SubSurface Designs Inc.

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GEOLOGIC & SOILS ENGINEERING INVESTIGATION

PROPOSED SINGLE FAMILY RESIDENCE

TRACT 3874, LOT 26

2172 N. BROADVIEW TERRACE & 6873 W. LOS ALTOS PLACE

LOS ANGELES, CALIFORNIA

FOR

MS. LINDA WANG

3183 WILSHIRE BOULEVARD, SUITE 196K19

LOS ANGELES, CALIFORNIA 90010

PIN# 7381

SEPTEMBER 10, 2019

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INTRODUCTION

This report presents the results of our Geologic & Soils Engineering Investigation performed at 2172 Broadview Terrace in the Hollywood Hills area of Los Angeles, California. The purpose of our investigation was to evaluate subsurface conditions as they relate to the proposed construction of a single-family residence on the subject property. This investigation is limited to the area of the proposed development and does not warrant the remaining portions of the property.

SCOPE

This investigation is based upon:

- A topographic site plan prepared by M&G Civil Engineering and Land Surveying - licensed Land Surveyors which was utilized as the base map for the enclosed Geologic Map, Plate A. Offsite topographic data was obtained from a topographic map obtained from the City of Los Angeles Navigate LA website.
- A review of preliminary plans by Mr. Adam Bressler.
- The review of eight (8) exploratory hand-dug test pits.
- Preparation of the enclosed Geologic Map which locates the proposed improvements and our explorations (see APPENDIX I).
- Preparation of the enclosed Geologic Cross-Section(s) (see APPENDIX I).
- Preparation of site exploration logs (see APPENDIX I).
- Laboratory testing and analysis of samples obtained within the excavations (see APPENDIX II).
- Calculations which may include, but are not limited to, bearing value, lateral pressure, active earth pressure, slope stability (see APPENDIX III).
- The review of available maps and reports prepared by this office and others (see APPENDIX IV).
- Preparation of this report.

The data which supports the following SUMMARY OF FINDINGS, CONCLUSIONS and RECOMMENDATIONS is contained within Appendices I through IV.

The scope of our exploration is limited to the areas explored for the proposed development as delineated on the enclosed Geologic Map. This report should not be considered as a comprehensive evaluation of the entire property. This report has not been prepared for use by other parties or for other purposes (or developments), and may not contain sufficient information for other than the intended use. If construction is delayed more than one year, this office should be contacted to perform an update and to verify the current site conditions.

LOCATION AND TOPOGRAPHY

General

The subject property is located within the east-central portion of the Santa Monica Mountains in the Hollywood Hills area of Los Angeles, California. The subject site is an undeveloped hillside parcel situated approximately fifty-five feet easterly of the intersection of Broadview Terrace and Los Altos Place. For reference, see the attached Vicinity Map for the location of the subject property (see APPENDIX I).

The proposed area of residential construction is along a north ascending slope within the central portion of the site. Existing site improvements are limited to a retaining wall along the toe of slope along Los Altos Place. Slopes ascend from the south margin of the property approximately thirty two feet (32') to Broadview Terrace at slope ratios ranging from 1:1 (45°) to 1.7:1 (30°). Slope areas are covered with a sparse growth of grasses, in addition to scattered shrubs and trees. For specific topographic conditions, refer to the attached Geologic Map, Plate A and Geologic Cross-Section, Plate B (see Attachments).

PROPOSED DEVELOPMENT

Final building plans have not been prepared and await the conclusions and recommendations of this investigation. However, it is our understanding that the proposed development will consist of constructing a new single family residence on the property. Grading will include excavation of future foundations. For reference, the locations of proposed improvements are shown on the attached Geologic Map, Plate A.

SUMMARY OF FINDINGS

Research

A representative from this office conducted research of available engineering geologic and geotechnical engineering reports prepared for the subject property and adjacent properties at the City of Los Angeles. In addition, research of available geologic maps and publications prepared for the area by the U.S. Geological Survey and California Geological Survey was conducted. SubSurface Designs, Inc. has reviewed the referenced reports and has incorporated applicable information into this report.

Additional reports may have been prepared for the subject site in the past but were not found during records research, or were not submitted to the governing reviewing agency, and thus are not part of public record.

Field Investigation

Site exploratory studies were conducted on July 23, 2019. Field investigation consisted of geologic reconnaissance and mapping of the subject site and adjacent areas. Additionally, eight (8) exploratory hand-dug test pits ranging from three and one-half to six and one-half feet (3.5' - 6.5') deep were excavated within the area of proposed construction and on the neighboring property to the west (2168 Broadview Terrace). For reference, the exploratory openings are located on the enclosed Geologic Map, Plate A (pocket attachment).

Subsurface conditions encountered in these explorations were logged in detail by a representative of this office. Further, representative samples of the earth materials encountered were obtained. The explorations were backfilled with the excavated materials. Backfill was not compacted and should be monitored for future settlement.

Undisturbed samples were obtained within the test pits through the use of a thin-walled, steel, hand-held sampler. The soil is retained in 1" high brass rings with a 2.50" outside diameter and a 2.37" inside diameter. Bulk samples were obtained for testing and analysis. All undisturbed and bulk samples were sent to the laboratory for examination, testing, and classification, using the Unified Classification system.

Drainage Conditions

Drainage within the site comprises of sheet flow runoff of precipitation derived primarily within property boundaries and contiguous properties to the north. It is recommended that a roof gutter/downdrain system be installed that will collect and direct water away from residence foundations. All downdrains should be connected to solid pipe for out letting purposes and discharge water at the street or an approved discharge area.

GEOLOGIC CONDITIONS

Earth Materials

Earth fill (ef) ranging from one to three feet (1' - 3') thick is present was encountered in the explorations. Natural soil deposits (Qns) ranging from six inches to two feet (6" - 2') thick mantle slope areas not impacted by past grading. Underlying the surficial soils on the subject site and surrounding areas is sedimentary bedrock assigned to the Chico Formation (Kc) of Cretaceous geologic age.

The earth materials encountered on the subject property are briefly described below. For approximate depths and more detailed descriptions, refer to the enclosed Exploration Logs, Figures E.1 through E.8 (see APPENDIX I).

Earth Fill (ef)

Silty Sand and Gravel - brown and tan, mottled, slightly moist, loosely compact.

Natural Soil (Qns)

Silty Sand & Gravel - dark brown, slightly moist to moist, medium dense.

The earth fill and natural soil deposits were visually classified in accordance with the Unified Soils Classification System.

Bedrock (Kc) - Chico Formation

Sandstone - light yellowish-brown, moist, moderately hard, massive, partially conglomeratic, upper 12" weathered.

Earth material profiles can only be obtained from individual explorations placed on the subject property. Care should be exercised when using these profiles to determine changes in depth or thickness of the earth materials between explorations.

Geologic Structure

Bedding

Site bedrock is massive in nature and does not possess a well-defined trend in bedding (planar or nearly planar surfaces that visibly separate each successive layer of stratified rock). Regional bedding depicted on the referenced geologic maps prepared by the City of Los Angeles (1960) and Dibblee (1991) exhibits a northwest strike accompanied by dips to the northeast ranging from 50° to 60°.

Joints

Joint are the surface of a fracture or parting in rock at which no appreciable movement has occurred parallel to the fracture, and only slight movement has occurred normal to the fracture. Joints may be open and void of mineral infilling or joint planes may be occupied with some form of mineral infilling. There were no well-defined, mappable joints within the explorations logged by this office.

Folds

A fold is a bend in bedding in rock usually created by deformation in the rock due to faulting and/or regional uplift of the area. Compilation of geologic data obtained on the subject site indicates that there are no significant folds extending through the subject site.

Shears

A shear is defined as deformation resulting from stresses that cause contiguous parts of a body to slide relative to each other in a direction parallel to their plane of contact. A shear plane is a surface or zone along which differential movement has taken place. The presence of a shear plane or shear zone is typically related to local or regional faulting and folding. Shear planes can also develop during mass slope movements such as landslides. The deformation and movement at the shear surface often results in the presence of a zone of gouge or breccia typically consisting of clay and pulverized material derived from the surrounding bedrock. There were no well-defined, significant shears mapped with site explorations logged by this office.

Landslides

A landslide is a general term for a wide variety of processes and landforms involving downslope movement, under gravity, of masses of rock and soil. There is a broad range of landslide morphology, scale, rates and patterns of movement.

The referenced geologic maps prepared by the City of Los Angeles (1960) and Dibblee (1991) do not depict landslides within or immediately adjacent to the subject property that would adversely affect the stability of the site. Large-scale landslides were not observed by this office during field mapping and reconnaissance of the area.

Groundwater

All water below the surface of the Earth is referred to as groundwater, or subsurface water. The equivalent term for water on the land surface is surface water. Groundwater occurs in two different zones below the subsurface which are referred to as the unsaturated zone and the saturated zone. The unsaturated zone contains both water and air, and is almost invariably underlain by a saturated zone where all interconnected openings within an earth material are full of water. Water in the saturated zone is the only groundwater available to supply wells and springs, and is the only water to which the term groundwater is correctly applied. The level of water in the saturated zone at which the hydraulic pressure is equal to the atmospheric pressure is referred to as the water table.

The presence, elevation and movement of groundwater are controlled by one or more of the following; climatic conditions, geologic structure, the hydraulic conductivity of the subsurface materials, irrigation and land use. The presence, elevation and movement of groundwater can vary significantly over short distances. Fluctuations in groundwater levels can occur due to tidal action, seasonal variations in the amount of rainfall, runoff, irrigation rates, alterations in the existing groundwater recharge area (i.e. modifications to the surface drainage and surface water infiltration conditions), and other factors not evident at the time site exploration was conducted. In addition, perched water conditions can develop in areas where bedrock is relatively shallow.

Groundwater was not encountered to a depth of 6.5' within site explorations. The Architect, Structural Engineer and Contractor should be aware of the possibility for groundwater fluctuations while designing and constructing the proposed structure(s).

SEISMIC EVALUATION

General

The Southern California region is located within a tectonically active portion of the earth's crust which has produced both small and sizeable earthquakes throughout time. Faults are generally classified as active, potentially active, or inactive. A fault is considered "active" if it has produced seismic activity within the past 11,000 years. A "potentially active" fault is one where there has been seismic activity along the fault between 11,000 and 1,000,000 years. "Inactive" faults have not produced any seismic activity within the past 1,000,000 years. Active faults are considered to have a high probability of future seismic activity, potentially active faults are considered to have a low probability of future seismic activity, and inactive faults are considered to be no longer capable of producing seismic activity.

The potential exists throughout Southern California for strong ground motion similar to that which occurred during the 1994 Northridge Earthquake. Earthquakes with a magnitude of 5.0 and greater have occurred in Southern California throughout historic time. Strong ground shaking from a moderate to major earthquake can be expected during the lifetime of the structure. This may result in significant damage to structures, hardscape and slopes areas. Since there are so many variables associated with ground movement during an intense earthquake, it is almost impossible to predict the impact of a seismic event to a particular site.

Earthquake Fault Zones

Following the 1971 Sylmar Earthquake, the State of California passed the Alquist-Priolo Special Studies Act in 1972. Active faults within the state were identified and zones were established which prohibited construction of most structures for human occupancy across a known active fault. The Alquist-Priolo Special Studies Act requires the State Geologist to delineate "special studies zones" along active faults, whereby development therein must include geologic investigation demonstrating the absence of a surface displacement threat prior to construction of habitable structures. "Special Studies Zones" have since been renamed "Earthquake Fault Zones".

The subject property is not located within the confines of an "Earthquake Fault Zone," and no zoned faults extend through the site or are in close proximity to the property. Although the site is not located within a State designated "Earthquake Fault Zone" it is located in an active seismic region where large numbers of earthquakes occur each year.

Seismic Hazard Zones

Following the 1989 Loma Prieta Earthquake, the State of California enacted the Seismic Hazard Mapping Act (SHMA) in 1990. As a result, the California Geological Survey (a.k.a. Department of Conservation) prepared a set of maps designating areas within the state that may be susceptible to seismic slope instability and/or liquefaction during a strong seismic event. The seismic safety zones were published in a series of maps initially released in 1996.

The Seismic Hazards Mapping Act was prompted by damaging earthquakes in northern and southern California, and is intended to protect public safety from the effects of strong ground shaking, liquefaction, landslides, and other earthquake-related hazards. The Seismic Hazards Mapping Act requires that the State Geologist delineate the various "seismic hazards zones." The maps depicting the zones are released by the California Geological Survey (CGS). The fact that a site lies outside of a zone does not mean it is free of seismic or geologic hazards such as landslides, rockfall, liquefaction or lateral spreading. Southern California has not been completely mapped, although new maps are issued and existing maps are refined occasionally.

The Seismic Hazards Mapping Act requires a site investigation by a certified Engineering Geologist and/or Civil Engineer prior to development of a project within a hazard zone. The investigation is to include recommendations for a "minimum level of mitigation" that should reduce the risk of ground failure during an earthquake to a level that does not cause the collapse of buildings for human occupancy. The Seismic Hazards Mapping Act does not require mitigation to a level of no ground failure and/or no structural damage.

Seismic Hazard Zone delineations are based on correlation of a combination factors, including: surface distribution of soil deposits and bedrock, slope steepness, depth to groundwater, bedding orientation with respect to slopes, bedrock shear strength, and occurrence of past seismic failure. Maps within the series are further designated as Reconnaissance, Preliminary or Official. Official Seismic Hazard Zone Maps are the culmination of mapping, analysis, review and comment of California Geological Survey, other State agencies, and the public following review and revision of the Preliminary Review Map. The Official Maps are the most rigorous and have the highest confidence level.

As defined, a "Liquefaction Hazard" area is an area where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693© would be required. As defined, an "Earthquake-Induced Landslide" area is an area where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693© would be required.

This office has reviewed the Seismic Hazards Map of the Hollywood Quadrangle prepared by the California Geological Survey (a.k.a. State of California Division of Mines and Geology). According to this map, the site is not located within an area of study for earthquake-induced liquefaction. However, the site is located within an area subject to earthquake-induced landsliding.

Recent Seismic Activity

The most recent largest earthquake within the specified search radius and time period is the Northridge Earthquake. The 6.7 magnitude Northridge Earthquake occurred on January 17, 1994 at 4:31 a.m., PST, and created strong ground shaking for approximately 10 seconds in the Los Angeles area resulting in wide spread, random damage. The earthquake occurred along a previously unrecognized south dipping thrust fault. The causative fault, as defined by a pattern of aftershocks, moved under an area roughly 19-miles across its front (approximately east-west in orientation) and 13 miles from front to back (approximately north-south in orientation). Although slip magnitude was approximately 9- to 10-feet, surface rupture along the causative fault did not occur as a result of the earthquake.)

Active Faults with Historic Surface Rupture

The 1857 Fort Tejon Earthquake (8.3±M) occurred along the San Andreas Fault Zone. The San Andreas Fault Zone, located northerly of the property, has a maximum probable event magnitude of 7.8. The 1933 Long Beach Earthquake (6.3M) occurred along the Newport-Inglewood Fault Zone. The Newport-Inglewood Fault, located southerly of the property, has a maximum probable event magnitude of 6.9. The 1971 San Fernando Earthquake (6.4M) occurred along the San Fernando Fault Zone. The San Fernando-Sierra Madre Fault Zone, located northerly of the property, has a maximum probable event magnitude of 6.7.

CBC Seismic Design Parameters

The majority of southern California, including all of Los Angeles and Ventura counties, is within a zone requiring structural design to resist earthquake loads. The spectral acceleration parameters and site coefficients can be determined using the program "U.S. Seismic Design Maps" obtained from the U.S. Geological Survey website (http://geohazards.usgs.gov/designmaps/us/application.php).

The following seismic coefficient values were obtained from use of the U.S. Seismic Design Maps utilizing the design code reference document (2010 ASCE 7 w/2013 errata). It is recommended that the project Structural Engineer independently verify the accuracy of all the parameters outlined in the following table, excluding Site Class, prior to use.

California Building Code (Section 1613) - Site Coefficients & Data	
Site Latitude	34.1097°
Site Longitude	-118.3395°
Site Class (average soil properties within the upper 100')	C
0.2 Second Spectral Response - S_s	2.579
1.0 Second Spectral Response - S_1	0.926

California Building Code (Section 1613) - Site Coefficients & Data	
Adjusted Maximum Considered Earthquake Spectral Response Acceleration Parameter	
$S_{MS} = F_a\, S_s$ (0.2 Second Spectral Response)	2.579
$S_{M1} = F_v\, S_1$ (1.0 Second Spectral Response)	1.203
Five Percent Damped Design Spectral Response Acceleration	
$S_{DS} = \frac{2}{3} S_{MS}$ (0.2 Second Spectral Response)	1.719
$S_{D1} = \frac{2}{3} S_{M1}$ (1.0 Second Spectral Response)	0.802

Conformance with the presented criteria for seismic structural design does not constitute any kind of warranty, guarantee, or assurance that significant damage, or ground failure, will not occur in the event of a maximum level earthquake. The primary goal of the code-required minimum seismic design is to protect life and limb, and catastrophic failure, and not avoid all damage, as such design may be economically prohibitive. The Project Structural Engineer and owner must decide if the level of risk associated with utilizing the minimum required code values is acceptable and, if not, assign appropriate seismic values above the minimum code values for use in the structural design.

Peak Ground Acceleration, Magnitude and Distance

The earthquake magnitude and distance to the fault was determined using the USGS 2008 Interactive Deaggregations program with an exceedance probability of 10% in 50 years. The peak ground acceleration was determined as $S_{DS}/2.5$. The value of S_{DS} was obtained from the "U.S. Seismic Design Maps" from the U.S. Geological Survey website as discussed above.

Fault Values	
Peak Ground Acceleration	0.688 g
PGA_M	0.986 g
Magnitude	6.9
Distance	5.76 km

SITE STABILITY

Slope Stability

Slopes were analyzed for stability on the basis of cross-section prepared by this office. It is our opinion that these cross sections represent the most critical conditions. As discussed, site bedrock is massive in nature and does not possess well-defined bedding planes. Regional bedding depicted on the referenced geologic maps prepared by the City of Los Angeles (1960) and Dibblee (1991) exhibits a northwest strike accompanied by dips to the northeast ranging from 50° to 60°. Regionally mapped bedding planes are supported in the downdip direction, a condition considered favorable with respect to future gross bedrock stability of the site.

Saturated shear strength parameters are based on laboratory tests performed on samples selected which, in the opinion of the Soils Engineer, represent the existing conditions at the site. Calculations for slope stability are based upon the ultimate shear strength values of the tested material.

Slope stability analysis on Section C-C' calculates a factor of safety in excess of the code required 1.5. Further, seismic slope stability analysis calculates a factor of safety in excess of the code required 1.1 (refer to APPENDIX III for calculations).

The potential for future erosion and soil slippage exists for all hillside developments. Therefore, it is imperative that pad and slope drainage be controlled in a manner that will prevent water from flowing over the slope areas in a concentrated or uncontrolled manner. Refer to the DRAINAGE AND MAINTENANCE section below for additional information. Additionally, it is recommended that slope area(s) be planted and maintained with erosion retardant ground cover adhering to the following criteria:

- is effective in preventing surface erosion;
- is drought resistant;
- has a relatively low surface mass weight;
- has a fairly deep and extensive root system;
- requires a minimum of maintenance by owner;
- has a low irrigation demand.

It requires approximately 2 to 3 years before an adequate erosion-retardant ground cover can become established on a slope. It is recommended that you consult with a landscape architect to determine specific botanicals that will serve as an effective erosion-retardant ground cover for your area.

Creep Forces

Based upon our field observations, research, laboratory testing and analysis, the fill, soil and bedrock materials encountered at the site may be subject to creep. This is due in part to the sloping contact between the fill and natural soil, and the natural soil and bedrock.

Creep is the very slow movement of clayey fills, natural soils and weathered bedrock that takes place in the near surface portions of slopes. Typically, the zone of active creep is considered to be above a 3:1 (h:v) plane projected up from the toe of the slope, or, a plane projected from the toe of slope to about twenty feet back from the top of slope. Creep rates are very slow with no distinct failure surfaces. The slow rate of deformation can have serious effects on buried utilities, drainage structures, roadways, slabs, fences walls, and similar structures.

Liquefaction Potential

Liquefaction refers to the momentary loss of shear strength. The necessary components for liquefaction include: a shallow groundwater condition; relatively loose soils; fine grained sands and silty sands; and repeated cyclic loading. During an earthquake cyclic loading occurs, allowing pore pressures to increase as a result of individual soil grain particles realign themselves. The realignment of the soil particles allows the water to completely separate and surround the grains. As cyclic loading continues the shear resistance of the soil decreases until the pore pressures equal the confining pressures. The result of the increases in the pore pressure and the decrease in the shear resistance is termed "Liquefaction".

A cursory review of maps contained within our offices indicates that the subject property is not mapped within a special studies zone for seismic induced liquefaction. Therefore, an analysis of the potential for earthquake inducted liquefaction has not been performed as the potential for liquefaction to occur at the subject property is considered to be low. This satisfies the requirement of the State of California Public Resources Code, Section 2690 et seq. (Seismic Hazard Mapping Act). Additionally, the subject property is underlain by bedrock. Therefore, the potential for liquefaction to occur at the subject property is remote.

Expansive Soils

Expansive soils are considered to be one of the most costly natural hazards as related to light structures, slabs, retaining walls, paving etc. Expansive soils are influenced greatly by changes in moisture content and can lead to damage when the moisture content changes significantly over short durations of time (i.e. seasonal).

These changes can result from many factors including the initial moisture content of the soil, climate, groundwater, drainage conditions, irrigation and vegetation to name a few. Therefore, it is imperative that soils underlying the subject property are maintained at a consistent moisture content in order to reduce the potential damage caused by expansive soils. A watering schedule that allows the soil to become saturated, then dry out can result in foundation movement and distress. In addition, the recommendations outlined in the DRAINAGE AND MAINTENANCE section should be followed.

Based upon our investigation and laboratory testing the subject site is underlain by soil in the low expansive range. All foundations and slabs should be designed for expansive conditions. To mitigate the effects of expansive soils, good site drainage should be maintained at all times. Roof gutters and downspouts should be incorporated in the design and construction of the structure.

Planters should not be placed near existing or future foundations. Existing planters should be equipped with concrete sides and bottoms. Planters should be connected to a drainage system to convey water away from the foundations. Utility pipes should be checked periodically for leaks.

CONCLUSIONS

General

It is the professional opinion of this office that construction of the proposed single-family residence is feasible provided that the recommendations contained herein are followed. In addition, all applicable elements of the governing agency Building Codes shall be followed.

Based upon our field observations, laboratory testing and analysis, the bedrock found in the explorations should possess sufficient strength to support the proposed single family residence. The artificial fill, natural soil and weathered bedrock deposits encountered in site explorations are not considered suitable for foundation support as these materials may possess adverse deformational characteristics.

Excavation Characteristics

Subsurface exploration was performed utilizing hand labor. Extremely hard layers of bedrock were encountered with depth. Thus, excavating into the bedrock during construction may be difficult. Should hard cemented bedrock be encountered, coring or the use of jack-hammers may be necessary.

RECOMMENDATIONS

1. Grading will consist of excavations for the proposed single family residence. The earth material generated during grading shall be placed as certified compacted fill or wasted off site. If the fill will be placed on site, the location shall be provided to this office and additional recommendations will be provided as necessary.

2. The proposed single family residence shall be supported by foundations extending into the underlying bedrock. Based upon code-required setback for structures planned on or adjacent to descending slopes, friction piles and/or deepened foundations will be required. Foundations should be designed as outlined in the FOUNDATIONS section below.

3. The site shall be maintained as outlined in the DRAINAGE AND MAINTENANCE section below.

It should be noted that, the recommendations contained within this report may be more restrictive than applicable building codes. All recommendations of this report which are in addition to or more restrictive than those outlined in a subsequent review letter, by your governing reviewing agency, shall be incorporated into the plans.

STRUCTURE SETBACK

The Code requires setbacks for structures planned adjacent to **ascending** slopes. The setback corresponds to a horizontal distance equal to one-half of the vertical height of the slope, with a minimum distance of three feet (3') and a maximum distance of fifteen feet (15'). This distance is measured from the toe of slope to the nearest edge of the structure.

FOUNDATIONS

It is recommended that the proposed single family residence be supported by foundations extending into bedrock. Foundation excavations shall be cleared of all loose material prior to the placement of steel, then prior to the placement of concrete to reduce the potential for future settlement and differential settlement. Water shall not be allowed to pond or drain into or through the footing trench excavations. All foundations shall maintain the required code setback from descending slopes.

The Code requires foundation setbacks for construction adjacent to slopes. The Code requires deepened foundations for building planned on or adjacent to **descending** slopes steeper than 3:1 (h:v). The setback corresponds to a horizontal distance equal to one-third of the vertical height of the slope, with a minimum distance of five feet (5') and a maximum distance of forty feet (40'). This distance is measured from the slope face to the lowest edge of the footing.

All earth materials derived from the excavations of foundations shall be removed from the site or placed as certified compacted fill. Fill temporarily stockpiled on site should be placed in a stable area, away from slopes, excavations and improvements. Earth materials shall not be cast over any descending slopes in an uncontrolled manner.

Conventional

The minimum continuous footing size is twelve inches (12") wide for one story structures and fifteen inches (15") wide for two story structures. Pad foundations shall be a minimum of twenty four inches (24") square. All depths of embedment for footings are to be measured from the lowest adjacent grade or into the specified bearing material.

Foundation Design Values						
Foundation Type	**Bearing Material**	**Embedment Depth**	**Bearing Value (psf)**	**Maximum Bearing Value (psf)**	**Coefficient of Friction**	**Passive Resistance (pcf)**
Continuous	Bedrock	18"	3000	5000	0.40	400

Foundation Design Values						
Foundation Type	**Bearing Material**	**Embedment Depth**	**Bearing Value (psf)**	**Maximum Bearing Value (psf)**	**Coefficient of Friction**	**Passive Resistance (pcf)**
Pad	Bedrock	18"	3500	6000	0.40	400

Increases in the bearing value are allowable at a rate of twenty percent (20%) for each additional foot of footing width or depth into the recommended bearing material to the maximum bearing value.

* The bedrock was measured at six inches to five feet (6" - 5') below grade. Therefore, the depth of the foundation embedment will be below these depths. Foundations shall be a minimum of eighteen inches (18") below grade and twelve inches (12") into the recommended bearing material.

The depths specified in the above table are minimum embedment depths required by this office. Deeper foundations may be required during the construction phase of the project due to the presence of unconsolidated soil, uncertified fill or weathered bedrock. Additionally, the project Structural Engineer may need to make the depths deeper to accommodate specific structural loads. The bearing values given above are net bearing values; the weight of concrete below grade may be neglected. These bearing values may be increased by one-third (⅓) for temporary loads, such as wind and seismic forces.

Based upon past experience, all continuous footings shall be reinforced with a minimum of four #4 bars, two placed near the top and two near the bottom. Reinforcing recommendations are minimums and may be revised by the structural engineer.

Lateral loads may be resisted by friction at the base of the foundations and by passive resistance within the bedrock. The coefficient of friction shall be used between the base of the foundation and the recommended bearing material. When combining passive and friction for resistance of lateral loads, the passive component should be reduced by one-third. For isolated poles, the allowable passive earth pressure may be doubled.

All footing excavation depths will be measured from the lowest adjacent grade of recommended bearing material. Footing depths will not be measured from any proposed elevations or grades. Any foundation excavations that are not the recommended depth <u>into</u> the recommended bearing materials will not be acceptable to this office.

<u>Friction Piles</u>

The minimum friction pile diameter is twenty four inches (24"). All friction piles should extend into the bedrock a minimum of ten feet (10'), and not less than what will be required to support loading conditions.

The friction piles may be proportioned using a skin friction value of 750 pounds per square foot of shaft exposed to the competent bedrock. Further, friction piles shall be considered fixed at an embedment depth of two feet (2') into the recommended bearing material. The skin friction values may be increased by one-third (⅓) for temporary loads, such as wind and seismic forces. All friction piles should be designed to resist a creep force of 1000 pounds per lineal foot for each foot of shaft exposed to the earth material above the bedrock.

All friction piles should be tied in both horizontal directions with grade beams. Friction piles supporting retaining walls shall be tied at the top with grade beams. The grade beam should extend a minimum of twenty four inches (24") below the lowest adjacent grade and extend into competent material. Grade beams supporting retaining walls should be designed for the same equivalent fluid pressure as outlined in the RETAINING WALL section below.

The City of Los Angeles Department of Building and Safety requires continuous inspection of all friction piles excavations.

Lateral Load Design (Friction Piles)

Lateral loads may be resisted by passive resistance within the bedrock. The passive resistance may be assumed to act as a fluid with a density of 400 pounds per cubic foot. A maximum passive earth pressure of 5000 pounds per square foot may be assumed. For isolated poles, the allowable passive earth pressure may be doubled. Piles are considered isolated where spaced more than 2.5 times the diameter of the piles.

Raised Floor Construction

Construction utilizing raised floors where the grade under the floor is lowered for joist clearance often leads to moisture problems. Surface moisture can seep through or migrate beneath footings and pond in the lowered underfloor area. The problem increases with increasing difference between the interior and exterior grades. Excessive moisture accumulation or ponding water in the underfloor area can lead to warping or cupping of wood floors. Further, consistent moist conditions can lead to the growth of wood destroying fungus, rotting of wood framing elements, and/or mold growth.

Due to the potential problems discussed above, SubSurface Designs, Inc., does not recommend the use of this construction technique. Should you decide to disregard the advice presented herein, positive drainage of the ground surface away from the footings, waterproofing the footings, sealing of utility line penetrations through footings, compaction of trench backfill, placement of foundation drains and the placement of planter drains can help to reduce moisture intrusion. Planters which are not sealed and drained should not be used adjacent to any structures. Subdrains placed directly adjacent to footing stemwalls are beneficial but will generally not completely prevent water from migrating beneath foundations. Lined planters with drains that are located away from the footings and extend deeper than the footings are generally the most effective mitigation technique.

Adequate ventilation of the underfloor area is also critical in preventing high moisture conditions below proposed structures. Creating adequate ventilation is difficult, particularly in larger homes with interior continuous footings. Telescoping vents are generally ineffective, particularly if provided with louvered covers. Consideration should be given to providing more than the minimum Code-required amount of vent space. Mechanical ventilation may be necessary, particularly in larger homes.

SETTLEMENT

Settlement and differential settlement can result in cracks in the exterior and interior finishes, flooring, etc. Controlling drainage around the structure as outlined in the DRAINAGE AND MAINTENANCE section below can help to control settlement/differential settlement. Additionally, foundation excavations cleared of all loose material prior to the placement of steel, then prior to the placement of concrete is required and can significantly minimize future settlement and differential settlement.

Future settlement and/or differential settlement of the structure and secondary features due to long term deformation and natural occurrences are still possible. Any site drainage improvements, such as those outlined in the DRAINAGE AND MAINTENANCE section below, will result in a lower risk of future foundation problems.

Settlement of the proposed single family residence, associated retaining walls and swimming pool will occur. However, settlement of the proposed structure supported by foundations extending into competent bedrock is anticipated to be negligible.

EXCAVATION EROSION CONTROL

During inclement periods of the year, when rain is threatening (between October 1, and April 15), an erosion control plan shall be implemented and approved by the reviewing agency to reduce the potential of site erosion. The following are several recommendations prepared by this office. The following recommendations are valid for any time of the year that rain threatens an excavation.

Open Excavations

All open excavations shall be protected from inclement weather. This is required to keep the surface of the open excavation from becoming saturated during rainfall. Saturation of the excavation may result in a relaxation of the soils which may result in failures.

Hillside Excavations

All hillside excavations shall be covered during the rainy seasons. Stakes, ropes, and sandbags, along with plastic may be employed to help facilitate the coverage of the excavations. Coverage of the open excavations shall over-extend from the edges of the excavations in all directions.

The project Civil Engineer shall be consulted for the limits of coverage. If possible, slopes around the open excavations shall be trimmed to slope away from the open excavation, so water runoff will not drain into the excavation. Any trees or planters that might cause failure around the open excavations, due to the saturated hillside, shall be anchored safely. After the rain has ceased, the excavations shall be reviewed by the project soil engineer and geologist for safety prior to recommencement of work.

Open Trenches

No water shall be allowed to pond or saturate open trenches. All open trenches shall be covered with plastic and sandbags. Areas around trenches shall be sloped in such a way that water will not runoff into the trenches. After the rain has ceased, trenches shall be reviewed by project soil engineer for safety prior to recommencing work. All footing excavations must be reviewed by the project soil engineer again, prior to pouring concrete.

Open Pile/Caisson Excavations

All open excavations for piles or caissons shall be reviewed and poured prior to rainfall. We do not recommend any pile excavations being left open through any rain storms. However, if it is necessary to leave pile excavations open through any rain storms, all water and runoff must be prevented from entering these pile excavations.

Grading in Progress

During the inclement part of the year, or during periods when rain is threatening, all fill that has been spread and awaits compaction shall be compacted before stopping work for the day or before stopping because of inclement weather. These fills, once compacted, shall have the surfaces sloped to drain to one area where water may be removed.

Work may start again, after the rainy period, once the site has been reviewed by the project soils engineer. Loose materials not compacted prior to the rain shall be removed and aerated so that the moisture content of these fills will be within three percent (3%) above the optimum moisture content.

Surface materials previously compacted before the rain, shall be scarified, brought to the proper moisture content, and re-compacted prior to placing additional fill, if deemed necessary by the Soils Engineer.

Additionally, it is suggested that all stock-piled loose fill materials, not compacted prior to anticipated rainfall, shall be covered with plastic. This action will keep the loose fill from being saturated with water, and will allow the grading to resume when the rain stops. It is always easier and less time consuming to increase moisture content of the fill than to aerate the fill to achieve optimum moisture.

All of the above recommendations shall be considered as part of the erosion control plan for the subject property. However, these recommendations shall and will not supersede, nor limit any erosion control plans produced by the Project Civil Engineer.

CONCRETE DECKING

Concrete decking should be a minimum of four inches (4") thick, reinforced with minimum #3 reinforcing bars placed at eighteen inches (18") on center each way. The decking should be underlain by two inches (2") sand to aid in concrete curing. It should be noted that cracking of concrete slabs and decking is very common during curing. The cracking occurs because concrete shrinks as it dries. It is important that additional water not be added to concrete at the site to make pumping easier as this will increase the magnitude of shrinkage and thus cracking.

For crack control in concrete decking, the maximum control joint spacing should be eight feet (8'). A closer control joint spacing would provide greater crack control. Additional control joints at 90° corners, curves, angle points and where decking transitions to a narrower segment are recommended. Cracks in slabs or decking, and gaps between the structure and decking, that develop will require periodic caulking to limit infiltration of moisture into the underlying soil.

Decking that adjoins a lawn, planters or the top of a slope should be provided with a twelve inch (12") thick deepened edge. The deck reinforcement should be bent down into the thickened edge. Steel reinforcing bars (#3) should be provided at the top and bottom of the deepened edge. Although precautions can be taken, the recommendations are not intended to stop movement, settlement, differential settlement, or cracking. Recommendations provided are only to reduce movement, settlement and cracking as a result of expansion/contraction or consolidation of the supporting soil.

Footing trench spoils should either be removed from the slab areas or compacted into place by mechanical means and tested for compaction.

UTILITY TRENCHES

It is recommended that utility tenches are not planned or placed parallel to and below a 1½:1 plane projected down from the base of the outer edge of a conventional foundation. Footings should be deepened to satisfy the above recommendations. Clean sand should be placed around utility lines and properly jetted. Flooding and/or jetting of utility trenches does not create compact trench backfill and should be limited to backfilling around, and up to six inches (6") above, utility pipes.

Backfill for the remaining portion of the trench above the pipes should be placed by mechanical compaction methods to a minimum of 90 or 95 percent of the maximum density, as determined by the latest version of ASTM D 1557. The higher compaction is required for fill material that has less than fifteen percent (15%) of the material finer than 0.005mm. The upper twelve inches (12") of the certified fill shall be compacted to at least 95 percent of the maximum density in all areas where vehicle loading occurs. All compaction should be tested and certified by this office. Failure to properly backfill and compact utility trenches can result in water migrating through the trench which could lead to foundation settlement or slope instability. Utility penetrations through footings should be tightly sealed when raised-floor construction is utilized.

DRAINAGE AND MAINTENANCE

General

Maintenance of structures and slopes must be performed to minimize the chance of serious damage and/or instability to improvements. Most problems are associated with, or triggered by water. Therefore, a comprehensive drainage system should be designed and incorporated into the final plans. In addition, pad areas should be maintained and planted in a way that will allow this drainage system to function as intended. The following are drainage, maintenance and landscaping recommendations that should be implemented at minimum. Reductions in these recommendations will reduce their effectiveness and may lead to damage and/or instability to site improvements and adjacent properties. It is the responsibility of the property owner to ensure that the residence and site drainage devices are maintained in accordance with the following recommendations, including the requirements of applicable governing agency.

1. Pad Drainage

    (a) Positive pad drainage shall be incorporated into the final plans. All drainage from the roof and pad shall be directed so that water does not pond adjacent to the foundations or flow toward them. All drainage from the site shall be collected and directed via non-erosive devices to a location approved by the building official. **No alteration of this system shall be allowed.**

    (b) Planters placed adjacent to the structures shall be designed to drain away from the structure. Care should be taken to not saturate the soils (i.e. leaking irrigation lines or excessive landscape watering).

2. Slope Drainage

    No water shall be allowed to flow over any slopes. The drainage structures constructed to enhance slope stability shall be cleaned and/or maintained. This includes, but is not limited to, interceptor ditches, drainage terraces, downdrains, berms, debris fences, grates, and exits for subsurface devices.

3. Landscaping (Planting)

   It is recommended that a landscape architect be consulted regarding planting adjacent to the development and on any slopes. Plants surrounding the development shall be of a variety that requires a minimum of watering. Slope landscaping shall consist of plants with dense and deep root structures that require a minimum of watering. It will be the responsibility of the property owner to maintain the planting. Alterations of planting schemes shall be reviewed by the landscape architect.

4. Irrigation

   An adequate irrigation system will be required to sustain landscaping. Any leaks or defective sprinklers shall be repaired immediately. To mitigate erosion and saturation, automatic sprinkling systems shall be adjusted for rainy seasons. A landscape irrigation specialist should be consulted to determine the best times for landscape watering and the maximum amount of water usage.

5. Rodent Control

   The property owner must undertake and maintain a program which eliminates or controls burrowing animals. This must be an ongoing program in order to provide protection to the slope's stability. The uncontrolled burrowing by rodents has proven to be one of the major causes for surficial slope stability problems.

REVIEWS

Plan Review and Plan Notes

The final construction and/or grading plans shall be reviewed and approved by the consultants. This is required to determine if the recommendations of the report have been properly understood and carried forth in the design drawings.

The final plans should reflect the following:

1. The Geologic & Soils Engineering Investigation by SubSurface Designs, Inc., as a part of the plans.

2. Plans must be reviewed and signed by this office.

3. All grading must be reviewed by a representative of this office.

4. All foundations shall be reviewed by a representative of this office.

5. All pile foundation excavations must be performed under the continuous review of a representative of this office.

6. All utility trench backfill shall be reviewed and tested by a representative of this office.

Reviews will be required to verify all work. A review will be performed to determine if the intent of the report has been adequately carried forth. This office should be notified at least **two working days** in advance of any reviews of this nature so that staff personnel may be made available.

Construction Review

It is required that all grading, foundation excavations, slot cutting, pile foundations, underpinning, shoring, utility trench backfill, pre-moistened soil, retaining wall backdrain systems and backfill be reviewed by this office. A review will be performed to determine if the intent of the report has been adequately carried forth. This office should be notified at least two working days in advance of any reviews of this nature so that staff personnel may be made available. The reviews will be billed at our current hourly rate.

LIMITATIONS

General

Subsurface conditions were determined on the basis of our field explorations. Soil and bedrock conditions may vary in type, strength, depth and other properties between the exploratory excavations. Recommendations presented herein are for soil/bedrock conditions encountered in the specific locations explored. Non-uniformity of the soil/bedrock conditions or manmade alterations may be revealed during construction. This office will revise design recommendations if conditions are encountered which are different from the presented herein.

Conclusions on building site stability, settlement, slippage, and the developments affects on off-site property are based on visual examination, observations within the explorations, laboratory testing of samples obtained during exploration, analysis of data, and our experience. Our examination does not, however, imply that the subject property is risk free.

Conclusions and recommendations presented herein are based on our experience and background. The conclusions and recommendations presented herein are professional opinions and are not meant to indicate a control of nature. This report makes no other warranty, either expressed or implied, concerning the advice presented herein.

This report may not be copied. If you wish additional copies, you may order them from this office. See your contract for charges.

Construction Notice

Construction can be difficult. Recommendations contained herein are based upon several windows (explorations) excavated at locations deemed suitable by your consultants. It is this corporation's aim to advise you through this report of the general site conditions, suitability for construction, and overall stability. It must be understood that the opinions are based upon testing, analysis, and interpretation thereof.

All properties are subject to risk, these risks can be mitigated but not be eliminated. Properties are subject to hazards including but not limited to, floods, mudslides, landslides, seepage, erosion, raveling of slopes, concentrated drainage, limited access, differential settlement, heaving and fire. The damage from these hazards may be reduced by the property owner by maintaining yards, slopes, walls, slough protection devices, drainage facilities, and by correcting any deficiencies found during occupancy of the property. It is not possible to eliminate all hazards.

Quantities for foundation concrete and steel may be estimated, based on the findings given in this report. However, you must be aware that depths and magnitudes will most likely vary between the excavated windows (explorations) given in the report.

If you have any questions concerning this report, please contact this office.

Respectfully submitted:
SUBSURFACE DESIGNS, INC.

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dist: (4) Addressee
(1) file

APPENDIX I

SITE INFORMATION

Vicinity Map

Preliminary Geologic Map, City of Los Angeles

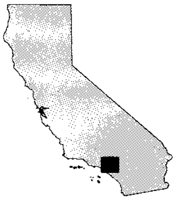
Geologic Map, Thomas W. Dibblee

Seismic Hazard Map

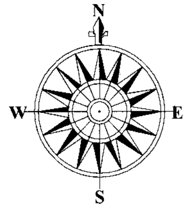
Exploration Logs, Figures E.1 through E.8

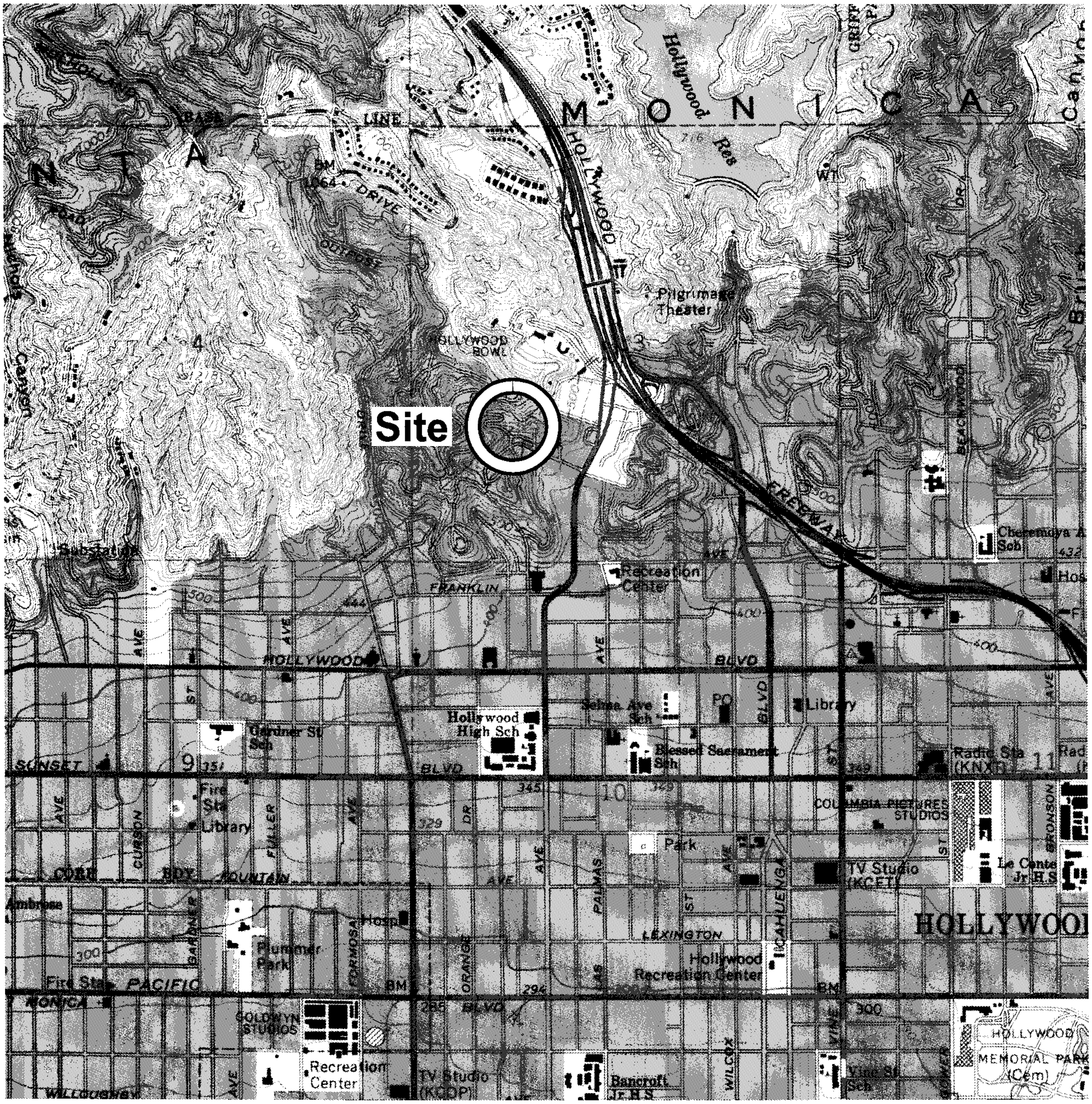
Geologic Map, Plate A (pocket attachment)

Geologic Cross-Section, Plate B (pocket attachment)



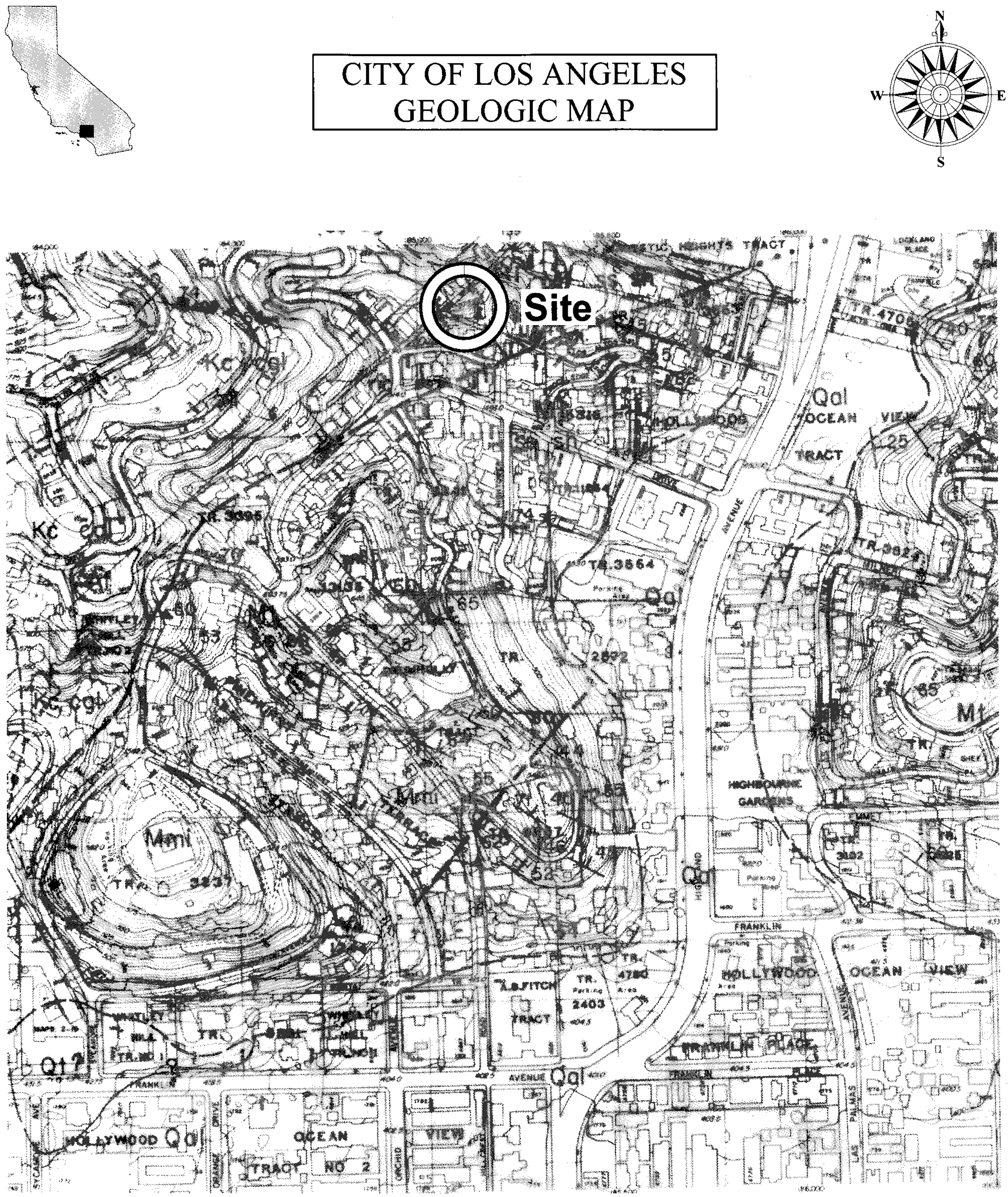
VICINITY MAP





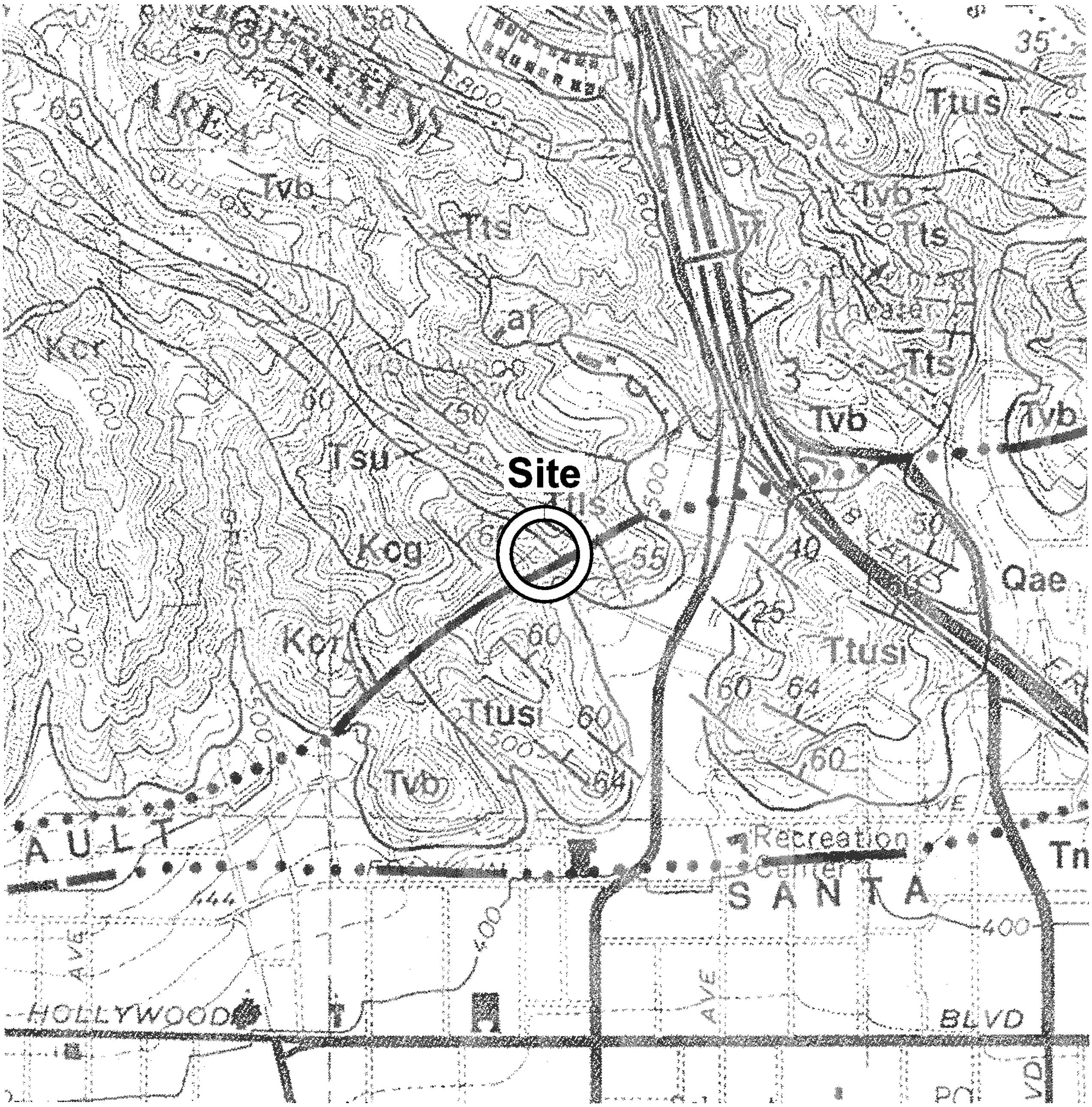
SubSurface Designs, Inc. Geotechnical Engineers Engineering Geologists	**Ref:** Modified from the Topographic Map of the Hollywood Quadrangle, prepared by U.S.G.S., 1966. **Scale:** 1" = 2000'

CITY OF LOS ANGELES
GEOLOGIC MAP



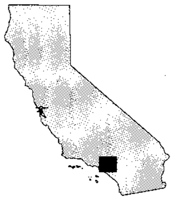
SubSurface Designs, Inc. Geotechnical Engineers Engineering Geologists	**Ref:** Modified from the Preliminary Geologic Map # 181 Santa Monica Mountains Map Series, prepared by the City of Los Angeles, 1960. **Scale:** 1" = 400'

DIBBLEE GEOLOGIC MAP

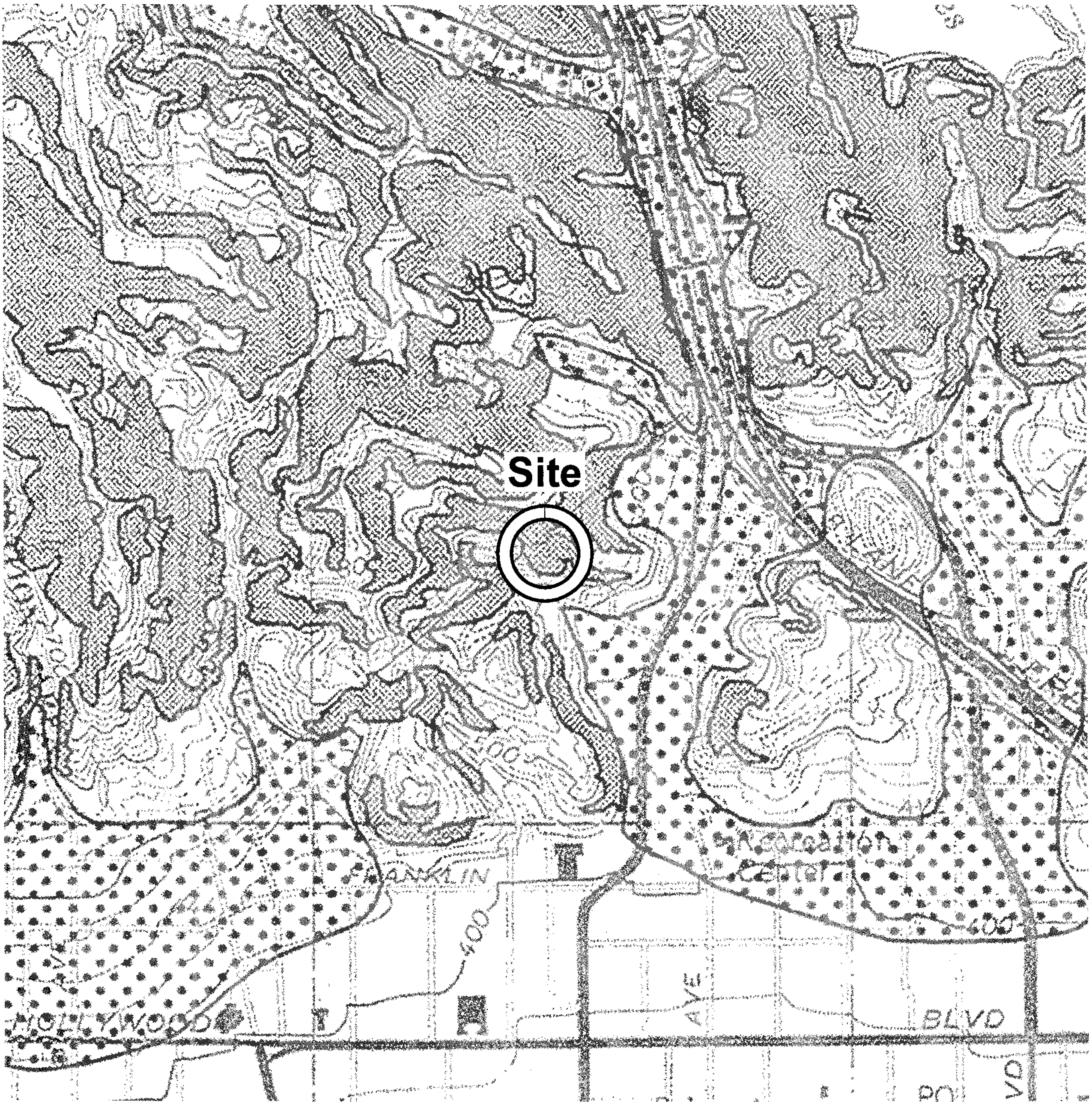


SubSurface Designs, Inc.
Geotechnical Engineers
Engineering Geologists

Ref: Modified from the Geologic Map of the Hollyood & Burbank (South 1/2) Quadrangles, prepared by Thomas W. Dibblee, 1991.
Scale: 1" = 1000'



SEISMIC HAZARD MAP



SubSurface Designs, Inc. Geotechnical Engineers Engineering Geologists	**Ref:** Modified from the Seismic Hazard Zone Map of the Hollywood Quadrangle, prepared by the State of California Division of Mines and Geology, 1999. **Scale:** 1" = 1000'

EXPLORATION LOG

PROJECT NAME: *Bressler / Broadview Terrace*	EXPLORATION NO: *TP 01*	PAGE *1* OF *1*
PROJECT NUMBER: *PIN 7380*	EXPLORATION EQUIPMENT: *Hand-Dug*	
Comments: *See attached Geologic Map for location.*		

Logged By: *KMC*	Total Depth: *6.5'*
Date Started: *July 23, 2019*	Top Elevation (ft.):
Date Completed: *July 23, 2019*	Excavation Width: *24"x36"*

Sample Graphics	Recovery (No. of Rings)	Moisture Content (%)	Unit Dry Wt. (pcf.)	Depth (ft.)	Lithologic Graphics	LITHOLOGIC DESCRIPTION
						Earth Fill (ef) Silty Sand & Gravel - brown and tan, mottled, slightly moist, loosely compact.
	6	3	104			
	--	3		2		
						Natural Soil (Qns) Silty Sand & Gravel - dark brown, slightly moist to moist, medium dense.
	6	4	85			
	--	4		4		
						Bedrock - Chico Formation (Kc) Sandstone - light yellowish-brown, moist, moderately hard, massive, partially conglomeritic, upper 12" weathered.
				6		

Figure E.1

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EXPLORATION LOG

PROJECT NAME: *Bressler / Broadview Terrace*	EXPLORATION NO: *TP 02*	PAGE *1* OF *1*
PROJECT NUMBER: *PIN 7380*	EXPLORATION EQUIPMENT: *Hand-Dug*	
Comments: *See attached Geologic Map for location.*		

Logged By: *KMC*	Total Depth: *3.5'*
Date Started: *July 23, 2019*	Top Elevation (ft.):
Date Completed: *July 23, 2019*	Excavation Width: *24"x36"*

Sample Graphics	*Recovery (No. of Rings)*	*Moisture Content (%)*	*Unit Dry Wt. (pcf.)*	*Depth (ft.)*	*Lithologic Graphics*	LITHOLOGIC DESCRIPTION
						Natural Soil (Qns) Silty Sand & Gravel - dark brown, slightly moist to moist, medium dense.
				2		**Bedrock - Chico Formation (Kc)** Sandstone - light yellowish-brown, moist, moderately hard, massive, partially conglomeritic, upper 12" weathered.
	6	2	128			
				4		
				6		

EXPLORATION LOG

PROJECT NAME: *Bressler / Broadview Terrace*	EXPLORATION NO: *TP 03*	PAGE *1* OF *1*
PROJECT NUMBER: *PIN 7380*	EXPLORATION EQUIPMENT: *Hand-Dug*	
Comments: *See attached Geologic Map for location.*		

Logged By: *KMC*	Total Depth: *3.5'*
Date Started: *July 23, 2019*	Top Elevation (ft.):
Date Completed: *July 23, 2019*	Excavation Width: *24"x36"*

Sample Graphics	Recovery (No. of Rings)	Moisture Content (%)	Unit Dry Wt. (pcf.)	Depth (ft.)	Lithologic Graphics	LITHOLOGIC DESCRIPTION
						Natural Soil (Qns) Silty Sand & Gravel - dark brown, slightly moist to moist, medium dense.
						Bedrock - Chico Formation (Kc) Sandstone - light yellowish-brown, moist, moderately hard, massive, partially conglomeritic, upper 12" weathered.
				2		
	--	4				
	6	5	128			
				4		
				6		

EXPLORATION LOG

PROJECT NAME: *Bressler / Broadview Terrace*	EXPLORATION NO: *TP 04*	PAGE *1* OF *1*
PROJECT NUMBER: *PIN 7380*	EXPLORATION EQUIPMENT: *Hand-Dug*	

Comments: *See attached Geologic Map for location.*

Logged By: *KMC*	Total Depth: *4.0'*
Date Started: *July 23, 2019*	Top Elevation (ft.):
Date Completed: *July 23, 2019*	Excavation Width: *24"x36"*

Sample Graphics	*Recovery (No. of Rings)*	*Moisture Content (%)*	*Unit Dry Wt. (pcf.)*	*Depth (ft.)*	*Lithologic Graphics*	LITHOLOGIC DESCRIPTION
				0–2.5		**Earth Fill (ef)** Silty Sand & Gravel - brown and tan, mottled, slightly moist, loosely compact.
				2.5–4		**Bedrock - Chico Formation (Kc)** Sandstone - light yellowish-brown, moist, moderately hard, massive, upper 12" weathered.

Depth scale: 2, 4, 6

EXPLORATION LOG

PROJECT NAME: *Bressler / Broadview Terrace*	EXPLORATION NO: *TP 05*	PAGE *1* OF *1*
PROJECT NUMBER: *PIN 7380*	EXPLORATION EQUIPMENT: *Hand-Dug*	
Comments: *See attached Geologic Map for location.*		

Logged By: *KMC*	Total Depth: *3.5'*
Date Started: *July 23, 2019*	Top Elevation (ft.):
Date Completed: *July 23, 2019*	Excavation Width: *24"x36"*

Sample Graphics	*Recovery (No. of Rings)*	*Moisture Content (%)*	*Unit Dry Wt. (pcf.)*	*Depth (ft.)*	*Lithologic Graphics*	LITHOLOGIC DESCRIPTION
						Earth Fill (ef) Silty Sand & Gravel - brown and tan, mottled, slightly moist, loosely compact.
	6	1	118			**Natural Soil (Qns)** Silty Sand & Gravel - dark brown, slightly moist to moist, medium dense.
				2		**Bedrock - Chico Formation (Kc)** Sandstone - light yellowish-brown, moist, moderately hard, massive, upper 12" weathered.
				4		
				6		

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EXPLORATION LOG

PROJECT NAME: *Bressler / Broadview Terrace*	EXPLORATION NO: *TP 06*	PAGE *1* OF *1*
PROJECT NUMBER: *PIN 7380*	EXPLORATION EQUIPMENT: *Hand-Dug*	
Comments: *See attached Geologic Map for location.*		

Logged By: *KMC*	Total Depth: *5.0'*
Date Started: *July 23, 2019*	Top Elevation (ft.):
Date Completed: *July 23, 2019*	Excavation Width: *24"x36"*

Sample Graphics	*Recovery (No. of Rings)*	*Moisture Content (%)*	*Unit Dry Wt. (pcf.)*	*Depth (ft.)*	*Lithologic Graphics*	LITHOLOGIC DESCRIPTION
						Earth Fill (ef) Silty Sand & Gravel - brown and tan, mottled, slightly moist, loosely compact.
				2		**Natural Soil (Qns)** Silty Sand & Gravel - dark brown, slightly moist to moist, medium dense.
				4		**Bedrock - Chico Formation (Kc)** Sandstone - light yellowish-brown, moist, moderately hard, massive, partially conglomeritic, upper 12" weathered.
				6		

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Figure E.6

EXPLORATION LOG

PROJECT NAME: *Bressler / Broadview Terrace*	EXPLORATION NO: *TP 07*	PAGE *1* OF *1*
PROJECT NUMBER: *PIN 7380*	EXPLORATION EQUIPMENT: *Hand-Dug*	
Comments: *See attached Geologic Map for location.*		

Logged By: *KMC*	Total Depth: *3.5'*
Date Started: *July 23, 2019*	Top Elevation (ft.):
Date Completed: *July 23, 2019*	Excavation Width: *24"x36"*

Sample Graphics	*Recovery (No. of Rings)*	*Moisture Content (%)*	*Unit Dry Wt. (pcf.)*	*Depth (ft.)*	*Lithologic Graphics*	LITHOLOGIC DESCRIPTION
						Natural Soil (Qns) Silty Sand & Gravel - dark brown, slightly moist to moist, medium dense.
	6	2	126			
				2		**Bedrock - Chico Formation (Kc)** Sandstone - light yellowish-brown, moist, moderately hard, massive, partially conglomeritic, upper 12" weathered.
	6	4	122			
				4		
				6		

EXPLORATION LOG

PROJECT NAME: *Bressler / Broadview Terrace*	EXPLORATION NO: *TP 08*	PAGE *1* OF *1*
PROJECT NUMBER: *PIN 7380*	EXPLORATION EQUIPMENT: *Hand-Dug*	
Comments: *See attached Geologic Map for location.*		

Logged By: *KMC*	Total Depth: *5.0'*
Date Started: *July 23, 2019*	Top Elevation (ft.):
Date Completed: *July 23, 2019*	Excavation Width: *24"x36"*

Sample Graphics	*Recovery (No. of Rings)*	*Moisture Content (%)*	*Unit Dry Wt. (pcf.)*	*Depth (ft.)*	*Lithologic Graphics*	LITHOLOGIC DESCRIPTION
	6	5	105			**Earth Fill (ef)** Silty Sand & Gravel - brown and tan, mottled, slightly moist, loosely compact.
						Natural Soil (Qns) Silty Sand & Gravel - dark brown, slightly moist to moist, medium dense.
				2		**Bedrock - Chico Formation (Kc)** Sandstone - light yellowish-brown, moist, moderately hard, massive, partially conglomeritic, upper 12" weathered.
	6	3	124	4		
				6		

SubSurface Designs, Inc.

GEOTECHNICAL ENGINEERS & ENGINEERING GEOLOGISTS

Figure E.8

APPENDIX II

LABORATORY TEST RESULTS

Laboratory Testing

Laboratory Recapitulation - Table I-1

Shear Strength Diagram, Figure S.1 through S.2

LABORATORY TEST RESULTS

Moisture and Density Tests

The moisture content and in-place dry density of all undisturbed samples obtained were determined. The test results are presented in the Laboratory Recapitulation - Table I. Tests are performed in accordance with the latest version of ASTM D 2216.

Shear Tests

Direct single-shear tests were performed on representative undisturbed samples to determine their strength characteristics. The desired normal load was applied to the specimen and allowed to come to equilibrium. The rate of deflection on the sample is approximately 0.01 inches per minute. Depending upon the sample location and future site condition, samples may be tested at field moisture. The results are plotted on the Shear Test Diagrams and values are presented in the Laboratory Recapitulation - Table I. Tests are performed in accordance with the latest version of ASTM D 3080.

Expansion Tests

Expansion tests are performed on representative samples to determine the expansive potential of compacted soils when inundated with water. The test was performed in accordance with the latest version of ASTM D 4829. The classification of potentially expansive soil is based on the following table.

Expansion Index	Potential Expansion
0-20	Very Low
20-50	Low
50-90	Medium
90-130	High
Above 130	Very High

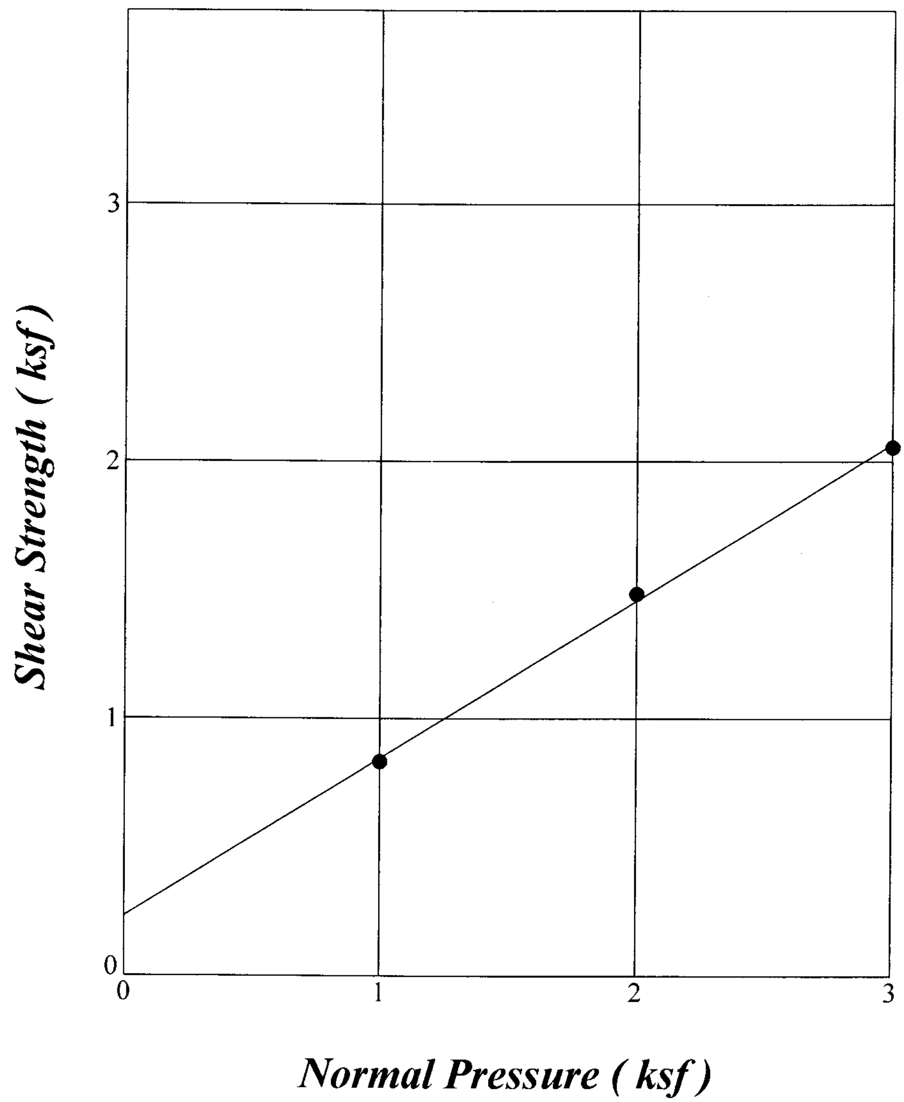
LABORATORY RECAPITULATION

Table I-1

Location	Depth (ft)	Material Type	In Situ Dry Density. (P.C.F.)	In Situ Water (%)	Expansion Index	Cohesion (ksf)	Friction Angle (deg)
TP 01	1.0	ef	104.1	3.5		0.235	31.5
TP 01	2.0	ef	Bulk	3.1	22		
TP 01	3.5	Qns	85.0	3.8			
TP 01	4.0	Qns	Bulk	4.2	24		
TP 02	3.0	Kc	127.5	2.2			
TP 03	2.5	Kc	Bulk	3.7	0		
TP 03	3.0	Kc	127.7	4.6			
TP 05	1.5	Qns	118.4	0.8			
TP 07	1.0	Qns	125.6	2.1			
TP 07	3.5	Kc	121.9	3.8			
TP 08	0.5	ef	104.6	4.7			
TP 08	4.0	Kc	123.8	3.1		0.735	40.0

SHEAR TEST DIAGRAM

PROJECT NAME: *Bressler / Broadview Terrace*	SAMPLE ID: *TP 01 @ 1.00'*
PROJECT NUMBER: *PIN 7380*	MATERIAL DESCRIPTION: *Earth Fill (ef)*
TEST METHOD: *Ultimate Saturated Shear*	



MOISTURE CONTENT (%)		DENSITY (pcf)		RESULTS	
In Situ:	*3.5*			Phi (deg.):	*31.5*
Saturated:	*19.4*	Dry Density:	*104.1*	Cohesion (ksf):	*0.235*

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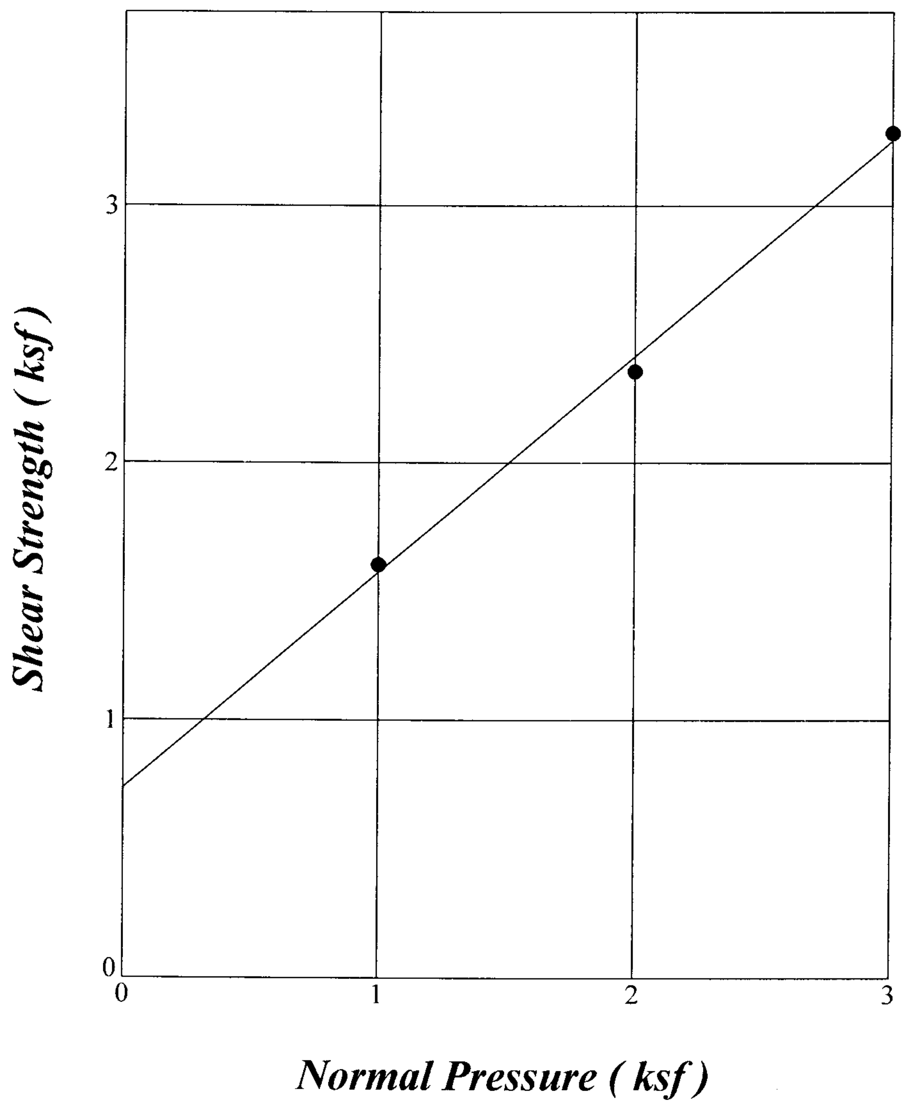
Figure S.1

SHEAR TEST DIAGRAM

PROJECT NAME: *Bressler / Broadview Terrace*	SAMPLE ID: *TP 08 @ 4.00'*
PROJECT NUMBER: *PIN 7380*	MATERIAL DESCRIPTION: *Bedrock (Kc)*
TEST METHOD: *Ultimate Saturated Shear*	



MOISTURE CONTENT (%)		DENSITY (pcf)		RESULTS	
In Situ:	*3.1*			Phi (deg.):	*40.0*
Saturated:	*20.5*	Dry Density:	*123.8*	Cohesion (ksf):	*0.735*

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Figure S.2

APPENDIX III

CALCULATIONS

Bearing Value

Slope Stability

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BEARING CAPACITY ANALYSIS

PIN # **7381**
CLIENT: **Wang**

CALCULATE THE ULTIMATE AND ALLOWABLE BEARING CAPACITIES OF THE BEARING MATERIAL LISTED BELOW USING HANSEN'S METHOD. (REFERENCE: J. BOWLES, *FOUNDATION ANALYSIS AND DESIGN*, 1988, p. 188-194).

CALCULATION PARAMETERS

EARTH MATERIAL:	BEDROCK	EMBEDMENT DEPTH:	1 feet
SHEAR DIAGRAM:	0	PAD LENGTH:	2 feet
COHESION:	735 psf	PAD WIDTH:	1 feet
PHI ANGLE:	40 degrees	SLOPE ANGLE:	0 degrees
DENSITY:	135 pcf	PAD INCLINATION:	0 degrees
SAFETY FACTOR:	3		
FOOTING TYPE:	P Pad		

CALCULATED RESULTS

HANSEN'S SHAPE, DEPTH, AND INCLINATION FACTORS

Nq =	64.20	Dq =	1.21	Sy =	0.80
Nc =	75.31	Gc =	1.00	Dy =	1.00
Ny =	79.54	Bc =	1.00	Iy =	1.00
Sc =	1.43	Iq =	1.00	Gy =	1.00
Sq =	1.42	Ic =	1.00	Gq =	1.00
Dc =	1.40	Bq =	1.00	By =	1.00

CALCULATED ULTIMATE BEARING CAPACITY (Qult)	129,757.6 pounds
ALLOWABLE BEARING CAPACITY (Qa = Qult / fs)	43,252.5 pounds
PERCENT INCREASE FOR EMBEDMENT DEPTH	14.6%

CONCLUSIONS:

THE ULTIMATE AND ALLOWABLE BEARING CAPACITIES OF THE BEARING MATERIAL WERE CALCULATED USING HANSEN'S METHOD. THE RECOMMENDED DESIGN BEARING PRESSURE IS 3500 POUNDS PER SQUARE FOOT.

SubSurface Designs Inc.

BEARING CAPACITY ANALYSIS

PIN # **7381**
CLIENT: **Wang**

CALCULATE THE ULTIMATE AND ALLOWABLE BEARING CAPACITIES OF THE BEARING MATERIAL LISTED BELOW USING HANSEN'S METHOD. (REFERENCE: J. BOWLES, *FOUNDATION ANALYSIS AND DESIGN*, 1988, p. 188-194).

CALCULATION PARAMETERS

EARTH MATERIAL:	BEDROCK	EMBEDMENT DEPTH:	1 feet
SHEAR DIAGRAM:	0	FOOTING LENGTH:	100 feet
COHESION:	735 psf	FOOTING WIDTH:	1 feet
PHI ANGLE:	40 degrees	SLOPE ANGLE:	0 degrees
DENSITY:	135 pcf	FOOTING INCLINATION:	0 degrees
SAFETY FACTOR:	3		
FOOTING TYPE:	S Strip		

CALCULATED RESULTS

HANSEN'S SHAPE, DEPTH, AND INCLINATION FACTORS

Nq =	64.20	Dq =	1.21	Sy =	1.00
Nc =	75.31	Gc =	1.00	Dy =	1.00
Ny =	79.54	Bc =	1.00	Iy =	1.00
Sc =	1.01	Iq =	1.00	Gy =	1.00
Sq =	1.01	Ic =	1.00	Gq =	1.00
Dc =	1.40	Bq =	1.00	By =	1.00

CALCULATED ULTIMATE BEARING CAPACITY (Qult)	94,115.7 pounds
ALLOWABLE BEARING CAPACITY (Qa = Qult / fs)	31,371.9 pounds
PERCENT INCREASE FOR EMBEDMENT DEPTH	14.2%

CONCLUSIONS:

THE ULTIMATE AND ALLOWABLE BEARING CAPACITIES OF THE BEARING MATERIAL WERE CALCULATED USING HANSEN'S METHOD. THE RECOMMENDED DESIGN BEARING PRESSURE IS 3000 POUNDS PER SQUARE FOOT.

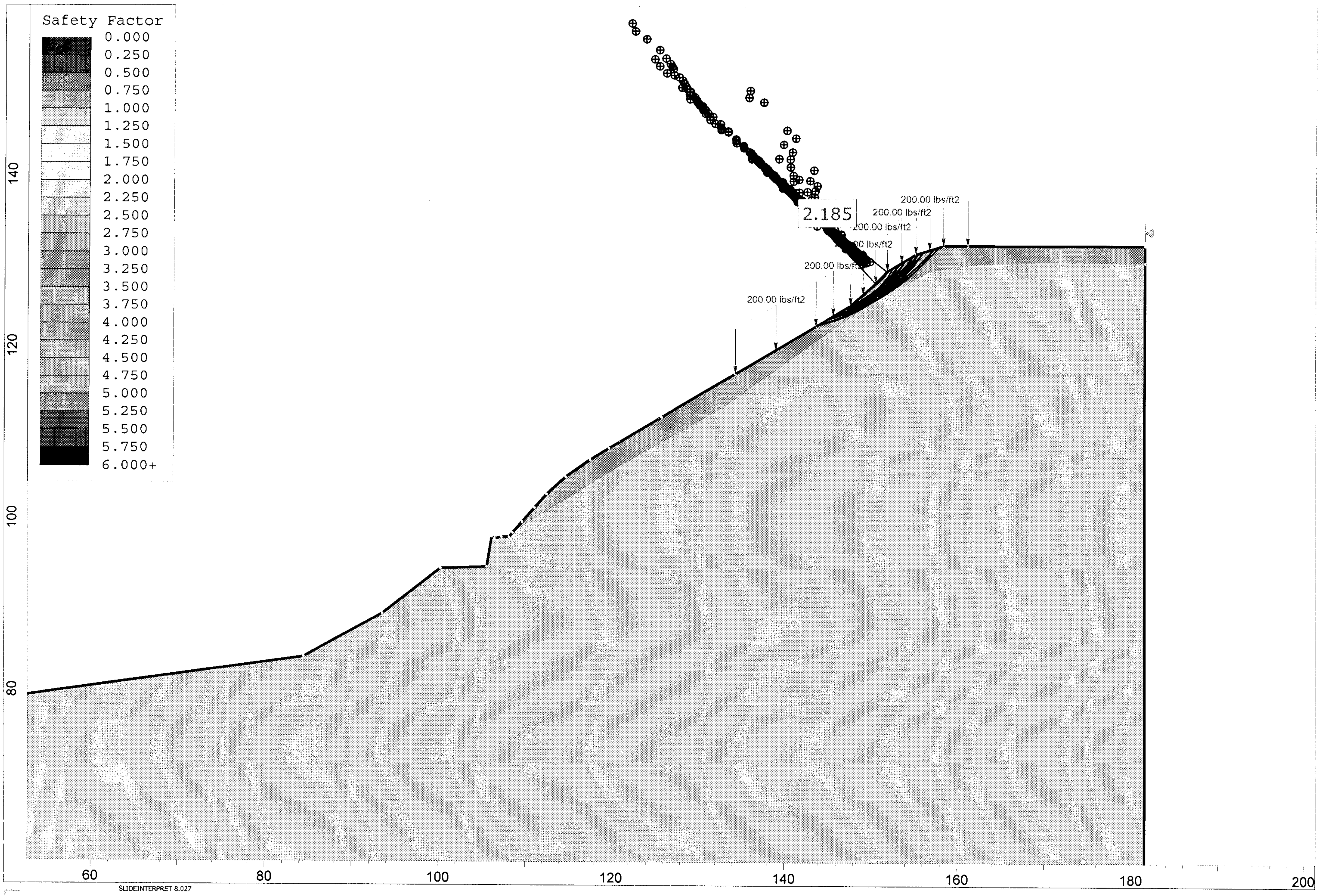
Slope Stability

Saturated shear strength parameters are based on laboratory tests performed on samples selected which, in the opinion of the Soils Engineer, represent the existing conditions at the site. Calculations for slope stability are based upon the ultimate shear strength values of the tested material.

Gross stability analysis was performed utilizing a critical failure surface searching method, using a random technique for generating circular surfaces by Spencer's Method.

Below are results for each section analyzed.

Section	Surface	Factor of Safety	Notes
C-C'	Circular	2.19	Lowest factor of safety for section
C-C'	Circular	1.53	Seismic stability of section


Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
2.185
200.00 lbs/ft2
200.00 lbs/ft2
200.00 lbs/ft2
200.00 lbs/ft2
200.00 lbs/ft2
140
120
100
80
60
80
100
120
140
160
180
200

Slide Analysis Information

7381C

Project Summary

File Name:	7381C.slmd
Slide Modeler Version:	8.027
Compute Time:	00h:00m:08.687s
Project Title:	SLIDE - An Interactive Slope Stability Program
Date Created:	9/10/2019, 2:40:25 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Analysis Methods Used

Slices Type:	Vertical
	Spencer
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Loading

- 1 Distributed Load present

Distributed Load 1

Distribution:	Constant
Magnitude [psf]:	200
Orientation:	Vertical

Materials

Property	Kc	ef
Color		
Strength Type	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	135	125
Cohesion [psf]	735	235
Friction Angle [°]	40	31.5
Water Surface	None	None
Ru Value	0	0

Global Minimums

Method: spencer

FS	2.184920
Center:	141.971, 136.946
Radius:	12.741
Left Slip Surface Endpoint:	150.520, 127.499
Right Slip Surface Endpoint:	151.849, 128.899
Resisting Moment:	7889.6 lb-ft
Driving Moment:	3610.93 lb-ft
Resisting Horizontal Force:	426.617 lb
Driving Horizontal Force:	195.255 lb
Total Slice Area:	0.0470566 ft2

FS	**2.184920**
Surface Horizontal Width:	1.32886 ft
Surface Average Height:	0.0354114 ft

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces:	9281
Number of Invalid Surfaces:	0

Slice Data

- **Global Minimum Query (spencer) - Safety Factor: 2.18492**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	0.0265771	0.0063638	42.2776	ef	235	31.5	150.672	329.207	153.732	0	153.732	290.726	290.726
2	0.0265771	0.018938	42.3865	ef	235	31.5	150.661	329.183	153.692	0	153.692	291.199	291.199
3	0.0265771	0.0311294	42.5485	ef	235	31.5	150.589	329.024	153.434	0	153.434	291.658	291.658
4	0.0265771	0.0428601	42.7109	ef	235	31.5	150.511	328.856	153.158	0	153.158	292.099	292.099
5	0.0265771	0.0541266	42.8738	ef	235	31.5	150.429	328.675	152.864	0	152.864	292.523	292.523
6	0.0265771	0.0649251	43.0371	ef	235	31.5	150.341	328.484	152.552	0	152.552	292.929	292.929
7	0.0265771	0.075252	43.2008	ef	235	31.5	150.249	328.281	152.221	0	152.221	293.318	293.318
8	0.0265771	0.0851035	43.365	ef	235	31.5	150.151	328.067	151.872	0	151.872	293.689	293.689
9	0.0265771	0.0944755	43.5296	ef	235	31.5	150.048	327.842	151.504	0	151.504	294.041	294.041
10	0.0265771	0.103364	43.6947	ef	235	31.5	149.939	327.605	151.118	0	151.118	294.376	294.376
11	0.0265771	0.111766	43.8602	ef	235	31.5	149.825	327.356	150.712	0	150.712	294.692	294.692
12	0.0265771	0.119676	44.0262	ef	235	31.5	149.706	327.096	150.287	0	150.287	294.989	294.989
13	0.0265771	0.127091	44.1926	ef	235	31.5	149.582	326.824	149.844	0	149.844	295.268	295.268
14	0.0265771	0.134006	44.3596	ef	235	31.5	149.452	326.541	149.381	0	149.381	295.529	295.529
15	0.0265771	0.140417	44.527	ef	235	31.5	149.317	326.245	148.899	0	148.899	295.77	295.77
16	0.0265771	0.14632	44.6948	ef	235	31.5	149.176	325.938	148.397	0	148.397	295.992	295.992
17	0.0265771	0.15171	44.8632	ef	235	31.5	149.03	325.618	147.875	0	147.875	296.195	296.195
18	0.0265771	0.156583	45.0321	ef	235	31.5	148.878	325.286	147.334	0	147.334	296.378	296.378
19	0.0265771	0.160934	45.2014	ef	235	31.5	148.72	324.942	146.772	0	146.772	296.542	296.542
20	0.0265771	0.164759	45.3713	ef	235	31.5	148.557	324.586	146.19	0	146.19	296.686	296.686
21	0.0265771	0.168052	45.5417	ef	235	31.5	148.388	324.217	145.588	0	145.588	296.81	296.81
22	0.0265771	0.17081	45.7126	ef	235	31.5	148.214	323.835	144.966	0	144.966	296.913	296.913
23	0.0265771	0.173026	45.884	ef	235	31.5	148.034	323.441	144.323	0	144.323	296.997	296.997
24	0.0265771	0.174697	46.056	ef	235	31.5	147.847	323.035	143.659	0	143.659	297.059	297.059
25	0.0265771	0.175816	46.2285	ef	235	31.5	147.655	322.615	142.975	0	142.975	297.102	297.102
26	0.0265771	0.176379	46.4015	ef	235	31.5	147.457	322.183	142.269	0	142.269	297.123	297.123
27	0.0265771	0.17638	46.5751	ef	235	31.5	147.254	321.737	141.542	0	141.542	297.123	297.123
28	0.0265771	0.175814	46.7492	ef	235	31.5	147.044	321.279	140.794	0	140.794	297.102	297.102
29	0.0265771	0.174676	46.9239	ef	235	31.5	146.828	320.807	140.024	0	140.024	297.059	297.059
30	0.0265771	0.17296	47.0992	ef	235	31.5	146.606	320.322	139.232	0	139.232	296.994	296.994
31	0.0265771	0.17066	47.2751	ef	235	31.5	146.377	319.823	138.418	0	138.418	296.908	296.908
32	0.0265771	0.16777	47.4515	ef	235	31.5	146.143	319.311	137.583	0	137.583	296.799	296.799
33	0.0265771	0.164284	47.6286	ef	235	31.5	145.902	318.785	136.724	0	136.724	296.668	296.668
34	0.0265771	0.160197	47.8062	ef	235	31.5	145.655	318.245	135.844	0	135.844	296.514	296.514
35	0.0265771	0.155502	47.9845	ef	235	31.5	145.402	317.692	134.94	0	134.94	296.337	296.337
36	0.0265771	0.150192	48.1633	ef	235	31.5	145.142	317.124	134.014	0	134.014	296.138	296.138
37	0.0265771	0.144262	48.3428	ef	235	31.5	144.876	316.542	133.064	0	133.064	295.914	295.914

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
38	0.0265771	0.137705	48.5229	ef	235	31.5	144.603	315.946	132.092	0	132.092	295.668	295.668
39	0.0265771	0.130514	48.7037	ef	235	31.5	144.324	315.335	131.095	0	131.095	295.397	295.397
40	0.0265771	0.122682	48.8851	ef	235	31.5	144.037	314.71	130.075	0	130.075	295.102	295.102
41	0.0265771	0.114202	49.0672	ef	235	31.5	143.745	314.071	129.032	0	129.032	294.783	294.783
42	0.0265771	0.105068	49.25	ef	235	31.5	143.445	313.416	127.963	0	127.963	294.44	294.44
43	0.0265771	0.0952708	49.4334	ef	235	31.5	143.139	312.747	126.871	0	126.871	294.071	294.071
44	0.0265771	0.0848044	49.6175	ef	235	31.5	142.825	312.062	125.754	0	125.754	293.677	293.677
45	0.0265771	0.0736608	49.8024	ef	235	31.5	142.505	311.362	124.612	0	124.612	293.258	293.258
46	0.0265771	0.0618321	49.9879	ef	235	31.5	142.178	310.647	123.445	0	123.445	292.813	292.813
47	0.0265771	0.0493104	50.1741	ef	235	31.5	141.843	309.916	122.252	0	122.252	292.341	292.341
48	0.0265771	0.0360877	50.3611	ef	235	31.5	141.502	309.17	121.034	0	121.034	291.844	291.844
49	0.0265771	0.0221556	50.5488	ef	235	31.5	141.153	308.408	119.79	0	119.79	291.32	291.32
50	0.0265771	0.00750556	50.7373	ef	235	31.5	140.797	307.629	118.52	0	118.52	290.769	290.769

Interslice Data

- **Global Minimum Query (spencer) - Safety Factor: 2.18492**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	150.52	127.499	0	0	0
2	150.547	127.523	0.289649	0	0
3	150.573	127.548	0.565776	0	0
4	150.6	127.572	0.825044	0	0
5	150.626	127.597	1.06767	0	0
6	150.653	127.621	1.29387	0	0
7	150.68	127.646	1.50387	0	0
8	150.706	127.671	1.69792	0	0
9	150.733	127.696	1.87625	0	0
10	150.759	127.721	2.03913	0	0
11	150.786	127.747	2.18682	0	0
12	150.812	127.772	2.31958	0	0
13	150.839	127.798	2.4377	0	0
14	150.866	127.824	2.54147	0	0
15	150.892	127.85	2.63119	0	0
16	150.919	127.876	2.70716	0	0
17	150.945	127.902	2.76971	0	0
18	150.972	127.929	2.81917	0	0
19	150.999	127.955	2.85588	0	0
20	151.025	127.982	2.88018	0	0
21	151.052	128.009	2.89245	0	0
22	151.078	128.036	2.89305	0	0
23	151.105	128.063	2.88236	0	0
24	151.131	128.091	2.86079	0	0
25	151.158	128.118	2.82875	0	0
26	151.185	128.146	2.78665	0	0
27	151.211	128.174	2.73493	0	0
28	151.238	128.202	2.67405	0	0
29	151.264	128.23	2.60445	0	0
30	151.291	128.259	2.52661	0	0
31	151.317	128.287	2.44104	0	0
32	151.344	128.316	2.34822	0	0

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
33	151.371	128.345	2.24868	0	0
34	151.397	128.374	2.14295	0	0
35	151.424	128.404	2.03159	0	0
36	151.45	128.433	1.91516	0	0
37	151.477	128.463	1.79425	0	0
38	151.504	128.493	1.66945	0	0
39	151.53	128.523	1.5414	0	0
40	151.557	128.553	1.41072	0	0
41	151.583	128.583	1.27807	0	0
42	151.61	128.614	1.14413	0	0
43	151.636	128.645	1.00961	0	0
44	151.663	128.676	0.875202	0	0
45	151.69	128.707	0.741661	0	0
46	151.716	128.739	0.609746	0	0
47	151.743	128.77	0.480238	0	0
48	151.769	128.802	0.353947	0	0
49	151.796	128.834	0.231703	0	0
50	151.822	128.867	0.114362	0	0
51	151.849	128.899	0	0	0

Entity Information

Group: Group 1

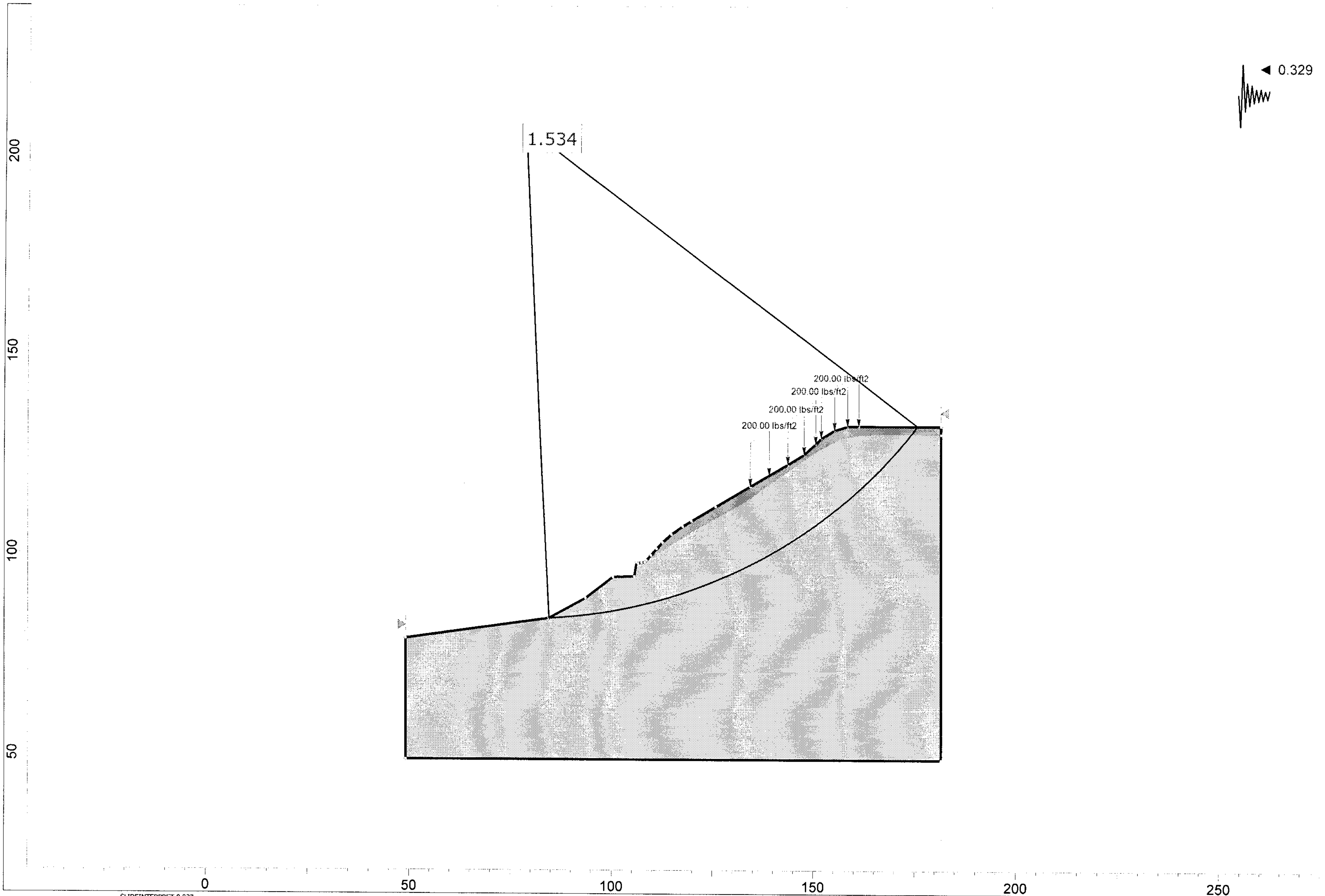
Shared Entities

Type	Coordinates

Type	Coordinates X	Coordinates Y
External Boundary	181.542	48.9415
	181.542	129.939
	181.542	131.942
	161.135	131.942
	158.353	131.942
	155.181	130.942
	151.889	128.942
	150.52	127.499
	147.641	124.942
	143.656	122.493
	134.304	116.942
	125.788	111.88
	119.741	108.252
	117.555	106.942
	114.738	104.942
	112.515	102.942
	111.098	101.362
	109.655	99.7302
	108.552	98.4415
	108.143	97.9415
	107.284	97.9306
	106.467	97.7707
	106.131	97.9776
	105.554	94.4415
	100.275	94.2697
	93.5382	88.9415
	84.4798	83.9415
	49.0615	78.9415
	49.0615	48.9415
Material Boundary	108.552	98.4415
	115.295	102.651
	121.06	106.232
	127.839	110.085
	132.887	112.963
	140.295	118.295
	144.863	121.589
	149.556	124.896
	150.259	125.339
	156.471	128.751
	156.675	128.852
	157.794	129.11
	159.838	129.467
	161.251	129.648
	163.069	129.814
	165.386	129.938
	168.622	129.991
	172.03	129.965
	181.542	129.939

Scenario-based Entities

Type	Coordinates		Master Scenario
	X	Y	
Distributed Load	134.304	116.942	Constant Distribution Orientation: Vertical Magnitude: 200 lbs/ft2 Creates Excess Pore Pressure: No
	143.656	122.493	
	147.641	124.942	
	150.52	127.499	
	151.889	128.942	
	155.181	130.942	
	158.353	131.942	
	161.135	131.942	



0.329
1.534
200.00 lbs/ft2
200.00 lbs/ft2
200.00 lbs/ft2
200.00 lbs/ft2
200
150
100
50
0
50
100
150
200
250

Slide Analysis Information

7381CS

Project Summary

File Name:	7381CS.slmd
Slide Modeler Version:	8.027
Compute Time:	00h:00m:11.387s
Project Title:	SLIDE - An Interactive Slope Stability Program
Date Created:	9/10/2019, 2:40:25 PM

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	feet/second
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Analysis Methods Used

Slices Type:	Vertical
	Spencer
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Auto Refine Search
Divisions along slope:	20
Circles per division:	10
Number of iterations:	10
Divisions to use in next iteration:	50%
Composite Surfaces:	Disabled
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Seismic Load Coefficient (Horizontal): 0.329

Loading

- 1 Distributed Load present

Distributed Load 1

Distribution:	Constant
Magnitude [psf]:	200
Orientation:	Vertical

Materials

Property	Kc	ef
Color		
Strength Type	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	135	125
Cohesion [psf]	735	235
Friction Angle [°]	40	31.5
Water Surface	None	None
Ru Value	0	0

Global Minimums

Method: spencer

FS	**1.533680**
Center:	78.411, 206.222
Radius:	122.429
Left Slip Surface Endpoint:	84.484, 83.944

FS	1.533680
Right Slip Surface Endpoint:	175.731, 131.942
Resisting Moment:	2.29677e+07 lb-ft
Driving Moment:	1.49755e+07 lb-ft
Resisting Horizontal Force:	165233 lb
Driving Horizontal Force:	107736 lb
Total Slice Area:	1223.51 ft2
Surface Horizontal Width:	91.2476 ft
Surface Average Height:	13.4087 ft

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces:	11692
Number of Invalid Surfaces:	0

Slice Data

- **Global Minimum Query (spencer) - Safety Factor: 1.53368**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.83065	111.93	3.27229	Kc	735	40	837.792	1284.9	655.351	0	655.351	703.251	703.251
2	1.83065	332.386	4.13085	Kc	735	40	896.696	1375.24	763.012	0	763.012	827.774	827.774
3	1.83065	546.023	4.99033	Kc	735	40	949.518	1456.26	859.563	0	859.563	942.474	942.474
4	1.83065	752.817	5.85094	Kc	735	40	996.729	1528.66	945.854	0	945.854	1047.99	1047.99
5	1.83065	952.895	6.71288	Kc	735	40	1038.8	1593.19	1022.75	0	1022.75	1145.02	1145.02
6	1.83065	1205.63	7.57635	Kc	735	40	1093.91	1677.72	1123.48	0	1123.48	1268.98	1268.98
7	1.83065	1499.8	8.44156	Kc	735	40	1157.63	1775.44	1239.94	0	1239.94	1411.75	1411.75
8	1.83065	1786.97	9.30871	Kc	735	40	1215.48	1864.16	1345.68	0	1345.68	1544.91	1544.91
9	1.83065	2043.11	10.178	Kc	735	40	1261.25	1934.36	1429.34	0	1429.34	1655.78	1655.78
10	1.83065	2040.29	11.0497	Kc	735	40	1234.89	1893.92	1381.15	0	1381.15	1622.3	1622.3
11	1.83065	1963.07	11.924	Kc	735	40	1190.17	1825.34	1299.42	0	1299.42	1550.74	1550.74
12	1.83065	2163.38	12.8011	Kc	735	40	1217.82	1867.74	1349.94	0	1349.94	1626.65	1626.65
13	1.83065	2627.89	13.6812	Kc	735	40	1308.91	2007.45	1516.44	0	1516.44	1835.07	1835.07
14	1.83065	2825.99	14.5647	Kc	735	40	1330.85	2041.1	1556.55	0	1556.55	1902.33	1902.33
15	1.83065	3203.47	15.4517	Kc	735	40	1393.33	2136.93	1670.75	0	1670.75	2055.9	2055.9
16	1.83065	3542.28	16.3426	Kc	735	40	1443.42	2213.75	1762.31	0	1762.31	2185.56	2185.56
17	1.83065	3799.03	17.2375	Kc	735	40	1472.29	2258.02	1815.07	0	1815.07	2271.87	2271.87
18	1.83065	3984.05	18.1368	Kc	735	40	1483.67	2275.47	1835.86	0	1835.86	2321.85	2321.85
19	1.83065	4129.9	19.0407	Kc	735	40	1485.69	2278.57	1839.56	0	1839.56	2352.31	2352.31
20	1.83065	4241.82	19.9496	Kc	735	40	1480.09	2269.99	1829.33	0	1829.33	2366.56	2366.56
21	1.83065	4344.69	20.8637	Kc	735	40	1472.42	2258.22	1815.3	0	1815.3	2376.5	2376.5
22	1.83065	4438.43	21.7835	Kc	735	40	1462.78	2243.43	1797.68	0	1797.68	2382.26	2382.26
23	1.83065	4523.5	22.7092	Kc	735	40	1451.38	2225.95	1776.84	0	1776.84	2384.24	2384.24
24	1.83065	4598.21	23.6411	Kc	735	40	1438.01	2205.45	1752.42	0	1752.42	2381.9	2381.9
25	1.83065	4663.81	24.5798	Kc	735	40	1423.03	2182.47	1725.03	0	1725.03	2375.94	2375.94
26	1.83065	4720.42	25.5256	Kc	735	40	1406.55	2157.19	1694.9	0	1694.9	2366.56	2366.56
27	1.83065	4768.61	26.4789	Kc	735	40	1388.75	2129.9	1662.38	0	1662.38	2354.14	2354.14
28	1.83065	4811	27.4401	Kc	735	40	1449.53	2223.11	1773.46	0	1773.46	2526.12	2526.12
29	1.83065	4843.95	28.4098	Kc	735	40	1448.85	2222.07	1772.21	0	1772.21	2555.92	2555.92

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
30	1.83065	4866.95	29.3885	Kc	735	40	1425.22	2185.83	1729.03	0	1729.03	2531.72	2531.72
31	1.83065	4879.73	30.3766	Kc	735	40	1400.31	2147.63	1683.5	0	1683.5	2504.29	2504.29
32	1.83065	4882	31.3749	Kc	735	40	1374.16	2107.52	1635.7	0	1635.7	2473.67	2473.67
33	1.83065	4875.41	32.3839	Kc	735	40	1347.65	2066.87	1587.25	0	1587.25	2441.97	2441.97
34	1.83065	4863.62	33.4043	Kc	735	40	1320.5	2025.23	1537.63	0	1537.63	2408.49	2408.49
35	1.83065	4854.74	34.4368	Kc	735	40	1299.95	1993.7	1500.06	0	1500.06	2391.38	2391.38
36	1.83065	4919.54	35.4823	Kc	735	40	1289.8	1978.14	1481.52	0	1481.52	2400.92	2400.92
37	1.83065	5009.45	36.5416	Kc	735	40	1280.79	1964.32	1465.04	0	1465.04	2414.21	2414.21
38	1.83065	5003.09	37.6155	Kc	735	40	1239.36	1900.78	1389.32	0	1389.32	2344.29	2344.29
39	1.83065	4911.53	38.7052	Kc	735	40	1199.57	1839.76	1316.6	0	1316.6	2277.82	2277.82
40	1.83065	4713.79	39.8118	Kc	735	40	1145.44	1756.74	1217.66	0	1217.66	2172.41	2172.41
41	1.83065	4441.13	40.9366	Kc	735	40	1086.57	1666.46	1110.07	0	1110.07	2052.5	2052.5
42	1.83065	4054.13	42.0808	Kc	735	40	1009.16	1547.73	968.57	0	968.57	1879.8	1879.8
43	1.83065	3640.71	43.246	Kc	735	40	889.116	1363.62	749.159	0	749.159	1585.44	1585.44
44	1.83065	3208.49	44.434	Kc	735	40	822.863	1262.01	628.064	0	628.064	1434.83	1434.83
45	1.83065	2756.71	45.6467	Kc	735	40	757.563	1161.86	508.711	0	508.711	1283.57	1283.57
46	1.83065	2284.29	46.8863	Kc	735	40	693.361	1063.39	391.364	0	391.364	1131.95	1131.95
47	1.83065	1790.18	48.1552	Kc	735	40	630.463	966.929	276.403	0	276.403	980.429	980.429
48	1.83065	1272.87	49.4563	Kc	735	40	569.091	872.804	164.228	0	164.228	829.521	829.521
49	1.83065	730.974	50.793	Kc	735	40	509.563	781.506	55.4237	0	55.4237	680.054	680.054
50	1.54553	191.49	52.0589	ef	235	31.5	154.445	236.869	3.04921	0	3.04921	201.149	201.149

Interslice Data

- **Global Minimum Query (spencer) - Safety Factor: 1.53368**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	84.4838	83.9437	0	0	0
2	86.3144	84.0483	1432.04	1218.21	40.3872
3	88.1451	84.1806	2867.36	2439.2	40.3871
4	89.9757	84.3404	4292.81	3651.8	40.3871
5	91.8064	84.528	5696.83	4846.17	40.3871
6	93.637	84.7435	7069.3	6013.7	40.3871
7	95.4677	84.987	8406.57	7151.29	40.3871
8	97.2983	85.2587	9700.67	8252.15	40.3871
9	99.129	85.5587	10939.5	9306.03	40.3872
10	100.96	85.8874	12112.2	10303.5	40.3869
11	102.79	86.2449	13213.3	11240.3	40.3872
12	104.621	86.6314	14249.3	12121.6	40.3872
13	106.452	87.0474	15210.9	12939.6	40.3871
14	108.282	87.493	16072.5	13672.6	40.3872
15	110.113	87.9687	16844.7	14329.4	40.3871
16	111.944	88.4747	17502.3	14888.8	40.387
17	113.774	89.0115	18039.8	15346	40.387
18	115.605	89.5795	18460.8	15704.2	40.3871
19	117.436	90.1791	18771.9	15968.8	40.387
20	119.266	90.8109	18977.3	16143.6	40.3871
21	121.097	91.4754	19082.4	16233	40.3871
22	122.928	92.1732	19088.5	16238.2	40.3871

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
23	124.758	92.9048	18997.5	16160.7	40.387
24	126.589	93.6709	18811.4	16002.5	40.3872
25	128.419	94.4722	18533.2	15765.8	40.3871
26	130.25	95.3096	18165.8	15453.3	40.3872
27	132.081	96.1838	17712.4	15067.5	40.387
28	133.911	97.0957	17176.1	14611.4	40.3872
29	135.742	98.0462	16567.6	14093.7	40.3871
30	137.573	99.0364	15877.9	13507	40.3871
31	139.403	100.067	15109.4	12853.3	40.3872
32	141.234	101.141	14267.3	12136.9	40.3871
33	143.065	102.257	13356.9	11362.4	40.387
34	144.895	103.418	12383.1	10534.1	40.3873
35	146.726	104.625	11349.9	9655.13	40.3871
36	148.557	105.88	10255.4	8724.04	40.3871
37	150.387	107.185	9070.53	7716.11	40.3871
38	152.218	108.542	7785.26	6622.75	40.3871
39	154.049	109.953	6453.88	5490.17	40.3871
40	155.879	111.419	5108.03	4345.29	40.3871
41	157.71	112.945	3801.22	3233.61	40.387
42	159.541	114.533	2571.52	2187.54	40.3871
43	161.371	116.186	1488.6	1266.32	40.3871
44	163.202	117.908	632.5	538.054	40.3871
45	165.033	119.703	-40.3046	-34.2863	40.3871
46	166.863	121.575	-509.57	-433.481	40.3871
47	168.694	123.531	-753.942	-641.362	40.3871
48	170.525	125.575	-750.963	-638.828	40.3871
49	172.355	127.715	-476.845	-405.642	40.3871
50	174.186	129.959	93.4073	79.4595	40.3871
51	175.731	131.942	0	0	0

Entity Information

Group: Group 1

Shared Entities

Type	Coordinates

Type	Coordinates X	Coordinates Y
External Boundary	181.542	48.9415
	181.542	129.939
	181.542	131.942
	161.135	131.942
	158.353	131.942
	155.181	130.942
	151.889	128.942
	150.52	127.499
	147.641	124.942
	143.656	122.493
	134.304	116.942
	125.788	111.88
	119.741	108.252
	117.555	106.942
	114.738	104.942
	112.515	102.942
	111.098	101.362
	109.655	99.7302
	108.552	98.4415
	108.143	97.9415
	107.284	97.9306
	106.467	97.7707
	106.131	97.9776
	105.554	94.4415
	100.275	94.2697
	93.5382	88.9415
	84.4798	83.9415
	49.0615	78.9415
	49.0615	48.9415
Material Boundary	108.552	98.4415
	115.295	102.651
	121.06	106.232
	127.839	110.085
	132.887	112.963
	140.295	118.295
	144.863	121.589
	149.556	124.896
	150.259	125.339
	156.471	128.751
	156.675	128.852
	157.794	129.11
	159.838	129.467
	161.251	129.648
	163.069	129.814
	165.386	129.938
	168.622	129.991
	172.03	129.965
	181.542	129.939

Scenario-based Entities

Type	Coordinates X	Coordinates Y	Master Scenario
Distributed Load	134.304	116.942	Constant Distribution Orientation: Vertical Magnitude: 200 lbs/ft2 Creates Excess Pore Pressure: No
	143.656	122.493	
	147.641	124.942	
	150.52	127.499	
	151.889	128.942	
	155.181	130.942	
	158.353	131.942	
	161.135	131.942	

APPENDIX IV

REFERENCES

Site References

Geologic References

Geotechnical References

REFERENCES

Site References

Geologic/soils reports were not on file for the subject site at the time research was conducted.

Geologic References

1. Aerial photographs U.S. Department of Agriculture, November 1952, AXJ-20K-45 and 46, scale 1"=1666'+.

2. American Geological Institute, 1984, Dictionary of Geological Terms, Third Edition.

3. California Department of Conservation - Division of Mines and Geology, 1994, Fault Activity Map of California and Adjacent Areas, Map No. 6 of the California Geologic Data Map Series; Compilation and Interpretation by Charles W. Jennings.

4. City of Los Angeles, January 1960, Preliminary Geologic Map No. 181 of the Santa Monica Mountains Map Series.

5. City of Los Angeles, January 1960, Topographic Map No. 181 of the Santa Monica Mountains Map Series.

6. Dibblee, Thomas W., Jr., 1991, Geologic Map of the Hollywood and Burbank (South ½) Quadrangles, Los Angeles County, California.

7. Hoots, H. W., 1931, "Geology of the Eastern Part of the Santa Monica Mountains, Los Angeles County, California," U.S. Geological Survey Professional Paper No. 165-C.

8. U.S. Geological Survey, 1987, Basic Ground-Water Hydrology, Ralph C. Heath, Water-Supply Paper 2220.

9. Ziony, J. I., editor, 1985, "Evaluating Earthquake Hazards in the Los Angeles Region--An Earth Science Perspective," U.S. Geological Survey Professional Paper 1360.

Geotechnical References

1. Bowles, Joseph, E., Foundation Analysis and Design (McGraw-Hill, New York : 1968)

2. California Geological Survey, Special Publication 117A - Guidelines for Evaluation and Mitigating Seismic Hazards in California, 2008.

3. Southern California Earthquake Center (SCEC), Recommended Procedures for Implementation of DMG Special Publication 117 - Guidelines for Evaluating and Mitigating Seismic Hazards in California, 2002.

4. Huang, Yang H., Stability Analysis of Earth Slopes (Van Nostrand Reinhold, New York : 1983)

5. Monahan, Edward J., PE, Construction of and on Compacted Fills (Wiley & Sons, New York : 1986)

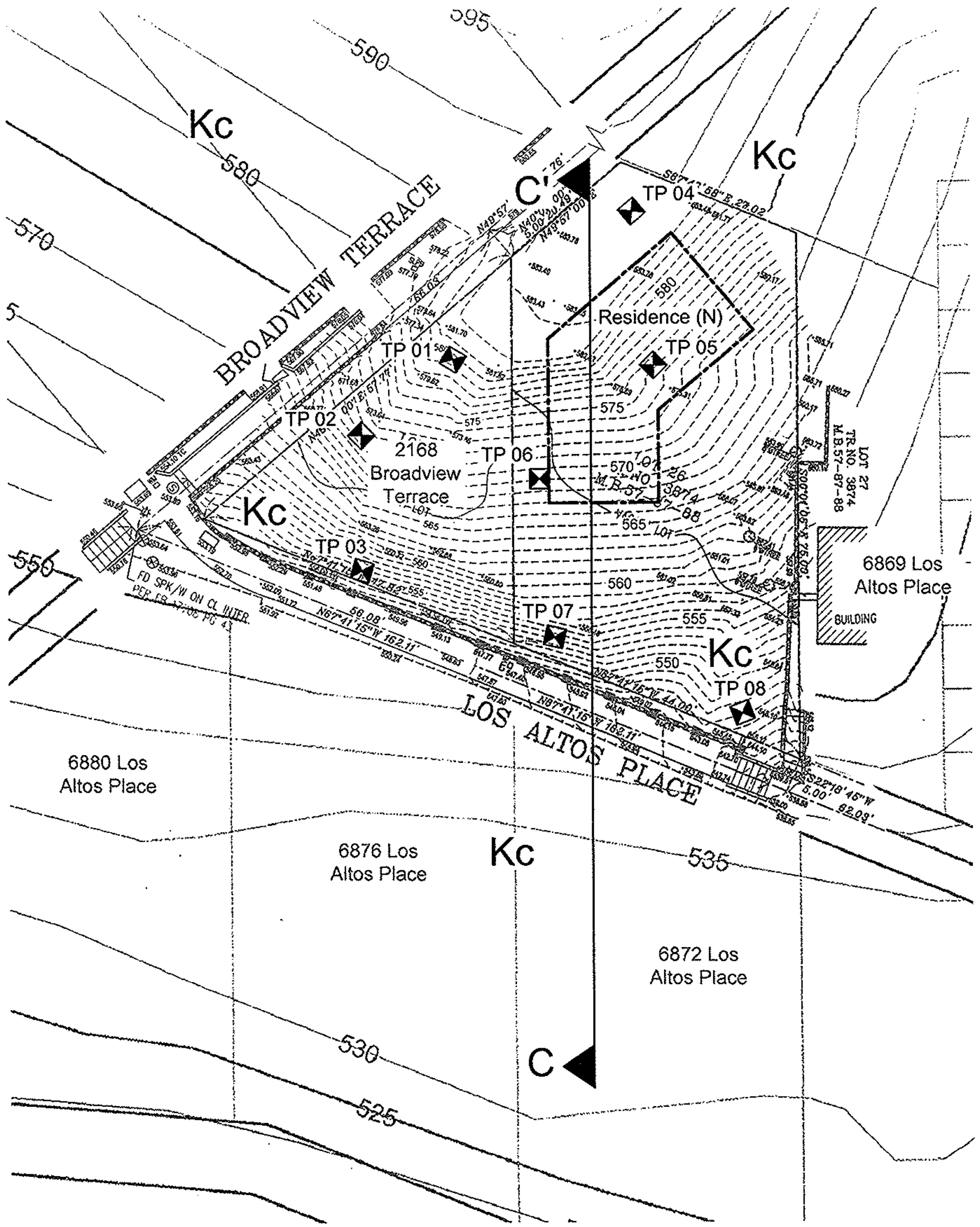
6. Naval Facilities Engineering Command Foundations and Earth Structures - Design Manual 7.02 (Naval Publications and Forms Center, Philadelphia : 1986)

7. Poulos, H. G., and Davis, E. H., Pile Foundation Analysis and Design (Wiley & Sons, New York : 1980)

8. Taylor, Donald W., Fundamentals of Soil Mechanics (Wiley & Sons, New York : 1948)

9. Terzaghi, Karl and Peck, Ralph B., Soil Mechanics in Engineering Practice (Wiley & Sons, New York : 1948)

10. Tschebotarioff, Gregory P., Foundations, Retaining and Earth Structures - 2nd (McGraw Hill, New York : 1979)



LEGEND

Kc	= Chico Formation (Cretaceous geologic age)
⊠	= Hand-dug test pit
▲—▲	= Geologic cross-section
△6	= Approximate depth to bedrock in feet

Test pit	Depth to bedrock
TP 01	5
TP 02	2
TP 03	1
TP 04	3
TP 05	2
TP 06	3
TP 07	2
TP 08	2

0 10 20
SCALE

SubSurface Designs Inc.
12848 Foothill Boulevard, Sylmar, CA 91342
(818) 898-1595 or (Fax) 898-4003

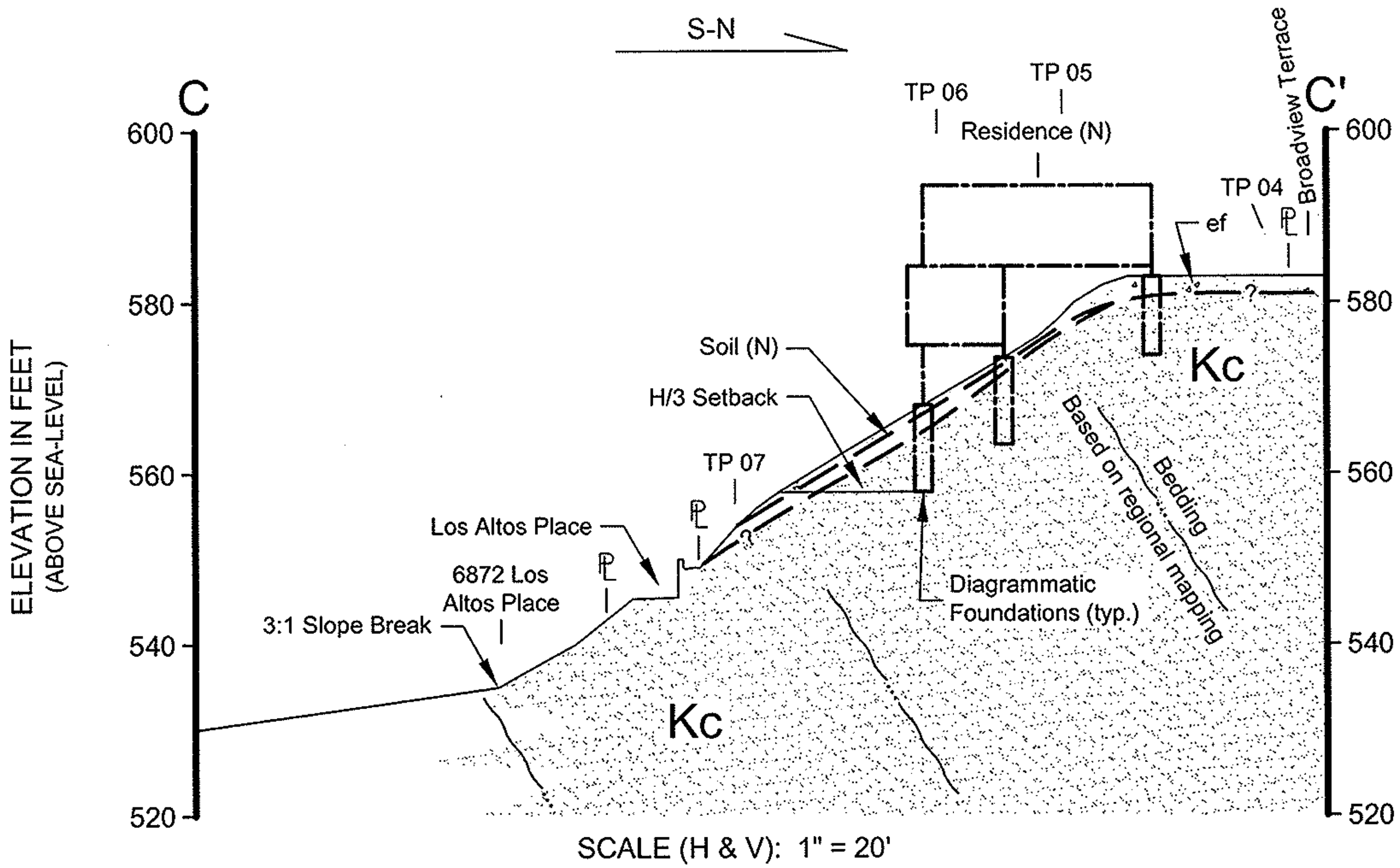
Wang
2172 Broadview Terrace, Los Angeles
PIN# 7381.01S

Geologic Map

September, 2019

Plate A

NOTE: This document has been created from a topographic base map M&G Civil Engineering and Land Surveying. Analyses and/or professional opinions generated from this plan are only as accurate as the plan(s) provided to this office. If discrepancies are found to exist between the plan(s) and the actual site conditions, they should be brought to our immediate attention so that revisions may be made as required.



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Wang

2172 Broadview Terrace, Los Angeles

PIN# 7381.01S

Geologic Cross Section A-A'

September, 2019

Plate B