 90 percent of the maximum dry density, as determined by the Soil Compaction Test Method (ASTM Standard D1557). When backfilling, walls should be braced. Heavy compaction equipment should not be used any closer to the back of the wall than the height of the wall. Soils that have an expansion index in excess of 50 should not be utilized for backfill behind walls that are greater than 3 feet in height. The backs of retaining walls should be water-proofed where aesthetics are concerned.

Density of Backfill: When designing retaining walls to resist over-turning, it can be assumed that compacted, on-site soils will have a density of 125 pcf.

Drainage: A drainage system should be provided behind retaining walls or the walls should be designed to resist hydrostatic pressures as discussed above. Retaining wall backfill may be drained utilizing a perforated pipe. The perforated pipe should be at least 4 inches in diameter and be placed at the base of the wall, with the perforations pointed down. The pipe should be sloped to provide positive drainage, but in no instance shall the pipe be elevated more than 2 feet above the bottom of the wall. The pipe should be surrounded by at least 6 inches of uniform-sized gravel and be permitted to outlet onto a surface that would not be subject to erosion. Alternatively, the drain could be connected to a suitable outlet device. The gravel should be separated from the surrounding soils by a filter fabric, such as Mirafi 140N or equivalent, wrapped around the gravel ("burrito-wrapped"). Alternatively, the filter fabric and gravel may be omitted when using a continuous slotted pipe and a graded sand that conforms to LACDPW "Graybook," F-1 Designated Filter Material.

Weepholes may be used in lieu of a drainage system consisting of perforated pipe. Weepholes should be at least 4 inches in diameter and be spaced at 8-foot intervals. The bottom of each weephole should be installed approximately 6 inches above the adjacent grade. At least one cubic foot of filter material should be placed behind each weephole, and some means to minimize the loss of the material through the weephole should be provided.

Drainage panels such as Miradrain or equivalent, or a 6- to 12-inch-wide gravel chimney drain, should be installed behind retaining walls that are greater than 5 feet in height. The tops of the drainage panels or chimney drain should be capped with at least 18 inches of compacted on-site soil; the thickness of the cap should be increased to provide a minimum of 3 feet of compacted fill soils under any footing within the area of the backfill, where appropriate. The intent of installing the drainage panels or chimney drain would be to reduce the potential for build-up of water directly behind the walls. Excessive build-up of water could result in wall failure if the wall is not designed to resist hydrostatic forces.

The installed drainage system should be observed by the Geotechnical Consultant prior to backfilling the system. Observation of the drainage system may also be required by the reviewing governmental agencies prior to backfilling.

Waterproofing: We defer to a waterproofing consultant for determining subsurface waterproofing requirements for the subterranean portion of the project. Waterproofing should maintain a dry environment and prevent calcium salt from infiltrating concrete and staining the inside of subgrade walls.

PRELIMINARY PAVEMENT DESIGN

It is assumed that the drive areas and parking stalls indicated on the Plot Plan will consist of asphalt or concrete pavement. The reader is referred to the "Grading" section of this report for recommendations related to grading in proposed pavement areas.

Presented below are preliminary pavement section recommendations, based on an assumed R-value for the site soils. Soil samples should be obtained from the proposed pavement areas following the completion of the recommended grading for the purposes of performing R-Value tests and determining final pavement section recommendations.

The following pavement section recommendations are based on the assumption that the on-site soils have an R-Value of at least 25.

TRAFFIC INDEX	ASPHALT THICKNESS (INCHES)	BASE COURSE (CAB) THICKNESS (INCHES)	BASE COURSE (CMB) THICKNESS (INCHES)
4	3	4	6
5	3	7	9
6	4	8	10
7	4	11	13
8	5	12	14

Base course material should consist of either crushed aggregate base (CAB), as defined by Section 200-2.2 of the Standard Specifications for Public Works Construction ("Greenbook"), or Crushed Miscellaneous Base (CMB), as defined by Section 200-2.4 of the Greenbook. The base course material should be compacted to at least 95 percent of the maximum dry density of the material as determined by ASTM Test D1557.

Base course material should be purchased from a supplier who will certify that the base course will meet or exceed the specifications in the Greenbook as indicated. We would, upon request, perform sieve analysis and sand equivalency tests on material delivered to the site that appears suspect. Additional tests could also be performed, upon request, to determine if the material is in compliance with the remainder of the Greenbook specifications.

As mentioned above, final concrete pavement recommendations would be based on the results of R-value tests performed upon the completion of the grading operations. It is anticipated that concrete pavement should be at least 8 inches in thickness and be underlain by at least 4 inches of compacted base course material.

To potentially increase the life of the pavement, concrete curbs and gutters could be deepened to extend 6 inches below the base course material and be seated in the soil subgrade. The intent of deepening the curbs and gutters is to form a “cut-off” wall to reduce the amount of water flow through the base course material from adjacent landscaped areas. Subgrade soils that become saturated as a result of water flowing through base course material can reduce the life of the pavement. The curb subgrade should be thoroughly moistened prior to casting concrete.

The preliminary pavement section recommendations presented above are based upon assumed Traffic Index values. R. T. Frankian & Associates does not take responsibility for the numerical determination of the Traffic Index values or the areas where they apply within the site. We would be pleased to provide pavement section recommendations for alternative Traffic Index values upon request.

OBSERVATION/TESTING SERVICES

This report has been prepared assuming that R. T. Frankian & Associates will perform all geotechnical field observations and testing. If the recommendations presented in this report are utilized and observation/testing of the geotechnical work is performed by others, the party performing the observations/testing must review this report and assume responsibility for the recommendations presented herein, or provide an additional report. That party would then assume the title “Geotechnical Engineer of Record” for the project and respond to any design and construction-related issues that may arise.

A representative of the Geotechnical Engineer of Record should be present to observe grading and backfill operations as well as foundation excavations for the project. A report presenting the results of these observations and related testing should be issued upon completion of the work.

-o0o-

The following are attached and complete this report:

- Plot Plan
- Appendix A – Explorations
  - Unified Soil Classification System, Figure A-1
  - Hollow-Stem Boring Logs HS-1 through HS-4
  - Infiltration Borings IB-1 and IB-2
- Appendix B – Laboratory Tests
  - Direct Shear Test Data (1 page)
  - Consolidation Test Data (7 pages)
  - Gradation Tests (2 pages)
- Appendix C – Boring Percolation Testing Procedures and Results (1 page)

ALAN W. RASPLICKA
No. GE 2558

Respectfully submitted,

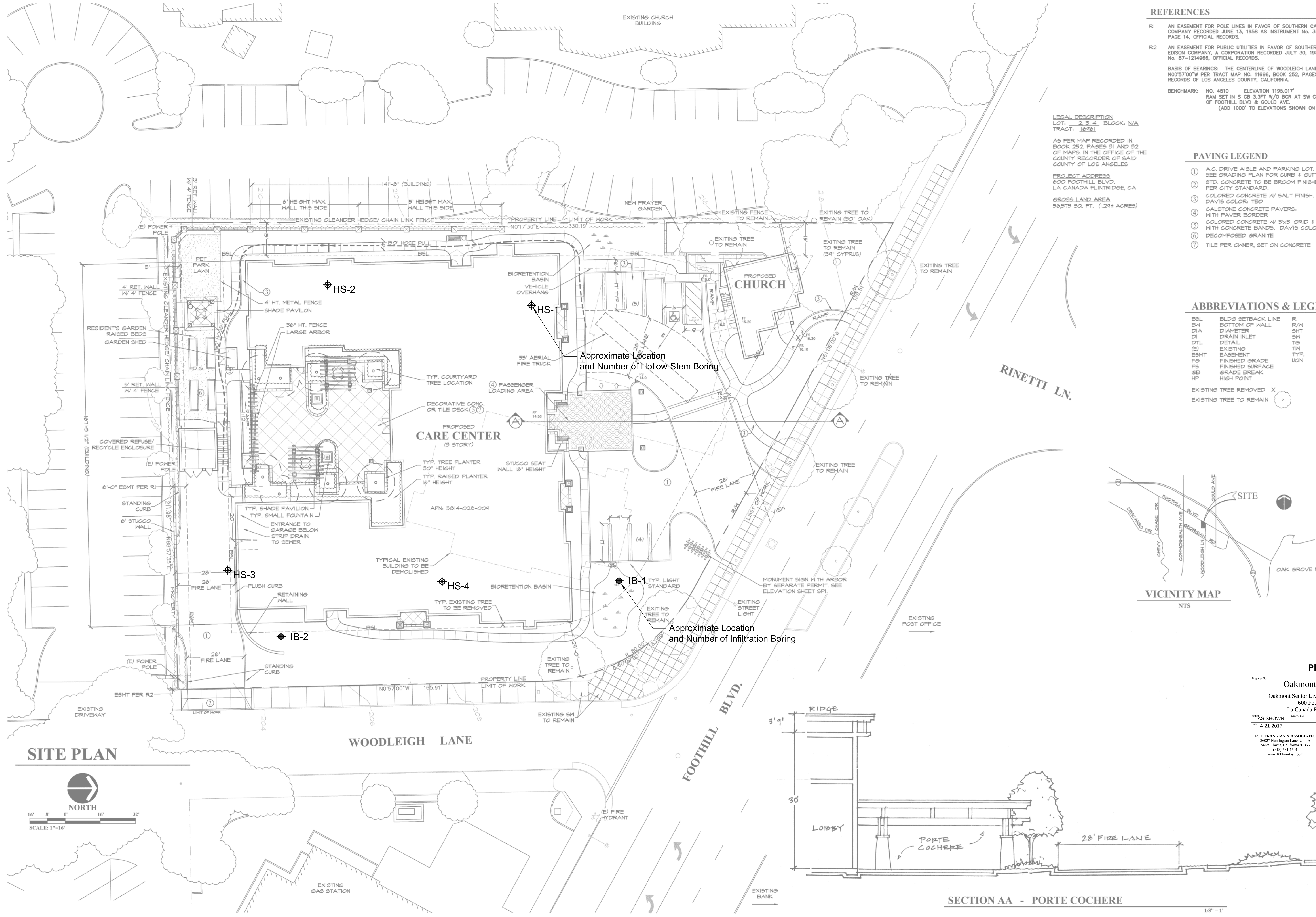
R. T. FRANKIAN & ASSOCIATES

Alan W. Rasplicka
Alan W. Rasplicka
Principal Geotechnical Engineer

Timothy P. Latiolait
and: Timothy P. Latiolait
Principal Engineering Geologist

PROFESSIONAL GEOLOGIST NO. 3749
TIMOTHY P. LATIOLAIT
#1140
CERTIFIED ENGINEERING GEOLOGIST

BKP/AWR/TLP/jh



REFERENCES

R1 AN EASEMENT FOR POLE LINES IN FAVOR OF SOUTHERN CALIFORNIA EDISON COMPANY RECORDED JUNE 13, 1958 AS INSTRUMENT No. 3288 IN BOOK D-127 PAGE 14, OFFICIAL RECORDS.

R2 AN EASEMENT FOR PUBLIC UTILITIES IN FAVOR OF SOUTHERN CALIFORNIA EDISON COMPANY, A CORPORATION RECORDED JULY 30, 1987 AS INSTRUMENT No. 87-1214966, OFFICIAL RECORDS.

BASIS OF BEARINGS: THE CENTERLINE OF WOODLEIGH LANE, BEING N00°57'00"W PER TRACT MAP NO. 11696, BOOK 252, PAGES 32 OF MAPS, RECORDS OF LOS ANGELES COUNTY, CALIFORNIA.

BENCHMARK: NO. 4510 ELEVATION 1195.017'
RAM SET IN S CB 3.3FT W/O BCR AT SW CORNER
OF FOOTHILL BLVD & GOULD AVE.
(ADD 1000' TO ELEVATIONS SHOWN ON PLAN)

LEGAL DESCRIPTION
LOT: 2, 3, 4 BLOCK: N/A
TRACT: 11696I

AS PER MAP RECORDED IN BOOK 252, PAGES 31 AND 32 OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY OF LOS ANGELES

PROJECT ADDRESS
600 FOOTHILL BLVD.
LA CANADA FLINTRIDGE, CA

GROSS LAND AREA
56,373 SQ. FT. (1.29± ACRES)

PAVING LEGEND

① A.C. DRIVE AISLE AND PARKING LOT. SEE GRADING PLAN FOR CURB & GUTTERS.
② STD. CONCRETE TO BE BROOM FINISHED PER CITY STANDARD.
③ COLORED CONCRETE W/ SALT FINISH. DAVIS COLOR: TBD
④ CALSTONE CONCRETE PAVERS: WITH PAVER BORDER
⑤ COLORED CONCRETE W/ 3'x3' GRID & SALT FINISH, WITH CONCRETE BANDS. DAVIS COLOR: TBD
⑥ DECOMPOSED GRANITE
⑦ TILE PER OWNER, SET ON CONCRETE

ABBREVIATIONS & LEGEND

BSL	BLDG SETBACK LINE	R	RADIUS
BW	BOTTOM OF WALL	R/W	RIGHT OF WAY
DIA	DIAMETER	SHT	SHEET
DI	DRAIN INLET	SW	SIDEWALK
DTL	DETAIL	TG	TOP OF GRATE
(E)	EXISTING	TW	TOP OF WALL
ESMT	EASEMENT	TYP.	TYPICAL
FG	FINISHED GRADE	UON	UNLESS OTHERWISE NOTED
FS	FINISHED SURFACE		
GB	GRADE BREAK		
HP	HIGH POINT		

EXISTING TREE REMOVED X
EXISTING TREE TO REMAIN

Plot Plan

Prepared For:
Oakmont Senior Living

Oakmont Senior Living of La Canada Flintridge
600 Foothill Boulevard
La Canada Flintridge, California

Scale: AS SHOWN	Drawn By: JH	Checked By: BKP
Date: 4-21-2017		2017-005-001

R. T. FRANKIAN & ASSOCIATES
26027 Huntington Lane, Unit A
Santa Clarita, California 91355
(818) 531-1501
www.RTFrankian.com
GEOTECHNICAL ENGINEERING & ENGINEERING GEOLOGY

OAKMONT OF LA CAÑADA FLINTRIDGE

FIRE PLAN

AUGUST, 2016
600 FOOTHILL BLVD.
LA CAÑADA FLINTRIDGE, CALIFORNIA
OAKMONT SENIOR LIVING

LANDESIGN GROUP
3344 GRAVENSTEIN HWY. N. SEBASTOPOL, CA
(707) 829-2580

SHEET:
F1

APPENDIX A

EXPLORATIONS

APPENDIX A

EXPLORATIONS

The soil conditions at the site were explored by drilling four, 8-inch-diameter, hollow-stem auger borings. The soils encountered were logged by our field engineer; undisturbed and bulk soil samples were obtained for laboratory inspection and testing. Two infiltration borings were excavated with a hand auger. The results of our observations during the excavation of the borings are presented in this Appendix. Details of the explorations are summarized in the Field Explorations section of the report and the approximate locations of the borings are shown on the Plot Plan. The soils encountered were classified in accordance with the United Soil Classification System.

Undisturbed samples were obtained from the borings using a heavy duty sampler with an external diameter of 3.50 inches. The sample sleeves within the sampler are 8 inches in length and have an internal diameter of 2.625 inches. The barrel sampler was driven by successive blows from a drop hammer. The number of blows required to drive the sampler 12 inches was recorded as an indication of the density, or consistency, of the earth materials. The depths at which undisturbed samples were obtained and the number of blows required to drive the sampler are indicated on the boring logs. The hammer weight and drop height for the borings are indicated on the logs.

MAJOR DIVISION			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS More than 50% retained on No. 200 (75 μm) sieve*	GRAVELS 50% or more of coarse fraction retained on No. 4 (4.75mm) sieve	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
		GRAVELS WITH FINES (Appreciable amount of fines)	GM	Silty gravel, gravel-sand-silt mixture
			GC	Clayey gravels, gravel-sand-clay mixture
	SANDS More than 50% of coarse fraction passes No. 4 (4.75 mm) sieve	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly-sands, little or no fines
			SP	Poorly graded sands, gravelly-sands, little or no fines
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS 50% or more passes No. 200 (75 μm) sieve	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils

*Based on the material passing the 3-inch (76 mm) sieve.

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by a combination of group symbols.

PARTICLE SIZE LIMITS

SILT OR CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	Fine	Medium	Coarse	Fine	Coarse		

No. 200 No. 40 No. 10 No. 4 3/4 in. 3 in. 12 in.

REFERENCE: ASTM D-2487

UNIFIED SOIL CLASSIFICATION SYSTEM

SAMPLE KEY:

- ■ FRANKIAN LINED-BARREL SAMPLER (3.50" O.D., 2.625" I.D., 8.0" LONG SAMPLE TUBE)
- ☒ STANDARD PENETRATION TEST (ASTM D-1586)
- ⧗ CALIFORNIA SAMPLER
- ▯ NO RECOVERY / DISTURBED SAMPLE
- ▲▼ BULK SAMPLE

BORING HS-1

JOB NUMBER: 2017-005-001
DATE DRILLED: 3/17/17
EQUIPMENT USED: 8" Diameter Hollow-Stem Rig with Heavy Duty Sampler
DRILLING CO.: Geoboden
LOGGED BY: JEF
BORING DEPTH: 0-26'
HAMMER WEIGHT: 140 pounds
SURFACE CONDITIONS: Asphalt Parking Lot

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
								ASPHALT (8")
							SM	**ARTIFICIAL FILL (af)** SILTY SAND: fine to medium, medium dense, damp to moist, medium brown
19	2.4	108	-		■			
							SW	**ALLUVIUM (Qal)** SAND: fine to coarse, slightly silty with gravel, medium dense, damp to moist, medium brown
20	1.5	121	-	5	■			
27	2.1	109	-		■			
56	6.5	109	-	10	■		SM	SILTY SAND: fine with occasional medium sand, dense, moist, light brown
44	8.3	122	-		■			fine with coarse sand, damp to moist
93/9"	7.1	109	-	15	■			
85/9"	7.7	126	-	20	■			fine with medium and occasional coarse sand, very dense, moist
75	10.1	114	-	25	■			fine to medium
								Bottom of Boring at 26 feet. No groundwater. No caving.
				30				
				35				
				40				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2017-005-001.GPJ FRANKIAN.GDT 4/25/17

LOG OF BORING

R.T. FRANKIAN & ASSOCIATES

BORING HS-2

JOB NUMBER: 2017-005-001
DATE DRILLED: 3/17/17
EQUIPMENT USED: 8" Diameter Hollow-Stem Rig with Heavy Duty Sampler
DRILLING CO.: Geoboden
LOGGED BY: JEF
BORING DEPTH: 0-26'
HAMMER WEIGHT: 140 pounds
SURFACE CONDITIONS: Asphalt Parking Lot

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SOIL TYPE	
						ASPHALT (6")
19	6.5	127	-		SM	**ARTIFICIAL FILL (af)** SILTY SAND: fine to medium, medium dense, damp to moist, medium brown
26	8.7	130	-	5	SW	**ALLUVIUM (Qal)** SAND: fine to medium, occasional coarse gravel, medium dense, damp to moist, medium brown
26	6.4	114	-			slightly silty, moist
22	13.4	119	-	10	SM	SILTY SAND: fine to medium, trace clay, medium dense, moist, medium brown
20	11.8	134	-			
50	9.9	136	-	15		
52	5.9	115	-	20	SW	SAND: fine to medium, slightly silty, medium dense, slightly moist, light brown, speckled black
56	18.6	124	-	25	SM	SILTY SAND: fine to medium, trace clay, dense, moist, light brown
						Bottom of Boring at 26 feet. No groundwater. No caving.
				30		
				35		
				40		

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2017-005-001.GPJ FRANKIAN.GDT 4/25/17

LOG OF BORING

BORING HS-3

JOB NUMBER: 2017-005-001
DATE DRILLED: 3/17/17
EQUIPMENT USED: 8" Diameter Hollow-Stem Rig with Heavy Duty Sampler
DRILLING CO.: Geoboden
LOGGED BY: JEF
BORING DEPTH: 0-26'
HAMMER WEIGHT: 140 pounds
SURFACE CONDITIONS: Asphalt Parking Lot

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	SOIL TYPE	
						SM	**ASPHALT (5")** **ARTIFICIAL FILL (af)** SILTY SAND: fine with occasional coarse, medium dense, damp to moist, medium brown
12	9.2	123	-		■		
8	17.2	129	-	5	■	SM	**ALLUVIUM (Qal)** SILTY SAND: fine, trace clay, medium dense, moist, medium brown
16	15.8	130	-		■		
22	14.6	128	-	10	■		fine to medium
70	9.6	126	-		■		dense
67/11.5"	9.7	131	-	15	■		
52	8	126	-	20	■		occasional coarse sand, medium dense, damp to moist
						SW	SAND: fine with occasional medium sand, trace silt, medium dense, damp to moist, light brown, speckled black
50	5.6	115	-	25	■	SM	SILTY SAND: fine with occasional medium sand, medium dense, damp to moist, medium brown
							Bottom of Boring at 26 feet. No groundwater. No caving.
				30			
				35			
				40			

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2017-005-001.GPJ FRANKIAN.GDT 4/25/17

LOG OF BORING

BORING HS-4

JOB NUMBER: 2017-005-001
DATE DRILLED: 3/17/17
EQUIPMENT USED: 8" Diameter Hollow-Stem Rig with Heavy Duty Sampler
DRILLING CO.: Geoboden
LOGGED BY: JEF
BORING DEPTH: 0-26'
HAMMER WEIGHT: 140 pounds
SURFACE CONDITIONS: Asphalt Parking Lot

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
								ASPHALT (3")
13	9.2	116	-		■		SM	**ARTIFICIAL FILL (af)** SILTY SAND: fine with occasional medium sand, medium dense, moist, medium brown
12	9.4	120	-	5	■		SP	**ALLUVIUM (Qal)** SAND: fine, trace silt, medium dense, damp to moist, medium brownish black
							SM	SILTY SAND: fine, medium dense, damp to moist, reddish brown
24	10.1	115	-		■			
23	11	122	-	10	■			
42	6.3	133	-		■			
							SW	SAND: fine to coarse, cemented, dense, damp to moist, yellowish orange, speckled black
60	10.8	136	-	15	■		SP	SAND: fine, trace silt, medium dense, damp to moist, medium brown
							SM	SILTY SAND: fine to medium, dense, damp to moist, medium brown with orange
41	12.9	132	-	20	■			fine with occasional medium sand, medium dense, damp to moist, medium brown
57	16.3	133	-	25	■			very silty, dense
								Bottom of Boring at 26 feet. No groundwater. No caving.
				30				
				35				
				40				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BOREHOLE LOG 2017-005-001.GPJ FRANKIAN.GDT 4/25/17

LOG OF BORING

BORING IB-1

JOB NUMBER: 2017-005-001
DATE DRILLED: 3/17/17
EQUIPMENT USED: 4" Diameter Hand Auger
DRILLING CO.: RTF&A
LOGGED BY: SDR
BORING DEPTH: 0-4'
SURFACE CONDITIONS: Landscape Area, Grass

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
							SM	**ARTIFICIAL FILL (af)** SILTY SAND: fine to medium, gravel to 2", occasional cobbles to 4", medium dense, moist, medium brown
							SM	**ALLUVIUM (Qal)** SILTY SAND: fine to medium, medium dense, moist, medium brown
								Bottom of Boring at 4 feet. No groundwater. No caving.
				5				
				10				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

BORING IB-2

JOB NUMBER: 2017-005-001
DATE DRILLED: 3/17/17
EQUIPMENT USED: 4" Diameter Hand Auger
DRILLING CO.: RTF&A
LOGGED BY: SDR
BORING DEPTH: 0-4'
SURFACE CONDITIONS: Asphalt Parking Lot, 2" Asphalt, No Base Materials

BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT (LBS. PER CU. FT.)	N-VALUE	DEPTH (FEET)	SAMPLE LOCATION	GRAPHIC LOG	SOIL TYPE	
						▨	SM	**ALLUVIUM (Qal)** SILTY SAND: fine to medium, medium dense, moist, medium brown
						▨	SM	SILTY SAND: fine to medium, medium dense, damp, light brown
				5				Bottom of Boring at 4 feet. No groundwater. No caving.
				10				

Note: The log of subsurface conditions shown hereon is approximate and applies only at the specific location and date indicated. It is not warranted to be representative of subsurface conditions at other locations or times.

LOG OF BORING

APPENDIX B

LABORATORY TESTS

APPENDIX B

LABORATORY TESTS

Laboratory tests were performed on selected samples obtained from the borings to aid in the classification of the soils and to determine their engineering properties.

Moisture and Density Tests: Moisture content and unit dry density tests were performed on samples of undisturbed soil obtained in the test borings. Dry density and field moisture information is useful in correlating field and laboratory data and in providing an indication of the variations of soil characteristics. The results of these tests are shown on the Log of Borings in Appendix A.

Direct Shear Tests: Direct shear tests were performed on undisturbed and remolded samples to determine the strength of the soils. The remolded samples were compacted to approximately 90 percent of the maximum dry density of the soils. The tests were performed after soaking the samples to near-saturated moisture content and at various surcharge pressures. The results of the direct shear tests are indicated on the attached summary of "Direct Shear Tests."

Consolidation Tests: Confined consolidation tests were performed on selected undisturbed samples at and below the proposed foundation level. The remolded samples were compacted to approximately 90 percent of the maximum dry density of the soils. Tests were performed on samples at or near the field moisture state. Samples of bearing soils that may become inundated were also tested in an artificially saturated state. For purposes of presentation, the results of the pertinent consolidation tests performed are shown on the attached summary of "Consolidation Test Data."

Gradation Tests: A sieve analysis was used to determine the distribution of grain sizes in selected soil samples. The purpose of the tests was to assist in classifying the soil. The results of the sieve analysis tests are presented as an attachment to this report.

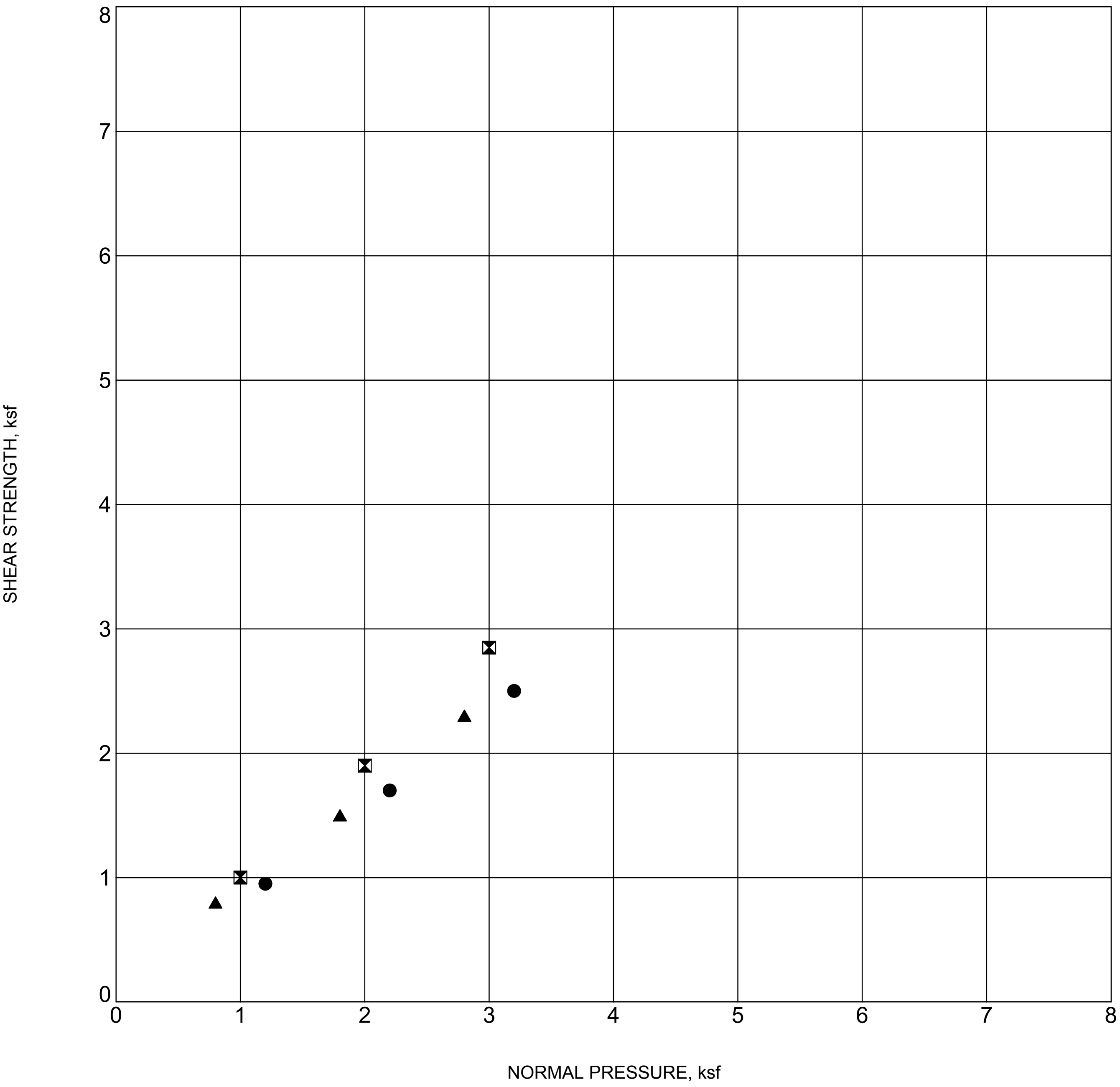
Expansion Index Tests: Expansion Index tests were used to classify the expansion characteristics of selected soil samples. The results of the tests are as follows:

Boring No. and Sample Depth	Expansion Index
HS-1 @ 1-8'	2
HS-3 @ 2-7'	1

Maximum Density Tests: The maximum dry densities and optimum moisture contents of bulk soil samples obtained from the test borings were determined in our laboratory in accordance with the current ASTM Soil Compaction Method D1557. The results of the maximum dry density tests are as follows:

Sample Number	**Soil Description and Classification**	**Maximum Dry Density (pcf)**	**Optimum Moisture Content (%)**
HS-1 @ 1-8’	Sand: Fine to Medium, slightly silty, light brown (SM)	134	6.0
HS-2 @ 4-8’	Silty Sand: Fine to Medium, occasional gravel, Medium brown (SM)	135	6.5

The optimum moisture contents are in percent of dry weight and the maximum dry densities are in pounds per cubic foot (pcf). The double-letter soil classification that follows each soil description is in accordance with the Uniform Soil Classification System (ASTM D2487).



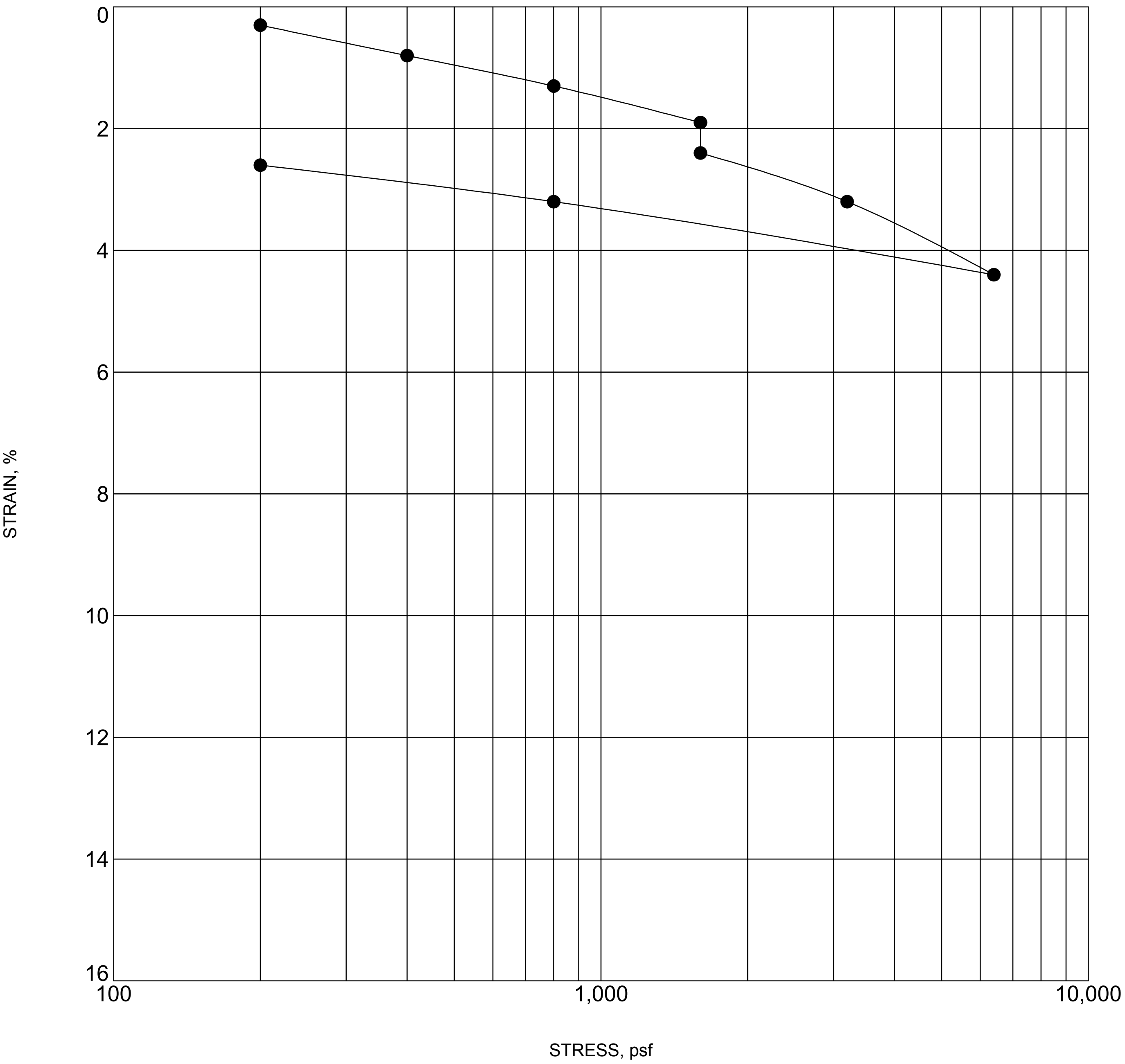
Specimen Identification			Classification				
●	HS-1	1'-8'	**Remolded to 90% (Saturated)**				
☒	HS-1	8.0'	**In-Place (Saturated)**				
▲	HS-2	4'-8'	**Remolded to 90% (Saturated)**				

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

DIRECT SHEAR TEST

JOB NUMBER: 2017-005-001

REPORT DATED: 04-21-2017



Water added at 1600 psf

	Specimen Identification		Classification		
●	**HS-1**	**5.0'**			

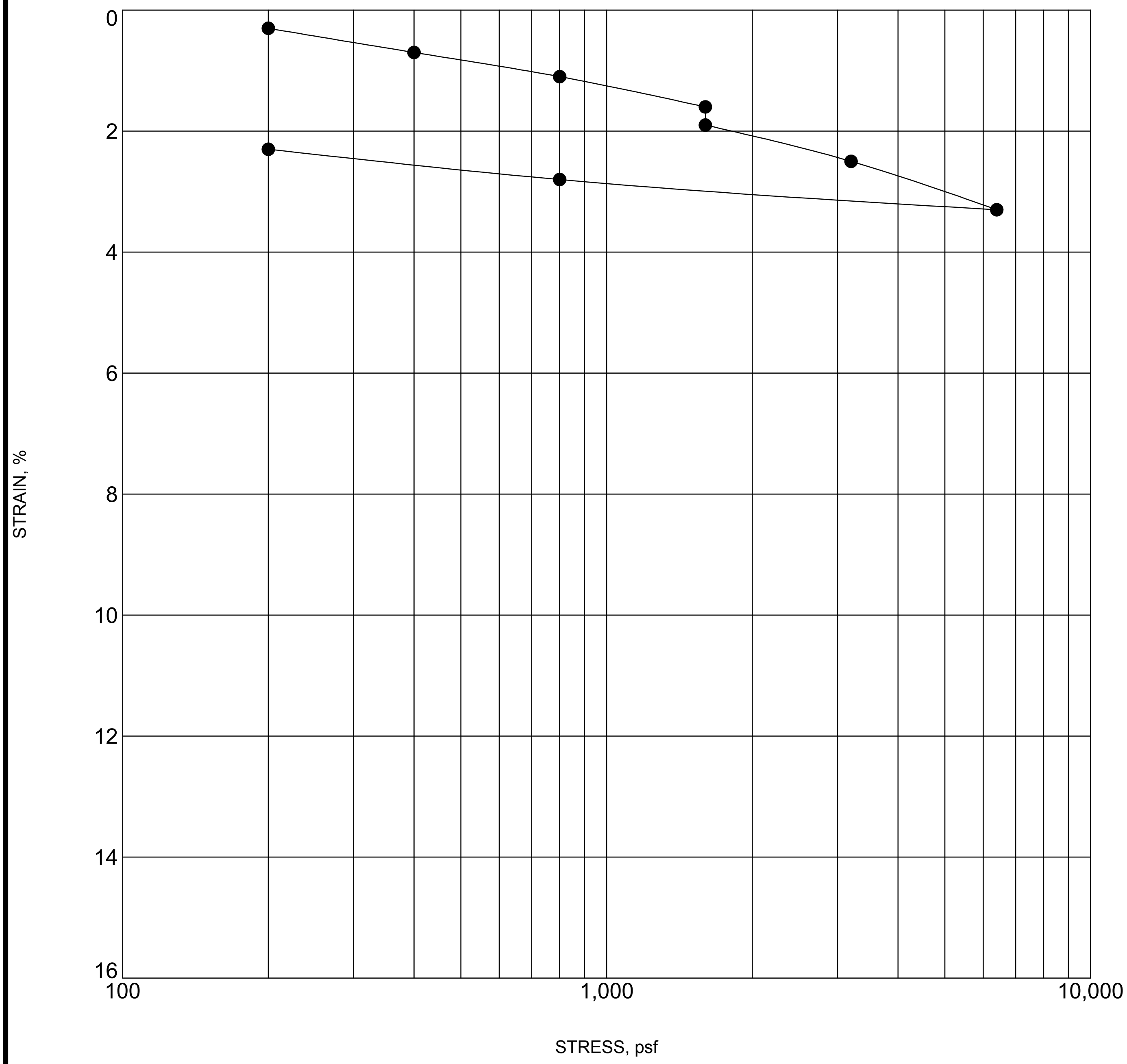
US CONSOL STRAIN 2017-005-001.GPJ FRANKIAN.GDT 4/24/17

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

CONSOLIDATION TEST

JOB NUMBER: 2017-005-001

REPORT DATED: 04-21-2017



Water added at 1600 psf

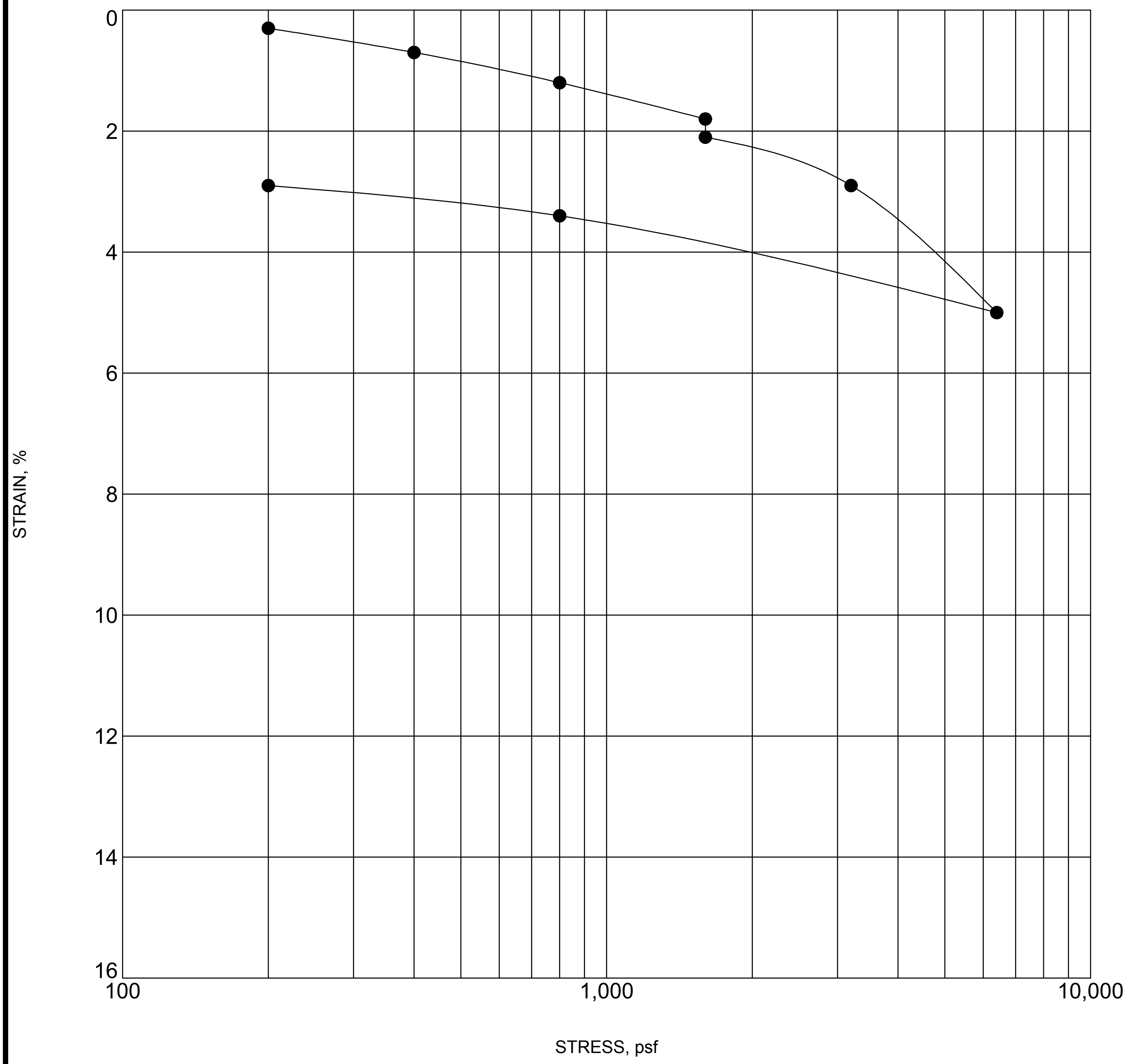
	Specimen Identification		Classification		
●	**HS-1**	**8.0'**			

CONSOLIDATION TEST

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

JOB NUMBER: 2017-005-001

REPORT DATED: 04-21-2017



Water added at 1600 psf

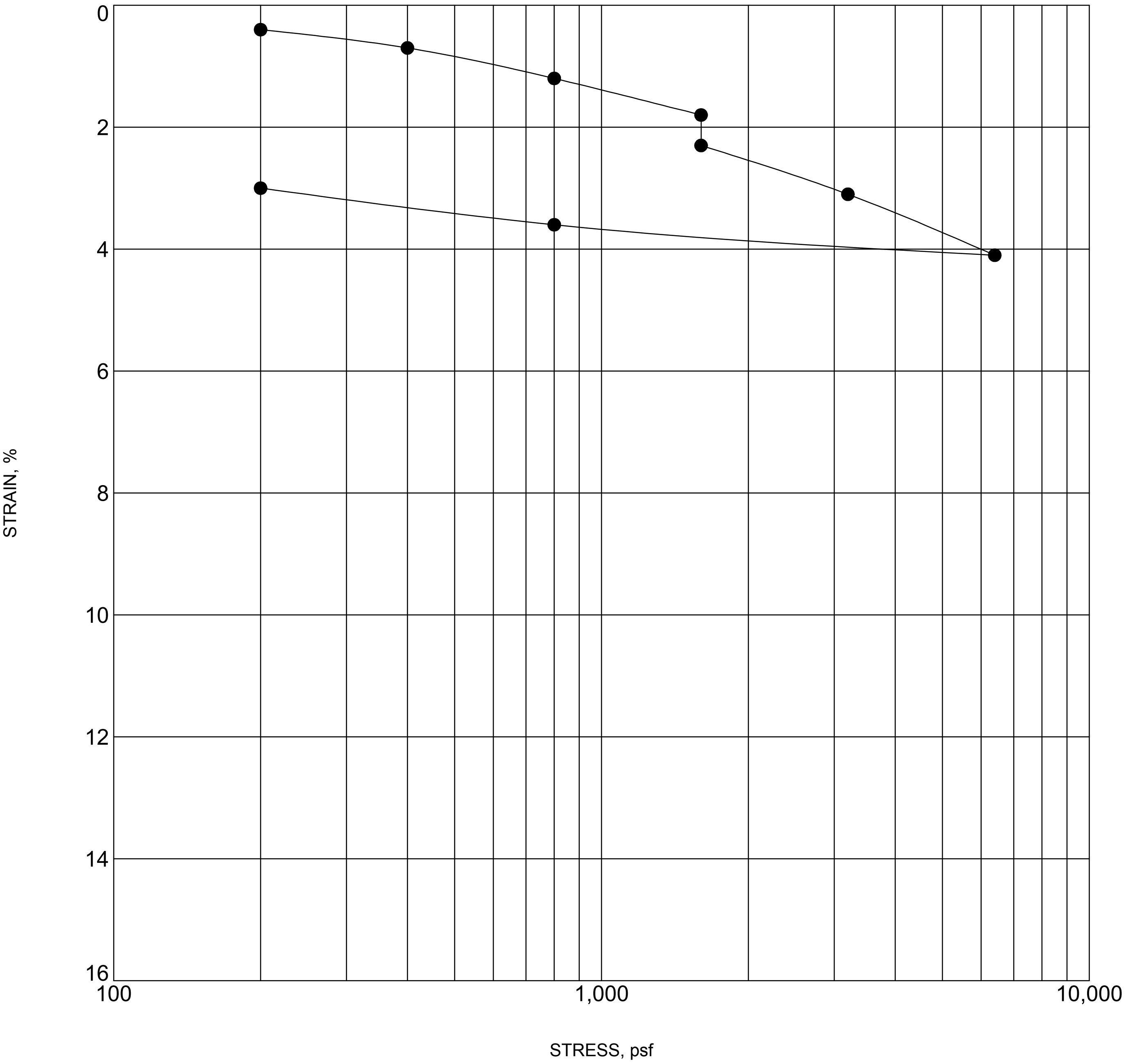
	Specimen Identification		Classification		
●	**HS-2**	**5.0'**			

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

CONSOLIDATION TEST

JOB NUMBER: 2017-005-001

REPORT DATED: 04-21-2017



Water added at 1600 psf

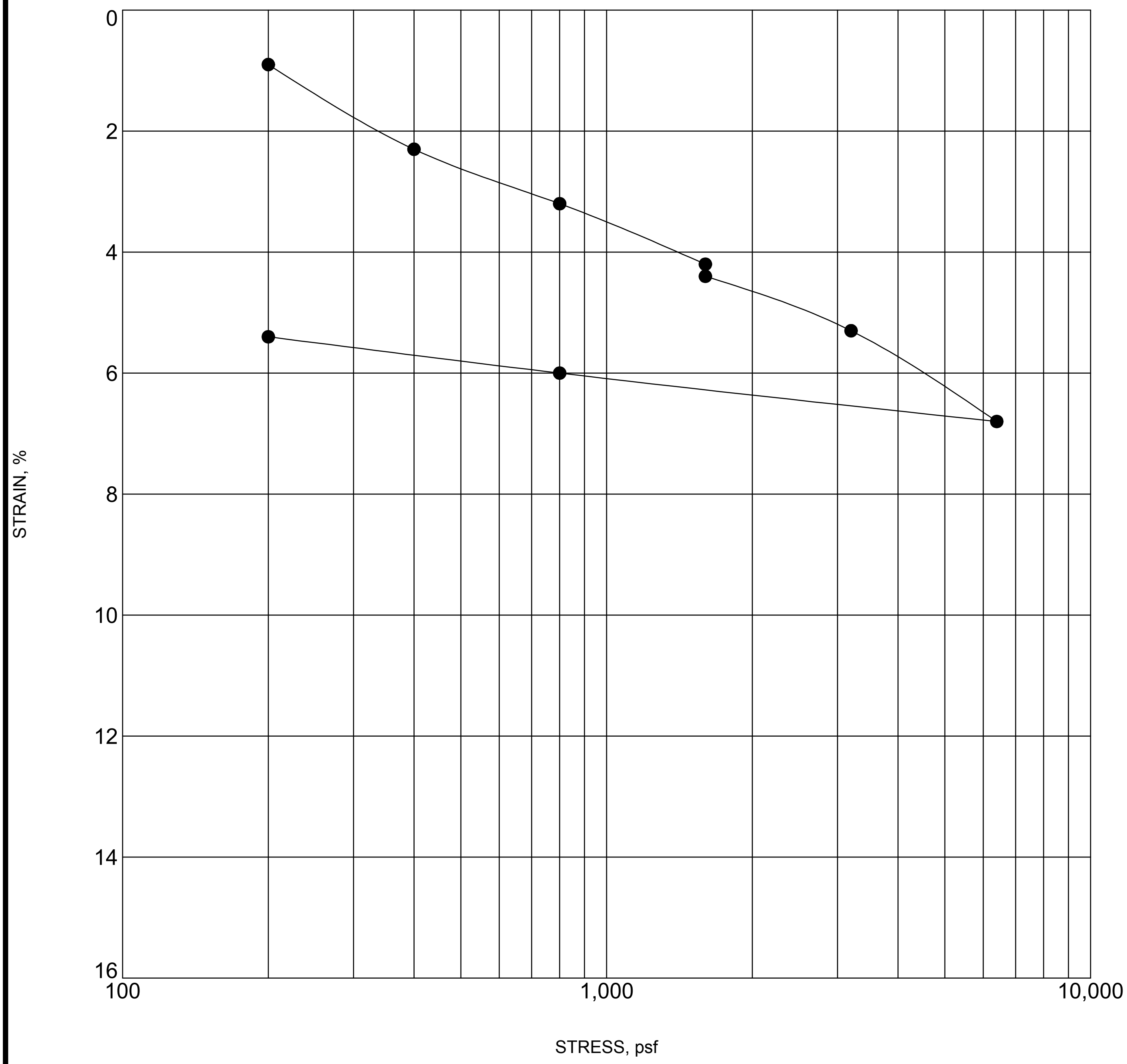
Specimen Identification		Classification		
●	**HS-2** **8.0'**			

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

CONSOLIDATION TEST

JOB NUMBER: 2017-005-001

REPORT DATED: 04-21-2017



Water added at 1600 psf

Specimen Identification			Classification		
●	**HS-3**	**5.0'**			

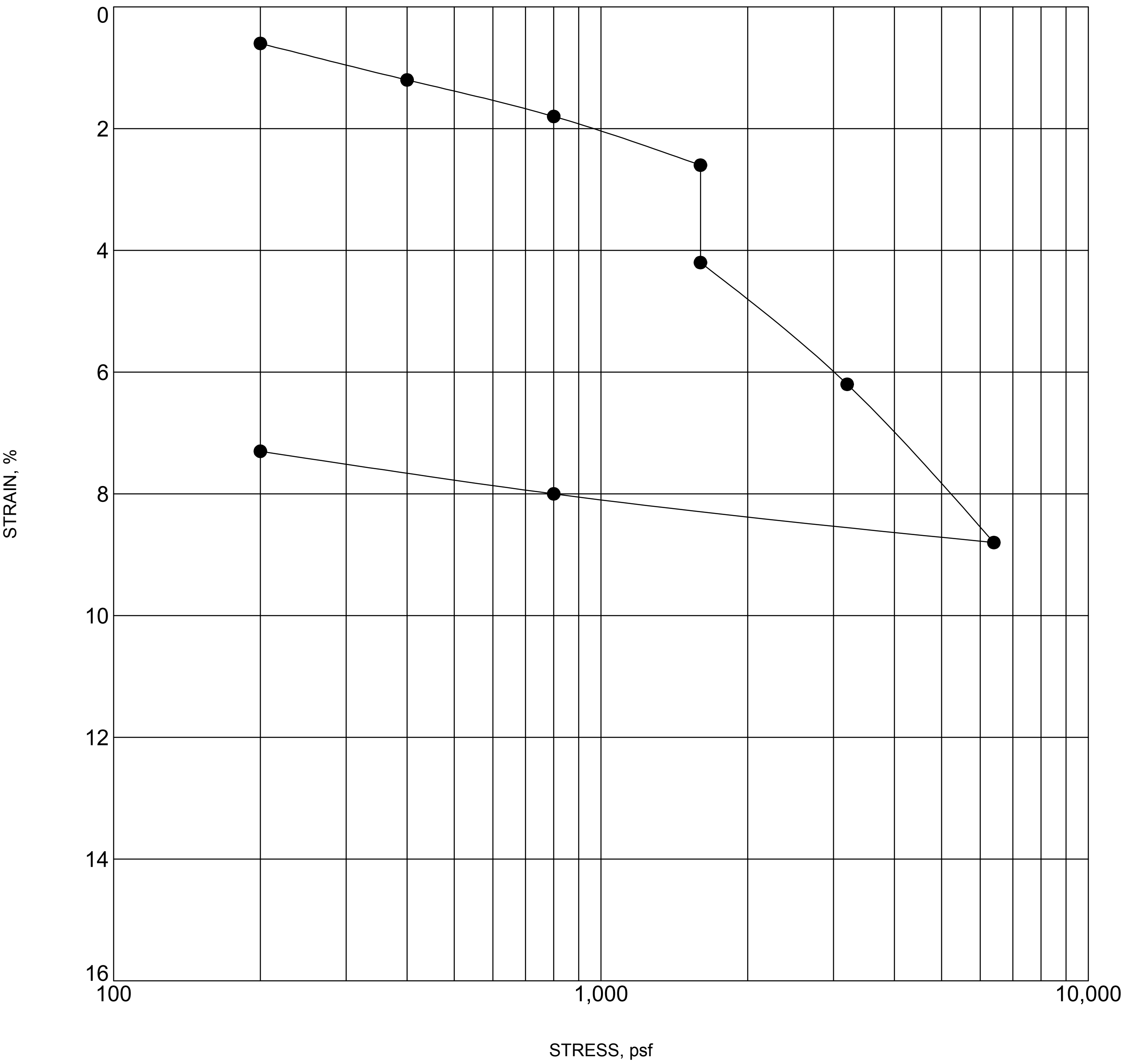
US CONSOL STRAIN 2017-005-001.GPJ FRANKIAN.GDT 4/24/17

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

CONSOLIDATION TEST

JOB NUMBER: 2017-005-001

REPORT DATED: 04-21-2017



Water added at 1600 psf

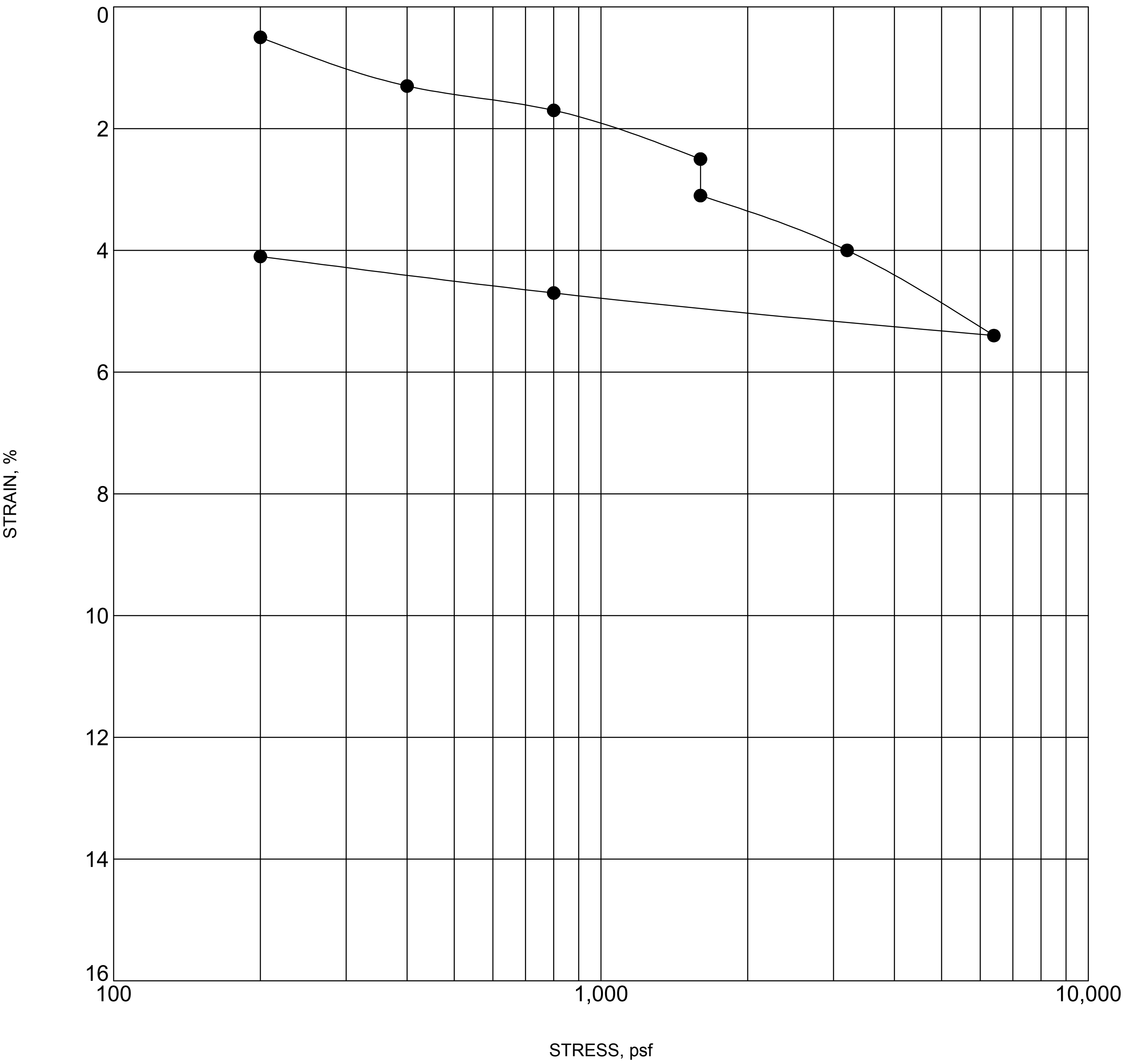
Specimen Identification		Classification		
●	**HS-4** **2.0'**			

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

CONSOLIDATION TEST

JOB NUMBER: 2017-005-001

REPORT DATED: 04-21-2017



Water added at 1600 psf

Specimen Identification		Classification		
●	**HS-4** **5.0'**			

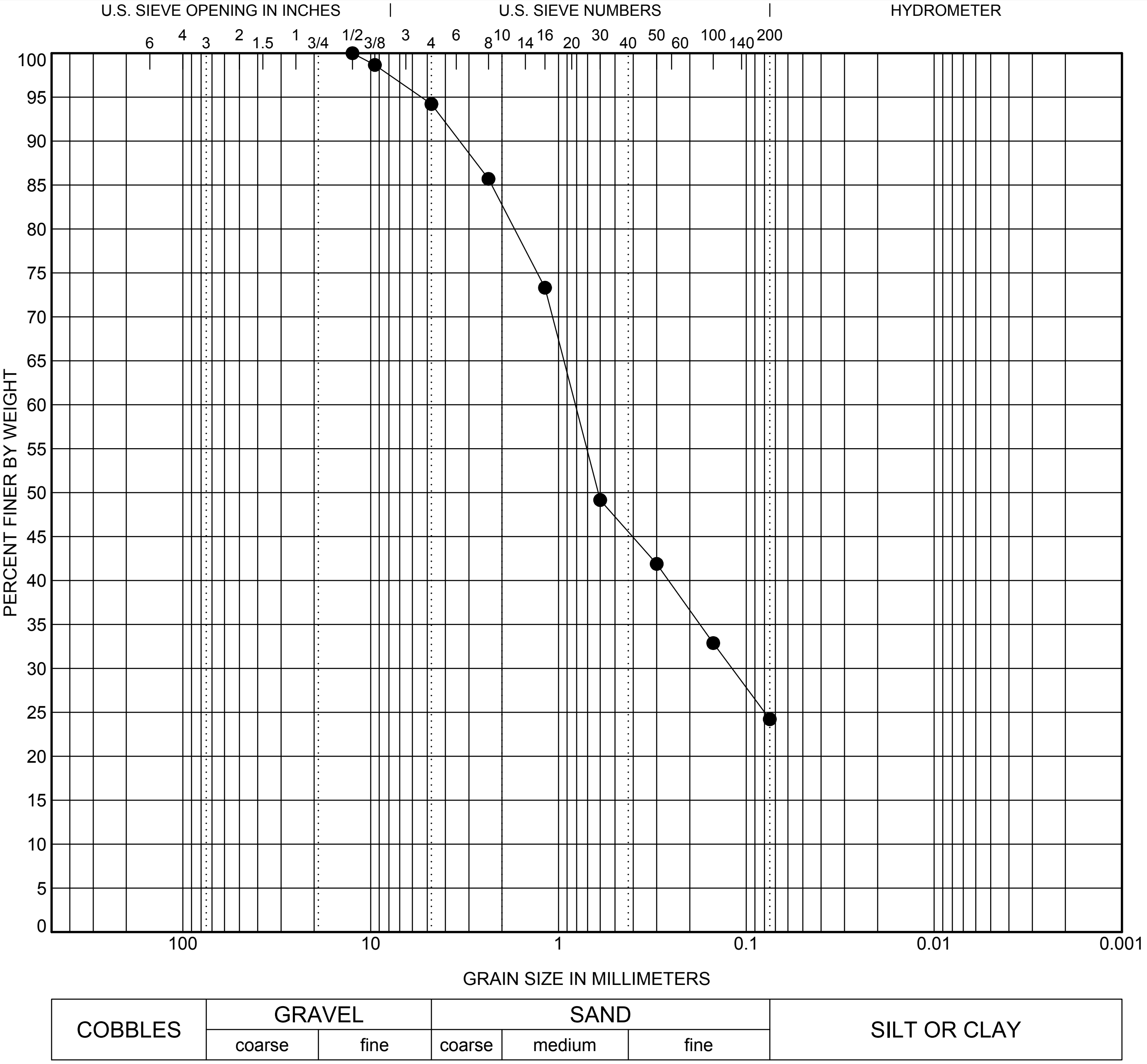
US CONSOL STRAIN 2017-005-001.GPJ FRANKIAN.GDT 4/24/17

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

CONSOLIDATION TEST

JOB NUMBER: 2017-005-001

REPORT DATED: 04-21-2017



Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	**IB-1**	**4.0**						

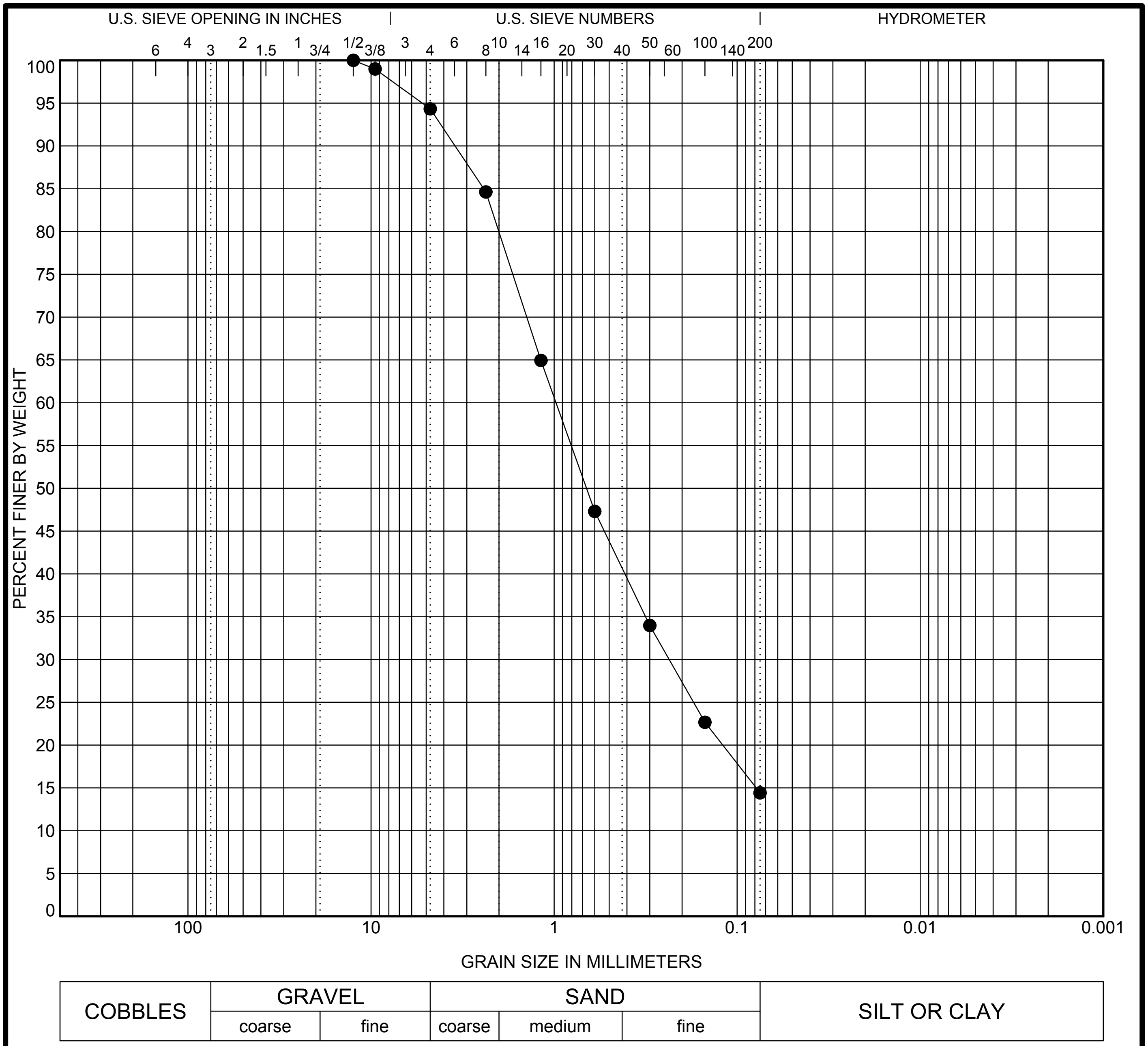
Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**IB-1**	**4.0**	**12.5**	**0.813**	**0.119**		**5.8**	**70.0**	**24.2**	

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

GRAIN SIZE DISTRIBUTION

JOB NUMBER: 2017-005-001

REPORT DATED: 04-21-2017



Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● **IB-2**	**4.0**						

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **IB-2**	**4.0**	**12.5**	**0.976**	**0.235**		**5.7**	**79.9**	**14.4**	

R. T. Frankian & Associates
26027 Huntington Lane, Suite A
Santa Clarita CA 91355
Telephone: 818 531 1501
Fax: 818 531 1510

GRAIN SIZE DISTRIBUTION

JOB NUMBER: 2017-005-001

REPORT DATED: 04-21-2017

US GRAIN SIZE 2017-005-001.GPJ FRANKIAN.GDT 4/24/17

APPENDIX C

BORING PERCOLATION TESTING PROCEDURES AND RESULTS

APPENDIX C

BORING PERCOLATION TESTING PROCEDURES AND RESULTS

The Boring Percolation Test Procedure method utilized as part of the subject infiltration study was performed within two separate 4-inch-diameter hand auger borings. Each test was performed after presoaking the boring sidewall soils by filling an installed casing with water and allowing the water level to drop in successive cycles. The water levels were periodically monitored during testing and was recorded. Each test cycle is performed up to eight times but may be stopped if three successive cycles yield a relatively uniform infiltration rate. The field procedures are as follows:

- Each boring was initially excavated to the desired depth and then a 2-inch-diameter PVC pipe casing was installed for the full depth of the boring. The lower portion of the casing was perforated with slots greater than 0.02 inches in width and was capped at the bottom.

- The perforated portion of the pipe was then surrounded with a filter pack consisting of washed gravel. After installation of the filter materials, the boring was then pre-soaked by filling the lower portion of the casing with water and maintaining a level that was at least 12 inches above the bottom of the casing.

- The casing was then refilled with water up to a level at least 12 inches above the bottom of the pipe. The water level was allowed to drop and the depth of the water level was measured at regular intervals. At the completion of the test cycle, the water level was again measured and recorded, signifying the end of that test cycle.

- The casing was then refilled with water and the next test cycle was initiated. The test cycles were repeated up to a total of eight times to complete the series of tests within the boring, but may have been stopped if three successive cycles yield a relatively uniform drop.

BORING PERCOLATION TESTING FIELD LOG

Job No.	2017-005-001
Boring Designation	BORING IB-1
Boring Diameter (in)	4
Depth of Boring (ft)	4

Project	Oakmont La Canada
Material	Fill
Tested by	S. Rudd
Pre Soak	Completed - 4 hours
Length of Pipe (ft)	3.89

Reading Number	Elapsed Time (mins)	Water Start Depth (in)	Water End Depth (in)	Water Drop (inches)	PercolationRate For Reading (in/hr)	Borehole Reduction Factor (Rf)	Borehole Corrected Infiltraton Rate (in/hr)
1	30.00	12.60	6.00	6.60	13.20	5.65	2.34
2	30.00	12.84	5.88	6.96	13.92	5.68	2.45
3	30.00	12.24	6.84	5.40	10.80	5.77	1.87
4	30.00	13.32	6.84	6.48	12.96	6.04	2.15
5	30.00	12.00	6.96	5.04	10.08	5.74	1.76
6	30.00	12.72	6.12	6.60	13.20	5.71	2.31

Average Field Percolation Last 3 Trials (in/hr)	12.00
Average Rf Adjusted Percolation Rate Last 3 Trials (in/hr)	2.07
CFv	2
CFs	2
Design Infiltration Rate (in/hr)	0.52

BORING PERCOLATION TESTING FIELD LOG

Job No. 2017-005-001
Boring Designation BORING IB-2
Boring Diameter (in) 4
Depth of Boring (ft) 4

Project Oakmont La Canada
Material Fill
Tested by S. Rudd
Pre Soak Completed - Drained completely in 30 minutes 2 times
Length of Pipe (ft) 3.87

Reading Number	Elapsed Time (mins)	Water Start Depth (in)	Water End Depth (in)	Water Drop (inches)	PercolationRate For Reading (in/hr)	Borehole Reduction Factor (Rf)	Borehole Corrected Infiltraton Rate (in/hr)
1	10.00	12.96	5.76	7.20	43.20	5.68	7.61
2	10.00	12.60	5.76	6.84	41.04	5.59	7.34
3	10.00	12.60	5.52	7.08	42.48	5.53	7.68
4	10.00	12.48	5.28	7.20	43.20	5.44	7.94
5	10.00	12.84	5.40	7.44	44.64	5.56	8.03
6	10.00	12.72	5.64	7.08	42.48	5.59	7.60

Average Field Percolation Last 3 Trials (in/hr)	42.24
Average Rf Adjusted Percolation Rate Last 3 Trials (in/hr)	7.52
CFv	2
CFs	2
Design Infiltration Rate (in/hr)	1.88