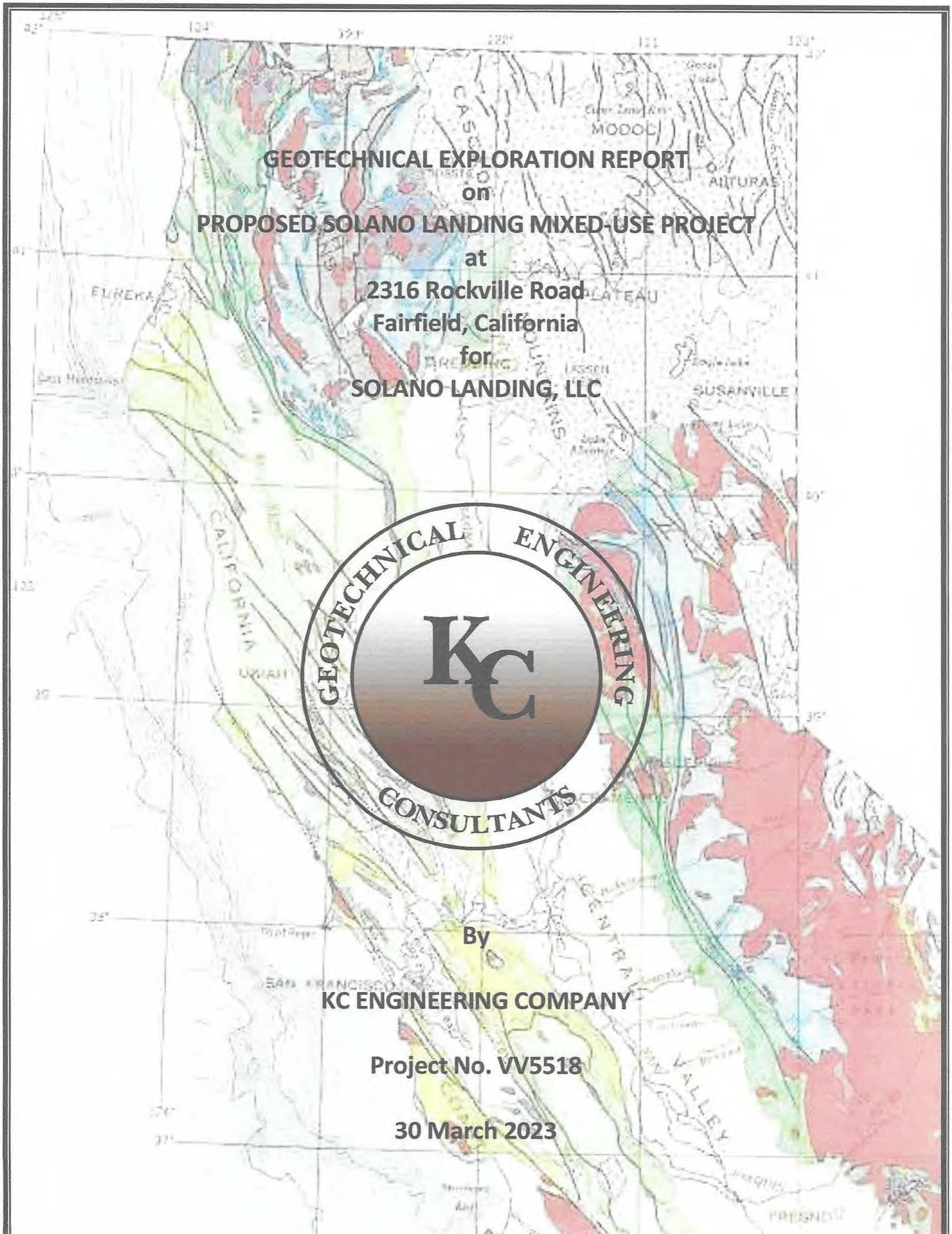
Appendix D

Geotechnical Investigation



GEOTECHNICAL EXPLORATION REPORT

on

PROPOSED SOLANO LANDING MIXED-USE PROJECT

at

2316 Rockville Road

Fairfield, California

for

SOLANO LANDING, LLC

GEOTECHNICAL ENGINEERING CONSULTANTS

KC

By

KC ENGINEERING COMPANY

Project No. VV5518

30 March 2023

865 Cotting Lane, Suite A
Vacaville, California 95688
(707) 447-4025, fax 447-4143

8798 Airport Road
Redding, California 96002
(530) 222-0832, fax 222-1611

KC ENGINEERING COMPANY
A SUBSIDIARY OF MATERIALS TESTING, INC.

Project No. VV5518
30 March 2023

Mr. Jimmy Pierson
Solano Landing LLC
506 Couch Street
Vallejo, CA 94590

Subject: Proposed Solano Landing Mixed-Use Project
APN 0027-200-150
2316 Rockville Road, Fairfield, California
GEOTECHNICAL EXPLORATION REPORT

Dear Mr. Pierson:

In accordance with your authorization, **KC ENGINEERING COMPANY** has explored the geotechnical conditions of the surface and subsurface soils for the proposed Solano Landing mixed-use project to be constructed at the subject site.

The accompanying report presents our conclusions and recommendations based on our exploration. Our findings indicate that the proposed Solano Landing mixed-use project and associated improvements are geotechnically feasible for construction on the subject site provided the recommendations of this report are carefully followed and are incorporated into the project plans and specifications.

Should you have any questions relating to the contents of this report or should you require additional information, please contact our office at your convenience.

Reviewed by,

REGISTERED PROFESSIONAL ENGINEER
DAVID V. CYMANSKI
GE 2585
EXP. 6-30-24
GEOTECHNICAL
STATE OF CALIFORNIA

David V. Cymanski, G.E.
Principal Engineer

Respectfully Submitted,
KC ENGINEERING COMPANY

Daniel Sanchez
Staff Engineer

Copies: 3 mail, 1 email to client, Taylor Lombardo & Foulk Civil Engineering

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GEOTECHNICAL EXPLORATION REPORT

Purpose and Scope

The purpose of the geotechnical exploration for the proposed Solano Landing mixed-use project to be constructed at 2316 Rockville Road in Fairfield, Solano County, California was to determine the surface and subsurface soil conditions at the subject site. Based on the results of the exploration, geotechnical criteria were established for the grading of the site, the design of foundations, slabs, pavements, drainage and the construction of other related facilities on the property.

In accordance with your authorization, our exploration services included the following tasks:

a. A review of available geotechnical and geologic literature concerning the site and vicinity;
b. Site reconnaissance by the Geotechnical Engineer to observe and map surface conditions;
c. Drilling and logging of eight exploratory borings and sampling of the subsurface soils;
d. Laboratory testing of the samples obtained to determine their classification and engineering characteristics;
e. Analysis of the data and formulation of conclusions and recommendations; and
f. Preparation of this written report.

Site Location and Description

The subject property is located at 2316 Rockville Road in Fairfield, California as shown on Figure 1, "Aerial Vicinity Map" included in the Appendix of this report. The property is located in an agricultural farming area southeast of Suisun Valley Road and Rockville Road. The property contains old house and barn structure on the north end and open undeveloped agricultural land on the south. A residential neighboring property is also on the north end. The building areas and surrounding property is flat in topography. Soft to loose soils are present on the upper 1 to 2 feet from agricultural disking/farming. The site was densely covered in tall grasses and weeds at the time of our exploration. The property contains young and mature oak trees along Suisun Valley Road and on the north end. The property is accessible from both Suisun Valley Road and Rockville Road.

The above description is based on a reconnaissance of the site by the Geotechnical Engineer, a review of a Google Earth aerial image dated 4/24/22, and an Overall Site Plan by Taylor Lombardo Architects, LLP, dated 8/22/22 showing the proposed structure footprints. The Google aerial image was used as the basis for our "Aerial Vicinity Map" and the Overall Site Plan was used as our "Site Plan" included as Figures 1 and 2, respectively, in the Appendix.

Proposed Construction

Based on the drawings by Taylor Lombardo Architects, the property will be developed to include a boutique market building, tasting room buildings, restaurants, a multi-purpose/dining hall, a hotel concierge, hotel cottages, an outdoor amphitheater, driveways, parking lots and surrounding vineyards in the locations shown on Figure 2.0, "Site Plan" and Figure 2.1 "Illustrative Site Plan" of the Appendix. The buildings are expected to be one to two stories in height and constructed of wood and/or steel framing. The building pads are expected to be elevated from existing surrounding grades for improved drainage. Additional grading will consist of reworking the upper 2 vertical feet of the existing ground prior to placing any fill for the building pads and surrounding improvement areas. Lime treatment of the building pads may also be performed. Additional site improvements are expected to consist of installing underground utilities, storm water bio-retention swales or basins and landscaping.

Field Exploration

The field exploration was performed on 2/13/23 and 2/21/23 and included a reconnaissance of site and the drilling of eight exploratory test borings at the approximate locations shown on Figures 2.0 and 2.1.

The borings were drilled to a maximum depth of 38.5 feet below the existing ground surface. The drilling was performed with a Mobile B24 rig using a power-driven, 4-inch diameter continuous flight solid augers. Visual classifications per ASTM D2488 were made from the auger cuttings and the samples in the field. As the drilling proceeded, representative disturbed tube samples were obtained by driving a 3-inch O.D., California Modified split-tube sampler, containing thin brass liners, into the boring bottom in accordance with ASTM D3550. The sampler was driven into the in-situ soils under the impact of a 140 pound hammer having a free fall of 30 inches. The number of blows required to advance the sampler 12 inches into the soil were adjusted to the standard penetration resistance (N-Value). The raw blow counts obtained using the California sampler were corrected to equivalent N-Values using Burmister's (1948) 65% energy and diameter correction formula. When the sampler was withdrawn from the boring bottom, the brass liners containing the relatively undisturbed samples were removed, examined for identification purposes, labeled and sealed to preserve the natural or in-situ moisture content.

The samples were then transported to our laboratory for testing per ASTM D4220. Classifications made in the field were verified in the laboratory after further examination and testing. The stratification of the soils, descriptions, location of undisturbed soil samples and standard penetration resistance are shown on the respective "Log of Test Boring" contained within the Appendix.

Laboratory Testing

The laboratory testing program was directed towards providing sufficient information for the estimation of the engineering characteristics of the site soils so that the recommendations outlined in this report could be formulated. The laboratory test results are presented in the Appendix.

Moisture content and dry density tests (ASTM D2937) were performed on representative relatively undisturbed soil samples to determine the consistency of the soil and the moisture variation throughout the explored soil profile as well as estimate the compressibility of the underlying soils.

In order to assist in the identification and classification of the subsurface soils, sieve analysis tests (ASTM D6913) and Atterberg Limits test (ASTM D4318) were performed on selected soil samples. The Atterberg Limits test results and Expansion Index test (ASTM D4829) were also used to estimate the expansion potential of the near surface soils. The strength of the subsurface soils were evaluated by an unconfined compression tests (ASTM D2166) and a direct shear test (ASTM D3080) on relatively undisturbed samples.

A consolidation test (ASTM D2435) was performed on a sample of the underlying firm soil deposits to evaluate its compressibility characteristics. The results were used to estimate the potential settlement due to the proposed anticipated structure loads.

A representative bulk sample of the near-surface pad soils was obtained and tested to evaluate the presence and concentration of water-soluble sulfates in accordance with ASTM C1580. These test results were used to identify the corrosion potential of the soils to at or below grade concrete. Additional corrosivity indicator tests were performed including soil pH, minimum resistivity and chlorides.

Subsurface Conditions

Based on our findings from the field and laboratory results, the subsurface soil conditions on the property were found to consist of moderately to highly expansive clays, clayey sand, and gravel alluvial fan deposits. For Boring 1, the upper 10 feet consist of moderately expansive very stiff clay, underlain by a loose clayey sand down to 16 feet below the surface, underlain by very stiff sandy clay down to 18 feet, further underlain by very stiff to hard sandy clay with cemented weathered gravels and tuff fragments down to a depth explored of 28.5 feet below the surface. At Boring 2, the upper 6 feet consist of moderately expansive very stiff clay, underlain by firm to stiff clays down to 17 feet below the surface, underlain by a stiff sandy clay with weathered gravel and tuff fragments down to a depth explored of 20.5 feet below the surface. Borings 3, 4, and 8 were explored down to 13.5 feet below the surface and consist of moderately to highly expansive firm to very stiff clays. At Boring 5, the upper 6 feet consist of moderately to highly expansive very stiff clay, underlain by a stiff clay layer down to 13 feet, underlain by stiff sandy clay down to 23 feet, underlain by a firm sandy clay down to 26 feet, underlain by a medium dense sandy gravel layer down to 28 feet, further underlain by hard sandy clay with weathered gravel down to the maximum depth explored of 38.5 feet below grade. At Boring 6, the upper 5 feet consist of moderately expansive very stiff clay, underlain by variable firm to stiff clay with silt layers down to a depth explored of 18.5 feet below the surface. At Boring 7, the upper 7.5 consist of highly expansive very stiff clay, underlain by medium dense clayey sand with gravel down to 11 feet, underlain by medium dense sand with silt and gravel down to 16 feet, then underlain by a loose gravel with sand down to a depth explored of 18.5 feet below the surface. The upper 1 to 2 feet of the surface soils across the site were soft to loose from agricultural disking.

Groundwater was encountered at depths ranging from 6 feet to 15 feet below the surface at the time of our exploration. Fluctuations in the groundwater level can occur with variations in seasonal rainfall, subsurface stratification, and irrigation on the site and vicinity.

A more thorough description and stratification of the soils encountered along with the results of the laboratory tests are presented on the respective "Log of Test Boring" in the Appendix. The approximate locations of the borings are shown on Figure 2.0, "Site Plan".

Soil Corrosivity

A representative composite sample of the near surface building pad soil (upper 3 feet) was collected and transported to Sunland Analytical in Rancho Cordova for testing of water soluble sulfates, pH, minimum resistivity and chlorides per ASTM and California Test Methods.

The testing indicates a sulfate content of 17.6 ppm (mg/kg), a chloride content of 3.4 ppm, a minimum resistivity of 2,140 ohm-cm, and a soil pH of 6.1 for the sample collected. It is noted that the sulfate test results indicate low or "S0" sulfate exposure to concrete as identified in the Durability Requirements, Section 1904 of the 2022 California Building Code, and Tables 19.3.1.1 of ACI 318-19 Building Code Requirements for Structural Concrete. Therefore, no cement type or minimum concrete strength requirements are applicable.

The Caltrans Corrosion Guidelines[1] defines a corrosive site as one where the soil and/or water has a sulfate concentration of 1,500 ppm or more, a chloride concentration of 500 ppm or more, a pH of 5.5 or less, and a minimum resistivity less than 1,100 ohm-cm. Based on these criteria, the soils at the site are not considered to have a severe corrosion potential to buried metal.

KC ENGINEERING CO. is not a corrosion engineering firm. Therefore, to further define the soil corrosion potential and interpret the above test results, or to design cathodic protection or grounding systems, a licensed Corrosion Engineer should be consulted.

Site Geology

According to Geologic Map of the Fairfield South 7.5' Quadrangle[2], the site is mapped across two distinguished zones of alluvial fan deposits (Holocene and latest Pleistocene to Holocene). The late Pleistocene to Holocene fan deposits are found in gently sloping, fan-shaped, relatively undissected alluvial surfaces including sand, gravel, silt, and clay, that were moderately to poorly sorted, and moderately to poorly bedded. These materials are deposited by streams emanating from mountain drainages onto alluvial valleys and are composed of moderate to poorly sorted sand, gravel, silt, and clay. The materials encountered during our exploration correlate with geologic mapping. A partial Geologic Map showing the site and surrounding areas is included as Figure 3, "Geologic Map".

Geo-Hazards

Seismicity & Ground Motion Analysis

The site is not located within an Alquist-Priolo Earthquake Fault Zone[3]. There are no known active faults crossing the site as mapped and/or recognized by the State of California. The Rockville area is located in a seismic-active region and earthquake related ground shaking should be expected during the design life of structures constructed on the site. The California Geological Survey has defined an active fault as one that has had surface displacement in the last 11,700 years, or has experienced earthquakes in recorded history.

[1] California Department of Transportation, Division of Engineering Services, Materials Engineering and Testing Services Corrosion Branch, *Corrosion Guidelines*, Version 3.2, May 2021.
[2] Bezore, S.P., Wagner, D.L., and Sowers, J.M., 1998, *Geologic Map of the Fairfield South 7.5' Quadrangle, Solano County, California*, California Geological Survey, Division of Mines and Geology.
[3] Parish, J.G., 2018 *Earthquake Fault Zones,* California Geological Survey, Special Publication 42, Revised 2018.

Based on our review of the Fault Activity Map of California[4] and the USGS National Seismic Hazard Maps-Source Parameters[5], the nearest major active faults are the Cordelia Fault, the Green Valley Fault, the West Napa Fault, the Hunting Creek-Berryessa Fault, and the Hayward-Rodgers Creek Fault located approximately 0.7 miles west, 2.3 miles west, 8.5 miles southwest, 15 miles northwest, and 20.2 miles southwest of the site, respectively. Numerous other active faults in the Bay Area may also produce significant seismic shaking at the site.

The 2022 CBC specifies that the potential for liquefaction and soil strength loss should be evaluated, where applicable, for the Maximum Considered Earthquake Geometric Mean (MCE_G) peak ground acceleration with an adjustment for site class effects in accordance with American Society of Civil Engineer (ASCE 7-16)[6]. The MCE_G is peak ground acceleration is based on the geometric mean peak ground acceleration with a 2 percent probability of exceedance in 50 years. Based on ASCE 7-16, the MCE_G peak ground acceleration with adjustment for site class effects (PGA_M) was calculated to be 0.676g for the property using ASCE 7 Hazards seismic design tool web-based with a site coefficient (F_{PGA}) of 1.1 for Site Class D. Structures at the site should be designed to withstand the anticipated ground accelerations.

Based on the ASCE 7 Hazards Tool[7] website and ASCE 7-16, the 2022 CBC earthquake design values are as follows. The ASCE hazard summary report is included in the Appendix.

Site Class:	F* D
Mapped Acceleration Parameters:	$S_S = 1.549g$; $S_1 = 0.600g$
Design Spectral Response Accelerations:	$S_{DS} = 1.033g$; $S_{D1} = 1.02g$

* A Site Class F is noted because liquefiable layers are present (ASCE 7-16, Section 20.3.1). A site response analysis is not necessary per the exception in ASCE 7-16, Section 20.3.1-1 for structures with a fundamental period of vibration less than or equal to 0.5 seconds. This should be evaluated by the project Structural Engineer. However, based on the average N-values for the upper 100 feet the provided values are based on a stiff clay soil profile or Site Class D. In our opinion, a ground motion hazard analysis is not necessary per the exception in ASCE 7-16, Section 11.4.8-1. The MCE_R spectral response acceleration parameter SM_1 has been increased by 50 percent for the calculation of the design spectral response acceleration parameter SD_1. The modified seismic design report is included in the Appendix.

[4] Jennings, C.W. and Bryant, W.A., 2010, *Fault Activity Map of California*, California Geological Survey Geologic Data Map No. 6, scale 1:750,000

[5] U.S. Geological Survey, 2008 National Seismic Hazards Maps – Source Parameters, accessed 3/15/23, from USGS web site: https://earthquake.usgs.gov/cfusion/hazfaults_2008_search/query_main.cfm

[6] American Society of Civil Engineer (ASCE), 2016, Minimum Design Loads for Buildings and Other Structures, Standard 7-16 and Supplement 1-3.

[7] https://asce7hazardtool.online, accessed 3/15/23

Fault Rupture

The site is not located within an Alquist-Priolo Earthquake Fault Zone. Based on our review of geologic maps, no known active or inactive faults cross or project toward the subject site. In addition, no evidence of active faulting was visible on the site during our site reconnaissance. Therefore, it is our opinion that there is no potential for fault-related surface rupture at the subject site.

Landsliding

The subject site and surrounding areas are located in rural flat farming land and therefore, not subject to seismically-induced landslide hazards.

Liquefaction

Soil liquefaction is a phenomenon in which loose and saturated cohesionless soils are subject to a temporary, but essentially total loss of shear strength, due to pore pressure build-up under the reversing cyclic shear stresses associated with earthquakes. Soils typically found most susceptible to liquefaction are saturated and loose, fine to medium grained sand having a uniform particle range and less than 35% fines passing the No. 200 sieve, and a corrected standard penetration blow count $(N_1)_{60}$ less than 30. According to Special Publication 117A by the California Geological Survey, the assessment of hazards associated with potential liquefaction of soil deposits at a site must consider translational site instability (i.e. lateral spreading, etc.) and more localized hazards such as bearing failure and settlement. The acceptable factor of safety against liquefaction is recommended in SP117 to be 1.3 or greater.

Based on our site exploration and laboratory test data, the soil profile within the upper 13.5 to 38.5 feet was found to principally consist of fine-grained firm to hard cohesive sandy clay, silty clay and clay soils. The liquefaction potential of these cohesive materials are considered to be very low. However, potentially liquefiable loose and medium dense clayey sand and sand deposits with 7 to 36% fines passing the No. 200 sieve were identified in Borings 1 between 10 to 16 feet below grade and in Boring 7 between 7 to 16 feet below grade.

A liquefaction analysis was performed for the layers in Boring 1 and 7 using the data from our field and lab exploration per the recommended analysis methods of the NCEER report[8] and Idriss and Boulanger (2008). The high groundwater modeled in the analysis was 6 feet below the ground surface based on the nearby well and our field exploration. Per CGS Special Publication

[8] Youd, T.L., et al., 2001 "Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils," in Journal of Geotechnical Geoenvironmental Engineering, October 2001

117, a probabilistically derived peak ground acceleration with a 10 percent probability of exceedance in 50 years (475-year return period) of 0.536g was used from the USGS Unified Hazard Tool[9] website. A maximum magnitude of 6.8 was also used from the nearby Cordelia and Green Valley Faults. Based on our analysis, the layers in Boring 1 and 7 were found to have a factor of safety less than 1.3 indicating a potential for liquefaction.

Utilizing the volumetric strain relationship developed by Tokimatsu and Seed[10], total settlement of 1.4 to 1.6 inches was determined for Borings 1 and 7. Differential settlement across a structure footprint may approach 0.8 inches. According to Ishihara[11], the potential for surface manifestation (i.e. sand boils/ejecta, ground fissures, etc...) is unlikely considering the depth of the potentially liquefiable soil layer. Due to the lack of open slope faces, the potential for lateral spreading at the site is considered nil.

Settlement Considerations

Our investigation of the site also included an evaluation of consolidation settlement of a firm clay layer in Boring 2 at 11 to 17 feet below grade. In order to determine the compressibility and potential settlement of the soil layer, a laboratory consolidation test (ASTM D2435) was performed on a relatively undisturbed soil sample. The lab results are presented in the Appendix. The sample was found to be over-consolidated. Settlement is still expected to occure with time under future loading.

We performed a settlement analysis utilizing the proposed estimated structure loads. Utilizing the estimated column loads of 50 kips and wall loads of 5kpf and a bearing capacity of 2,000 psf for a perimeter footing and a distributed load for the thickened interior slab foundation, we determined a total consolidation settlement of up to 0.5 inch in area of Boring 2. Once actual structure loads are determined, additional analysis may be required.

In our opinion, the amount of anticipated total and differential settlement and/or angular distortion that may occur over the proposed building footprint is marginally excessive for a conventional shallow spread footing and slab floor foundation. To mitigate these concerns and to minimize the anticipated differential settlement, we recommend that the proposed structures be supported on uniformly thickened post-tensioned slab foundation systems as recommended herein.

[9] https://earthquake.usgs.gov/hazards/interactive/, accessed 03/28/23

[10] Tokimatsu, K. and Seed, H.B., 1987, *Evaluation of Settlements in Sands Due to Earthquake Shaking*, Journal of the Geotechnical Engineering Division, ASCE, Volume 113, No. 8, August 1987.

[11] Ishihara, K., 1985, *Stability of Natural Deposits During Earthquakes*, Proceedings of the Eleventh International Conference on Soil Mechanics and Foundation Engineering, San Francisco, CA, Volume 1, p. 321-376, August.

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

General

From a geotechnical point of view, the proposed Solano Landing structures and additional improvements are considered to be feasible for construction on the subject site provided the recommendations presented in this report are incorporated into the project plans and specifications.

All grading and foundation plans for the development must be reviewed by the Soil Engineer prior to contract bidding or submittal to governmental agencies to ensure that the geotechnical recommendations contained herein are properly incorporated and utilized in design.

KC ENGINEERING CO., should be notified at least two working days prior to site clearing, grading, and/or foundation operations on the property. This will give the Soil Engineer ample time to discuss the problems that may be encountered in the field and coordinate the work with the contractor.

Field observation and testing during the grading and/or foundation operations must be provided by representatives of ***KC ENGINEERING CO.***, to enable them to form an opinion regarding the adequacy of the site preparation, the acceptability of fill materials, and the extent to which the earthwork construction and the degree of compaction comply with the specification requirements. Any work related to the grading and/or foundation operations performed without the full knowledge and under the direct observation of the Soil Engineer will render the recommendations of this report invalid.

Geotechnical Considerations

The primary geotechnical considerations for the property are the presence of moderately to highly expansive clay soils, the potential for total and differential settlements due to seismically induced liquefaction and consolidation settlement, and the presence of near surface soft/loose materials. Laboratory testing of samples obtained show that the surficial clay soils are moderately to highly expansive. The soil is prone to heave and shrink movements with changes in moisture content and, consequently, must be carefully considered in the design of grading, foundations, and drainage.

As discussed in the "Liquefaction" section above, up to 1.6 inches of total settlement may occur from seismically induced liquefaction in area of Boring 7 and up to 1.4 inches in area of Boring 1. Differential settlement ranging up to 0.8 inches may also be possible across a structure footprint. In our opinion, the amount of anticipated total and differential settlement and/or angular distortion that may occur over the proposed structure building footprints are excessive for a conventional shallow spread footing and slab floor foundation.

Due to the expansive soil conditions and the potential for differential settlement up to 0.8 inches across the structure footprints, we recommend that the market building, tasting room buildings, restaurants, multi-purpose/dining hall, hotel concierge and cottages be supported by a uniformly thickened post-tensioned slab foundation systems as recommended in the "Foundation" section of this report.

Alternatively, the proposed building pad soils could be lime treated to mitigate the expansive nature of the materials, as well as to provide a structural fill pad. Specific recommendations are presented in the "Grading" section of this report. The structures could then be supported by a well-reinforced conventional spread footing and slab floor foundation systems. The recommendations provided in the following sections will minimize the detrimental effects of expansive soil movement. Specific grading, drainage and foundation recommendations are provided herein.

The upper 1 to 2 feet across the site was found to be relatively soft and loose due to previous agricultural farming and disking operations. To mitigate this concern, we recommend that the upper 2 feet of existing grades be over-excavated, processed and compacted prior to placing any additional fills. Specific grading recommendations are provided herein.

Grading

Grading activities may be performed during the rainy season, however, achieving proper compaction may be difficult due to excessive moisture and delays will occur. Use of lime treatment or geogrids and geotextiles to stabilize soft areas and street subgrades may be required depending on actual moisture conditions at the time of grading. Grading performed during the dry months will minimize the occurrence of the above problems.

The surface of the site in areas to be graded should be stripped to remove all existing vegetation and/or other deleterious materials. It is estimated that stripping depths of 1 to 2 inches may be necessary. Disking of vegetation into the soils is not recommended. Any material that is deemed to be topsoil and requiring stripping may not be used as engineered fill but may be stockpiled and used later for landscaping purposes.

Where any loose or soft soils are encountered they must be over-excavated to undisturbed native ground. Excavated soil materials may be used as engineered fill with the approval of the Soils Engineer provided they do not contain organics.

After stripping and clearing, the exposed surface soils under building pads, streets and any improvement area should be over-excavated 12 inches and then the exposed material scarified to a depth of 12 inches, moisture conditioned as necessary to 4 or more percent above optimum moisture content by thorough mixing to a uniform moisture content, followed by compacting to a minimum of 90% relative compaction as determined by ASTM D1557. The above original ground processing should extend a minimum distance of 5 feet beyond the structure footprints or improvement area footprint. The site may then be filled to the desired finished grades by placing engineered fill in lifts of 8 inches in uncompacted thickness and compacting to a minimum relative compaction of 90% at 4% or more above optimum in accordance with the aforementioned test procedure.

Utility trenches extending underneath all traffic areas must be backfilled with native or import soil materials and compacted to relative compaction of 90% to within 12 inches of the subgrade. The upper 12 inches should be compacted to 95% relative compaction in accordance with Laboratory Test Procedure ASTM D1557. Backfilling and compaction of these trenches must also meet the requirements set forth by the City of Fairfield or Solano County, Department of Public Works.

As discussed above, the building pads may be alternatively lime treated where conventional footing foundations are desired. In this case, we recommended that the upper 3 feet of the building pads and adjacent concrete flatwork comprise the on-site materials modified with high calcium quicklime. It is noted that the structural fill must extend at least 5 feet beyond the building footprint and to the edge of surrounding flatwork, whichever is greater.

The lime treatment should consist of a 5% mixture by dry weight with high-calcium quicklime meeting ASTM C 977. Based on a unit weight of 120 p.c.f., a minimum spread rate of 9.0 p.s.f. is recommended for the 18-inch mixing depth. In the pavement areas, the upper 12 inches of subgrade may also be lime treated with a minimum spread rate of 6.0 p.s.f. The lime treated soils should be compacted to at least 95% relative compaction of the maximum wet density at a moisture content at least 4% above optimum. The lime treatment must be performed by a qualified soil stabilization contractor in general conformance with Caltrans Standard Specification Section 24. The product specification and quality control test results must be provided to us by the contractor for review and acceptance prior to the treatment operations. The lime should be spread and mixed with equipment capable of providing relatively uniform conditions and allowed to mellow overnight. The lime treated sections must be mixed again the following day prior to compaction. After compaction, it is important to moist cure the lime treated soils until placement of the subsequent slab subbase materials (i.e. do not let pad dry out and desiccate).

Where select import material is to be used to meet design grades or be required for general fill, the import material should be approved by the Soil Engineer before it is brought to the site. Where select import soil is used for the pad areas, it should meet the following requirements:

a. Have a Plasticity Index not higher than 15;
b. No rocks larger than 3 inches in maximum size;
c. Caltrans Class 2 aggregate base may be used.

The fill materials shall be placed in uniform lifts of not more than 8 to 12 inches in uncompacted thickness depending on size and weight of equipment used. Each layer shall be spread evenly and shall be thoroughly blade mixed during the spreading to obtain uniformity of material in each layer. Before compaction begins, the fill shall be brought to a water content that will permit proper compaction by either (a) aerating the material if it is too wet, or (b) spraying the material with water if it is too dry. Significant moisture mixing and processing should be anticipated by the Contractor.

Compaction shall be by footed rollers or other types of acceptable compacting rollers. Rollers shall be of such design that they will be able to compact the fill to the specified density. Rolling shall be accomplished while the fill material is within the specified moisture content range. Rolling of each layer shall be continuous over its entire area and the roller shall make sufficient trips to ensure that the required density has been obtained. No ponding or jetting shall be permitted.

The standard test used to define maximum densities and optimum moisture content of all compaction work shall be the Laboratory Test procedure ASTM D1557 and field tests shall be expressed as a relative compaction in terms of the maximum dry density and optimum moisture content obtained in the laboratory by the foregoing standard procedure. Field density and moisture tests shall be made in each compacted layer by the Soil Engineer in accordance with ASTM D6938, respectively. When footed rollers are used for compaction, the density and moisture tests shall be taken in the compacted material below the surface disturbed by the roller. When these tests indicate that the compaction requirements for any layer of fill, or portion thereof, have not been met, the particular layer, or portion thereof, shall be reworked until the compaction requirements have been met.

Surface & Subsurface Drainage

A very important factor affecting the performance of structures is the proper design, implementation, and maintenance of surface and subsurface drainage, as well as maintaining uniform moisture conditions around the structures. Ponded water will cause swelling and/or loss of soil strength and may also seep under structures. Should surface water be allowed to seep under the structures, differential foundation movement resulting in structural damage and/or standing water under the slab will occur. This may cause dampness to the floor which may result in mildew, staining, and/or warping of floor coverings. To minimize the potential for the above problems, dampproofing and waterproofing should be provided as required by Section 1805 of the 2022 CBC. In addition, the following surface drainage measures are recommended and must be maintained by the property owner in perpetuity:

a) Positive building pad slopes and drainage must be provided by the project Civil Engineer to remove all storm water from the pad and to prevent storm and/or irrigation water from ponding adjacent to the structure foundations. The finished pad grade around the structures should be compacted and sloped 5% away from the exterior foundations and as required in Section 1804.4 of the 2022 CBC and be directed to yard swales and drainage outlets. Earth swales should slope a minimum of 2% to a suitable outlet.

b) Enclosed or trapped planter areas adjacent to the structure foundation should be avoided if possible. Where enclosed planter areas are constructed, these areas must be provided with adequate measures to drain surface water (irrigation and rainfall) away from the foundation. Positive surface gradients and/or controlled drainage area inlets should be provided. Care should be taken to adequately slope surface grades away from the structure foundation and into area inlets. Drainage area inlets should be piped to a suitable discharge facility.

c) Adequate measures for storm water discharge from the roof gutter downspouts must be provided by the project Civil Engineer and maintained by the property owners at all times, such that no water is allowed to pond next to the structure. Closed pipe discharge lines should be connected to downspouts and discharged into a suitable drainage facility. It is important not to allow concentrated discharge on the surface of any slope so as to prevent erosion.

d) Site drainage should be designed by the project Civil Engineer. Civil engineering, hydraulic engineering, and surveying expertise is necessary to design proper surface drainage to assure that the flow of water is directed away from the foundations.

e) Over-irrigation of plants is a common source of water migrating beneath a structure. Consequently, the amount of irrigation should not be any more than the amount necessary to support growth of the plants. Foliage requiring little irrigation (drip system) is recommended for the areas immediately adjacent to the structure.

With respect to any proposed bio-retention swales or basins, we anticipate that bio-swales will be located relatively close to the proposed structures. We recommend a minimum separation of 10 horizontal feet where possible. The bottom of the swales and/or treatment materials should be sloped away from the structure foundation a minimum of 5%. In addition, we recommend that a subsurface drain be provided below the select treatment soils and drainrock at the low side of the swale/basin. The subdrain should be connected to the nearest storm drain catch basin. A 4 inch SDR35 perforated pipe surrounded by Caltrans Class 2 Permeable Material should be provided to discharge collected water into the nearest catch basin. An impermeable liner may also be required in the bottom of the swales where located closer than 10 feet from a building foundation. Structure foundations where located adjacent to bio-treatment swales should be deepened 1 foot below the bottom of the treatment section. Additional details can be provided when plans are available.

Foundations

Considering the moderately to highly expansive site soil conditions, we recommend that the market building, tasting room buildings, restaurants, multi-purpose/dining hall, hotel concierge, and cottage structures be supported on a uniformly thickened post-tension slab foundation system. Alternatively, conventional spread footing foundations may be utilized provided that the upper 3 feet of the building pad soils are lime treated as recommended in the "Grading" section above. Recommendation for both systems are provided below.

Post-Tensioned Slabs

Post-tensioned slabs for the structures should be a minimum of 10 inches in thickness (for uniform thickness slabs) and designed using the following criteria which is based on the design method of the "Standard Requirements for Design of Shallow Post-Tensioned Concrete Foundations on Expansive Soils", dated May 2008, Third Edition, prepared by the Post Tensioning Institute:

Edge Moisture Variation Distance:

e_m (Edge Lift)	=	3.7 feet
e_m (Center Lift)	=	6.9 feet

Differential Movement:

y_m (Edge Lift)	=	3.0 inches
y_m (Center Lift)	=	-2.0 inches

Estimated Differential Settlement: = 0.75 inch

In addition to the recommendations and guidelines in the Third Edition by the PTI, the following recommendations should also be incorporated into the design and construction for the above structural mat foundation systems:

a) An allowable bearing capacity of 1,000 p.s.f. may be utilized and may be increased by one-third to resist short-term wind and seismic loading.

b) To resist lateral loading, a coefficient of friction between the perimeter concrete thickened edge and the soil of 0.30 may be used.

c) All areas to receive slabs should be thoroughly soaked within the upper 12 inches prior to placing the vapor retarder and underslab components. This work should be performed under the observation of the Soil Engineer and approved prior to vapor barrier and concrete placement.

d) The reinforcement and/or cables shall be placed in the center of the slab unless otherwise designated by the Structural Engineer.

e) A vapor retarder membrane should be installed between the prepared building pad and the interior slab to minimize moisture condensation under the floor coverings and/or upward vapor transmission. The vapor barrier membrane should be a minimum 15-mil extruded polyolefin plastic that complies with ASTM E1745 Class A and have a permeance of less than 0.01 perms per ASTM E96 or ASTM F1249. It is noted that polyethylene films (visqueen) do not meet these specifications. The vapor barrier must be adequately lapped and taped/sealed at penetrations and seems in accordance with ASTM E1643 and the manufacturer's specifications. The vapor retarder must be placed continuously across the slab area.

f) The slabs should be thickened at the perimeter to extend below pad grade at least 6 inches for a width of 12 inches to create frictional resistance for lateral loading, to provide additional edge rigidity, and to minimize moisture infiltration under the slab.

g) Water vapor migrating to the surface of the concrete can adversely affect floor covering adhesives. Provisions should be provided in the concrete mix design to minimize moisture emissions. This should include the selection of a water-cement ratio which inhibits water permeation (0.45 max). Additional suitable admixtures to limit water transmission may also be utilized. The slabs should not be subjected to rainfall or cleaning water prior to placement of the floor coverings.

h) Exterior porches, garages and attached covered patios areas should also be designed as part of the same post-tension foundation system.

i) We recommend that appropriate provisions be provided by the Structural Engineer and Contractor to minimize slab cracking, such as curing measures and/or admixtures to minimize concrete shrinkage and curling. American Concrete Institute methods and guidelines of curing, such as wet curing or membrane curing, are recommended to minimize drying shrinkage cracking.

j) The foundation plans, specifications, calculations and concrete mix designs should be provided to the Structural Engineer and us for review prior to construction to ensure conformance with the above recommendations.

Continuous Spread Footings

Provided the building pads are lime treated as presented in the "Grading" section above, spread footing foundations may be utilized. Continuous spread footings for the buildings should be utilized around the perimeter of the structure and for all interior bearing and shear walls. Footing for the market building, tasting room buildings, restaurants, multi-purpose/dining hall, and hotel concierge should be a minimum of 1.5 feet wide. All interior and exterior column footings should be interconnected to the perimeter with reinforced concrete tie-beams. Isolated footings should not be utilized unless connected with reinforced tie-beams. The continuous and pad/column footings should extend a minimum depth of 24 inches below the interior slab subgrade soil elevation. The tie beams should extend to a minimum depth of 18 inches below the interior soil pad grade. The recommended design allowable bearing pressure for footings is 2,000 p.s.f. due to dead plus live loads. This value may be increased one-third for transient wind and seismic loads.

All foundations must be adequately reinforced to provide structural continuity and resist the anticipated loads as determined by the project Structural Engineer. The final footing design and reinforcement should be determined by the project Structural Engineer. However, continuous footings and tie-beams are recommended to be reinforced with a minimum of four No. 5 bars, two at the top and two near the bottom of the footing. Additional reinforcement will be as required by the structural engineer and in accordance with structural building code requirements. Foundations designed in accordance with the above criteria are expected to experience a total settlement of less than 1 inch with less than 1/2 of an inch of differential settlement in 30 feet.

To accommodate lateral building loads, the passive resistance of the foundation soil can be utilized. The passive soil pressures can be assumed to act against the front face of the footing below a depth of 1 foot below the ground surface. It is recommended that a passive pressure equivalent to that of a fluid weighing 225 p.c.f. be used. For design purposes, an allowable friction coefficient of 0.28 can be assumed at the base of the spread footings. These two modes of resistance should not be added unless the frictional component is reduced by 50 percent since the mobilization of the passive resistance requires some horizontal movement, effectively reducing the frictional resistance.

Slab-on-Grade Construction

Interior slabs where footing foundation are used, and exterior concrete slabs, including pedestrian sidewalks, driveways, non-structural detached patios and general flatwork will likely experience some cracking due to finishing and curing methods as well as moisture variations within the underlying clay soils. We should note that City or County maintained curbs, gutters, sidewalks and driveway aprons should be designed and constructed per the City or County Standards, Specifications and Plans. To reduce the potential cracking of the slabs-on-grade, the following recommendations are made:

a) All areas to receive slabs should be thoroughly wetted and soaked in the upper 12 inches to seal any desiccation or shrinkage cracks prior to placing concrete. This work should be done under the observation of the Soil Engineer.

b) Slabs should be underlain by a minimum of 4 inches of angular gravel or clean crushed rock material placed between the finished subgrade and the slabs to serve as a capillary break between the subsoil and the slab. The gravel should not have more that 10% passing the No. 4 sieve per CBC Section 1805.4.1. Caltrans Class 2 aggregate base may also be used provided it is compacted to a minimum of 90%.

c) Interior slabs for building structures where footings are used, and exterior slabs for attached patios, structure entries, outdoor BBQ and kitchen areas, and auto parking stalls should be a minimum of 5 inches thick and reinforced with a minimum of No. 4 rebar spaced 18 inches center to center, each way. Additional PCC pavement recommendations are presented under the Pavement section of this report. The actual slab thickness and reinforcement should be determined by the project Structural Engineer in accordance with the structural requirements and the anticipated loading conditions. The reinforcement shall be placed in the center of the slab unless otherwise designated by the design engineer.

d) Where a footing and slab foundation is used or where moisture vapor is a concern, a vapor retarder membrane should be installed between the prepared building pad aggregate base and the interior slabs to minimize moisture condensation under the floor coverings and/or upward vapor transmission. The vapor barrier membrane should be a minimum 15-mil extruded polyolefin plastic that complies with ASTM E1745 Class A and have a permeance of less than 0.01 perms per ASTM E96 or ASTM F1249. It is noted that polyethylene films (visqueen) do not meet these specifications. The vapor barrier must be adequately lapped and taped/sealed at penetrations and seems in accordance with ASTM E1643 and the manufacturer's specifications. The vapor retarder must be placed continuously across the slab area.

e) Water vapor migrating to the surface of the concrete can adversely affect floor covering adhesives. Provisions should be provided in the concrete mix design to minimize moisture emissions. This should include the selection of a water-cement ratio which inhibits water permeation (0.45 max) and/or the addition of suitable admixtures to limit water transmission.

f) Slabs for driveways, entries, attached patios and exterior flatwork should be placed structurally independent of the foundations. Driveway/pavement slab recommendations are presented in the "Pavement" section of the report. A 30-pound felt strip, expansion joint material, or other positive separator should be provided around the edge of all floating slabs to prevent bonding to the foundation. However, rebar doweling to the foundation is recommended to minimize vertical movements between exterior slabs and building foundations. Doweling details should be determined by the Structural Engineer.

g) To minimize moisture infiltration under exterior slabs and to add edge rigidity, we recommend that slabs be thickened at the edges to extend below the aggregate base layer to the soil subgrade for a minimum width of 6 inches.

h) Slabs should be provided with crack control saw cut joints or tool joints to allow for expansion and contraction of the concrete. In general, contraction joints should be spaced no more than 20 times the slab thickness in each direction. The layout of the joints should be determined by the project Structural Engineer and/or Architect.

h) We recommend that appropriate provisions be provided by the Structural Engineer and Contractor to minimize slab cracking, such as curing measures and/or admixtures to minimize concrete drying-shrinkage and curling. American Concrete Institute methods and guidelines of curing, such as wet curing or membrane curing, are recommended to minimize drying shrinkage cracking.

Retaining Walls

Any retaining walls that are to be incorporated into the project should be designed to resist lateral pressures exerted from a media having an equivalent fluid weight as noted the following table.

Gradient of Back Slope	Equivalent Fluid Weight (p.c.f.)			Coefficient of Friction
	Unrestrained Condition (Active)	Restrained Condition (At Rest)	Passive Resistance	
Horizontal	60	75	225	0.28

It should be noted that the effects of any surcharge or compaction loads behind the walls must be accounted for in the design of the walls. We recommend that the project Structural Engineer use the formula $P_Q = QHKa$ where Q = uniform surcharge load in psf, Ka = 0.5, and H = wall height. Because the surcharge pressure acting on the retaining wall is considered relatively uniform, the resultant force P_Q should be applied at mid-height of the wall.

Per Section 1803.5.12 of the 2022 California Building Code, dynamic lateral earth pressures on retaining walls supporting more than 6 feet of backfill in height are required. Based on the Mononobe-Okabe & Seed-Whitman equations, a total unit weight of 120 pcf and a Kh of ½ PGAm, an earthquake load of $15.5H^2$ should be applied at 1/3H where H = wall height, from the bottom of the wall is applicable.

Low height retaining walls (less than 5 feet), including dry stack non-mortared walls, may be founded on continuous spread footings as noted in the "Foundation" section above.

The above criteria are based on fully drained conditions. In order to achieve fully-drained conditions, a gravel drainage filter blanket should be placed behind the wall. The gravel blanket should be a minimum of 12 inches thick and should extend to within 12 inches of the surface and capped with compacted soil. If the excavated area behind the wall exceeds 12 inches, the entire excavated space behind the 12-inch blanket should consist of compacted engineered fill or blanket material. The gravel drainage blanket material may consist of either granular crushed rock or drain pipe fully encapsulated in geotextile filter fabric (Mirafi 140N or equivalent) or Class II permeable material that meets CalTrans Specification, Section 68. A 4-inch diameter SDR35 perforated drain pipe should be installed in the bottom of the drainage blanket and should be underlain by 4 inches of filter type material. Piping with a minimum gradient of 2% shall be provided to discharge water that collects behind the walls to an adequately controlled discharge system away from the structure foundations. Weep holes may alternatively be utilized.

Pavement Areas

The driveways and parking areas will be paved with either asphalt concrete (AC) or Portland cement concrete (PCC) surfaces. Recommendations for these pavement surfaces are presented below. We emphasize that the performance of the pavement is critically dependent upon adequate and uniform compaction of the subgrade soils, as well as engineered fill and utility trench backfill within the limits of pavements. Pavements will typically have poor performance and shorter life where water is allowed to migrate into the aggregate base and subgrade soils. The main sources of water into pavement materials are landscape planters constructed within or adjacent to pavement areas. Where this is planned, it is suggested to extend the curbs into the soil subgrade at least 2 inches. The construction of all pavements should conform to the requirements set forth by the latest Standard Specifications of the Department of Transportation of the State of California (Caltrans) and/or City of Fairfield or Solano County.

R-Value: Bulk samples were obtained of the near surface soils within the planned street areas that are representative of the anticipated subgrade soils. The samples were tested in accordance with the California Test Method 301 to determine the R-Value for the site soils. An R-Value of 6 was determined for the sample as shown in the Appendix.

Preparation of Subgrade: After underground utilities have been placed in the areas to receive pavement and removal of excess material has been completed, the upper 12 inches of the subgrade soil should be scarified, moisture conditioned and compacted to a minimum relative compaction of 95% at a moisture content at 3% or more above optimum in accordance with the grading recommendations specified in this report. As recommended in the "Grading" section above, the upper 12 inches of the subgrade may alternatively be lime treated. Prior to placement of aggregate baserock, it is recommended that the subgrade be proof rolled and observed for deflection by the Soils Engineer. Should deflection and/or pumping conditions be encountered, stabilization recommendations will be provided based on field conditions.

Aggregate Base: All aggregate base material placed subsequently should also be compacted to a minimum relative compaction of 95% based on the ASTM Test Procedure D1557. Aggregate base should meet the minimum requirements of Caltrans ¾" Class 2 per Section 26 and be crushed and angular. The recommended aggregate base thicknesses for asphalt concrete pavements are noted in the table below. The minimum aggregate base thickness for Portland cement concrete PCC roadway pavements is 6 compacted inches.

Asphalt Concrete: Asphalt concrete shall conform with Section 39 of Caltrans Standard Specifications and shall be per the City of Fairfield or Solano County Standards. Based on an R-Value of 6, and traffic indices typical for commercial/farming projects, the recommended pavement sections for aggregate and asphalt concrete surfaces are summarized in the table below. Should the driveway and parking lot soils be lime treated, we are providing an alternate section based on a minimum R-value of 30. The appropriate traffic index (TI) and any minimum pavement sections should be determined by the Civil Engineer in conformance with the City of Fairfield.

Traffic Condition	Traffic Index (TI)	Asphalt Concrete (inches)	Class II Aggregate Base[1] (inches)
Auto Parking Stalls	4.5	3.0 3.0	8.0 4.0*
Drive Isles/Lanes	6.0	4.0 4.0	11.5 6.5*
Collector	8.0	4.5 4.5	18.5 11.5*
Arterial	10.0	6.0 6.0	23.5 15.0*

NOTES:
(1) Minimum R-Value = 78
(2) All layers in compacted thickness to CalTrans Standard Specifications.
* 12" Lime Treated Subgrade (R-Value = 30 min)

Portland Cement Concrete: Where PCC pavement areas are utilized, such as for drive isles and truck areas or trash enclosures, the concrete should be poured on the compacted aggregate base layer described above of 6 inches. We recommend a minimum of 6 inches thick PCC reinforced with a minimum of No. 4 rebar spaced at 16 inches on center, each way, underlain by 6 inches of compacted Class 2 aggregate base. Pavement joints shall be per the HDM and City/County Standards.

Underground Utility and Excavations

Groundwater was encountered at depths as shallow as 6 feet at the time of our exploration. Depending on the time of year of underground construction, higher groundwater may be encountered especially in deeper utilities. Temporary dewatering and shoring are the responsibility of the Contractor.

Should groundwater be encountered, the utility construction should begin at its lowest point and proceed uphill. The utility trench should be over-excavated 6 to 12 inches below the City/County required pipe bedding material. Open-graded 1.5-inch crushed aggregate should be placed in the bottom of the trench followed by the City/County standard bedding material. A sump pit should be excavated at the lowest point of the open excavation/trench to facilitate pumping of collected water. The collected water should be pumped to a City/County approved discharge facility.

Utility trenches extending to the building foundations must be backfilled with native or approved import material and compacted to relative compaction of 90% in accordance with Laboratory Test Procedure ASTM D1557. Backfilling and compaction of these trenches must meet the requirements set forth by the City of Fairfield or Solano County, Department of Public Works.

Applicable safety standards require that excavations in excess of 5 feet must be properly shored or that the walls of the excavation slope back to provide safety for installation of lines. If trench wall sloping is performed, the inclination should vary with the soil type and applicable OSHA Safety Standards.

With respect to state-of-the-art construction or local requirements, utility lines are generally bedded with granular materials. These materials can convey surface or subsurface water beneath the structures. It is, therefore, recommended that all utility trenches which possess the potential to transport water be sealed with a compacted impervious cohesive soil material or lean concrete where the trench enters/exits the building perimeter. This impervious seal should extend a minimum of 2 feet away from the building perimeter.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. It should be noted that it is the responsibility of the owner or his representative to notify ***KC ENGINEERING CO.***, in writing, a minimum of two working days before any clearing, grading, or foundation excavation operations can commence at the site.

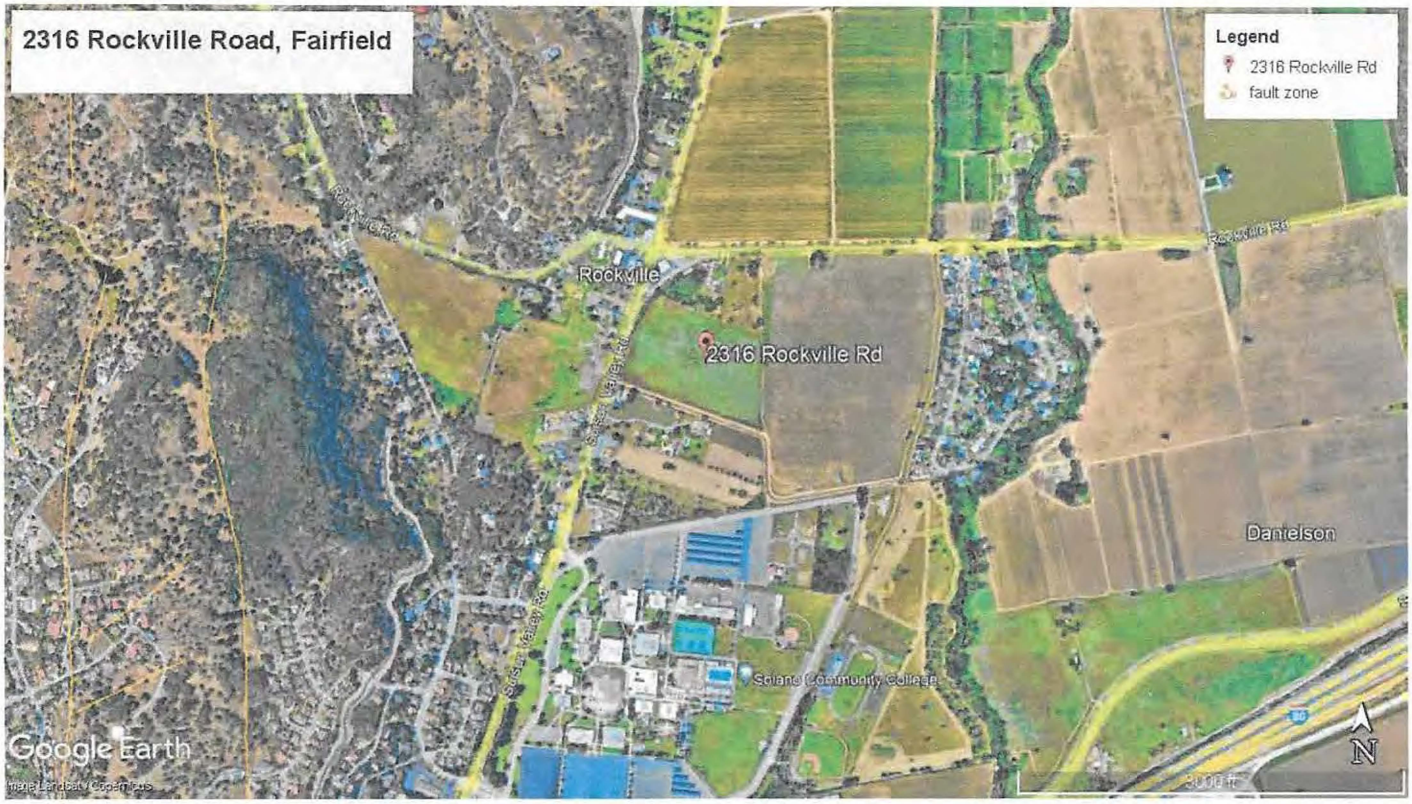
2. The recommendations of this report are based upon the assumption that the soil conditions do not deviate from those disclosed in the borings and from a reconnaissance of the site. Should any variations or undesirable conditions be encountered during the development of the site, ***KC ENGINEERING CO.***, will provide supplemental recommendations as dictated by the field conditions.

3. This report is issued with the understanding that it is the responsibility of the owner, or his representative, to ensure that the information and recommendations contained herein are brought to the attention of the Architect and Engineer for the project and incorporated into the plans and that the necessary steps are taken to see that the Contractor and Subcontractors carry out such recommendations in the field.

4. At the present date, the findings of this report are valid for the property investigated. With the passage of time, significant changes in the conditions of a property can occur due to natural processes or works of man on this or adjacent properties. In addition, legislation or the broadening of knowledge may result in changes in applicable standards. Changes outside of our control may render this report invalid, wholly or partially. Therefore, this report should not be considered valid after a period of two (2) years without our review, nor should it be used, or is it applicable, for any properties other than those investigated.

5. Notwithstanding, all the foregoing applicable codes must be adhered to at all times.

APPENDIX



KC ENGINEERING COMPANY
865 Cotting Lane, Suite A
Vacaville, CA 95688
707.447.4025

Project No. VV5518
Proposed Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA
Figure 1 – AERIAL VICINITY MAP

LEGEND

Approximate Boring Location

KC ENGINEERING COMPANY
865 Cotting Lane, Suite A
Vacaville, CA 95688
707.447.4025

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Proposed Solano Landing Mixed-Use Project
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Figure 2.0 – SITE PLAN

LEGEND

Approximate Boring Location

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865 Cotting Lane, Suite A
Vacaville, CA 95688
707-447-4025

Project No. VV5518
Proposed Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA
Figure 2.1 – ILLUSTRATIVE SITE PLAN

Solano Landing
2316 Rockville Road
Fairfield, CA 94534

Date: 08.22.2022
3D View - from Northwest

SOLANO
LANDING

Taylor
Lombardo
Architects
LLP

40 Hotaling Place
San Francisco
California 94111

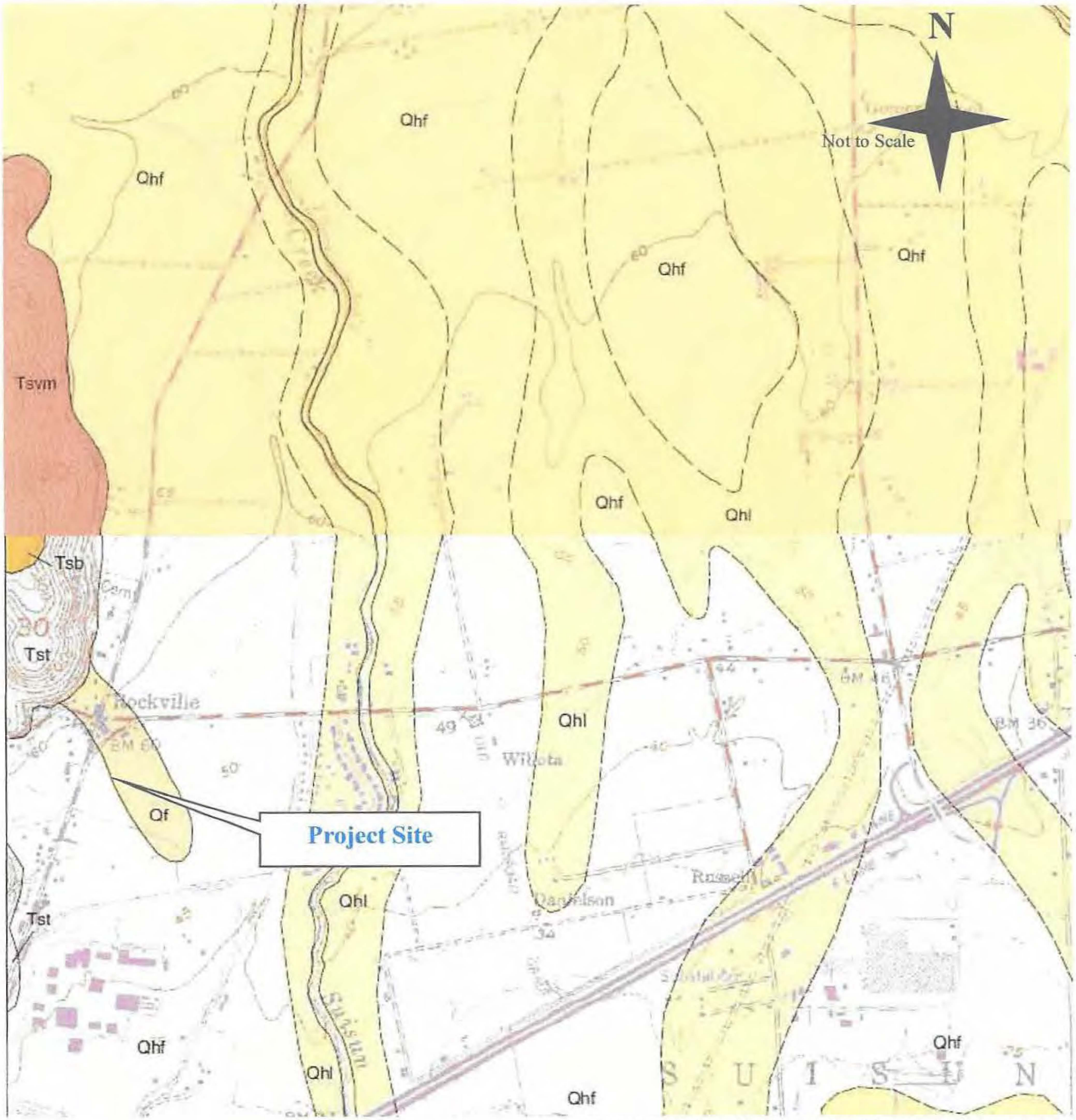
(415) 433-7777 tel
(415) 433-7717 fax

taylorlombardo.com

GEOTECHNICAL ENGINEERING CONSULTANTS
KC

KC ENGINEERING COMPANY
865 Cotting Lane, Suite A
Vacaville, CA 95688
707-447-4025

Project No. VV5518
Proposed Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA
Figure 2.2 – SITE PLAN 3D VIEW



GEOLOGIC MAP OF THE
FAIRFIELD NORTH 7.5' QUADRANGLE
SOLANO AND NAPA COUNTIES, CALIFORNIA: A DIGITAL DATABASE

Geologic Map of the Fairfield South 7.5' Quadrangle,
Solano County, Calilfornia
by
Stephen P. Bezore', David L. Wagner', and Janet M. Sowers'
1998

Qhl	Fan levee deposits (Holocene)
Qhf	Alluvial fan deposits (Holocene)
Qf	Alluvial fan deposits (latest Pleistocene <~30,000 years to Holocene)
Tst	Ash-flow tuff (Pliocene). Pumicitic, locally welded, with bedded agglomeritic tuff.

KC ENGINEERING COMPANY
865 Cotting Lane, Suite A
Vacaville, CA 95688
(707) 447-4025

Project No. VV5518
Proposed Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA
Figure 3 – GEOLOGIC MAP

LOG OF TEST BORING

BORING NO.: 1

PROJECT: Solano Landing Mixed-Use Project
CLIENT: Solano Landing, LLC
LOCATION: 2316 Rockville Road, Fairfield, CA
DRILLER: California Geo-Tech
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 12'

PROJECT NO.: VV5518
DATE: 02/13/23
ELEVATION: n/a
LOGGED BY: DS
BORING DIAMETER: 4"
FINAL: ▼ : 6.5' AFTER: HRS

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	Qp (t.s.f.) Penetrometer	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Dark Brown CLAY; moist, very stiff.	CL					
	1-1					18	106.4	20.5	2.25	LL=41 PI=23 UCC=6,577 psf
5				▼						
	1-2			As Above very stiff.		16				No Retrieval.
10				Light Olive Brown Clayey SAND w/ Gravel; wet, loose.	SC					
				▽						
	1-3					7	105.5	21.8		%<200=36
15				Light Olive Brown Sandy CLAY; wet, very stiff.	CL					
	1-4a						92.0	29.0		%<200=66
	1-4b			Dark Brown Sandy CLAY w/ Weathered Cemented Gravels & Tuff Fragments; moist, very stiff.	CL	18	92.2	27.8		
20										
	1-5			As Above, hard.		50-5"	96.9	25.2		
25										

This information pertains only to this boring and is not necessarily indicative of the whole site.

LOG OF TEST BORING

BORING NO.: 1

PROJECT: Solano Landing Mixed-Use Project
CLIENT: Solano Landing, LLC
LOCATION: 2316 Rockville Road, Fairfield, CA
DRILLER: California Geo-Tech
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 12'

PROJECT NO.: VV5518
DATE: 02/13/23
ELEVATION: n/a
LOGGED BY: DS
BORING DIAMETER: 4"
FINAL: ▼ : 6.5' AFTER: HRS

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	Qp (t.s.f.) Penetrometer	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
	1-6			As Above, very stiff.		27	99.5	21.7		
				Boring Terminated @ 28.5'. Groundwater Encountered @ 12'. Then rose to 6.5' from grade.						
30										
35										
40										
45										
50										
55										

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

LOG OF TEST BORING

BORING NO.: 2

PROJECT: Solano Landing Mixed-Use Project
CLIENT: Solano Landing, LLC
LOCATION: 2316 Rockville Road, Fairfield, CA
DRILLER: California Geo-Tech
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 6'

PROJECT NO.: VV5518
DATE: 02/13/23
ELEVATION: n/a
LOGGED BY: DS
BORING DIAMETER: 4"
FINAL: ▼ : AFTER: HRS

DEPTH	SAMPLE NO.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	Qp (t.s.f.) Penetrometer	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0		Dark Brown CLAY; moist, very stiff.	CL					
	2-1			18	106.4	20.5	3.0	LL=43 PI=23
5								
		Light Brown CLAY; moist, stiff. ▽	CL/CH					
	2-2			12	104.0	21.4	1.5	
10								
		Light Olive Brown CLAY w/ Trace Sand; very moist to wet, firm.	CL					
	2-3			7	93.9	27.6	0.5	%<200=81 Pc=1,638 psf
15								
		Light Olive Brown Sandy CLAY w/ Weathered Gravel/ Tuff Fragments; wet, stiff.	CL					
20	2-4			10	94.3	26.9		%<200=56
		Boring Terminated @ 20.5'. Groundwater Encounterd @ 6'.						
25								

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.

Figure 5

LOG OF TEST BORING

BORING NO.: 3

PROJECT: Solano Landing Mixed-Use Project
CLIENT: Solano Landing, LLC
LOCATION: 2316 Rockville Road, Fairfield, CA
DRILLER: California Geo-Tech
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 10'

PROJECT NO.: VV5518
DATE: 02/13/23
ELEVATION: n/a
LOGGED BY: DS
BORING DIAMETER: 4"
FINAL: ▼ : AFTER: HRS

DEPTH	SAMPLE NO.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	Qp (t.s.f.) Penetrometer	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0		Brown CLAY; moist, stiff to very stiff.	CL/CH					
	3-1			15	107.4	20.7	2.25	ϕ=21° c=950 psf
5								
		Brown CLAY; moist to very moist, stiff.	CL/CH					
	3-2			12	102.8	23.0	1.5	UCC=3,696 psf
10		▽						
		Light Olive CLAY; very moist, stiff.	CL/CH					
	3-3			10	97.0	25.8	1.25	
		Boring Terminated @ 13.5'. Groundwater Encountered @ 10'.						
15								
20								
25								

This information pertains only to this boring and is not necessarily indicative of the whole site.

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Figure 6

LOG OF TEST BORING

BORING NO.: 4

PROJECT: Solano Landing Mixed-Use Project
CLIENT: Solano Landing, LLC
LOCATION: 2316 Rockville Road, Fairfield, CA
DRILLER: California Geo-Tech
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ∇ : 7.5'

PROJECT NO.: VV5518
DATE: 02/13/23
ELEVATION: n/a
LOGGED BY: DS
BORING DIAMETER: 4"
FINAL: ▼ : AFTER: HRS

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	Qp (t.s.f.) Penetrometer	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown CLAY; moist, stiff.	CL/CH					
	4-1					12	105.8	20.2	1.5	UCC=4,423 psf
5										
	4-2			As Above. ∇		10	107.0	22.2	1.0	
10				Light Olive CLAY w/ Trace Sand; wet, firm.	CL/CH					
	4-3					7	89.7	30.9	0.5	
				Boring Terminated @ 13.5'. Groundwater Encountered @ 7.5'.						
15										
20										
25										

This information pertains only to this boring and is not necessarily indicative of the whole site.

LOG OF TEST BORING

BORING NO.: 5

PROJECT: Solano Landing Mixed-Use Project
CLIENT: Solano Landing, LLC
LOCATION: 2316 Rockville Road, Fairfield, CA
DRILLER: California Geo-Tech
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ∇ : 15'

PROJECT NO.: VV5518
DATE: 02/21/23
ELEVATION: n/a
LOGGED BY: DS
BORING DIAMETER: 4"
FINAL: ▼ : AFTER: HRS

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	Qp (t.s.f.) Penetrometer	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown CLAY; moist, very stiff.	CL					
	5-1					16	109.9	18.9	2.5	LL=44 PI=25
5										
				Light Brown CLAY; moist, stiff.	CL					
	5-2					11	100.3	23.1	1.0	
10										
	5-3			Yellowish Brown Sandy CLAY w/ Trace Gravel; very moist to wet, stiff. ∇	CL	10	98.3	25.4	0.5	%<200=65
15										
	5-4			As Above; wet.		10	90.2	31.3	0.5	
20										
	5-5			Yellowish Brown Sandy CLAY w/ Gravels; wet, firm.	CL	7	88.0	31.3	0.5	
25										
				Brown & Gray Sandy GRAVELS w/ Clay; wet, medium dense. (gravels up to 2")	GM					

This information pertains only to this boring and is not necessarily indicative of the whole site.

LOG OF TEST BORING

BORING NO.: 5

PROJECT: Solano Landing Mixed-Use Project
CLIENT: Solano Landing, LLC
LOCATION: 2316 Rockville Road, Fairfield, CA
DRILLER: California Geo-Tech
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 15'

PROJECT NO.: VV5518
DATE: 02/21/23
ELEVATION: n/a
LOGGED BY: DS
BORING DIAMETER: 4"
FINAL: ▼ : AFTER: HRS

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	Qp (t.s.f.) Penetrometer	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
	5-6			Grayish Green Sandy CLAY w/ Trace Weathered Gravel; very moist, hard.	CL/SC	36	84.5	34.2	4.5+	
30										
	5-7			As Above.		46			4.5	
35										
	5-8			As Above.		50-5"	110.6	19.6	4.5	
				Boring Terminated @ 38.5'. Groundwater Encountered @ 15'.						
40										
45										
50										
55										

This information pertains only to this boring and is not necessarily indicative of the whole site.

LOG OF TEST BORING

BORING NO.: 6

PROJECT: Solano Landing Mixed-Use Project
CLIENT: Solano Landing, LLC
LOCATION: 2316 Rockville Road, Fairfield, CA
DRILLER: California Geo-Tech
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 12.5'

PROJECT NO.: VV5518
DATE: 02/21/23
ELEVATION: n/a
LOGGED BY: DS
BORING DIAMETER: 4"
FINAL: ▼ : AFTER: HRS

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	Qp (t.s.f.) Penetrometer	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown CLAY; moist, very stiff.	CL					
	6-1					17			2.5	
5				Light Brown CLAY w/ Trace Silt; moist to very moist, very stiff.	CL					
	6-2					16	102.1	23.1	1.5	
10				Yellowish Brown CLAY w/ Silt; very moist to wet, firm to stiff. ▽	CL					
	6-3					8	93.2	28.3	0.25	
15				Yellowish Brown CLAY w/ Silt; wet, firm to stiff.	CL					
	6-4					8	88.8	32.2	0.25	
				Boring Terminated @ 18.5'. Groundwater Encountered @ 12.5'.						
20										
25										

This information pertains only to this boring and is not necessarily indicative of the whole site.

LOG OF TEST BORING

BORING NO.: 7

PROJECT: Solano Landing Mixed-Use Project
CLIENT: Solano Landing, LLC
LOCATION: 2316 Rockville Road, Fairfield, CA
DRILLER: California Geo-Tech
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ▽ : 12.5'

PROJECT NO.: VV5518
DATE: 02/21/23
ELEVATION: n/a
LOGGED BY: DS
BORING DIAMETER: 4"
FINAL: ▼ : AFTER: HRS

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	Qp (t.s.f.) Penetrometer	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Brown CLAY; moist to very moist, soft to firm upper 2' then very stiff.	CH					
	7-1					16	107.0	20.8	1.5	LL=53 PI=31 UCC=4,533 psf
5										
				Reddish Brown Clayey SAND w/ Gravels; moist to very moist, medium dense.	SM					
	7-2					18	118.0	11.3		%<200=14
10										
				Brown & Gray SAND w/ Silt & Gravel; wet, medium dense. (gravels up to 2") ▽	SW-SM					
	7-3					14	113.1	15.6		%<200=7
15										
				Brown & Gray GRAVEL w/ Sand; wet, loose.	GW					
	7-4					7				%<200=4.6
				Boring Terminated @ 18.5'. Groundwater Encountered @ 12.5'.						
20										
25										

This information pertains only to this boring and is not necessarily indicative of the whole site.

LOG OF TEST BORING

BORING NO.: 8

PROJECT: Solano Landing Mixed-Use Project
CLIENT: Solano Landing, LLC
LOCATION: 2316 Rockville Road, Fairfield, CA
DRILLER: California Geo-Tech
DRILL RIG: Mobile B-24
DEPTH TO WATER: INITIAL ≚ :

PROJECT NO.: VV5518
DATE: 02/21/23
ELEVATION: n/a
LOGGED BY: DS
BORING DIAMETER: 4"
FINAL: ≚ : AFTER: HRS

DEPTH	SAMPLE NO.	SAMPLER	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	SOIL CLASSIFICATION	CONVERTED SPT BLOW COUNT (BLOWS/FT.)	DRY DENSITY (PCF)	MOISTURE CONTENT (PERCENT)	Qp (t.s.f.) Penetrometer	ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, ø&c, Gradation)
0				Light Brown CLAY; moist, very stiff.	CL/CH					
	8-1					24	108.3	20.5	3.0	ϕ=25° c=993 psf
5										
	8-2			As Above.		18	106.9	21.3	2.25	
10										
				Yellowish Brown Silty CLAY; very moist, stiff.	CL/CH					
	8-3					12	93.3	29.8	1.75	
				Boring Terminated @ 13.5'. No Groundwater Encountered.						
15										
20										
25										

This information pertains only to this boring and is not necessarily indicative of the whole site.

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS More than half of material is retained on the No. 200 Sieve	GRAVEL More than half of coarse fraction is larger than No. 4 sieve	Clean gravels (<5% fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines (Cu>4 & 1<Cc<3)
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines (Cu < 4 and/or 1>Cc>3)
		Gravel with fines (>12% fines)	GM	Silty gravels and gravel-sand-silt mixtures (PI<4 or below "A" line)
			GC	Clayey gravels and gravel-sand-clay mixtures (PI>7 & on or above "A" line)
	SAND Half or more of the coarse fraction is smaller than No. 4 sieve	Clean sands (<5% fines)	SW	Well graded sands, gravelly sands, little or no fines (Cu>6 & 1<Cc<3)
			SP	Poorly graded sands, gravelly sands, little or no fines (Cu<6 and/or 1>Cc>3)
		Sand with fines (>12% fines)	SM	Silty sands and gravel-sand-silt mixtures (PI<4 or below "A" line)
			SC	Clayey sands and gravel-sand-clay mixtures (PI>7 & on or above "A" line)
FINE GRAINED SOILS Half or more of the material passes the No. 200 Sieve	SILTS AND CLAYS Liquid Limit is less than 50%		ML	Inorganic silts with gravel and sand having slight plasticity (PI<4 or below "A" line)
			CL	Inorganic clays of low to med. plasticity with gravel and sand (PI>7 & on or above "A" line)
			OL	Organic silts and clays of low plasticity
	SILTS AND CLAYS Liquid Limit is 50% or more		MH	Inorganic elastic silts (PI below "A" line)
			CH	Inorganic clays of high plasticity, fat clays (PI on or above "A" line)
			OH	Organic silts and clays of medium to high plasticity
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils

MTI-KC ENGINEERING COMPANY
865 Cotting Lane, Ste A, Vacaville, CA 95688
8798 Airport Road, Redding, CA 96002

SAMPLER AND LAB TESTING LEGEND

- Auger
- Bulk Sample, taken from auger cuttings
- California Sampler
- Bulk/Grab Sample
- Pitcher
- Standard Penetration Test
- Shelby Tube
- No Recovery

LL=Liquid Limit (%)
PI=Plasticity Index
φ =Friction Angle
C=Cohesion
UCC=Unconfined Compression
R value=Resistance Value
Consol=Consolidation Test

SOIL GRAIN SIZE

U.S. STANDARD SIEVE OPENINGS

		#200		#40	#10	#4		¾"	3"	12"
CLAY	SILT	SAND				GRAVEL			COBBLES	BOULDERS
		FINE	MEDIUM	COARSE		FINE	COARSE			
	0.002	0.075	0.425	2.00		4.75	19.0		75	300

SOIL GRAIN SIZE IN MILLIMETERS

RELATIVE DENSITY (Coarse-grained soils)

SANDS & GRAVELS	BLOWS/FOOT[1]
Very Loose	0 – 4
Loose	4 – 10
Medium Dense	10 – 30
Dense	30 – 50
Very Dense	> 50

CONSISTENCY (Fine-grained soils)

SILTS & CLAYS	STRENGTH[2]	BLOWS/FOOT[1]
Very Soft	< 500	0 – 2
Soft	500 – 1,000	2 – 4
Firm	1,000 – 2,000	4 – 8
Stiff	2,000 – 4,000	8 – 15
Very Stiff	4,000 – 8,000	15 – 30
Hard	> 8,000	>30

1 – Number of blows of 140 pound hammer falling 30 inches to drive a 2-inch O.D. split spoon sampler (ASTM D1586)
2 – Unconfined compressive strength in lb/ft^2 as determined by lab testing or approximated by the standard penetration test (ASTM D1586) or pocket penetrometer.

WEATHERING (Bedrock)

Fresh	No visible sign of decomposition or discoloration; rings under hammer impact
Slightly weathered	Slight discoloration inwards from open fractures; little or no effect on normal cementation; otherwise similar to Fresh
Moderately weathered	Discoloration throughout; weaker minerals decomposed; strength somewhat less than fresh rock but cores can not be broken by hand or scraped with knife; texture preserved; cementation little to not affected; fractures may contain filling
Highly weathered	Most minerals somewhat decomposed; specimens can be broken by hand with effort or shaved with knife; texture becoming indistinct but fabric preserved; faint fractures
Completely weathered	Minerals decomposed to soil but fabric and structure preserved; specimens can be easily crumbled or penetrated

STRENGTH (Bedrock)

Plastic	Very low strength
Friable	Crumbles easily by rubbing with fingers
Weak	An unfractured specimen will crumble under light hammer blows
Moderately strong	Specimen will withstand a few heavy hammer blows before breaking
Strong	Specimen will withstand a few heavy ringing blows and will yield with difficulty only dust and small flying fragments
Very strong	Specimen will resist heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments

BEDDING (Bedrock)	SPACING (inches)
Very thickly bedded	> 48
Thickly bedded	24 to 48
Thin bedded	2.5 to 24
Very thin bedded	5/8 to 2.5
Laminated	1/8 to 5/8
Thinly laminated	<1/8

FRACTURING (Bedrock)	SPACING (inches)
Very little fractured	> 48
Occasionally fractured	12 to 48
Moderately fractured	6 to 12
Closely fractured	1 to 6
Intensely fractured	5/8 to 1
Crushed	<5/8

Materials Testing, Inc.

8798 Airport Road
Redding, California 96002
(530) 222-1116, fax 222-1611

865 Cotting Lane, Suite A
Vacaville, California 95688
(707) 447-4025, fax 447-4143

Client:	Solano Landing, LLC 506 Coach Street Vallejo, CA 94590	Date:	03/15/2023
		Client No.:	VV5518
		Report No.:	0300-001
		Submitted By:	KC Engineering
Project:	Solano Landing Mixed-Use Project 2316 Rockville Road, Fairfield, CA	Date Submitted:	02/23/2023
		Page No.:	1 of 3

Density of Soil in Place by the Drive-Cylinder Method (ASTM D2937) and Liquid Limit, Plastic Limit & Plasticity Index of Soils (ASTM D4318)

Sample #	Description	Dry Density p.c.f.	Moisture Content %	Liquid Limit	Plastic Limit	Plastic Index
1-1 @ 3.0'	Dark Brown Clay (visual)	106.4	20.5	41	18	23
1-3 @ 13.0'	Light Olive Brown Clayey Sand with Gravel (visual)	105.5	21.8	---	---	---
1-4a @ 17.5'	Light Olive Brown Sandy Clay (visual)	92.0	29.0	---	---	---
1-4b @ 18.0'	Dark Brown Sandy Clay with Gravel (visual)	92.2	27.8	---	---	---
1-5 @ 23.0'	Dark Brown Sandy Clay with Gravel (visual)	96.9	25.2	---	---	---
1-6 @ 28.0'	Dark Brown Sandy Clay with Gravel (visual)	99.5	21.7	---	---	---
2-1 @ 3.0'	Dark Brown Clay (visual)	106.4	20.5	43	20	23
2-2 @ 8.0'	Light Brown Clay (visual)	104.0	21.4	---	---	---
2-3 @ 13.0'	Light Olive Brown Clay with Sand (visual)	93.9	27.6	---	---	---
2-4 @ 20.0'	Light Olive Brown Sandy Clay (visual)	94.3	26.9	---	---	---
3-1 @ 3.0'	Brown Clay (visual)	107.4	20.7	---	---	---

Tested by John Hubbard.
The samples were tested according to the referenced standard test procedures and relate only to the items inspected or tested. Results are not transferable and shall not be reproduced, except in full, without written permission from MTI.

M T I
Materials Testing, Inc.

8798 Airport Road
Redding, California 96002
(530) 222-1116, fax 222-1611

865 Cotting Lane, Suite A
Vacaville, California 95688
(707) 447-4025, fax 447-4143

Client: Solano Landing, LLC
506 Coach Street
Vallejo, CA 94590

Project: Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA

Date: 03/15/2023
Client No.: VV5518
Report No.: 0300-001
Submitted By: KC Engineering
Date Submitted: 02/23/2023

Density of Soil in Place by the Drive-Cylinder Method (ASTM D2937) and Liquid Limit, Plastic Limit & Plasticity Index of Soils (ASTM D4318)

Sample #	Description	Dry Density p.c.f.	Moisture Content %	Liquid Limit	Plastic Limit	Plastic Index
3-2 @ 8.0'	Brown Clay (visual)	102.8	23.0	---	---	---
3-3 @ 13.0'	Light Olive Clay (visual)	97.0	25.8	---	---	---
4-1 @ 3.0'	Brown Clay (visual)	105.8	20.2	---	---	---
4-2 @ 8.0'	Brown Clay (visual)	107.0	22.2	---	---	---
4-3 @ 13.0'	Light Olive Clay with Sand (visual)	89.7	30.9	---	---	---
5-1 @ 3.0'	Brown Clay (visual)	109.9	18.9	44	19	25
5-2 @ 8.0'	Light Brown Clay (visual)	100.3	23.1	---	---	---
5-3 @ 13.0'	Yellowish Brown Sandy Clay (visual)	98.3.	25.4	---	---	---
5-4 @ 18.0'	Yellowish Brown Clay with Sand (visual)	90.2	31.3	---	---	---
5-5 @ 23.0'	Yellowish Brown Sandy Clay (visual)	88.0	31.3	---	---	---
5-6 @ 28.0'	Grayish Green Sandy Clay (visual)	84.5	34.2	---	---	---

Tested by John Hubbard.
The samples were tested according to the referenced standard test procedures and relate only to the items inspected or tested.

M T I
Materials Testing, Inc.
8798 Airport Road
Redding, California 96002
(530) 222-1116, fax 222-1611
865 Cotting Lane, Suite A
Vacaville, California 95688
(707) 447-4025, fax 447-4143

Client: Solano Landing, LLC
506 Coach Street
Vallejo, CA 94590

Project: Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA

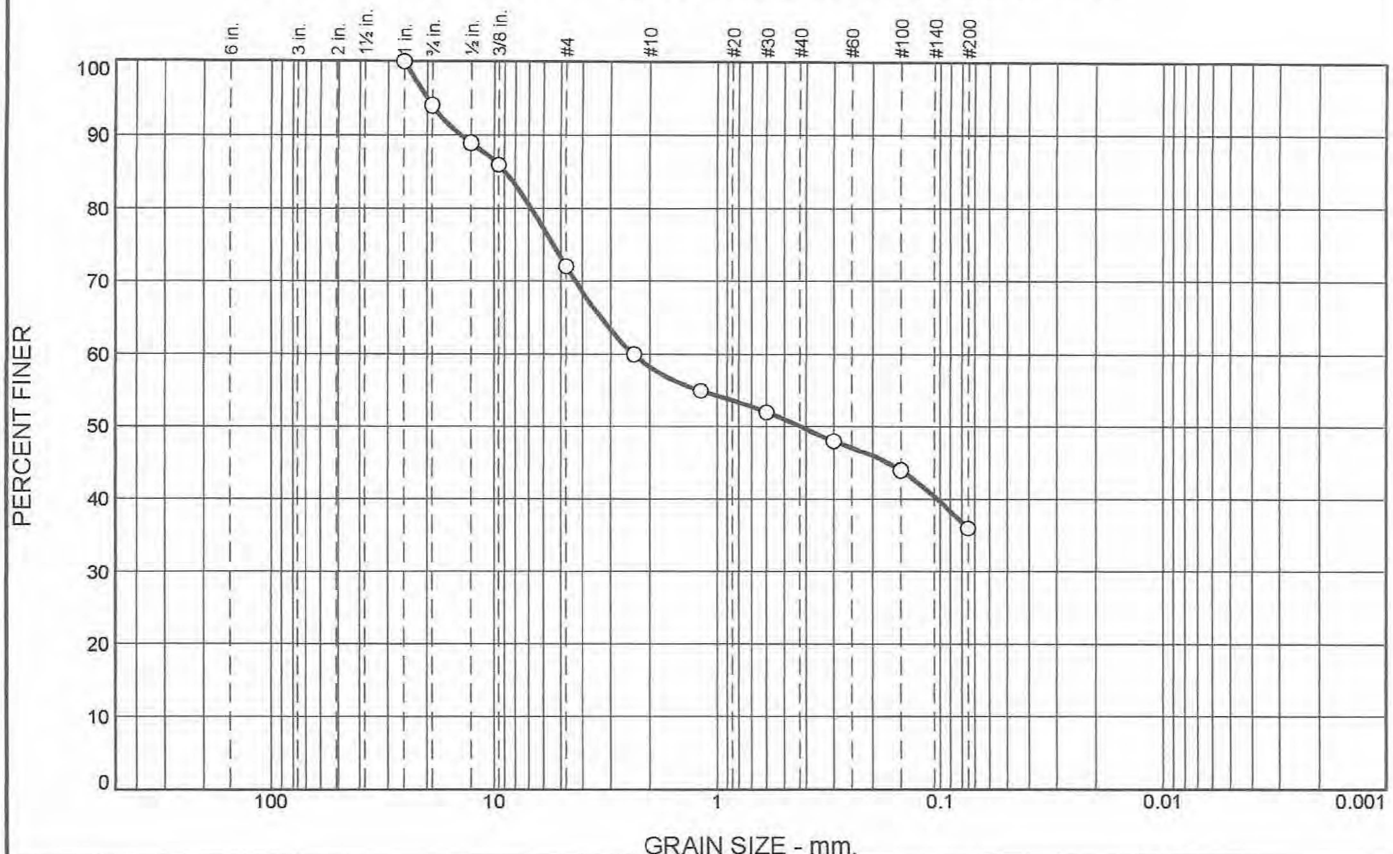
Date: 03/15/2023
Client No.: VV5518
Report No.: 0300-001
Submitted By: KC Engineering
Date Submitted: 02/23/2023

Density of Soil in Place by the Drive-Cylinder Method (ASTM D2937) and Liquid Limit, Plastic Limit & Plasticity Index of Soils (ASTM D4318)

Sample #	Description	Dry Density p.c.f.	Moisture Content %	Liquid Limit	Plastic Limit	Plastic Index
5-8 @ 38.0'	Grayish Green Sandy Clay (visual)	110.6	19.6	---	---	---
6-2 @ 8.0'	Light Brown Clay with Silt (visual)	102.1	23.1	---	---	---
6-3 @ 13.0'	Yellowish Brown Clay with Silt (visual)	93.2	28.3	---	---	---
6-4 @ 18.0'	Yellowish Brown Clay with Silt (visual)	88.8	32.2	---	---	---
7-1 @ 3.0'	Brown Clay (visual)	107.0	20.8	53	22	31
7-2 @ 8.0'	Reddish Brown Clayey Sand with Gravel (visual)	118.0	11.3	---	---	---
7-3 @ 13.0'	Brown and Gray Sand with Silt and Gravel (visual)	113.1	15.6	---	---	---
8-1 @ 3.0'	Light Brown Clay (visual)	108.3	20.5	---	---	---
8-2 @ 8.0'	Light Brown Clay (visual)	106.9	21.3	---	---	---
8-3 @ 13.0'	Yellowish Brown Silty Clay (visual)	93.3	29.8	---	---	---

Tested by John Hubbard.
The samples were tested according to the referenced standard test procedures and relate only to the items inspected or tested.
Results are not transferable and shall not be reproduced, except in full, without written permission from MTI.

PARTICLE SIZE DISTRIBUTION REPORT



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0	42	8	14	36	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100		
3/4"	94		
1/2"	89		
3/8"	86		
#4	72		
#8	60		
#16	55		
#30	52		
#50	48		
#100	44		
#200	36		

* (no specification provided)

Material Description

Light Olive Brown Clayey Sand with Gravel (visual)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 14.0851 D_{85}= 8.8928 D_{60}= 2.3600
D_{50}= 0.4240 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO=

Remarks

Material tested in accordance with ASTM D6913.

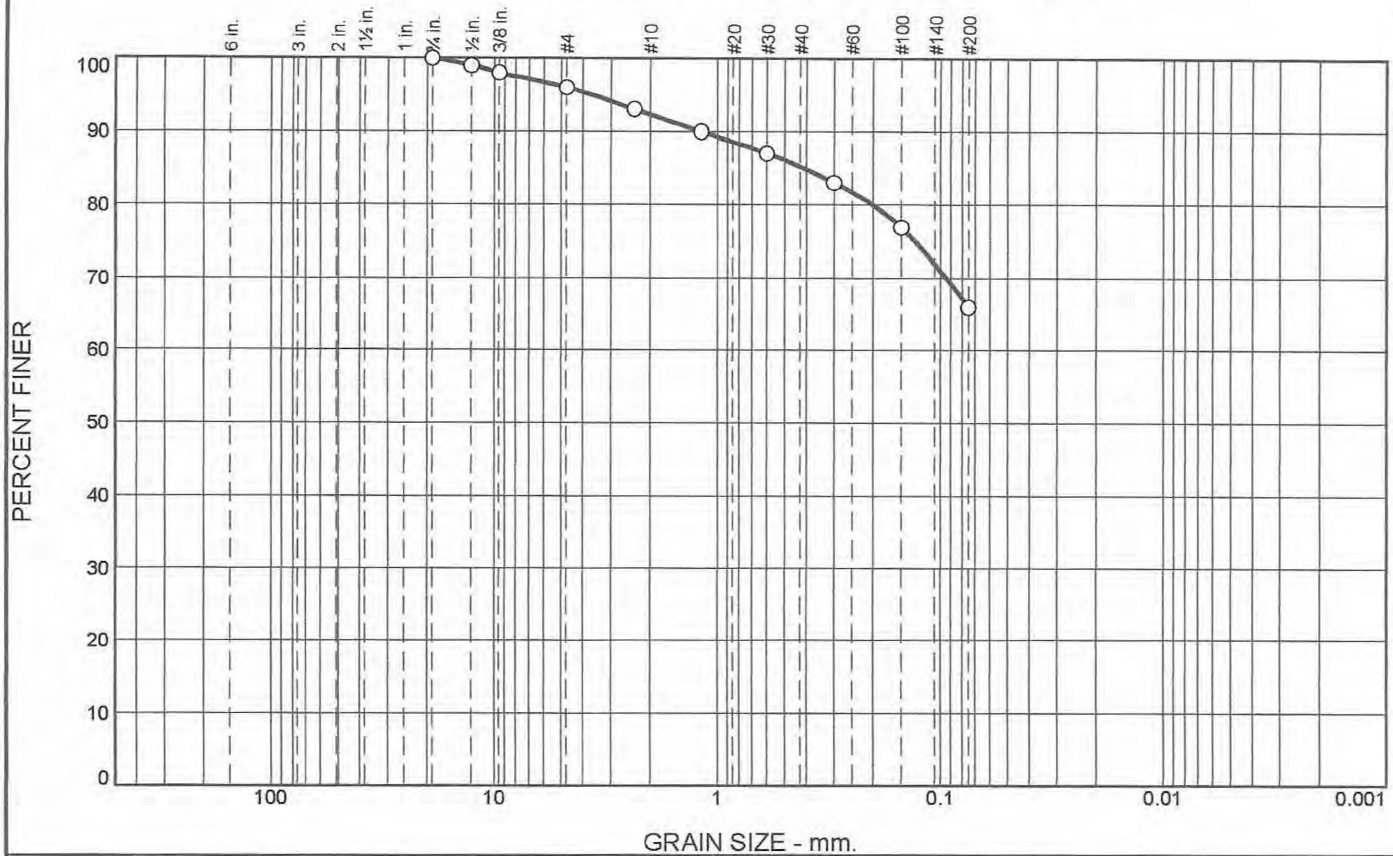
Location: 1-3
Sample Number: 3 **Depth:** 13.0' **Date:** 03/15/2023

MATERIALS TESTING INCORPORATED M T I

Client: Solano Landing, LLC
Project: Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA
Project No: VV5518 **Figure** 0300-002

Tested By: John Hubbard

PARTICLE SIZE DISTRIBUTION REPORT



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0	8	7	19	66	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100		
1/2"	99		
3/8"	98		
#4	96		
#8	93		
#16	90		
#30	87		
#50	83		
#100	77		
#200	66		

* (no specification provided)

Material Description

Light Olive Brown Sandy Clay (visual)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.1800 D_{85}= 0.4149 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

Material tested in accordance with ASTM D6913.

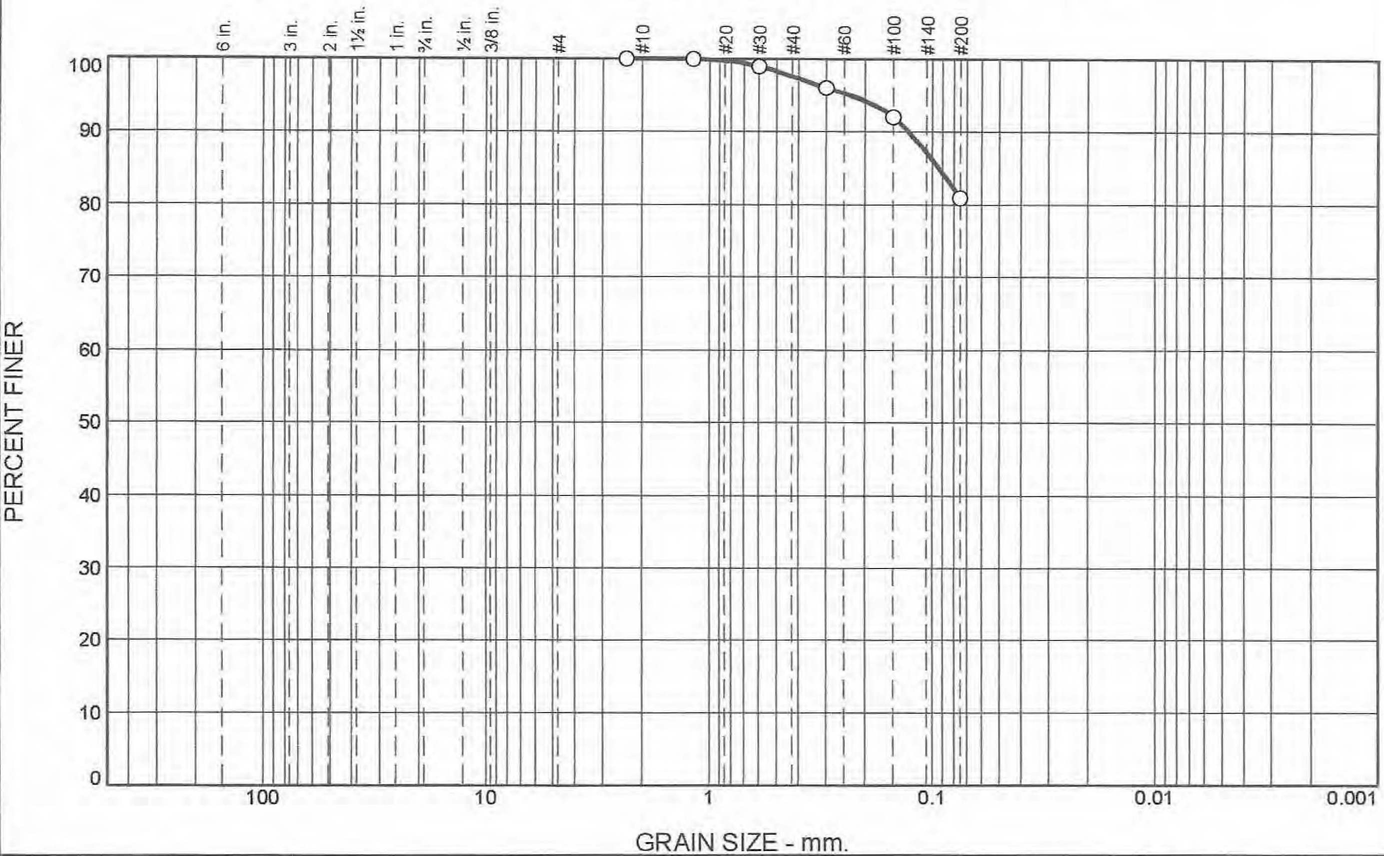
Location: 1-4a
Sample Number: 4 **Depth:** 17.5' **Date:** 03/15/2023

MATERIALS TESTING INCORPORATED M T I

Client: Solano Landing, LLC
Project: Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA
Project No: VV5518 **Figure** 0300-003

Tested By: John Hubbard

PARTICLE SIZE DISTRIBUTION REPORT



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0	0	2	17	81	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#8	100		
#16	100		
#30	99		
#50	96		
#100	92		
#200	81		

* (no specification provided)

Material Description

Light Olive Brown Clay with Sand (visual)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1275 D_{85}= 0.0934 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

Material tested in accordance with ASTM D6913.

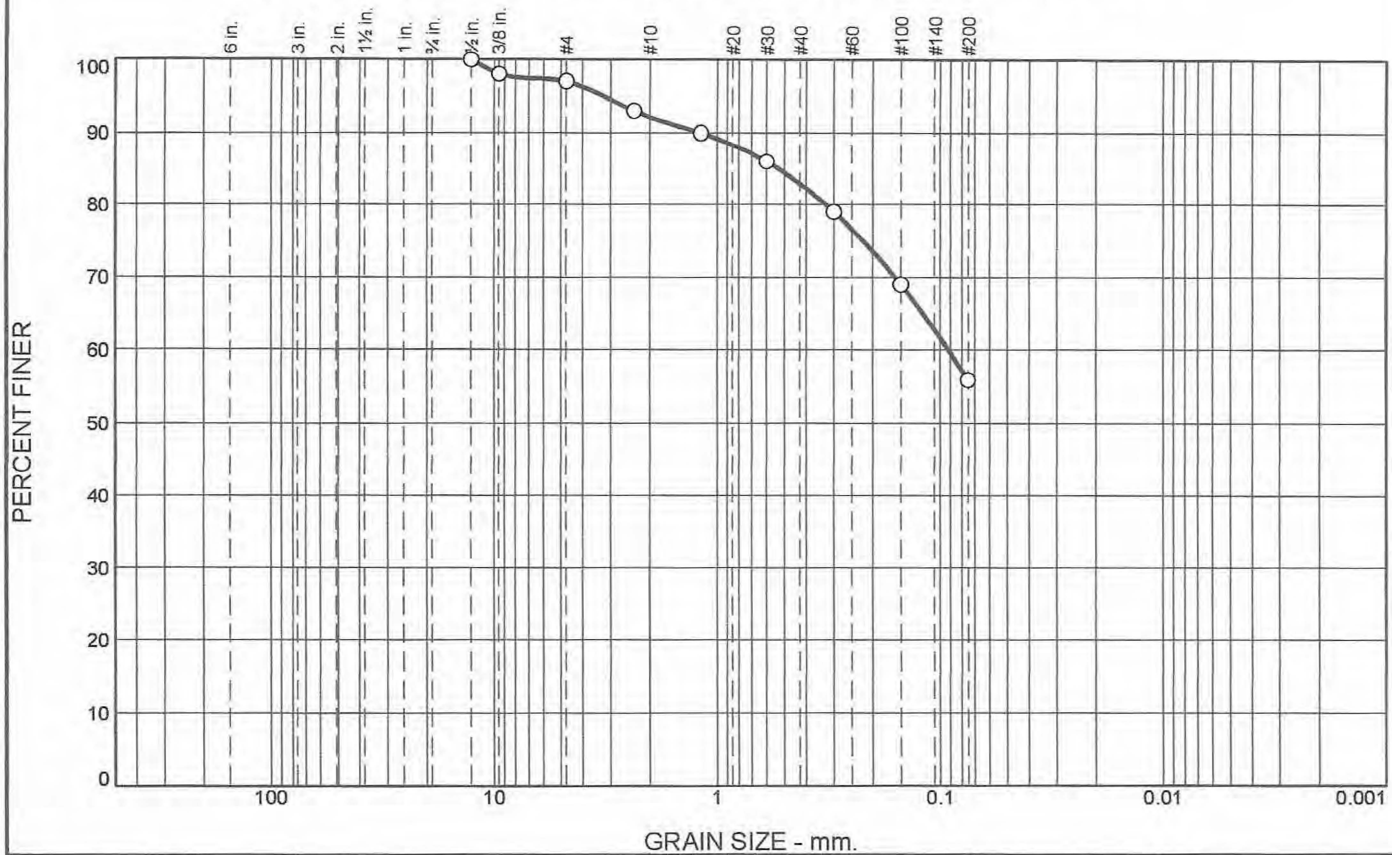
Location: 2-3
Sample Number: 10 **Depth:** 13.0' **Date:** 03/15/2023

MATERIALS TESTING INCORPORATED M T I

Client: Solano Landing, LLC
Project: Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA
Project No: VV5518 **Figure** 0300-004

Tested By: John Hubbard

PARTICLE SIZE DISTRIBUTION REPORT



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0	8	9	27	56	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1/2"	100		
3/8"	98		
#4	97		
#8	93		
#16	90		
#30	86		
#50	79		
#100	69		
#200	56		

* (no specification provided)

Material Description

Light Olive Brown Sandy Clay (visual)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.1800 D_{85}= 0.5318 D_{60}= 0.0920
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

Material tested in accordance with ASTM D6913.

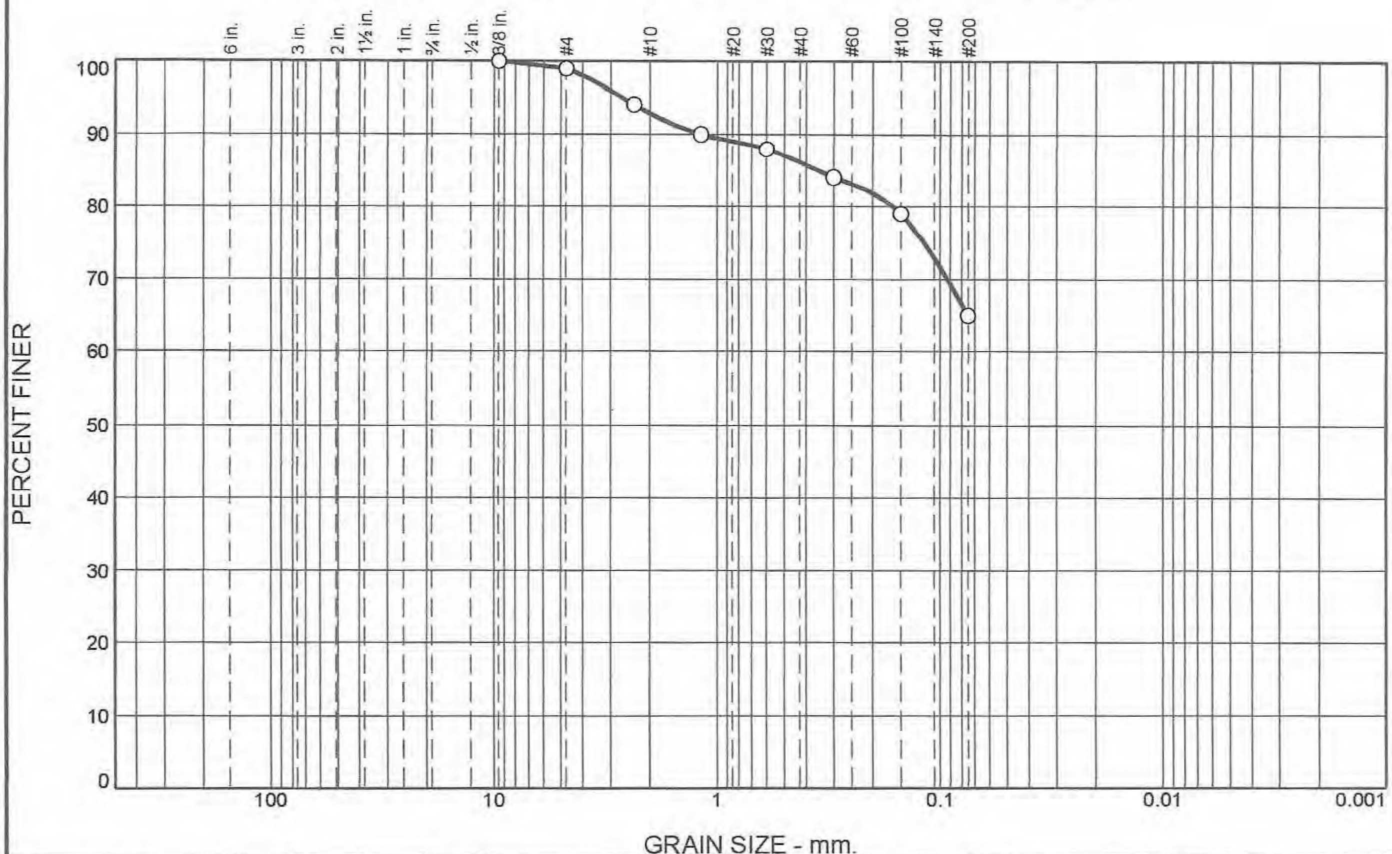
Location: 2-4
Sample Number: 11 **Depth:** 20.0' **Date:** 03/15/2023

MATERIALS TESTING INCORPORATED M T I

Client: Solano Landing, LLC
Project: Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA
Project No: VV5518 **Figure** 0300-005

Tested By: John Hubbard

PARTICLE SIZE DISTRIBUTION REPORT



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0	7	7	21	65	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100		
#4	99		
#8	94		
#16	90		
#30	88		
#50	84		
#100	79		
#200	65		

* (no specification provided)

Material Description

Yellowish Brown Sandy Clay (visual)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.1800 D_{85}= 0.3565 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

Material tested in accordance with ASTM D6913.

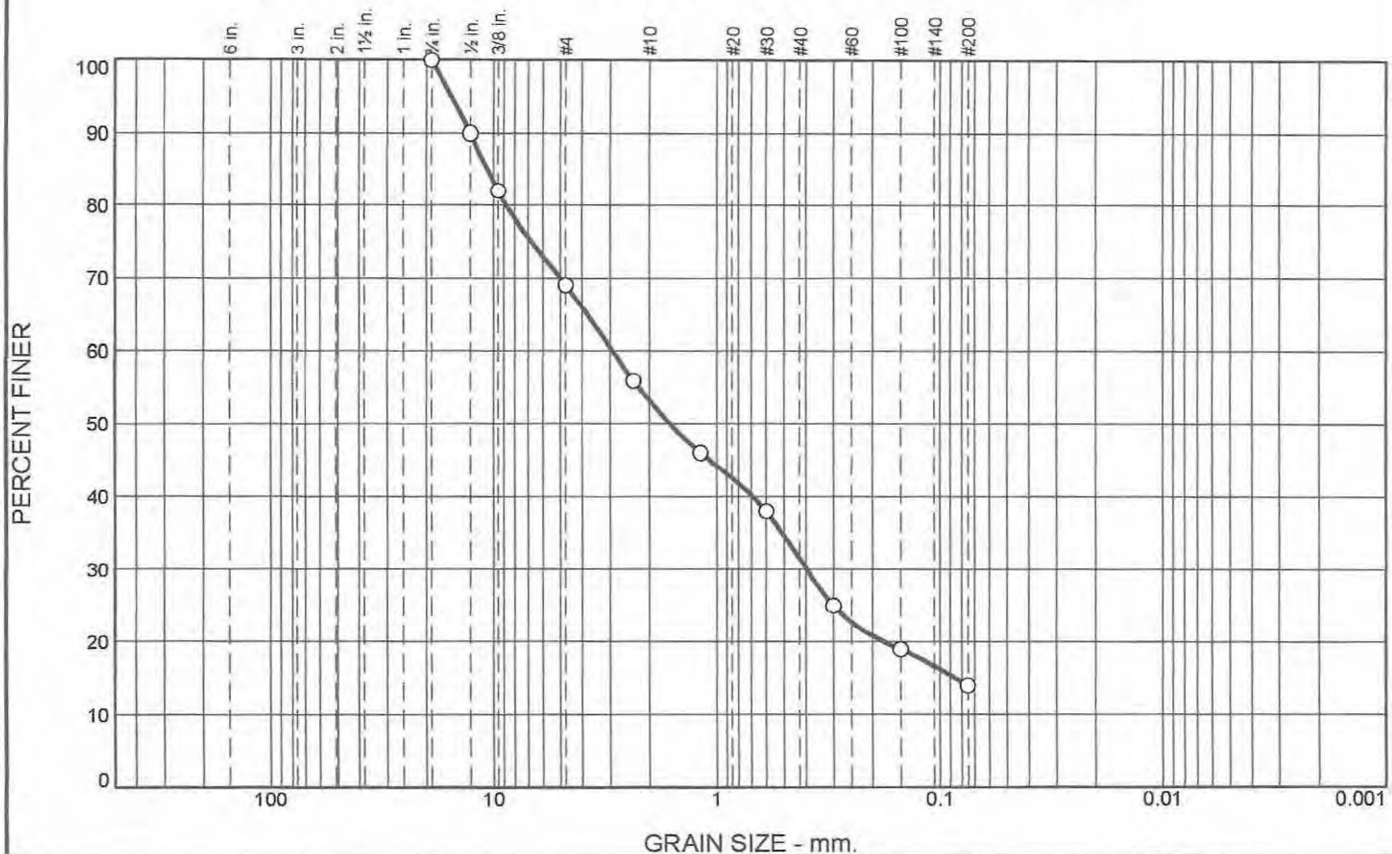
Location: 5-3
Sample Number: 21 **Depth:** 13.0'
Date: 03/15/2023

MATERIALS TESTING INCORPORATED M T I

Client: Solano Landing, LLC
Project: Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA
Project No: VV5518 **Figure** 0300-006

Tested By: John Hubbard

PARTICLE SIZE DISTRIBUTION REPORT



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0	47	22	17	14	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100		
1/2"	90		
3/8"	82		
#4	69		
#8	56		
#16	46		
#30	38		
#50	25		
#100	19		
#200	14		

* (no specification provided)

Material Description

Reddish Brown Clayey Sand with Gravel (visual)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 12.7000 D_{85}= 10.6439 D_{60}= 2.9312
D_{50}= 1.6186 D_{30}= 0.3964 D_{15}= 0.0854
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Material tested in accordance with ASTM D6913.

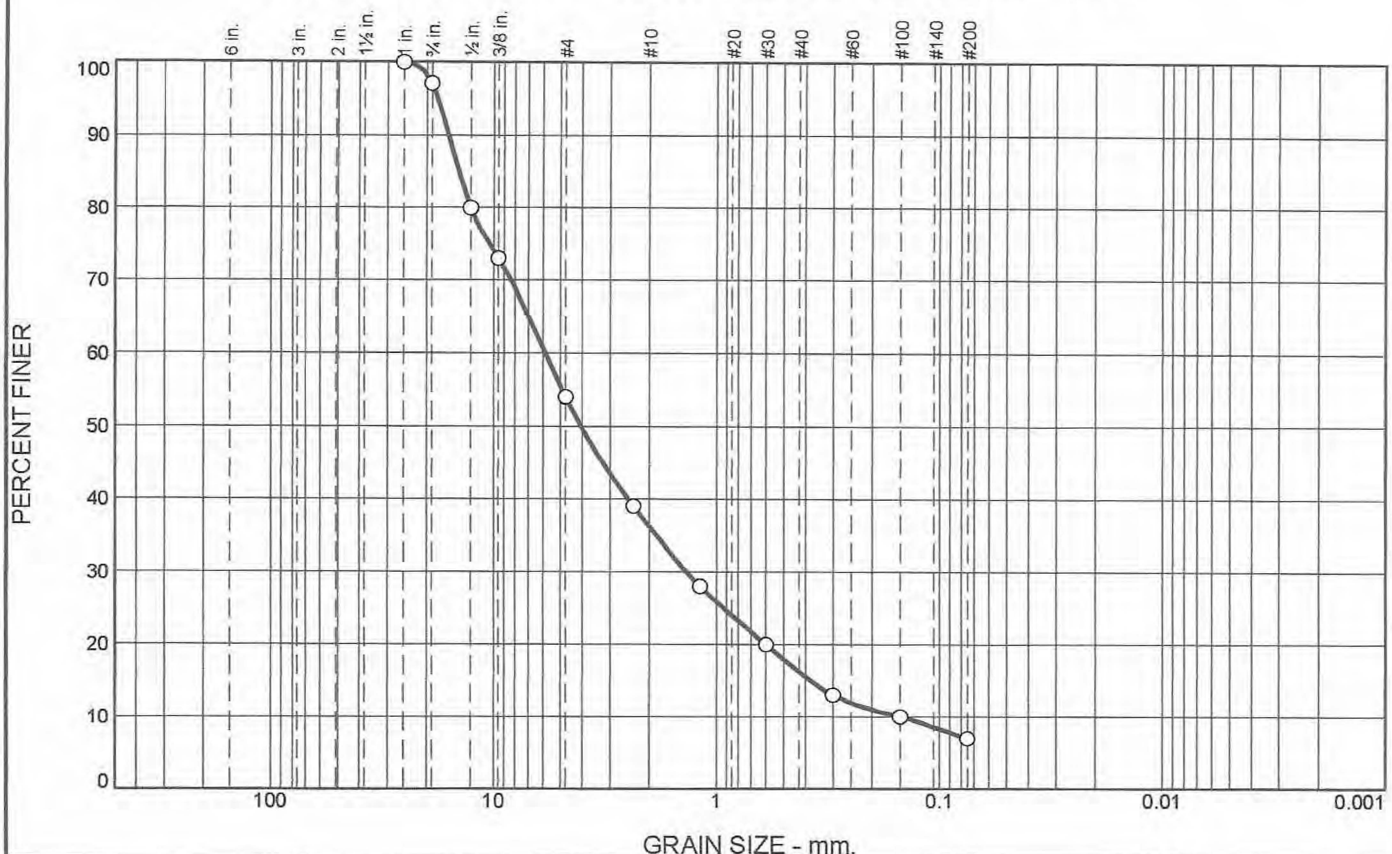
Location: 7-2
Sample Number: 32 **Depth:** 8.0' **Date:** 03/15/2023

MATERIALS TESTING INCORPORATED M T I

Client: Solano Landing, LLC
Project: Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA
Project No: VV5518 **Figure** 0300-007

Tested By: John Hubbard

PARTICLE SIZE DISTRIBUTION REPORT



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0	64	20	9	7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100		
3/4"	97		
1/2"	80		
3/8"	73		
#4	54		
#8	39		
#16	28		
#30	20		
#50	13		
#100	10		
#200	7.0		

* (no specification provided)

Material Description

Brown and Gray Sand with Silt and Gravel (visual)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 15.9171 D_{85}= 14.3135 D_{60}= 5.8712
D_{50}= 4.0539 D_{30}= 1.3611 D_{15}= 0.3793
D_{10}= 0.1500 C_u= 39.14 C_c= 2.10

Classification

USCS= SW-SM AASHTO=

Remarks

Material tested in accordance with ASTM D6913.

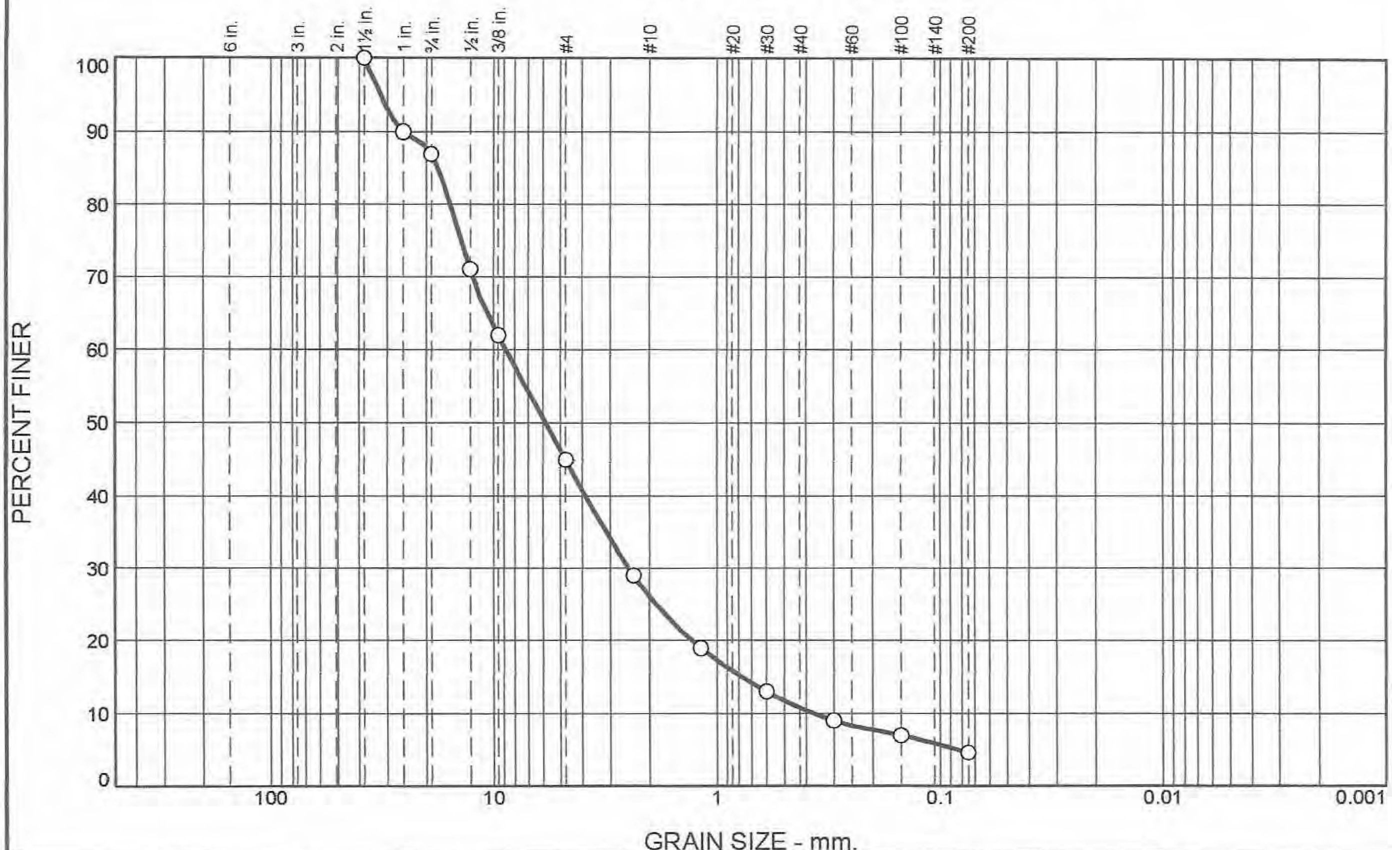
Location: 7-3
Sample Number: 33 **Depth:** 13.0' **Date:** 03/15/2023

MATERIALS TESTING INCORPORATED M T I

Client: Solano Landing, LLC
Project: Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA
Project No: VV5518 **Figure** 0300-008

Tested By: John Hubbard

PARTICLE SIZE DISTRIBUTION REPORT



% +3"	% Gravel	% Sand		% Fines	
		Coarse	Fine	Silt	Clay
0	74	15	6	5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1 1/2"	100		
1"	90		
3/4"	87		
1/2"	71		
3/8"	62		
#4	45		
#8	29		
#16	19		
#30	13		
#50	9		
#100	7		
#200	4.6		

* (no specification provided)

Material Description

Brown and Gray Gravel with Sand (visual)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 25.4000 D_{85}= 17.7225 D_{60}= 8.8192
D_{50}= 5.8573 D_{30}= 2.4831 D_{15}= 0.7753
D_{10}= 0.3730 C_u= 23.65 C_c= 1.87

Classification

USCS= GW AASHTO=

Remarks

Material tested in accordance with ASTM D6913.

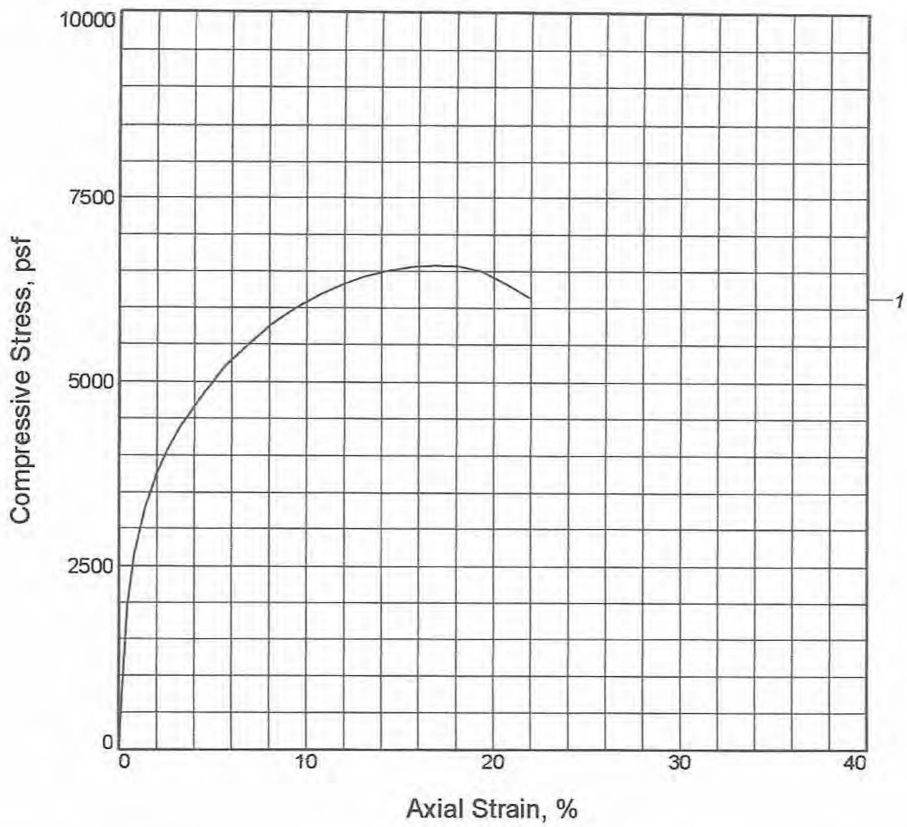
Location: 7-4
Sample Number: 34 **Depth:** 18.0' **Date:** 03/15/2023

MATERIALS TESTING INCORPORATED M T I

Client: Solano Landing, LLC
Project: Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA
Project No: VV5518 **Figure** 0300-009

Tested By: John Hubbard

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	6577			
Undrained shear strength, psf	3289			
Failure strain, %	16.9			
Strain rate, in./min.	0.071			
Water content, %	20.5			
Wet density, pcf	128.2			
Dry density, pcf	106.4			
Saturation, %	85.2			
Void ratio	0.6964			
Specimen diameter, in.	2.41			
Specimen height, in.	5.70			
Height/diameter ratio	2.37			

Description: Dark Brown Clay (visual)

LL = 41	**PL =** 18	**PI =** 23	**GS=** 2.89	**Type:** Tube

Project No.: VV5518

Date Sampled: 03/15/2023

Remarks:
Material tested in accordance with ASTM D2166.
Type of Failure - Bulge, Cone and Split

Figure 0300-010

Client: Solano Landing, LLC

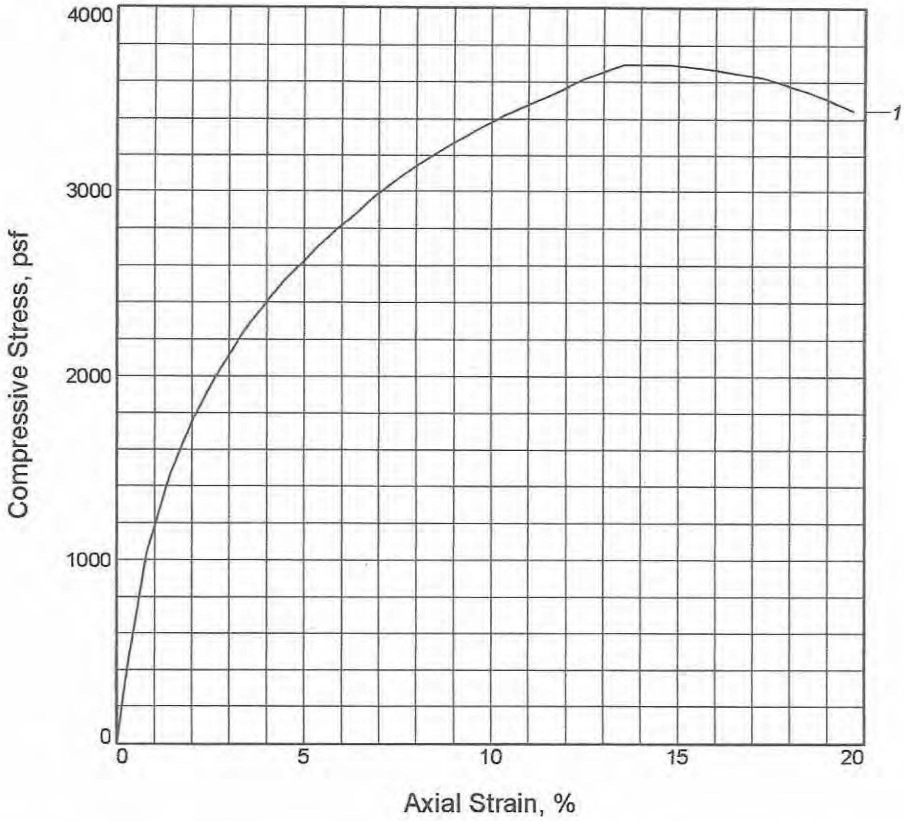
Project: Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA

Location: 1-1

Sample Number: 2 **Depth:** 3.0'

Tested By: Travis Fiscus

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	3696			
Undrained shear strength, psf	1848			
Failure strain, %	13.5			
Strain rate, in./min.	0.725			
Water content, %	23.0			
Wet density, pcf	126.4			
Dry density, pcf	102.8			
Saturation, %	93.0			
Void ratio	0.6887			
Specimen diameter, in.	2.41			
Specimen height, in.	5.80			
Height/diameter ratio	2.41			

Description: Brown Clay (visual)

LL =	PL =	PI =	GS= 2.78	Type: Tube

Project No.: VV5518

Date Sampled: 03/15/2023

Remarks:
Material tested in accordance with ASTM D2166.
Type of Failure - Bulge and Shear

Figure 0300-011

Client: Solano Landing, LLC

Project: Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA

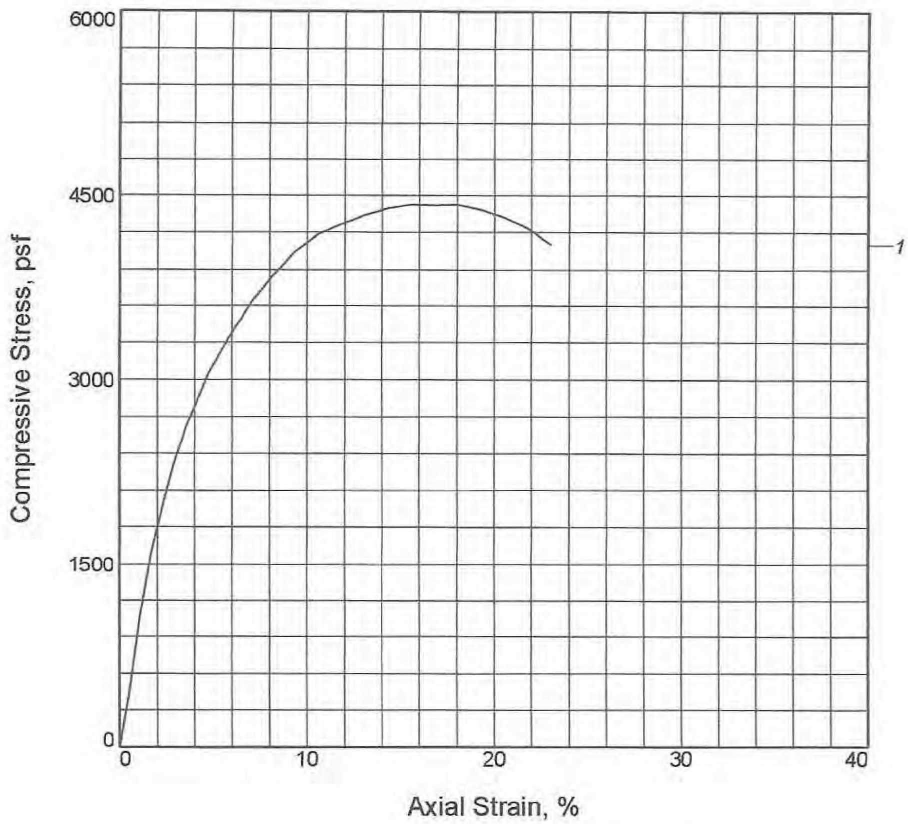
Location: 3-2

Sample Number: 14 **Depth:** 8.0'

M T I

Tested By: Travis Fiscus

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	4423			
Undrained shear strength, psf	2211			
Failure strain, %	18.0			
Strain rate, in./min.	0.070			
Water content, %	20.2			
Wet density, pcf	127.2			
Dry density, pcf	105.8			
Saturation, %	97.9			
Void ratio	0.5397			
Specimen diameter, in.	2.41			
Specimen height, in.	5.60			
Height/diameter ratio	2.32			

Description: Brown Clay (visual)

LL =	PL =	PI =	GS= 2.61	Type: Tube

Project No.: VV5518

Date Sampled: 03/15/2023

Remarks:
Material tested in accordance with ASTM D2166.
Type of Failure - Bulge, Shear, Cone and Shear

Figure 0300-012

Client: Solano Landing, LLC

Project: Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA

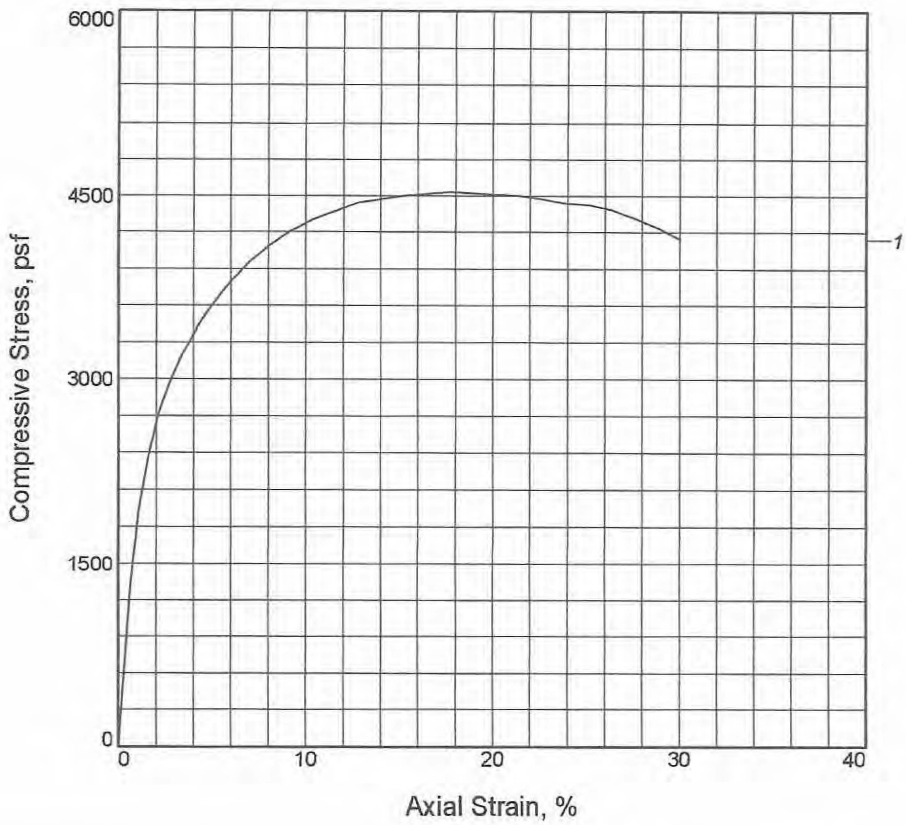
Location: 4-1

Sample Number: 16 **Depth:** 3.0'

MTI

Tested By: Travis Fiscus

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, psf	4533			
Undrained shear strength, psf	2266			
Failure strain, %	17.8			
Strain rate, in./min.	0.068			
Water content, %	20.8			
Wet density, pcf	129.3			
Dry density, pcf	107.0			
Saturation, %	101.7			
Void ratio	0.5397			
Specimen diameter, in.	2.41			
Specimen height, in.	5.40			
Height/diameter ratio	2.24			

Description: Brown Clay (visual)

LL = 53	**PL =** 22	**PI =** 31	**GS=** 2.64	**Type:** Tube

Project No.: VV5518

Date Sampled: 03/15/2023

Remarks:
Material tested in accordance with ASTM D2166.
Type of Failure - Bulge, Cone and Shear

Figure 0300-013

Client: Solano Landing, LLC

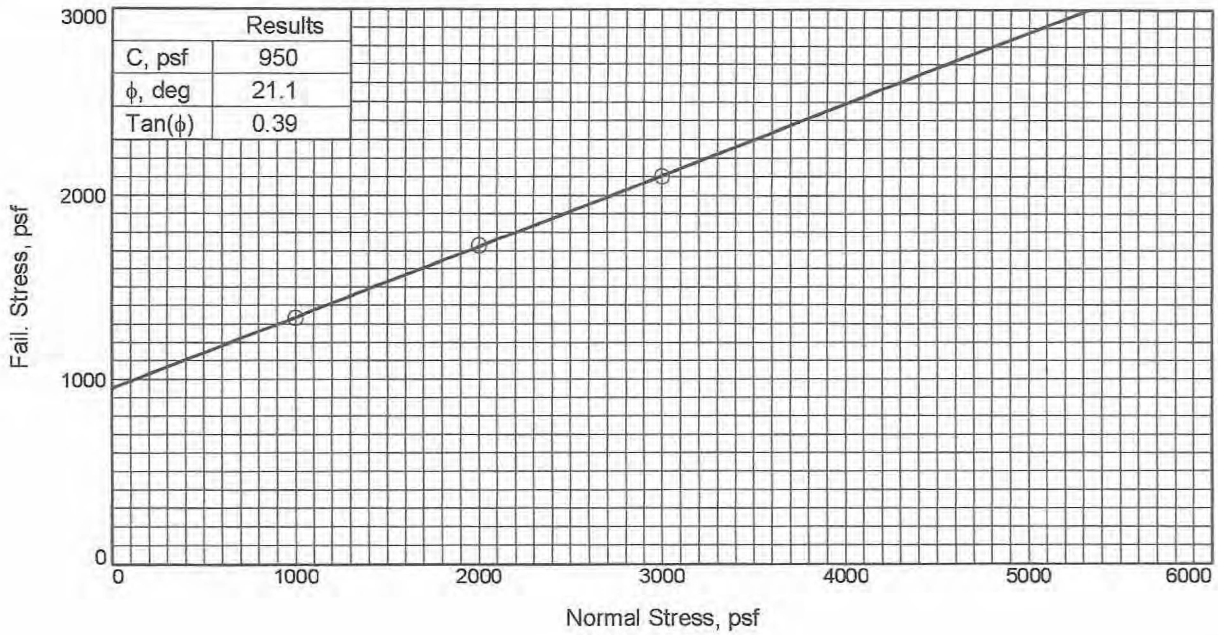
Project: Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA

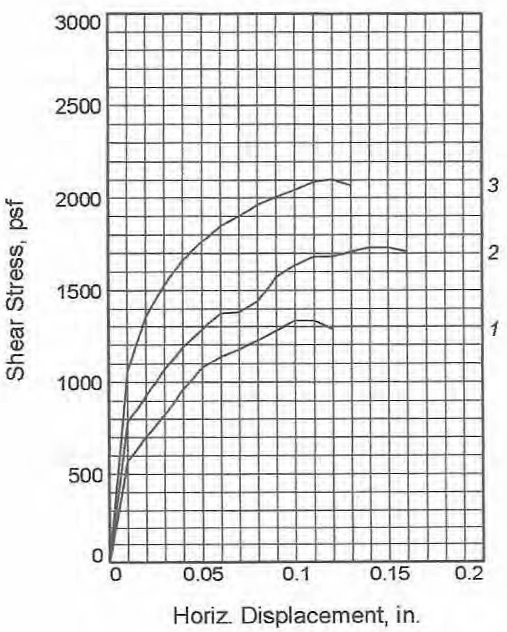
Location: 7-1

Sample Number: 31 **Depth:** 3.0'

MTI

Tested By: Travis Fiscus





	Sample No.	1	2	3
Initial	Water Content, %	20.7	20.7	20.7
	Dry Density, pcf	97.6	97.3	100.7
	Saturation, %	79.5	78.9	86.0
	Void Ratio	0.6892	0.6947	0.6366
	Diameter, in.	2.41	2.41	2.41
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	22.8	21.3	20.7
	Dry Density, pcf	102.6	104.2	106.8
	Saturation, %	99.2	96.8	100.6
	Void Ratio	0.6058	0.5822	0.5425
	Diameter, in.	2.41	2.41	2.41
	Height, in.	0.95	0.93	0.94
	Normal Stress, psf	1000	2000	3000
	Fail. Stress, psf	1332	1727	2102
	Displacement, in.	0.10	0.14	0.12
	Ult. Stress, psf			
	Displacement, in.			
	Strain rate, in./min.	0.002	0.002	0.002

Sample Type: Tube
Description: Brown Clay (visual)

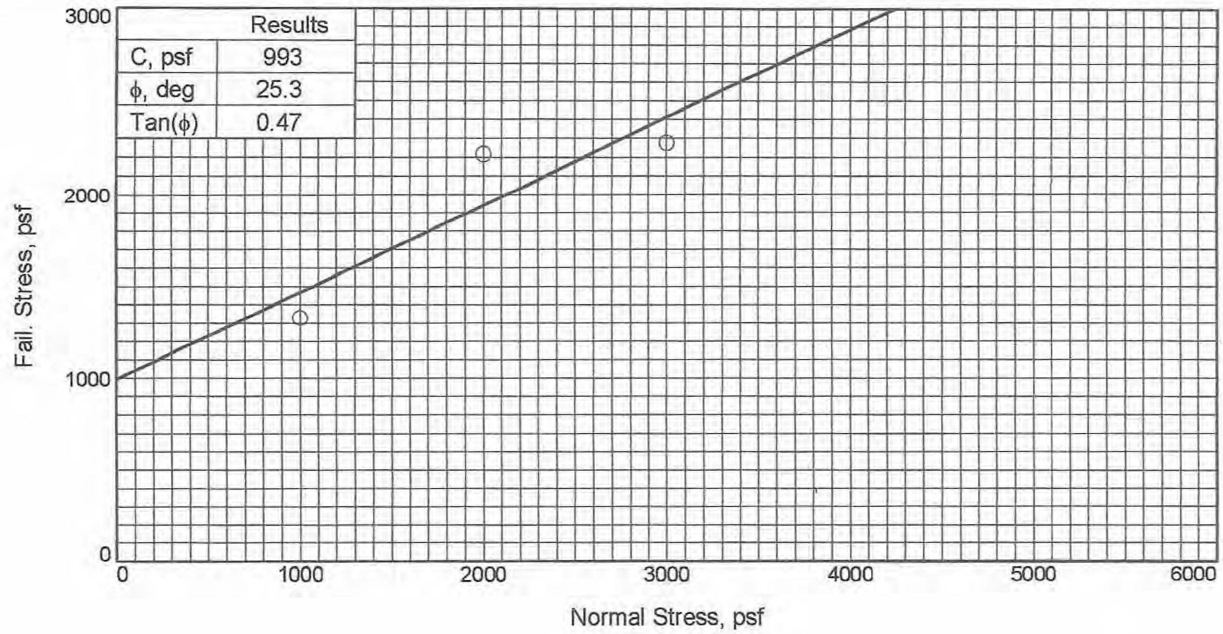
Specific Gravity= 2.64
Remarks: Material tested in accordance with ASTM D3080.

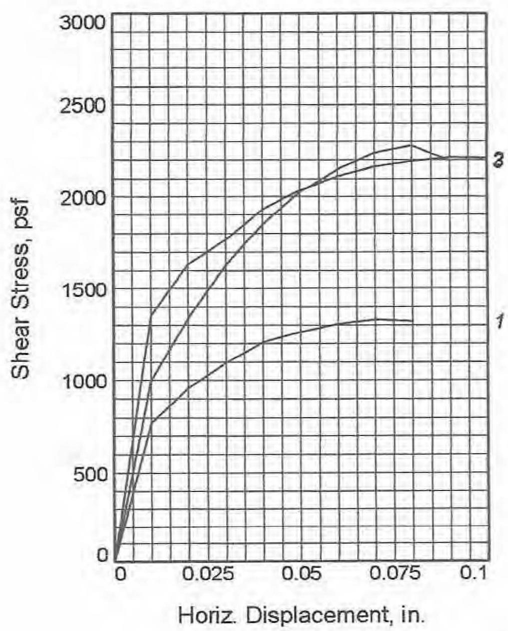
Figure 0300-014

Client: Solano Landing, LLC

Project: Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA
Location: 3-1
Sample Number: 13 **Depth:** 3.0'
Proj. No.: VV5518 **Date Sampled:** 03/15/2023

Tested By: Jack Bianchin





	Sample No.	1	2	3
Initial	Water Content, %	20.5	20.5	20.5
	Dry Density, pcf	104.1	128.8	99.4
	Saturation, %	87.2	171.0	77.8
	Void Ratio	0.6436	0.3282	0.7217
	Diameter, in.	2.41	2.10	2.41
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	22.5	23.1	22.0
	Dry Density, pcf	105.9	136.8	106.7
	Saturation, %	100.0	253.0	99.9
	Void Ratio	0.6157	0.2504	0.6027
	Diameter, in.	2.41	2.10	2.41
	Height, in.	0.98	0.94	0.93
	Normal Stress, psf	1000	2000	3000
	Fail. Stress, psf	1329	2216	2276
	Displacement, in.	0.07	0.09	0.08
	Ult. Stress, psf			
	Displacement, in.			
	Strain rate, in./min.	0.002	0.002	0.002

Sample Type: Tube

Description: Light Brown Clay (visual)

Specific Gravity= 2.74

Remarks: Material tested in accordance with ASTM D3080.

Figure 0300-015

Client: Solano Landing, LLC

Project: Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA

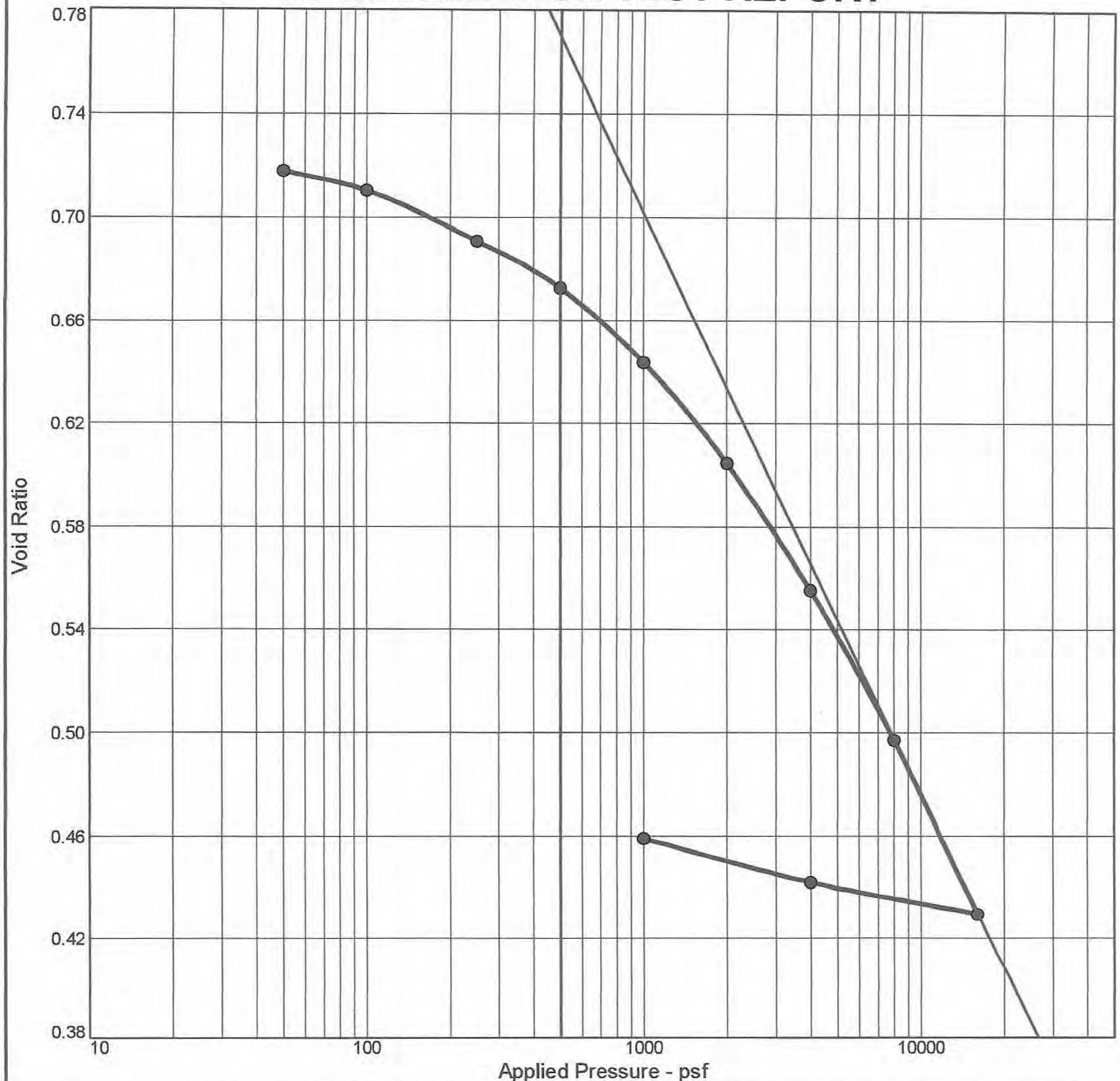
Location: 8-1

Sample Number: 35 **Depth:** 3.0'

Proj. No.: VV5518 **Date Sampled:** 03/15/2023

Tested By: Jack Bianchin

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (psf)	P_c (psf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
98.4 %	27.6 %	93.9			2.60	1557	1638	0.23	0.03	0.729

MATERIAL DESCRIPTION	USCS	AASHTO
Light Olive Brown Sandy Clay (visual)		

Project No. VV5518 **Client:** Solano Landing, LLC

Project: Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA

Location: 2-3 **Depth:** 13.0' **Sample Number:** 10

Remarks:
Material tested in accordance with ASTM D2435.

Figure 0300-016

M T I
Materials Testing, Inc.
8798 Airport Road
Redding, California 96002
(530) 222-1116, fax 222-1611
865 Cotting Lane, Suite A
Vacaville, California 95688
(707) 447-4025, fax 447-4143

Client:	Solano Landing, LLC 506 Coach Street Vallejo, CA 94590	**Page:**	1 of 1
		Client No:	VV5518
		Figure No:	0300-017
		Date:	03/15/2023
Project:	Solano Landing Mixed-Use Project 2316 Rockville Road, Fairfield, CA	**Submitted by:**	KC Engineering
		Date Submitted:	02/23/2023

"R" VALUE TEST REPORT
(CTM 301)

Sample: 12
Description: Brown Clay (visual)
Location: Subgrade 0.0'-3.0'

SIEVE ANALYSIS

Sieve Size	3"	2"	1-1/2"	1"	3/4"	1/2"	3/8"	#4
As Received (% Pass)	---	---	---	---	---	---	---	100
As Used (% Pass)	---	---	---	---	---	---	---	100

RESISTANCE VALUE

Specimen Number	Dry Unit Weight, PCF	Moisture (%)	Exudation Pressure (PSI)	Expansion Pressure Dial Reading & PSF		R-Value
1	107.7	18.9	496	159	688	21
2	104.5	21.0	369	22	150	9
3	97.5	24.5	212	0	0	4

R-Value @ 300 PSI Exudation Pressure = **6**

Notes:

Tested by John Hubbard.
The samples were tested according to the referenced standard test procedures and relate only to the items inspected or tested.

Materials Testing, Inc.

8798 Airport Road
Redding, California 96002
(530) 222-1116, fax 222-1611

865 Cotting Lane, Suite A
Vacaville, California 95688
(707) 447-4025, fax 447-4143

Client:	Solano Landing, LLC 506 Coach Street Vallejo, CA 94590	Client No: Report No: Date:	VV5518 0300-018 03/15/2023
Subject: Location:	Solano Landing Mixed-Use Project 2316 Rockville Road, Fairfield, CA	Submitted By: Submitted Date:	Client 02/23/2023

EXPANSION INDEX
(ASTM D4829)

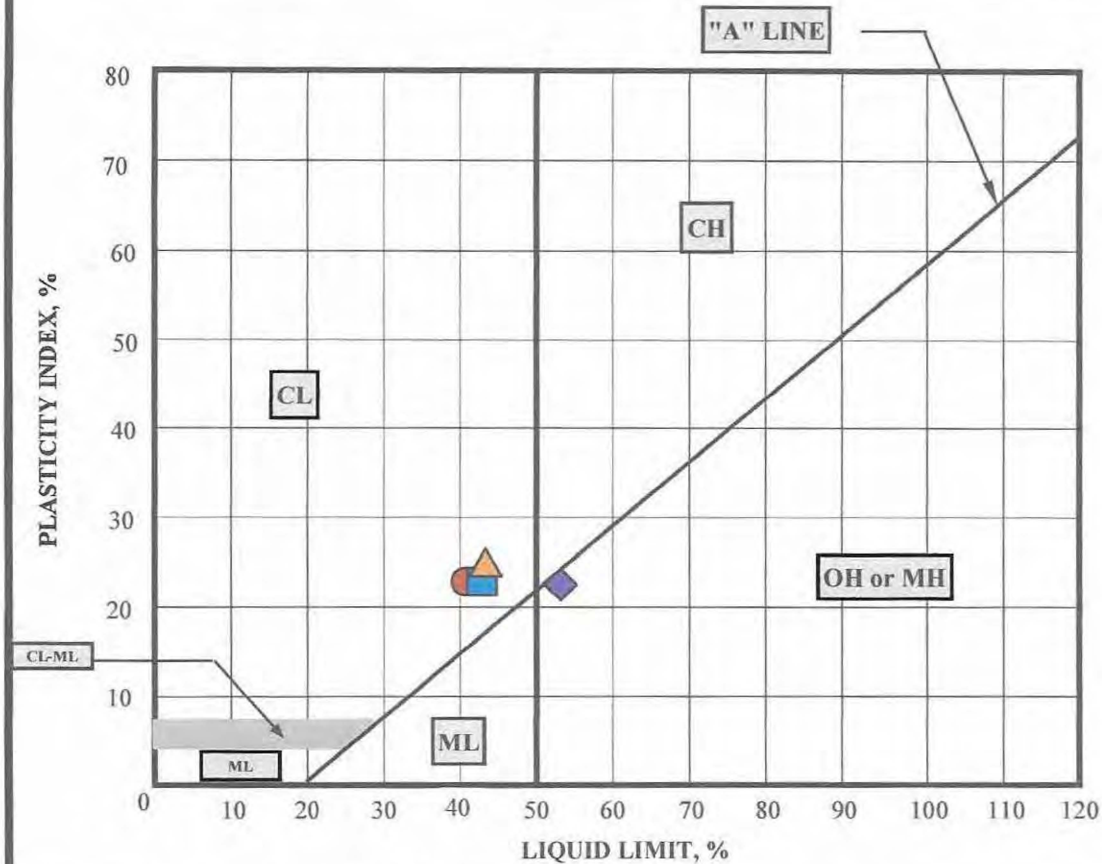
Sample #:	12
Soil Description:	Brown Clay (visual)
Initial Moisture Content (%):	10.8
Moisture Content after Test (%):	25.9
Initial Dry Density (lb/ft^3):	99.7
After Test Wet Density (lb/ft^3):	125.6
Degree of Saturation (%):	48.1
Expansion Index:	**74**

Table 1 Classification of Potential Expansion of Soils Using EI (ASTM D4829-11)

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

Tested by John Hubbard.

The samples were tested according to the referenced standard test procedures and relate only to the items inspected or tested. Results are not transferable and shall not be reproduced, except in full, without written permission from MTI.



KEY SYMBOL	SAMPLE NUMBER	DEPTH	NATURAL MOISTURE CONTENT, %	LIQUID LIMIT, LL, %	PLASTIC LIMIT, PL, %	PLASTICITY INDEX, PI, %	LIQUIDITY INDEX	UNIFIED SOIL CLASSIFICATION SYMBOL
●	1-1	3.0'	N/A	41	18	23	N/A	CL
■	2-1	3.0'	N/A	43	20	23	N/A	CL
▲	5-1	3.0'	N/A	44	19	25	N/A	CL
◆	7-1	3.0'	N/A	53	22	31	N/A	CH

Note: Atterberg Limits tested in accordance with ASTM D4318.

MATERIALS TESTING INCORPORATED M T I

Materials Testing, Inc.

PLASTICITY CHART AND DATA

Solano Landing Mixed-Use Project
2316 Rockville Road, Fairfield, CA

Client No:	Date:	Report No:
VV5518	3/15/2023	0300-019

Sunland Analytical
11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 03/01/2023
Date Submitted 02/24/2023

To: David Cymanski
K.C. Engineering
865 Cotting Lane Suite A
Vacaville, CA 95688

From: Gene Oliphant, Ph.D. \ Randy Horney RA
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : VV5518 Site ID : PAD @ 0-3.
Thank you for your business.

* For future reference to this analysis please use SUN # 89093-185036.

EVALUATION FOR SOIL CORROSION

Soil pH	6.10		
Minimum Resistivity	2.14 ohm-cm (x1000)		
Chloride	3.4 ppm	0.00034	%
Sulfate-SO4	17.6ppm	0.00176	%

METHODS
pH and Min.Resistivity CA DOT Test #643 Mod.(Sm.Cell)
Sulfate-SO4 ASTM C1580, Chloride CA DOT Test #422m

ASCE 7 Hazards Report

Address:
2316 Rockville Rd
Fairfield, California
94534

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Latitude: 38.243843
Longitude: -122.12084
Elevation: 0 ft (NAVD 88)

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Seismic

Site Soil Class: D - Stiff Soil

Results:

S_S :	1.549	S_{D1} :	1.02
S_1 :	0.6	T_L :	8
F_a :	1	PGA :	0.615
F_v :	1.7	PGA_M :	0.676
S_{MS} :	1.549	F_{PGA} :	1.1
S_{M1} :	1.53	I_e :	1
S_{DS} :	1.033	C_v :	1.41

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Wed Mar 15 2023

Date Source: USGS Seismic Design Maps

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided "as is" and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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