



GEOLOGIC AND SOILS ENGINEERING EXPLORATION UPDATE
PROPOSED RESIDENCE
PARCEL B, PARCEL MAP 968
2774 CHADWICK CIRCLE
LOS ANGELES, CALIFORNIA

FOR MATT HOLLAND
IRVINE GEOTECHNICAL, INC. PROJECT NUMBER IC 06017-I
OCTOBER 15, 2014

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INTRODUCTION

This report has been prepared per our agreement and summarizes findings of Irvine Geotechnical's geologic and soils engineering exploration update performed on the site. The purpose of this study is to evaluate the nature, distribution, engineering properties, relative stability and geologic structure of the earth materials underlying the site with respect to the design and construction of the proposed project.

INTENT

It is the intent of this report to assist in the design and completion of the proposed project. The recommendations are intended to reduce geotechnical risks affecting the project. The professional opinions and advice presented in this report are based upon commonly accepted standards and are subject to the general conditions described in the **NOTICE** section of this report.

EXPLORATION

The scope of the field exploration was determined from our initial site visit and consultation with the client. Exploration was conducted using techniques normally applied to this type of project in this setting. This report is limited to the area of the exploration and the proposed project as shown on the enclosed Geologic Map Site Plan and cross sections. Conditions affecting portions of the property outside the area explored, are beyond the scope of this report.

Exploration was conducted on February 20, 2006 with the aid of hand labor. It included excavating four test pits to a maximum depth of 7 feet. Samples of the earth materials were obtained and delivered to the soils engineering laboratory of Soil Labworks, LLC for testing and analysis. Downhole observation of the earth materials was performed by the engineering geologist. The site was revisited in October of 2014 by the project geologist, and site conditions remain essentially the same as 2006.

Office tasks included laboratory testing of selected soil samples, researching records on file at City of Los Angeles, reviewing historical topographic maps and aerial photographs, preparing the Geologic Map Site Plan and cross section and performing engineering analysis. Earth materials exposed in the test pits are described on the enclosed Log of Test Pits. Appendix I contains a discussion of the laboratory testing procedures and results.

The proposed project, surface geologic conditions, and the location of the test pits are shown on the Geologic Map. Subsurface distribution of the earth materials, projected geologic structure, and the proposed project are shown on Section A, which forms the basis for the enclosed stability calculations.

RESEARCH - PREVIOUS WORK

Irvine Geotechnical explored the subject property in 2006. The results of our surface exploration, laboratory testing and engineering analysis are contained in *“Geologic and Soils Engineering Exploration, Proposed Residence, Parcel B, Parcel Map 968, 2774 Chadwick Circle, Los Angeles, California,”* dated April 17, 2006. The report was reviewed and approved by the Grading Division on their Soils/Geology Approval Letter, dated June 6, 2006. The Department approval letter is appended to this report for reference.

PROPOSED PROJECT

Information concerning the proposed project was provided by the client. Formal plans have not been prepared and await the conclusions and recommendations of this report. It is planned to develop the descending parcel below Chadwick Circle with a three-level, single-family residence. The lower two levels will be partially “tucked” into the slope with retaining walls on the order of 4 to 8 feet. Retaining walls outside the building footprint will be limited to conform to the city of Los Angeles retaining wall ordinance.

SITE DESCRIPTION

The subject property consists of a partially graded and vacant hillside parcel, in the El Sereno section of the City of Los Angeles, California. It is located on the west (downhill) side of Chadwick Circle, east of Eastern Avenue, and approximately midway between Alhambra Road on the south and Huntington Drive on the north. Lynnfield Circle bounds the property along the southwestern (downslope) property line. The adjacent lots are also vacant. However, the remaining portion of Chadwick Circle is developed with single-family residences.

The property is situated on the southwest-facing flank of a broad knob. Past grading on the site has been associated with the creation of Chadwick Circle and Lynnfield Circle. The uphill side of Lynnfield Circle is cut into the ridge flank and cuts on the order of 8 to 10 feet high and 1:1 in gradient are present along the southwestern property line. Fill was placed over the slope to support the downhill side of Chadwick Drive and the associated shoulder. Physical relief between Chadwick and Lynnfield Circles is 60 feet. The average slope gradient is just flatter than 2:1.

Vegetation on the site consists of scattered weeds and grasses. Drainage on the site is not controlled and runoff down the contours of the land toward Lynnfield Circle.

GROUNDWATER

Groundwater was not encountered during exploration. Seasonal fluctuations in groundwater levels may occur due to variations in climate, irrigation, and other factors not evident at the time of the exploration. Fluctuations in groundwater levels may also occur across the site.

EARTH MATERIALS

Fill

Fill, associated with creation of Chadwick Circle blankets the slopes to a maximum observed thickness of 4 feet in the vicinity of Test Pit 4. The fill consists of silty sand that is mottled grey-brown, slightly moist, medium dense and contains sandstone fragments.

Soil

Natural residual soils were encountered in all of the test pits except Test Pit 4. The Soil consists of clayey sand that is dark brown, moist and medium dense. The soil layer ranged in thickness from 6 to 18 inches.

Bedrock

Bedrock underlying the site and encountered in the test pits consists of sandstone of the Monterey Formation as mapped by T.W. Dibblee, (*Geologic Map of the Los Angeles Quadrangle*, CD Compilation, 2002). The bedrock is well exposed in road cuts along the uphill side of Chadwick Circle. The sandstone is orange-brown, moderately hard to hard, massive to thickly bedded and moderately weathered.

GEOLOGIC STRUCTURE

The bedrock described is common to this area of the Repetto Hills and the geologic structure is consistent with regional trends. Bedding planes mapped generally strike northwest and dip steeply toward the northeast. Joint planes mapped are randomly oriented and steeply dipping and not a factor in the stability of the site or temporary excavations.

The geologic structure of the bedrock is favorably oriented for stability of the site and proposed project. Recommendations to eliminate or support any unfavorably oriented bedding are presented in the **CONCLUSIONS AND RECOMMENDATIONS** section of this report.

GENERAL SEISMIC CONSIDERATIONS

Southern California is located in an active seismic region and numerous known and undiscovered earthquake faults are present in the region. Hazards associated with fault rupture and earthquakes include direct affects such as strong ground shaking and ground rupture, as well as secondary effects such as liquefaction, landsliding and lurching. The United States Geological Survey (USGS), California Geologic Survey (CGS), Southern California Earthquake Center (SCEC), private consultants and universities have been studying earthquakes in southern California for several decades. Early studies were directed toward earthquake prediction and early warning of strong ground shaking. Research and practice have shown that earthquake prediction is not practical or sufficiently accurate to benefit the general public. Also, several recent and damaging earthquakes have occurred on faults that were unknown prior to rupture. Current standards and the California Building Code call for earthquake resistant design of structures as opposed to prediction.

Alquist-Priolo Fault Rupture Hazard Study Zone

California faults are classified as active, potentially active or inactive. Faults from past geologic periods of mountain building, but do not display any evidence of recent offset are considered “inactive” or “potentially active.” Faults that have historically produced earthquakes or show evidence of movement within the Holocene (past 11,000 years) are considered “active faults.” Active faults that are capable of causing large earthquakes may also cause ground rupture. The Alquist-Priolo Act of 1971 was enacted to protect structures from hazards associated with fault ground rupture. No known active faults cross the subject property and the site is not located within an Alquist-Priolo Fault Rupture Hazard Study Zone. The ground rupture hazard at the site is considered nil.

Building Code Seismic Coefficients

Seismic design parameters within the Building Code include amplification of the seismic forces on the structure depending on the soil type, distance to seismic source and intensity of shaking. The purpose of the code seismic design parameters is to prevent collapse of structures and loss of life during strong ground shaking. Cosmetic damage should be expected.

The following table lists the applicable seismic coefficients for the 2014 Los Angeles Code.

SEISMIC COEFFICIENTS (2014 Los Angeles Building Code)		
Latitude = 34.07859°N Longitude = 118.17620°W	Short Period (0.2s)	One-Second Period
Earth Materials and Site Class from Table 1613.5.2 and Section 1613.5.2	Bedrock - C	
Seismic Design Category from Table 1613.5.6(1) and 1613.5.6(2)	E	
Spectral Accelerations from Figures 1613.5 (1) through 1613.5(14)	$S_s = 2.699 \text{ (g)}$	$S_1 = 0.936 \text{ (g)}$
Site Coefficients from Tables 1613.5.3 (1) and 1613.5.3 (2)	$F_A = 1.0$	$F_V = 1.3$
Spectral Response Accelerations from Equations 16-36 and 16-37	$S_{MS} = 2.699 \text{ (g)}$	$S_{M1} = 1.217 \text{ (g)}$
Design Accelerations from Equations 16-38 and 16-39	$S_{DS} = 1.799 \text{ (g)}$	$S_{D1} = 0.811 \text{ (g)}$

Seismic Hazards

The principal seismic hazard to the subject property and proposed project is strong ground shaking from earthquakes produced by local faults. Modern, well-constructed buildings are designed to resist ground shaking through the use of shear panels, moment-resisting

frames and reinforcement. Additional precautions may be taken to protect personal property and reduce the chance of injury, including strapping water heaters and securing furniture and appliances. It is likely that the subject property will be shaken by future earthquakes produced in southern California. However, secondary effects such as surface rupture, lurching, liquefaction, consolidation, ridge shattering, and landsliding should not occur at the subject property.

Seismic Hazard Zones

The California State Legislature enacted the Seismic Hazards Mapping Act of 1990, which was prompted by damaging earthquakes in California, and was 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 various “seismic hazards zones.” The maps depicting the zones are released by the California Geological Survey.

The Seismic Hazards Mapping Act requires a site investigation by a certified engineering geologist and/or civil engineer with expertise in geotechnical engineering, for projects sited 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 of factors, including: surface distribution of soil deposits; physical relief; depth to historic high groundwater; shear strength of the soils; and occurrence of past seismic deformation. The subject property is located within the United States Geologic Survey, Los Angeles Quadrangle. Seismic hazards within the Los Angeles Quadrangle were evaluated by the CGS

in their report, "*Seismic Hazard Zone Report for the Los Angeles 7.5-minute Quadrangle, Los Angeles County, California, Seismic Hazard Zone Report 029.*" According to the Seismic Hazard Zones Map, portions of the subject property is within an area that has been subject to, or may be subject to earthquake induced ground deformation.

Ground Motion

Spectral accelerations at the site were determined for the Maximum Considered Earthquake (MCE) following the procedures in ASCE 7-10 and the 2014 Building Code. The computed PGA_M for this site is 1.03g. According to the USGS deaggregation website (<https://geohazards.usgs.gov/deaggint/2008/>), and using a ground motion with a 10 percent probability of exceedance in 50 years, the modal de-aggregated earthquake PGA and moment magnitude are 0.569g and 6.6, respectively. The modal distance to the ground motion source is 4.8km.

SLOPE STABILITY

Gross Stability

Slopes affecting the subject property include a 60 foot high slope between the ridge crest Chadwick Circle and the toe of slope at Lynnfield Circle. Section A was prepared to show the highest and steepest topography on the site. The gross stability of the slope shown in Section A was calculated using a computerized version of the Simplified Bishop's method (SLIDE Version 6.029) developed by ROCSCIENCE, Inc.

The seismic stability of the site was calculated in conformance with Southern California Earthquake Center (SCEC), 2002, "*Recommended Procedures for Implementation of DMG Special Publication 117*" and California Geological Survey (CGS), Special Publication 117A, 2008 "*Guidelines for Evaluating and Mitigating Seismic Hazards in California.*" Using the

screening procedure and for a maximum allowable displacement of 5 cm, the horizontal acceleration (K_{eq}) is 0.343g.

The analysis shows that the subject property and existing slopes are grossly stable with a factor of safety in excess of 1.5 under static conditions and in excess of 1.0 under seismic conditions. The calculations use the shear tests of samples believed to represent the weakest earth material encountered during exploration. The cross section used is the most critical for the slopes analyzed.

Surficial Stability

Based upon the enclosed calculations, it is reasonable to assume that the soil and existing fill are surficially stable.

The method of analysis used is the "parallel seepage model." The assumptions of this method are: a uniform planar slope; uniform soil density and shear strength; and uniform seepage parallel to the slope. The validity of the analysis depends, in part, by how closely the assumptions model the field conditions.

For surficial deposits overlying natural slopes, it is the opinion of Irvine Geotechnical that the assumptions of the "parallel seepage model" are not completely satisfied. Thus, though the calculation shows that the surficial materials on the site are stable with a factor of safety in excess of 1.5, the mitigating measures recommended in the **CONCLUSIONS AND RECOMMENDATIONS** of this report should be implemented during development of the site.

CONCLUSIONS AND RECOMMENDATIONS

General Findings

The conclusions and recommendations of this update report are based upon four test pits, field geologic mapping, research of available records, consultation, years of experience observing similar properties in similar settings and review of the development plans. It is the finding of Irvine Geotechnical that construction of the proposed project is feasible from a geologic and soils engineering standpoint provided the advice and recommendations contained in this report are included in the plans and are implemented during construction.

The recommended bearing material is the bedrock, which is present at depths of one to six feet of the surface. Due to the slopes, deepened foundations consisting of friction piles tied with grade beams are recommended to support the proposed structures. Existing fill and soil on the site are not suitable for fill, slab or foundation support. The existing fill and soil should be removed and recompact for slab support.

FOUNDATION DESIGN

General Conditions

The following foundation recommendations are minimum requirements. The structural engineer may require footings that are deeper, wider, or larger in diameter, depending on the final loads.

Deepened Foundations - Friction Piles

Drilled, cast-in-place concrete friction piles are recommended to support the proposed structures. Piles should be a minimum of 24 inches in diameter and a minimum of 8 feet

into bedrock. Piles may be assumed fixed at 3 feet into bedrock. For the vertical forces, the piles may be designed for a skin friction of 500 pounds per square foot for that portion of pile in contact with the bedrock. The friction value is for the total of dead and frequently applied live loads and may be increased by one third for short duration loading, which includes the effects of wind or seismic forces.

Lateral Design

The existing fill and soil on the site are subject to downhill creep. Pile shafts are subject to lateral loads due to the creep forces. Pile shafts should be designed for a lateral load of 1,000 pounds per linear foot for each foot of shaft exposed to the existing fill and soil.

Resistance to lateral loading may be provided by passive earth pressure within the bedrock. Passive earth pressure may be computed as an equivalent fluid having a density of 500 pounds per cubic foot. The maximum allowable earth pressure is 5,000 pounds per square foot. For design of isolated piles, the allowable passive and maximum earth pressures may be increased by 100 percent. Piles spaced more than $2\frac{1}{2}$ pile diameters on center may be considered isolated.

All pile should be designed to resist lateral forces in conformance with Section 1810.2 of the Building Code. This may require tying the piles in two horizontal directions with grade beams.

Passive Pressure Reduction - Stacked Retaining Walls

Footings supporting structures upslope from a retaining wall should be founded in bedrock below a 1:1 plane projected up from the lower wall. This condition is considered a “stacked” condition. For retaining walls in a “stacked” condition, the passive earth

pressure should be reduced from 500 pcf to 125 pcf. The passive earth pressure may be increased to 500 pcf below the elevation of the lowest adjacent retaining wall.

Foundation Settlement

Settlement of the foundation system is expected to occur on initial application of loading. A settlement of $\frac{1}{4}$ to $\frac{1}{2}$ inch may be anticipated. Differential settlement should not exceed $\frac{1}{4}$ inch.

Foundation Setback

The Building Code requires that foundations be a sufficient depth to provide horizontal setback from a descending slope steeper than 3:1. The required setback is $\frac{1}{3}$ the height of the slope with a minimum of five feet and a maximum of 40 feet measured horizontally from the base of the foundation to the slope face.

RETAINING WALLS

General Design - Static Loading

Cantilevered retaining walls up to 12 feet high that support bedrock and approved retaining wall backfill, may be designed for an equivalent fluid pressure of 43 pounds per cubic foot per the enclosed calculations. Restrained basement walls that are pinned at the top by a non-yielding floor should be designed for an at-rest earth pressure. The recommended design at-rest earth pressure on restrained basement walls is an equivalent fluid pressure of 60 pcf.

Seismic Surcharge

In conformance with the Code, retaining walls higher than 6 feet have been considered for seismic loading for the design ground motion resulting from the Maximum Considered Earthquake. The horizontal coefficient of seismic increment (K_E) and seismic increment (P_E) were estimated following procedures by Sitar, N. et. al., 2010, (*Seismic Earth Pressures on Deep Building Basements*, SEAOC 2010 Convention Proceedings). Spectral accelerations at the site were determined for the Maximum Considered Earthquake (MCE) following the procedures in ASCE 7-10 and the 2014 Building Code. The computed PGA_M for this site is 1.03g. The horizontal coefficient of seismic increment (K_E) was assumed to be $\frac{1}{3}(PGA_M) = 0.343g$.

The force required in addition to the static design force to raise the safety factor to at least 1.0 (P_E) was checked using a computerized version of the Mononobe-Okabe method. Ground motion was assumed to be 0.343g.

For 12-foot high cantilevered retaining walls, the static design force is equal to 3.096 kips ($12ft^2 * 43 \text{ pcf} / 2$). For a ground motion of 0.343g and a FS of 1.0, the enclosed calculations indicate an unbalanced force under seismic conditions from the Maximum Considered Earthquake is 2.458 kips. The static design force is higher than the seismic force and there is no seismic increment. For retaining walls higher than 6 feet designed for either a cantilevered or restrained condition, an additional seismic surcharge need not be added.

Surcharge Loading

Retaining walls that are surcharged by traffic and/or structural loads should be designed to withstand the surcharge. For traffic within 10 feet of retaining walls, the recommended traffic surcharge is 100 psf, distributed evenly over the upper 10 feet of wall. Irvine

Geotechnical would be happy to assist the structural engineer in evaluating the surcharge pressure and the point of application from concentrated structural loads.

Subdrain

The recommended design earth pressures assume a free-draining backfill and no buildup of hydrostatic pressures. Retaining walls should be provided with a subdrain or weepholes covered with a minimum of 12 inches of $\frac{3}{4}$ inch crushed gravel. Not all subdrain systems and pipes are approved by all Building Departments. It is recommended that the Building Department be consulted when using non-conventional systems. The subdrain system should discharge to the atmosphere or to an engineered sump via gravity. Surface drains should not be connected to the subdrain system.

Backfill

Retaining wall backfill should be compacted to a minimum of 90 percent of the maximum density as determined by ASTM D 1557-12. Where access between the retaining wall and the temporary excavation prevents the use of compaction equipment, retaining walls should be backfilled with $\frac{3}{4}$ inch crushed gravel to within 2 feet of the ground surface. Where the area between the wall and the excavation exceeds 18 inches, the gravel must be vibrated or wheel-rolled, and tested for compaction. The upper 2 feet of backfill above the gravel should consist of a compacted fill blanket to the surface. Retaining wall backfill should be capped with a paved surface drain or a concrete slab.

Foundation Design

Retaining wall footings may be sized per the FOUNDATION DESIGN section of this report.

Freeboard

Retaining walls surcharged by a sloping condition should be provided with a minimum of 18 inches of freeboard for slough protection. An open "V" drain should be placed behind the wall so that all upslope flows are directed around the structure to the street or an approved location.

TEMPORARY EXCAVATIONS

Temporary excavations will be required to construct the proposed retaining walls. The excavations will be up to 10 feet in height and will expose fill and soil over bedrock. The fill and soil should be trimmed to 1:1 for wall excavations. Northeast excavations will unsupported bedding in the down-dip direction. Northeast-facing excavations are not contemplated. Favorably oriented bedrock is capable of maintaining vertical excavations up to 9 feet per the enclosed calculations. Where vertical excavations in the bedrock exceed 9 feet in height, the upper portion should be trimmed to 1:1 (45 degrees).

A representative of the geotechnical engineer or geologist should be present during grading to see temporary slopes. All excavations should be stabilized within 30 days of initial excavation. Water should not be allowed to pond on top of the excavations nor to flow toward them. No vehicular surcharge should be allowed within three feet of the top of the cut.

Excavation Characteristics

The test pits did not encounter hard, cemented bedrock. Excavation difficulty is a function of the degree of weathering and amount of fracturing within the bedrock. The bedrock generally becomes harder and more difficult to excavate with increasing depth. Hard cemented layers are also known to occur at random locations and depths and may be

encountered during foundation excavation. Should a hard cemented layer be encountered, coring or the use of jackhammers may be necessary.

CORROSION

The pH of the soils is near neutral and not a factor in corrosion. The chloride content is low and not a factor in design. The sulfate content is negligible and not a factor in concrete design. The resistivity indicates that the soils are corrosive to ferrous metals.

FLOOR SLABS & CONCRETE DECKING

Floor slabs and concrete decking should be cast over bedrock or an approved compacted fill cap. The existing fill and soil, if any, should be removed to expose bedrock, the exposed grade should then be scarified to a depth of 6 inches, moistened as required to obtain optimum moisture content, and recompact to 90 percent of the maximum dry density, as determined by ASTM D 1557-12.

Slabs should be at least 4 inches thick and reinforced with a minimum of #4 bars on 16 inch centers, each way. Care should be taken to cast the reinforcement near the center of the slab. Slabs which will be provided with a floor covering should be protected by a polyethylene plastic vapor barrier or other approved moisture barrier.

For performance and concrete curing, it recommended that the vapor barrier be placed over at least two inches of clean sand and then covered by at least two inches of clean sand. The topping sand is intended to prevent punctures during placement of the reinforcing steel and to aid in the concrete cure.

As an alternative, floor slabs may be constructed in conformance with the Green Building Code that requires slabs be poured directly on top of the vapor barrier, which is to be

underlain by four inches of gravel. Since the vapor barrier is to be placed on the gravel, it is important to exercise care to prevent damaging the moisture barrier during construction. From a geotechnical engineering standpoint, a vapor barrier may be placed over 4 inches of gravel, provided that the vapor barrier is of sufficient strength to resist punctures and tearing. If plastic sheeting is used, this may require a greater than 10 mil thickness. Bentonitic barriers such as Miraclay or Volclay may also be used as long as they conform to the minimum requirements of durability, strength and waterproofing. Vapor barriers should conform to ASTM E 1745 and ACI 302.2R-06 (Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials).

Decking that caps a retaining wall should be provided with a flexible joint to allow for the normal one to two percent deflection of the retaining wall. Decking that does not cap a retaining wall should not be tied to the wall. The space between the wall and the deck will require periodic caulking to prevent moisture intrusion into the retaining wall backfill.

It should be noted that cracking of concrete floor slabs is very common during curing. The cracking occurs because concrete shrinks as it dries. Crack control joints which are commonly used in exterior decking to control such cracking are normally not used in interior slabs. The reinforcement recommended above is intended to reduce cracking and its proper placement is critical to the slab's performance. The minor shrinkage cracks which often form in interior slabs generally do not present a problem when carpeting, linoleum, or wood floor coverings are used. The slab cracks can, however, lead to surface cracks in brittle floor coverings such as ceramic tile. A mortar bed or slip sheet is recommended between the slab and tile to limit, the potential for cracking.

Slabs should be protected with a polyethylene plastic vapor barrier placed beneath the slab. This barrier is intended to prevent the upward migration of moisture from the subgrade soils through the porous concrete slab. It should be noted that vapor barriers are penetrated by any number of elements including water lines, drain lines, and footings. These barriers are

therefore not completely watertight. It is recommended that a surface seal be placed on slabs which will receive a wood floor. The floor installer should be consulted regarding an adequate product.

DRAINAGE

Control of site drainage is important for the performance of the proposed project. Pad and roof drainage should be collected and transferred to the street or approved location in non-erosive drainage devices. Drainage should not be allowed to pond on the pad or against any foundation or retaining wall. Drainage should not be allowed to flow uncontrolled over any descending slope. Planters located within retaining wall backfill should be sealed to prevent moisture intrusion into the backfill. Drainage control devices require periodic cleaning, testing and maintenance to remain effective.

Because the site is within a designated hillside area and due to nearby slopes, onsite infiltration of surface runoff is not considered feasible.

WATERPROOFING

Interior and exterior retaining walls are subject to moisture intrusion, seepage, and leakage and should be waterproofed. Waterproofing paints, compounds, or sheeting can be effective if properly installed. Equally important is the use of a subdrain that daylight to the atmosphere. The subdrain should be covered with $\frac{3}{4}$ inch crushed gravel to help the collection of water. Yard areas above the wall should be sealed or properly drained to prevent moisture contact with the wall or saturation of wall backfill.

PLAN REVIEW

Formal plans ready for submittal to the Building Department should be reviewed by Irvine Geotechnical. Any change in scope of the project may require additional work.

SITE OBSERVATIONS DURING CONSTRUCTION

Please advise Irvine Geotechnical at least 24 hours prior to any required site visit. The agency approved plans and permits should be at the jobsite and available to our representative. The project consultant will perform the observation and post a notice at the jobsite of his visit and findings. This notice should be given to the agency inspector.

During construction, a number of reviews by this office are recommended to verify site geotechnical conditions and conformance with the intent of the recommendations for construction. Although not all possible geotechnical observation and testing services are required by the reviewing agency, the more site reviews requested, the lower the risk of future problems. It is recommended that all grading, foundation, and drainage excavations be seen by a representative of the geotechnical engineer PRIOR to placing fill, forms, pipe, concrete, or steel. Any fill which is placed should be approved, tested, and verified if used for engineering purposes. Temporary excavations should be observed by a representative of the Geotechnical Engineer.

The following site reviews are advised or required. Should the observations reveal any unforeseen hazards, the geologist/engineer will recommend treatment.

Pre-construction meeting	Advised
Temporary excavations	Required
Bottom excavation for removals	Required
Compaction of fill	Required
Foundation excavations	Required
Slab subgrade moisture barrier membrane	Advised
Slab subgrade rock placement	Advised

Slab steel placement	Advised
Subdrain and rock placement behind retaining walls	Required
Compaction of retaining wall backfill	Required
Compaction of utility trench backfill	Advised

Irvine Geotechnical requires at least a 24 hour notice prior to any required site visits. The approved plans and building/grading permits should be on the job and available to the project consultant.

FINAL INSPECTION

Many projects are required by the agency to have final geologic and soils engineering reports upon completion of the grading.

CONSTRUCTION SITE MAINTENANCE

It is the responsibility of the contractor to maintain a safe construction site. When excavations exist on a site, the area should be fenced and warning signs posted. All pile excavations must be properly covered and secured. Soil generated by foundation and subgrade excavations should be either removed from the site or properly placed as a certified compacted fill. Soil must not be spilled over any descending slope. Workers should not be allowed to enter any unshored trench excavations over five feet deep.

GENERAL CONDITIONS

This report and the exploration are subject to the following NOTICE. Please read the NOTICE carefully, it limits our liability.

NOTICE

In the event of any changes in the design or location of any structure, as outlined in this report, the conclusions and recommendations contained herein may not be considered valid unless the changes are reviewed by us and the conclusions and recommendations are modified or reaffirmed after such review.

The subsurface conditions, excavation characteristics, and geologic structure described herein and shown on the enclosed cross sections have been projected from excavations on the site as indicated and should in no way be construed to reflect any variations that may occur between these excavations or that may result from changes in subsurface conditions.

Fluctuations in the level of groundwater may occur due to variations in rainfall, temperature, irrigation, and other factors not evident at the time of the measurements reported herein. Fluctuations also may occur across the site. High groundwater levels can be extremely hazardous. Saturation of earth materials can cause subsidence or slippage of the site.

If conditions encountered during construction appear to differ from those disclosed herein, notify us immediately so we may consider the need for modifications. Compliance with the design concepts, specifications or recommendations during construction requires the review of the engineering geologist and geotechnical engineer during the course of construction.

THE EXPLORATION WAS PERFORMED ONLY ON A PORTION OF THE SITE, AND CANNOT BE CONSIDERED AS INDICATIVE OF THE PORTIONS OF THE SITE NOT EXPLORED.

This report is issued and made for the sole use and benefit of the client, is not transferable and is as of the exploration date. Any liability in connection herewith shall not exceed the fee for the exploration. No warranty, expressed or implied, is made or intended in connection with the above exploration or by the furnishing of this report or by any other oral or written statement.

THIS REPORT WAS PREPARED ON THE BASIS OF THE PRELIMINARY DEVELOPMENT PLAN OR CONCEPT FURNISHED. FINAL PLANS SHOULD BE REVIEWED BY THIS OFFICE AS ADDITIONAL GEOTECHNICAL WORK MAY BE REQUIRED.

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Irvine Geotechnical appreciates the opportunity to provide our service on this project. Any questions concerning the data or interpretation of this report should be directed to the undersigned.

Respectfully submitted,
Irvine Geotechnical, Inc.



Jon A. Irvine
E.G. 1691/G.E. 2891

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Enc: Appendix I - Laboratory Testing by Soil Labworks
Shear Test Diagrams (Plates B-1 through B-3)
Vicinity Map
Regional Geologic Map
Log of Test Pits (4 Pages)
Calculation Sheets (18)
Sections A
Geologic Map

xc: (7) Addressee

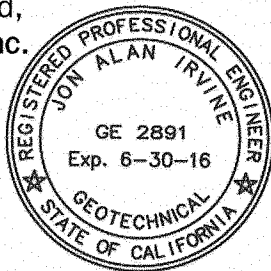
STATEMENT OF RESPONSIBILITY - SOIL TESTING BY SOIL LABWORKS, LLC

Laboratory testing by Soil Labworks, LLC was performed under the supervision of the undersigned engineer. Irvine Geotechnical and Jon A. Irvine has reviewed referenced laboratory testing report dated March 7, 2006 and the results appear to be reasonable for this area of El Sereno. Irvine Geotechnical and the undersigned engineer concurs with the findings of Soil Labworks, LLC and accepts professional responsibility for utilizing the data.

October 15, 2014
IC 06017-I
Page 23

Irvine Geotechnical appreciates the opportunity to provide our service on this project. Any questions concerning the data or interpretation of this report should be directed to the undersigned.

Respectfully submitted,
Irvine Geotechnical, Inc.



Jon A. Irvine
E.G. 1691/G.E. 2891

R:\ICprojects\2006Projects\IC06017HollandChadwick\IC06017HollandChadwickUpdateRpt.wpd

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SL06.443
March 7, 2006

Irvine Geotechnical
145 N. Sierra Madre Boulevard
Suite 12
Pasadena, California 91107

Subject: Laboratory Testing

Site: 2774 Chadwick Drive
Los Angeles, California

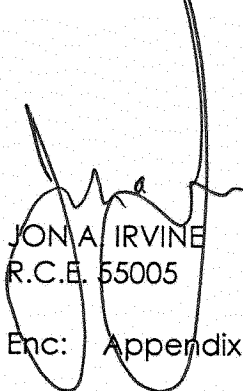
Job: Irvine/Holland

Laboratory testing for the subject property was performed by Soil Labworks, LLC., under the supervision of the undersigned Engineer. Samples of the earth materials were obtained from the subject property by personnel of Irvine Geotechnical and transported to the laboratory of Soil Labworks for testing and analysis. The laboratory tests performed are described and results are attached.

Services performed by this facility for the subject property were conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions.

Respectfully Submitted:

SOIL LABWORKS, LLC


JON A. IRVINE
R.C.E. 55005
Enc: Appendix



APPENDIX

Laboratory Testing

Sample Retrieval - Hand Labor

Samples of earth materials were obtained by driving a thin-walled steel sampler conforming to ASTM D 3550-01 with successive blows of a drop hammer. The earth material was retained in brass rings of 2.416 inches inside diameter and 1.00 inch height. The samples were stored in closefitting, water-tight containers for transportation to the laboratory.

Moisture Density

The field moisture content and dry density were determined for each of the soil samples. The dry density was determined in pounds per cubic foot following ASTM 2937-00. The moisture content was determined as a percentage of the dry soil weight conforming to ASTM 2216-98. The results are presented below in the following table. The percent saturation was calculated on the basis of an estimated specific gravity.

Test Pit/Boring No.	Sample Depth (Feet)	Soil Type	Dry Density (pcf)	Moisture Content (percent)	Percent Saturation ($G_s=2.65$)
TP1	2	Fill	99.1	5.2	21
TP2	2	Soil	99.6	7.7	31
TP2	5	Bedrock	106.8	4.4	21
TP3	2	Soil	96.9	5.7	21
TP3	5	Bedrock	107.3	8.1	40

Shear Strength

The peak and ultimate shear strengths of the fill, soil and bedrock were determined by performing consolidated and drained direct shear tests in conformance with ASTM D3080-03. The tests were performed in a strain-controlled machine manufactured by GeoMatic. The rate of deformation was 0.01 inches per minute. Samples were sheared under varying confining pressures, as shown on the "Shear Test Diagrams," B-Plates. The repeated shear strength of the soil was determined by repeatedly shearing a sample under varying confining pressures in the direct shear machine. The rate of deformation for the last test at each confining pressure was 0.01 inches per minute. The moisture conditions during testing are shown on the following table and on the B-Plates. The samples indicated as saturated were artificially saturated in the laboratory. All saturated samples were sheared under submerged conditions.

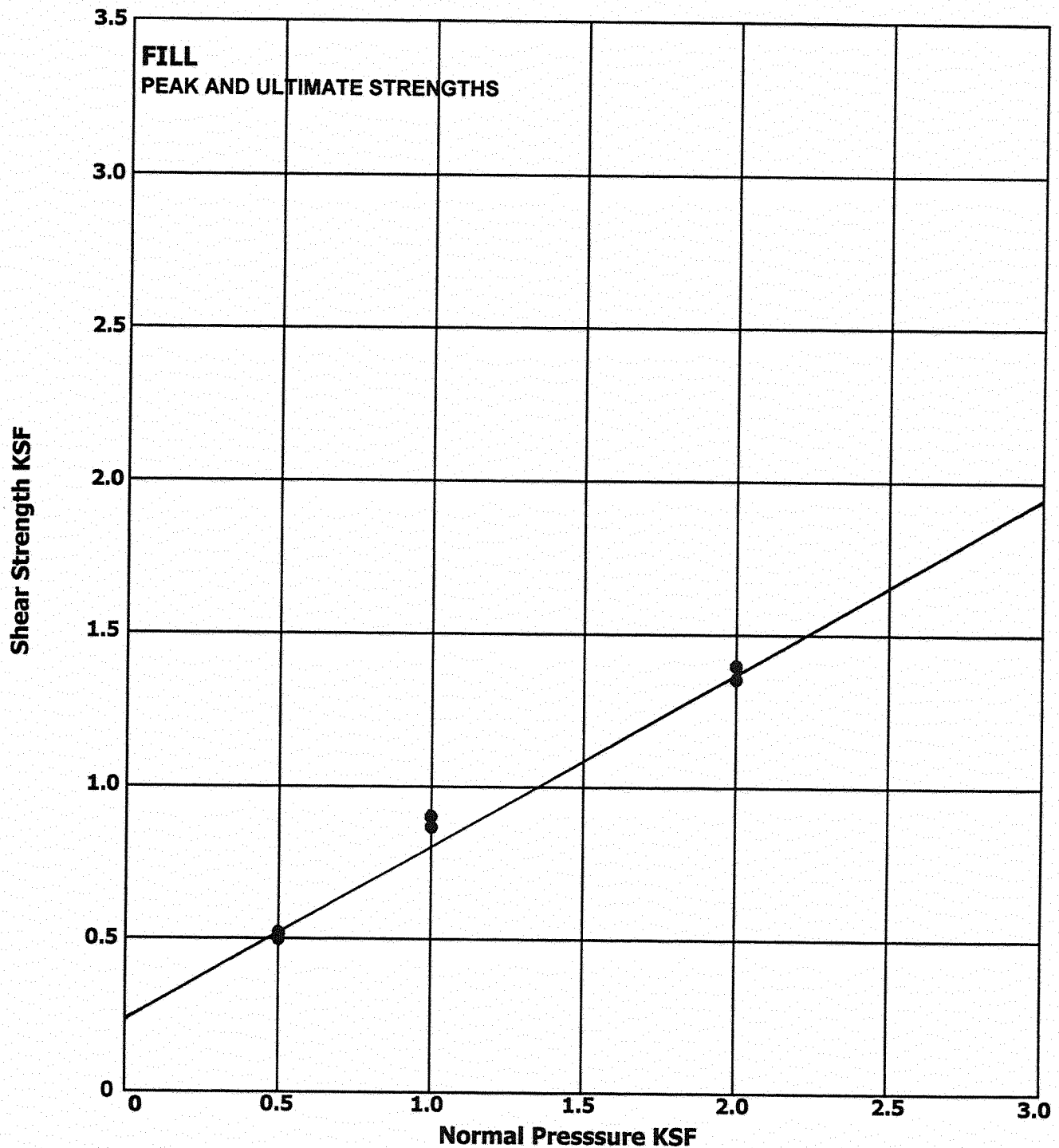
Shear Strength (continued)

Test Pit/ Boring No.	Sample Depth (Feet)	Dry Density (pcf)	As-Tested Moisture Content (percent)
TP1	2	99.1	26
TP3*	2	96.9	25
TP3	5	107.3	23

* Sample repeatedly sheared to determine repeated strength.

SHEAR TEST DIAGRAM

Project: IRVINE/HOLLAND



○ Direct Shear at Field Moisture

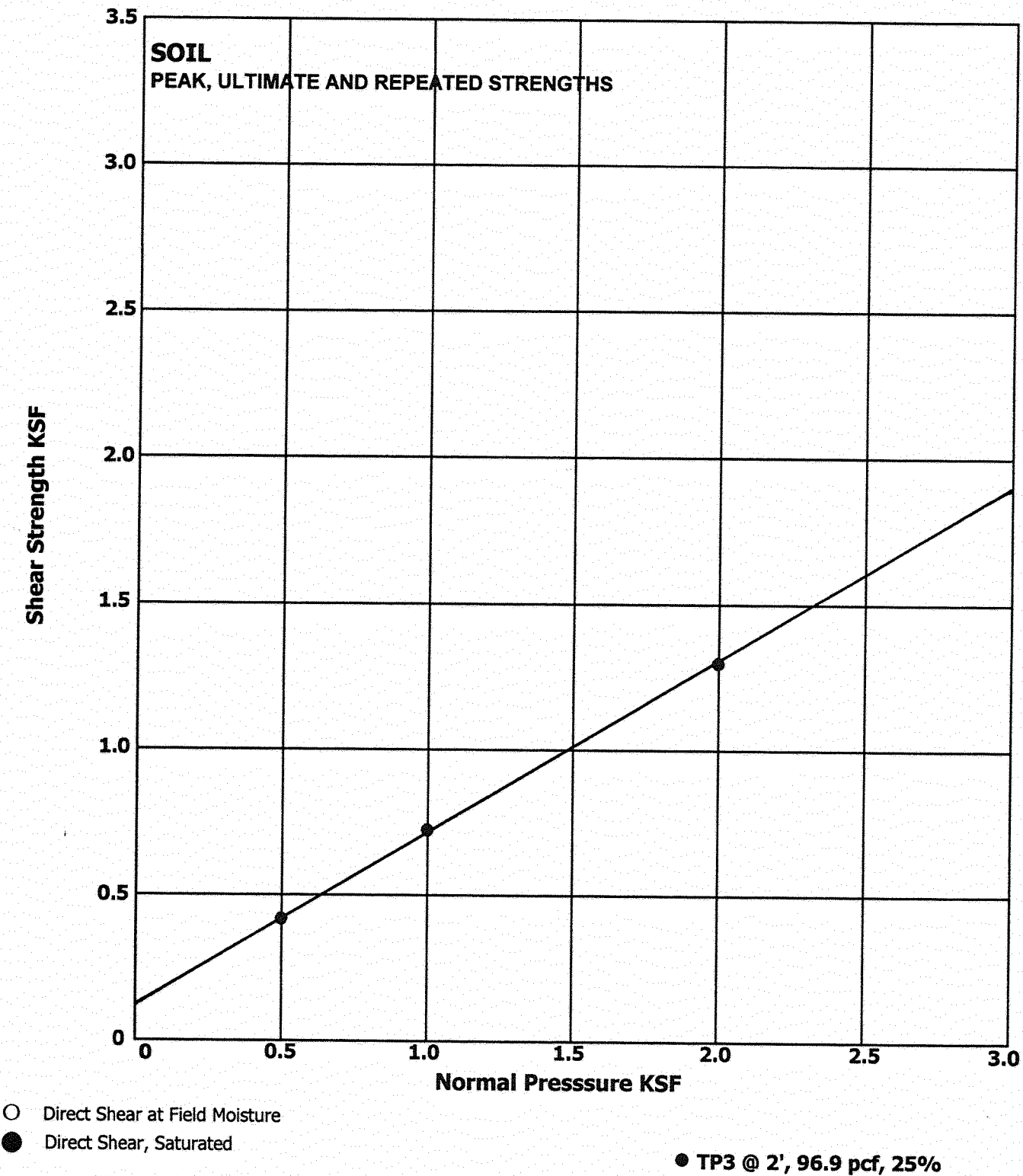
● Direct Shear, Saturated

● TP1 @ 2', 99.1 pcf, 26%



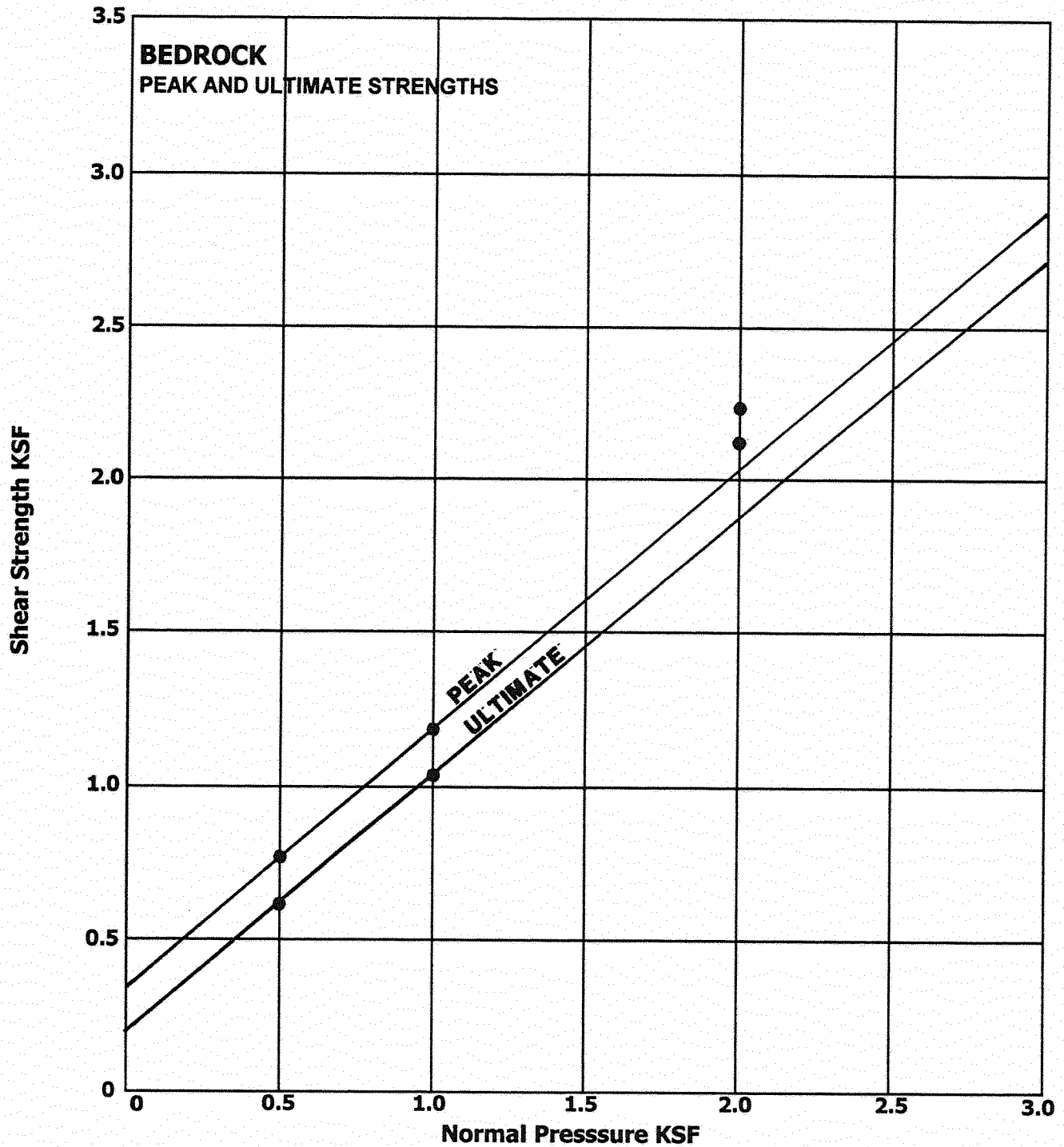
PLATE B-1

SHEAR TEST DIAGRAM
Project: IRVINE/HOLLAND



SHEAR TEST DIAGRAM

Project: IRVINE/HOLLAND



- Direct Shear at Field Moisture
- Direct Shear, Saturated

● TP3 @ 5', 107.3 pcf, 23%



PLATE B-3

IRVINE**GEOTECHNICAL Inc****RETAINING WALL**IC: **1414X** CONSULT: **JAI**
CLIENT: **HOLLAND CHADWICK**

CALCULATION SHEET #

CALCULATE THE DESIGN MINIMUM EQUIVALENT FLUID PRESSURE (EFP) FOR PROPOSED RETAINING WALLS. THE WALL HEIGHT AND BACKSLOPE AND SURCHARGE CONDITIONS ARE LISTED BELOW. ASSUME THE BACKFILL IS SATURATED WITH NO EXCESS HYDROSTATIC PRESSURE. USE THE MONONOB-OKABE METHOD FOR SEISMIC FORCES.

CALCULATION PARAMETERS

EARTH MATERIAL:	FILL	WALL HEIGHT	10 feet
SHEAR DIAGRAM:	B-1	BACKSLOPE ANGLE:	27 degrees
COHESION:	240 psf	SURCHARGE:	0 pounds
PHI ANGLE:	30 degrees	SURCHARGE TYPE:	P Point
DENSITY	125 pcf	INITIAL FAILURE ANGLE:	20 degrees
SAFETY FACTOR:	1.5	FINAL FAILURE ANGLE:	70 degrees
WALL FRICTION	0 degrees	INITIAL TENSION CRACK:	1 feet
CD (C/FS):	160.0 psf	FINAL TENSION CRACK:	50 feet
PHID = ATAN(TAN(PHI)/FS) =	21.1 degrees		
HORIZONTAL PSEUDO STATIC SEISMIC COEFFICIENT (k_h)			0 %g
VERTICAL PSEUDO STATIC SEISMIC COEFFICIENT (k_v)			0 %g

CALCULATED RESULTS

CRITICAL FAILURE ANGLE	48 degrees
AREA OF TRIAL FAILURE WEDGE	69.9 square feet
TOTAL EXTERNAL SURCHARGE	0.0 pounds
WEIGHT OF TRIAL FAILURE WEDGE	8743.2 pounds
NUMBER OF TRIAL WEDGES ANALYZED	2550 trials
LENGTH OF FAILURE PLANE	14.9 feet
DEPTH OF TENSION CRACK	4.0 feet
HORIZONTAL DISTANCE TO UPSLOPE TENSION CRACK	10.0 feet
CALCULATED HORIZONTAL THRUST ON WALL	1941.6 pounds
CALCULATED EQUIVALENT FLUID PRESSURE	38.8 pcf
DESIGN EQUIVALENT FLUID PRESSURE	43.0 pcf

THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALL MAY BE DESIGNED FOR AN EQUIVALENT FLUID PRESSURE OF 43 POUNDS PER CUBIC FOOT.

IRVINE**GEOTECHNICAL Inc****RETAINING WALL**IC: **1414X** CONSULT: **JAI**
CLIENT: **HOLLAND CHADWICK**

CALCULATION SHEET #

CALCULATE THE DESIGN MINIMUM EQUIVALENT FLUID PRESSURE (EFP) FOR PROPOSED RETAINING WALLS. THE WALL HEIGHT AND BACKSLOPE AND SURCHARGE CONDITIONS ARE LISTED BELOW. ASSUME THE BACKFILL IS SATURATED WITH NO EXCESS HYDROSTATIC PRESSURE. USE THE MONONOB-OKABE METHOD FOR SEISMIC FORCES.

CALCULATION PARAMETERS

EARTH MATERIAL:	FILL	WALL HEIGHT	12 feet
SHEAR DIAGRAM:	B-1	BACKSLOPE ANGLE:	0 degrees
COHESION:	240 psf	SURCHARGE:	0 pounds
PHI ANGLE:	30 degrees	SURCHARGE TYPE:	P Point
DENSITY	125 pcf	INITIAL FAILURE ANGLE:	20 degrees
SAFETY FACTOR:	1	FINAL FAILURE ANGLE:	70 degrees
WALL FRICTION	0 degrees	INITIAL TENSION CRACK:	1 feet
CD (C/FS):	240.0 psf	FINAL TENSION CRACK:	50 feet
PHID = ATAN(TAN(PHI)/FS) =	30.0 degrees		
HORIZONTAL PSEUDO STATIC SEISMIC COEFFICIENT (k_h)		0.343 %g	
VERTICAL PSEUDO STATIC SEISMIC COEFFICIENT (k_v)		0 %g	

CALCULATED RESULTS

CRITICAL FAILURE ANGLE	46 degrees
AREA OF TRIAL FAILURE WEDGE	62.9 square feet
TOTAL EXTERNAL SURCHARGE	0.0 pounds
WEIGHT OF TRIAL FAILURE WEDGE	7857.9 pounds
NUMBER OF TRIAL WEDGES ANALYZED	2550 trials
LENGTH OF FAILURE PLANE	11.5 feet
DEPTH OF TENSION CRACK	3.7 feet
HORIZONTAL DISTANCE TO UPSLOPE TENSION CRACK	8.0 feet
CALCULATED HORIZONTAL THRUST ON WALL	2458.4 pounds

THE CALCULATION INDICATES THAT FOR THE DESIGN GROUND MOTION, THE UNBALANCED FORCE ON RETAINING WALLS IS 2.458 KIPS.

IRVINE

GEOTECHNICAL Inc

TEMPORARY EXCAVATION HEIGHT

IC: 1414X CONSULT: JAI
CLIENT: HOLLAND CHADWICK

CALCULATION SHEET #

CALCULATE THE HEIGHT TO WHICH TEMPORARY EXCAVATIONS ARE STABLE (NEGATIVE THRUST).
THE EXCAVATION HEIGHT AND BACKSLOPE AND SURCHARGE CONDITIONS ARE LISTED BELOW.
ASSUME THE EARTH MATERIAL IS SATURATED WITH NO EXCESS HYDROSTATIC PRESSURE.

CALCULATION PARAMETERS

EARTH MATERIAL:	BEDROCK	WALL HEIGHT:	10 feet
SHEAR DIAGRAM:	B-3	BACKSLOPE ANGLE:	45 degrees
COHESION:	350 psf	SURCHARGE:	0 pounds
PHI ANGLE:	41 degrees	SURCHARGE TYPE:	P Point
DENSITY:	133 pcf	INITIAL FAILURE ANGLE:	30 degrees
SAFETY FACTOR:	1.25	FINAL FAILURE ANGLE:	70 degrees
WALL FRICTION:	0 degrees	INITIAL TENSION CRACK:	4 feet
CD (C/FS):	280.0 psf	FINAL TENSION CRACK:	30 feet
PHID = ATAN(TAN(PHI)/FS) =	34.8 degrees		

CALCULATED RESULTS

CRITICAL FAILURE ANGLE	57 degrees
AREA OF TRIAL FAILURE WEDGE	31.7 square feet
TOTAL EXTERNAL SURCHARGE	0.0 pounds
WEIGHT OF TRIAL FAILURE WEDGE	4213.6 pounds
NUMBER OF TRIAL WEDGES ANALYZED	2214 trials
LENGTH OF FAILURE PLANE	7.3 feet
DEPTH OF TENSION CRACK	6.8 feet
HORIZONTAL DISTANCE TO UPSLOPE TENSION CRACK	4.0 feet
CALCULATED HORIZONTAL THRUST	-105.1 pounds
CALCULATED EQUIVALENT FLUID PRESSURE	-2.6 pcf
MAXIMUM HEIGHT OF TEMPORARY EXCAVATION	9.0 feet

CONCLUSIONS:

THE CALCULATION INDICATES THAT TEMPORARY VERTICAL
EXCAVATIONS IN BEDROCK UP TO 9 FEET HIGH HAVE A NEGATIVE
THRUST AND ARE TEMPORARILY STABLE.

IRVINE

GEOTECHNICAL Inc

SURFICIAL STABILITY

IC: 1414X CONSULT: JAI
CLIENT: HOLLAND CHADWICK

CALCULATION SHEET #

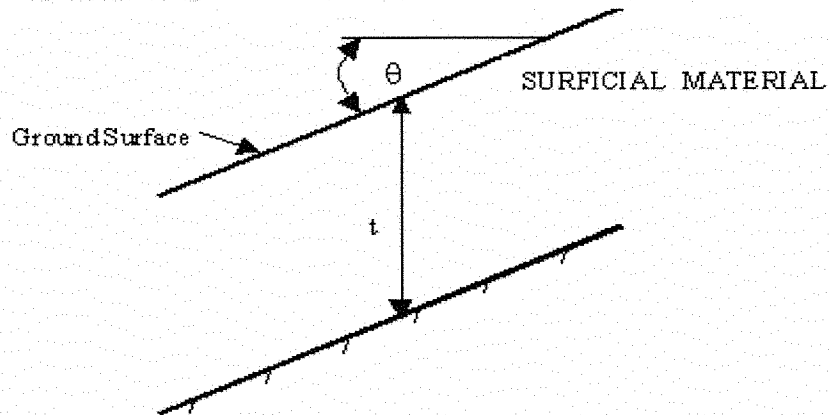
CALCULATE THE SURFICIAL STABILITY OF THE EARTH MATERIAL USING THE INFINITE SLOPE ANALYSIS WITH PARALLEL SEEPAGE. THIS METHOD WAS RECOMMENDED BY THE ASCE AND THE BUILDING AND SAFETY ADVISORY COMMITTEE (8/16/78). MODIFIED FROM SKEMPTON & DeLORY, 1957.

CALCULATION PARAMETERS

EARTH MATERIAL: SOIL

COHESION: 130 psf
PHI ANGLE: 31 degrees
DENSITY: 121 pcf

SHEAR DIAGRAM: B-2
SLOPE ANGLE: 27 degrees
SATURATION DEPTH (t): 2.5 feet



$$FS = \frac{C + (\gamma_{soil} - \gamma_{water}) \cdot t \cdot \cos^2 \theta \tan \Phi}{\gamma_{soil} \cdot t \cdot \cos \Phi \sin \Phi}$$

SAFETY FACTOR = 1.63

CONCLUSIONS:

THE CALCULATION INDICATES THAT UNIFORM SLOPES IN SOIL ARE SURFICIALLY STABLE.

IRVINE**GEOTECHNICAL Inc****SURFICIAL STABILITY**

IC: **1414X** CONSULT: **JAI**
 CLIENT: **HOLLAND CHADWICK**

CALCULATION SHEET #

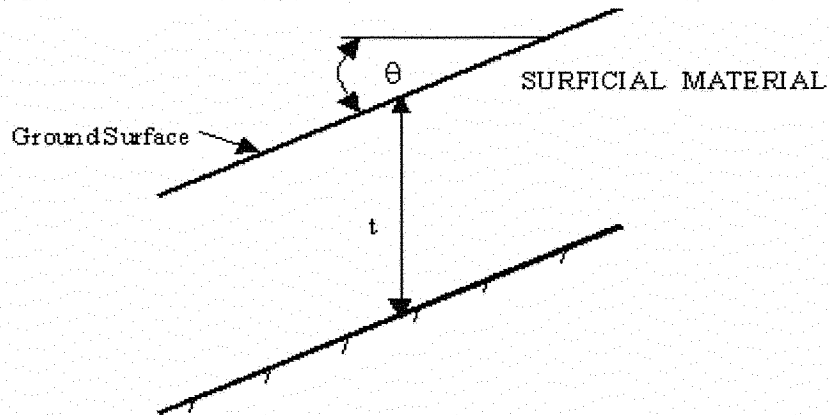
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CALCULATION PARAMETERS

EARTH MATERIAL: FILL

COHESION: 240 psf
 PHI ANGLE: 30 degrees
 DENSITY: 125 pcf

SHEAR DIAGRAM: B-1
 SLOPE ANGLE: 27 degrees
 SATURATION DEPTH (t): 3.0 feet



$$FS = \frac{C + (\gamma_{\text{soil}} - \gamma_{\text{water}}) \cdot t \cdot \cos^2 \theta \tan \Phi}{\gamma_{\text{soil}} \cdot t \cdot \cos \Phi \sin \Phi}$$

SAFETY FACTOR = 2.15**CONCLUSIONS:**

THE CALCULATION INDICATES THAT UNIFORM SLOPES IN FILL ARE SURFICIALLY STABLE.

**BOARD OF
BUILDING AND SAFETY
COMMISSIONERS****EFREN ABRATIQUE, P.E.**
PRESIDENT**JAVIER NUÑEZ**
VICE-PRESIDENT**VAN AMBATIELOS****PEDRO BIRBA****MARSHA L. BROWN****CITY OF LOS ANGELES**
CALIFORNIA**ANTONIO R. VILLARAIGOSA**
MAYOR**DEPARTMENT OF
BUILDING AND SAFETY**
201 NORTH FIGUEROA STREET
LOS ANGELES, CA 90012**ANDREW A. ADELMAN, P.E.**
GENERAL MANAGER**RAYMOND CHAN**
EXECUTIVE OFFICER**GEOLOGY AND SOILS REPORT APPROVAL LETTER**

June 6, 2006

Log # 53317

SOILS/GEOLOGY FILE - 2

Matt Holland
P.O. Box 505
Pasadena, CA 91102TRACT: P M 968
LOT: B
LOCATION: 2774 N. Chadwick Circle

<u>CURRENT REFERENCE</u> <u>REPORT/LETTER(S)</u>	<u>REPORT</u> <u>NO.</u>	<u>DATE(S) OF</u> <u>DOCUMENT</u>	<u>PREPARED BY</u>
Geology/Soils Report	IC 06017-I	04/17/06	Irvine Geotechnical
Oversize Document	"	"	"

The referenced report concerning the proposed new multi-level single family residence has been reviewed by the Grading Division of the Department of Building and Safety.

It should be noted that the site will be subject to the requirements of the Retaining Walls in Hillside Areas, Ordinance No. 176, 445 (effective 03/09/2005) which places limitations on height(s) and location(s) of retaining walls in hillside areas. A copy of the ordinance may be obtained from the City Planning web site at <http://cityplanning.lacity.org>.

The report is acceptable, provided the following conditions are complied with during site development:

(Note: Numbers in parenthesis () refer to applicable sections of the 2002 City of LA Building Code. P/BC numbers refer the applicable Information Bulletin. Information Bulletins can be accessed on the internet at LADBS.ORG.)

1. All new graded slopes shall be no steeper than 2H:1V (7010.2 & 7011.2).
2. Existing uncertified fill and natural soils shall not be used for support of footings, concrete slabs or new fill. (7011.3 & 1806.1)
3. All footings shall be founded in competent bedrock, as recommended.
4. All recommendations of the reports which are in addition to or more restrictive than the conditions contained herein shall be incorporated into the plans.

Page 2

2774 N. Chadwick Circle

5. A copy of the subject and appropriate referenced reports and this approval letter shall be attached to the District Office and field set of plans. Submit one copy of the above reports to the Building Department Plan Checker prior to issuance of the permit. (7006.1)
6. The geologist and soils engineer shall review and approve the detailed plans prior to issuance of any permits. This approval shall be by signature on the plans which clearly indicates that the geologist and soils engineer have reviewed the plans prepared by the design engineer and that the plans include the recommendations contained in their reports.
7. Footings adjacent to a descending slope steeper than 3:1 in gradient shall be located a distance of one-third the vertical height of the slope but need not exceed 40 feet measured horizontally from the footing bottom to the face of the slope. (1806.5.3 & 1806.5.4)
8. Pile and/or caisson shafts shall be designed for a lateral load of 1000 pounds per linear foot of shaft exposed to fill, soil and weathered bedrock. (P/BC 2001-50)
9. The applicant is advised that the approval of this report does not waive the requirements for excavations contained in the State Construction Safety Orders enforced by the State Division of Industrial Safety. (3301.1)
10. Prior to excavation, an initial inspection shall be called at which time sequence of shoring (if utilized), protection fences and dust and traffic control will be scheduled.
11. The portion of all un-surcharged temporary vertical excavations in favorably oriented bedrock greater than 9 feet in height shall either be shored or sloped back to a 1:1 horizontal to vertical slope gradient.
12. The portion of all un-surcharged temporary vertical excavations in soil and /or fill shall be sloped back to a 1:1 horizontal to vertical slope gradient.
13. The geologist and soils engineer shall inspect all excavations to determine that conditions anticipated in the report have been encountered and to provide recommendations for the correction of hazards found during grading. (7008.2)
14. All loose foundation excavation material shall be removed prior to commencement of framing. Slopes disturbed by construction activities shall be restored. (7005.3)
15. Cantilevered retaining walls up to a maximum height of 12 feet shall be designed for a minimum equivalent fluid pressure of 34 pcf, as recommended.
16. Restrained basement retaining walls shall be designed as recommended on page 13 of the referenced report dated April 17, 2006.
17. All retaining walls shall be provided with a standard surface backdrain system and all drainage shall be conducted to the street in an acceptable manner and in a non-erosive device. (7013.11)

Page 3

2774 N. Chadwick Circle

18. The rear yard retaining walls shall be provided with a minimum freeboard of 18-inches.
19. The recommended equivalent fluid pressure (EFP) for the proposed retaining wall shall apply from the top of the freeboard to the bottom of the wall footing.
20. All retaining walls shall be provided with a subdrain system to prevent possible hydrostatic pressure behind the wall. Prior to issuance of any permit, the retaining wall subdrain system recommended in the soil report shall be incorporated into the foundation plan which shall be reviewed and approved by the soils engineer of record. (7015.5 & 108.9)
21. Installation of the subdrain system shall be inspected and approved by the soils engineer of record and the City grading/building inspector. (7015.5 & 108.9)
22. The dwelling shall be connected to the public sewer system. (P/BC 2001-27)
23. A grading permit shall be obtained. (106.1.2)
24. Grading shall be scheduled for completion prior to the start of the rainy season, or detailed temporary erosion control plans shall be filed in a manner satisfactory to the Grading Inspection Division of the Department and the Department of Public Works, Bureau of Engineering, B-Permit Section, for any grading work in excess of 200 cu yd. (7007.1)
201 N. Figueroa Street Room 770, LA (213) 977-6039
25. All roof and pad drainage shall be conducted to the street in an acceptable manner. Water shall not be dispersed on to descending slopes without specific approval from the Grading Division and the consulting geologist and soils engineer. (7013.10)
26. Subdrains shall be installed in all drainage courses within which compacted fill is to be placed. (7013.8)
27. All graded, brushed or bare slopes shall be planted with low-water consumption, native-type plant varieties. (7012)
28. All man-made fill shall be compacted to a minimum 90 percent of the maximum dry density of the fill material per the latest version of ASTM D 1557. Where cohesionless soil having less than 15 percent finer than 0.005 millimeters is used for fill, it shall be compacted to a minimum of 95 percent relative compaction based on maximum dry density (D1556). Placement of gravel in lieu of compacted fill is allowed only if complying with Section 91.7011.3 of the Code.(7011.3)
29. Prior to the placing of compacted fill, a representative of the consulting soils engineer shall inspect and approve the bottom excavations. He shall post a notice on the job site for the LADBS Grading Inspector and the Contractor stating that the soil inspected meets the conditions of the report, but that no fill shall be placed until the LADBS Grading Inspector has also inspected and approved the bottom excavations. A written certification to this effect

Page 4

2774 N. Chadwick Circle

shall be filed in the final compaction report filed with the Grading Engineering Division of the Department. All fill shall be placed under the inspection and approval of the soils engineer. A compaction report together with the approved soil report and Department approval letter shall be submitted to the Grading Engineering Division of the Department upon completion of the compaction. The engineer's certificate of compliance shall include the grading permit number and the legal description as described in the permit (7011.3).

30. Prior to the pouring of concrete, a representative of the consulting soils engineer shall inspect and approve the footing excavations. He shall post a notice on the job site for the LADBS Building Inspector and the Contractor stating that the work so inspected meets the conditions of the report, but that no concrete shall be poured until the LADBS Building Inspector has also inspected and approved the footing excavations. A written certification to this effect shall be filed with the Department upon completion of the work. (108.9 & 7008.2)
31. The LABC Soil Type underlying the site is S_c as recommended in the report. The minimum horizontal distances to known seismic sources shall conform to the Maps of Known Active Fault Near Source Zones published by ICBO (1636A)


JEFFREY T. WILSON
Engineering Geologist I


PASCAL CHALLITA
Geotechnical Engineer II

JTW/PC:jtw/pc
53317
(213) 482-0480

cc: Irvine Geotechnical, Inc., Geotechnical Consultant
LA District Office

118.20000° W

118.18333° W

118.16667° W

WGS84 118.15000° W

VICINITY MAP

34.10000° N

34.08333° N

34.06667° N

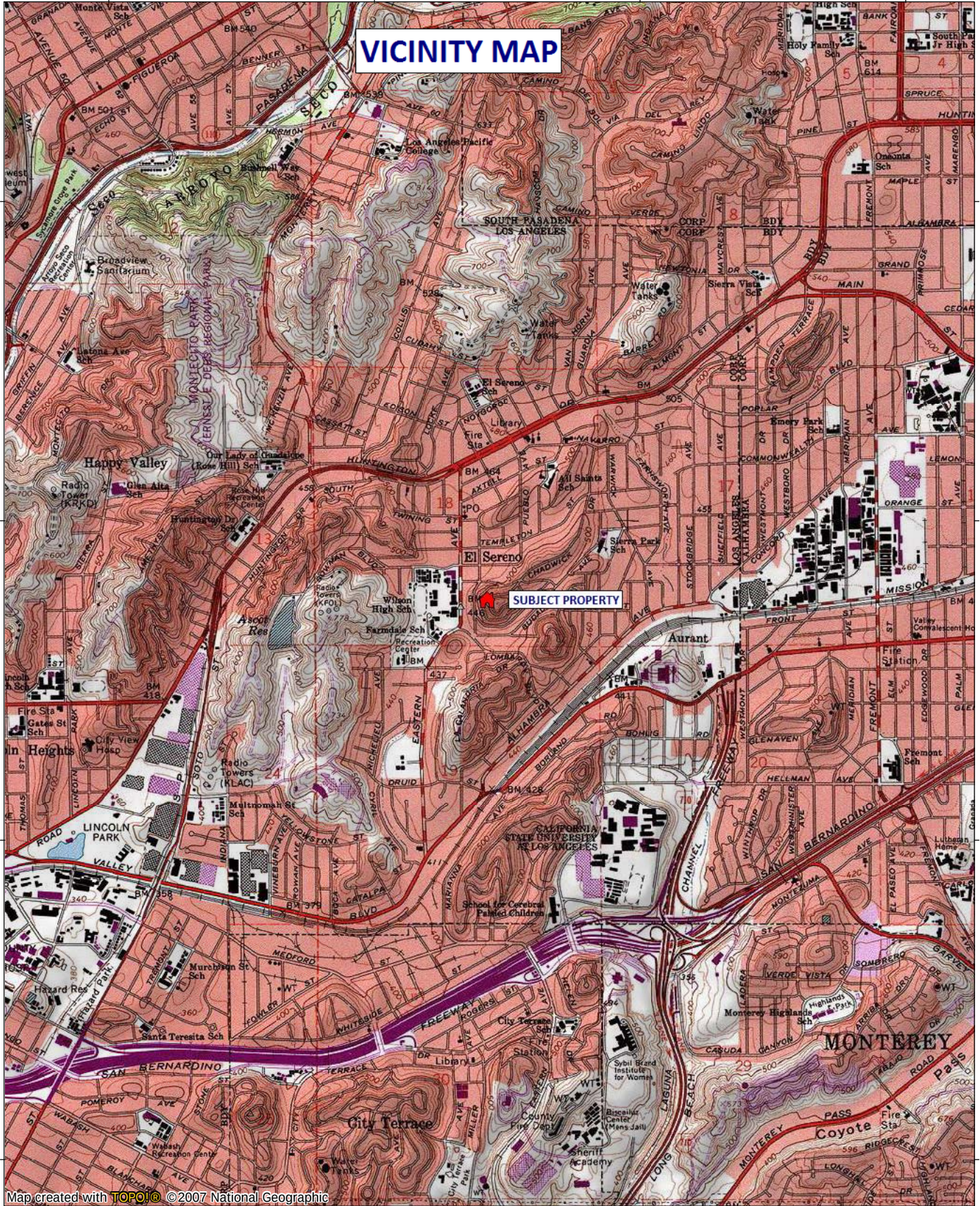
34.05000° N

34.10000° N

34.08333° N

34.06667° N

34.05000° N



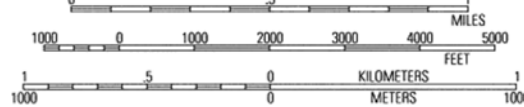
Map created with TOPO! © 2007 National Geographic

118.20000° W

118.18333° W

118.16667° W

WGS84 118.15000° W



TN
MN
12½°
10/15/14

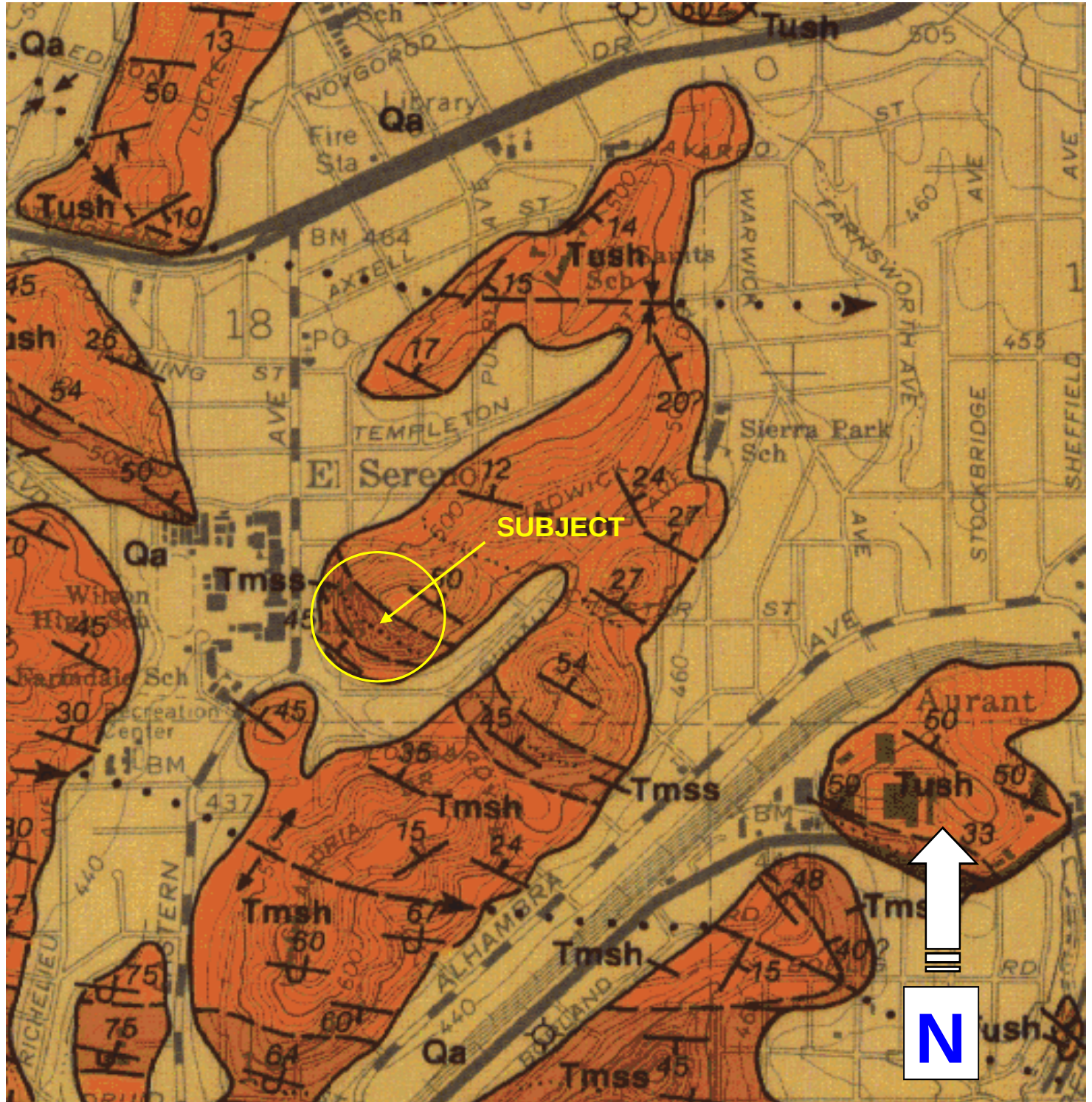
IRVINE

GEOTECHNICAL Inc

REGIONAL GEOLOGIC MAP

IC: 06017-I CONSULT: JAI
CLIENT HOLLAND - 2774 CHADWICK
SCALE: 1" = 1000'

REFERENCE: Geologic Map of the Los Angeles Quadrangle, Dibblee, 1987



LOG OF TEST PITS

PROJECT	IC 06017 Holland - Chadwick
DRILL DATE	2/20/2006
LOG DATE	2/20/2006
LOGGED BY	JAI
DRILL TYPE	HAND LABOR
DIAMETER	30 INCHES

SURFACE ELEVATION	194 feet
DRILLING CONTRACTOR	Mike Howell Excavating
SURFACE CONDITIONS	Steep Slope

TEST PIT 1

Page 1 of 1

Sample Type	Sample Depth (feet)	Blows per foot	Moisture (%)	Dry Unit Weight (pcf)	Saturation (%)	USCS Code	Elevation (feet)	Depth (feet)	Lithologic Description
R	2	n/a	5.2	99.1	21	SM	194.0	0	FILL: Silty Sand with Sandstone fragments, mottled grey and brown, slightly moist, medium dense
							193.0	1	
							192.0	2	
						SM	191.0	3	SOIL: Clayey Sand, dark brown, moist
							190.0	4	BEDROCK: Sandstone, orange, massive, hard, slightly weathered
						189.0	5	END TP @ 5': No Water, No Caving	

The logo for IRVINE GEOTECHNICAL Inc features the word "IRVINE" in a large, bold, sans-serif font. Below it, the words "GEOTECHNICAL Inc" are written in a smaller, bold, sans-serif font. A stylized graphic of a yellow and brown wavy line, resembling a geological profile, is positioned behind the text.

LOG OF TEST PITS

PROJECT IC 06017 Holland - Chadwick
DRILL DATE 2/20/06
LOG DATE 2/20/06
LOGGED BY JAI
DRILL TYPE HAND LABOR
DIAMETER 30 INCHES

SURFACE ELEVATION 171 feet
DRILLING CONTRACTOR Mike Howell Excavating
SURFACE CONDITIONS Steep Slope

TEST PIT 2

Page 1 of 1

Sample Type	Sample Depth (feet)	Blows per foot	Moisture (%)	Dry Unit Weight (pcf)	Saturation (%)	USCS Code	Elevation (feet)	Depth (feet)	Lithologic Description
R	2	n/a	7.7	99.6	31	SM	171.0	0	FILL: Silty Sand with Sandstone fragments, mottled grey and brown, slightly moist, medium dense
							170.0	1	
						SC	169.0	2	SOIL: Clayey Sand, dark brown, moist, medium dense
R	5	n/a	4.4	106.8	21		168.0	3	BEDROCK: Sandstone, grey, orange, brown, thickly bedded, moderately weathered
							167.0	4	
							166.0	5	END TP @ 5': No Water, No Caving, Fill to 1½ feet
									NOTE: Bedding N45W; 55NE

The logo for IRVINE GEOTECHNICAL Inc features the word "IRVINE" in a large, bold, sans-serif font. Below it, the words "GEOTECHNICAL Inc" are written in a smaller, bold, sans-serif font. A stylized graphic of a yellow and brown wavy line, resembling a geological profile, is positioned behind the text.

LOG OF TEST PITS

PROJECT IC 06017 Holland - Chadwick
DRILL DATE 2/20/06
LOG DATE 2/20/06
LOGGED BY JAI
DRILL TYPE HAND LABOR
DIAMETER 30 INCHES

SURFACE ELEVATION 171 feet
DRILLING CONTRACTOR Mike Howell Excavating
SURFACE CONDITIONS Steep Slope

TEST PIT 3

Page 1 of 1

Sample Type	Sample Depth (feet)	Blows per foot	Moisture (%)	Dry Unit Weight (pcf)	Saturation (%)	USCS Code	Elevation (feet)	Depth (feet)	Lithologic Description
R	2	n/a	5.7	96.9	21	SM	171.0	0	FILL: Silty Sand with Sandstone fragments, mottled grey and brown, slightly moist, medium dense
						SC	170.0	1	
							169.0	2	SOIL: Clayey Sand, dark brown, moist, medium dense
							168.0	3	
R	5	n/a	8.1	107.3	40		167.0	4	BEDROCK: Sandstone, grey, orange, brown, thickly bedded
							166.0	5	
									END TP @ 5': No Water, No Caving, Fill to 1½ feet NOTE: Bedding N50W; 58NE

The logo for IRVINE GEOTECHNICAL Inc features the word "IRVINE" in a large, bold, sans-serif font. Below it, the words "GEOTECHNICAL Inc" are written in a smaller, bold, sans-serif font. A stylized graphic of a yellow and brown wavy line, resembling a geological profile or a road, runs diagonally across the background of the logo.

LOG OF TEST PITS

PROJECT IC 06017 Holland - Chadwick
DRILL DATE 2/20/06
LOG DATE 2/20/06
LOGGED BY JAI
DRILL TYPE HAND LABOR
DIAMETER 30 INCHES

SURFACE ELEVATION 194 feet
DRILLING CONTRACTOR Mike Howell Excavating
SURFACE CONDITIONS Steep Slope

TEST PIT 4

Page 1 of 1

Sample Type	Sample Depth (feet)	Blows per foot	Moisture (%)	Dry Unit Weight (pcf)	Saturation (%)	USCS Code	Elevation (feet)	Depth (feet)	Lithologic Description
						SM	194.0	0	FILL: Silty Sand with Sandstone fragments, medium dense
							193.0	1	
							192.0	2	
							191.0	3	
							190.0	4	
							189.0	5	BEDROCK: Sandstone, orange, massive, hard, slightly weathered
							188.0	6	
							187.0	7	
									END TP @ 7': No Water, No Caving, Fill to 5 feet

PSH Deaggregation on NEHRP C soil 2774_Chadwick 118.176° W, 34.079 N.

Peak Horiz. Ground Accel. ≥ 0.5687 g

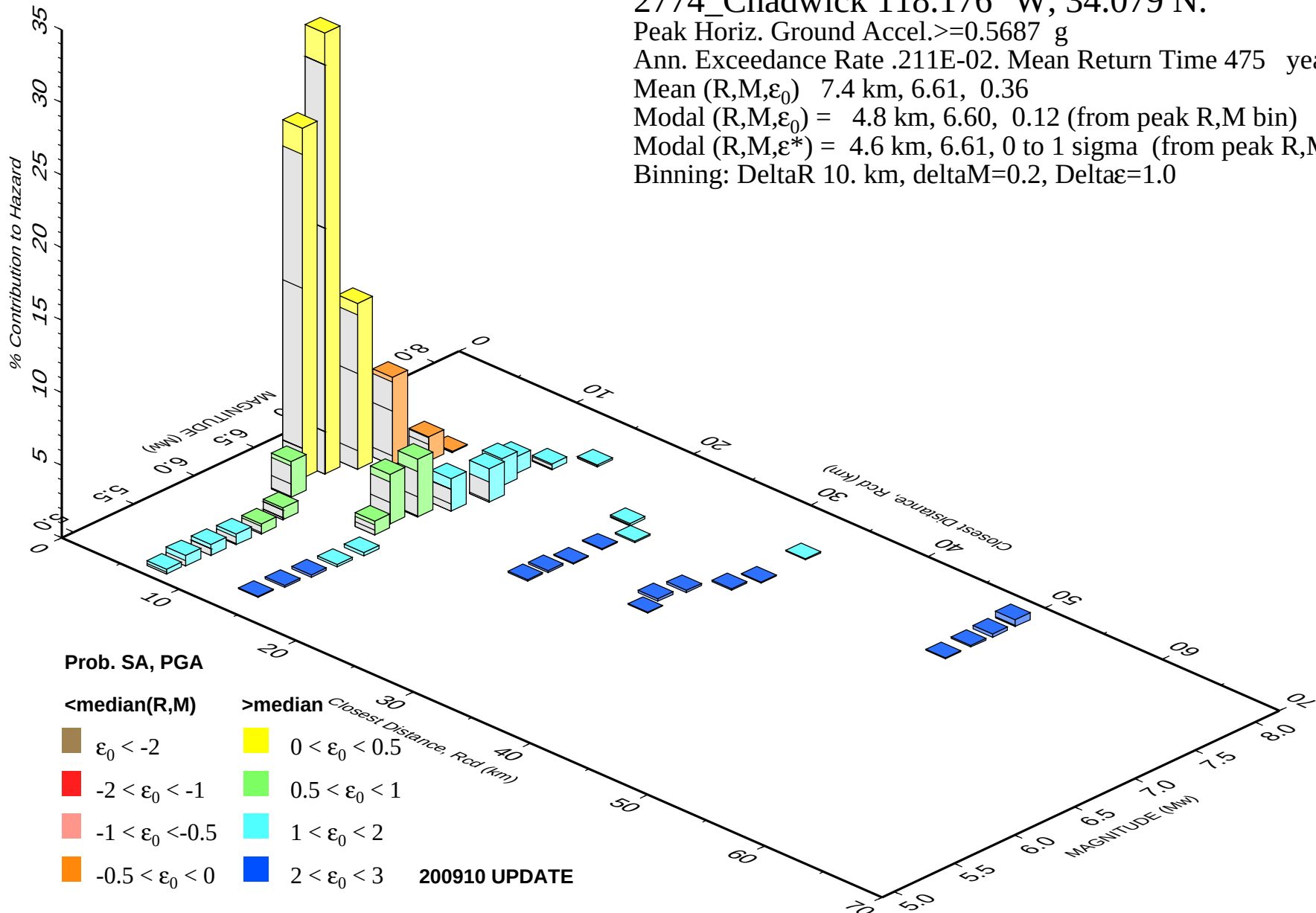
Ann. Exceedance Rate .211E-02. Mean Return Time 475 years

Mean (R,M, ϵ_0) 7.4 km, 6.61, 0.36

Modal (R,M, ϵ_0) = 4.8 km, 6.60, 0.12 (from peak R,M bin)

Modal (R,M, ϵ^*) = 4.6 km, 6.61, 0 to 1 sigma (from peak R,M, ϵ bin)

Binning: DeltaR 10. km, deltaM=0.2, Delta ϵ =1.0



The logo for Irvine Geotechnical Inc features the word "IRVINE" in a bold, sans-serif font. Below it is a stylized yellow wave. A thick, dark brown diagonal line crosses the wave. At the bottom, the words "GEOTECHNICAL Inc" are written in a smaller, italicized font.

IRVINE

GEOTECHNICAL Inc

SCREENING ACCELERATION

IC: 1414x CONSULT: JAI

CLIENT HOLLAND CHADWICK

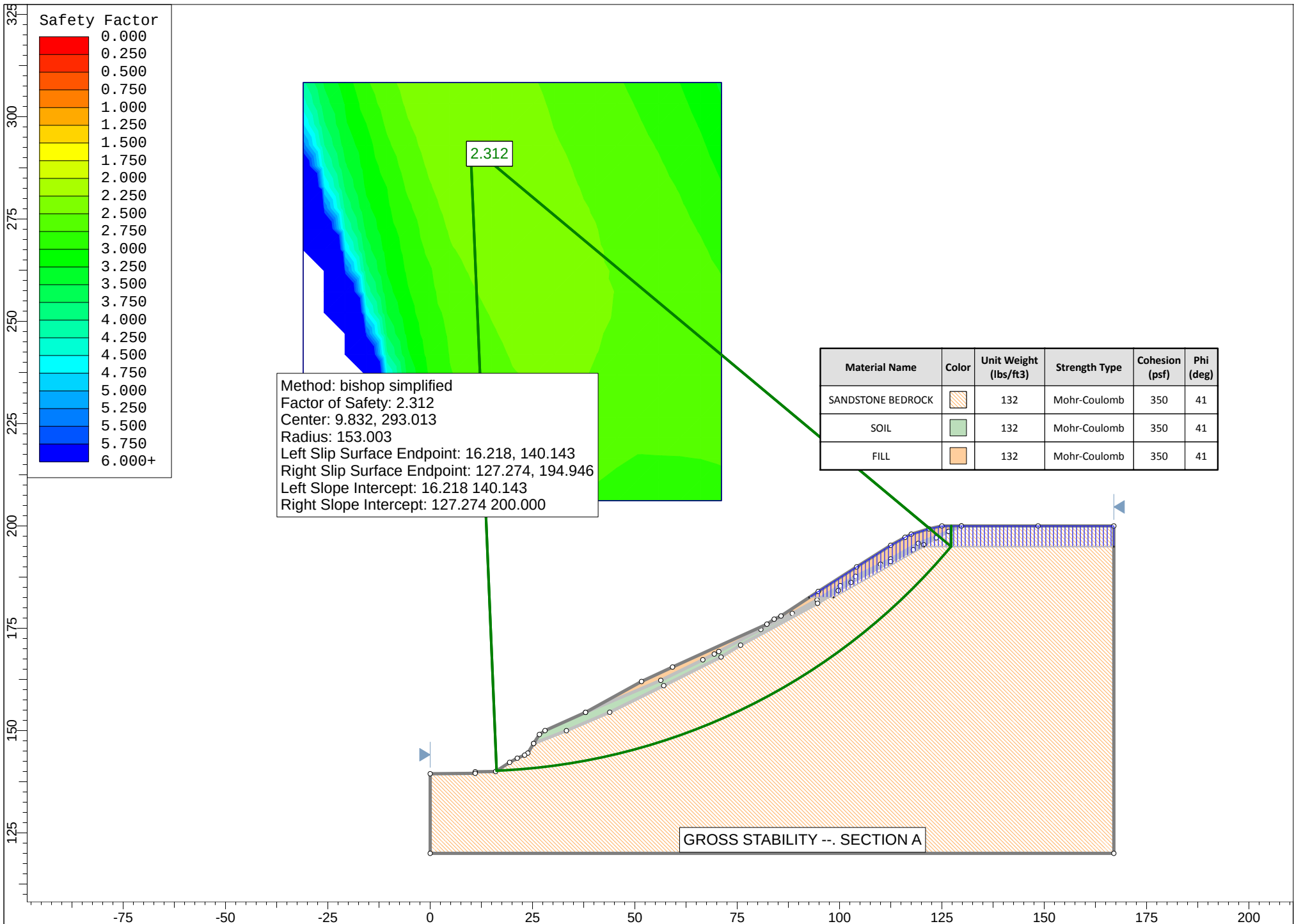
CONSULT

REFERENCES

CGS, SP117A, 2008 (Guidelines for Evaluating and Mitigating Seismic Hazards in California) & SCEC, 2002 (Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landsliding in California)

Longitude	118.176 W
Latitude	34.079 N
Mean Return Time	475 years
Modal EQ Magnitude (M)	6.6
Modal Source Distance (r)	4.8 km
Max. Horizontal Acceleration (MHA)	0.687 g
Significant Duration of Shaking (D ₅₋₉₅)	10.07 secs
Modal Mean Period (T _m)	0.471
Nonlinear Response Factor (NRF)	0.623
Design Allowable Displacement	5 cm
Seismic Factor (f _{eq})	0.499
Screening Acceleration (K_{eq})	0.343 g

CONCLUSIONS: The screening acceleration for determining the seismic slope stability is 0.343g.



Slide Analysis Information

Project Summary

File Name: IC06017 HollandChadwick
Slide Modeler Version: 6.029

General Settings

Units of Measurement: Imperial Units
Time Units: seconds
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check $m\alpha < 0.2$: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft³
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: Grid Search
Radius Increment: 10

Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Tension Crack

Tension crack Water level: filled with water

Material Properties

Property	SANDSTONE BEDROCK	SOIL	FILL
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	132	132	132
Cohesion [psf]	350	350	350
Friction Angle [deg]	41	41	41
Water Surface	None	None	None
Ru Value	0	0	0

Global Minimums

Method: bishop simplified

FS: 2.311520
Center: 9.832, 293.013
Radius: 153.003
Left Slip Surface Endpoint: 16.218, 140.143
Right Slip Surface Endpoint: 127.274, 194.946
Left Slope Intercept: 16.218 140.143
Right Slope Intercept: 127.274 200.000
Resisting Moment=3.24562e+007 lb-ft
Driving Moment=1.4041e+007 lb-ft
Total Slice Area=1582.82 ft2

Valid / Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces: 4408
Number of Invalid Surfaces: 443

Error Codes:

Error Code -98 reported for 66 surfaces
Error Code -103 reported for 8 surfaces
Error Code -106 reported for 6 surfaces
Error Code -1000 reported for 363 surfaces

Error Codes

The following errors were encountered during the computation:

-98 = Circular slip surface is entirely within the tension crack zone.

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.

-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.

-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 2.31152

Slice Number	Width [ft]	Weight [lbs]	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]
1	4.44226	768.726	SANDSTONE BEDROCK	350	41	212.001	490.044	161.102	0	161.102
2	4.44226	2122	SANDSTONE BEDROCK	350	41	320.731	741.376	450.227	0	450.227
3	4.44226	4781.52	SANDSTONE BEDROCK	350	41	533.129	1232.34	1015.01	0	1015.01
4	4.44226	5900.83	SANDSTONE BEDROCK	350	41	617.33	1426.97	1238.91	0	1238.91
5	4.44226	6656	SANDSTONE BEDROCK	350	41	670.74	1550.43	1380.94	0	1380.94
6	4.44226	7493.16	SANDSTONE BEDROCK	350	41	729.351	1685.91	1536.79	0	1536.79
7	4.44226	8356.92	SANDSTONE BEDROCK	350	41	788.637	1822.95	1694.44	0	1694.44
8	4.44226	9138.42	SANDSTONE BEDROCK	350	41	840.144	1942.01	1831.39	0	1831.39
9	4.44226	9714.27	SANDSTONE BEDROCK	350	41	874.663	2021.8	1923.19	0	1923.19
10	4.44226	10095.6	SANDSTONE BEDROCK	350	41	893.529	2065.41	1973.35	0	1973.35
11	4.44226	10368.1	SANDSTONE BEDROCK	350	41	903.574	2088.63	2000.07	0	2000.07
12	4.44226	10542.7	SANDSTONE BEDROCK	350	41	905.837	2093.86	2006.08	0	2006.08
13	4.44226	10622.1	SANDSTONE BEDROCK	350	41	900.736	2082.07	1992.52	0	1992.52
14	4.44226	10602.5	SANDSTONE BEDROCK	350	41	888.199	2053.09	1959.18	0	1959.18
15	4.44226	10485.4	SANDSTONE BEDROCK	350	41	868.554	2007.68	1906.95	0	1906.95
16	4.44226	10512.4	SANDSTONE BEDROCK	350	41	858.911	1985.39	1881.3	0	1881.3
			SANDSTONE							

			BEDROCK							
18	4.44226	10673.4	SANDSTONE BEDROCK	350	41	845.621	1954.67	1845.96	0	1845.96
19	4.44226	10571.2	SANDSTONE BEDROCK	350	41	825.825	1908.91	1793.32	0	1793.32
20	4.44226	10317.7	SANDSTONE BEDROCK	350	41	795.723	1839.33	1713.28	0	1713.28
21	4.44226	9897.88	SANDSTONE BEDROCK	350	41	754.767	1744.66	1604.37	0	1604.37
22	4.44226	9294.53	SANDSTONE BEDROCK	350	41	702.378	1623.56	1465.07	0	1465.07
23	4.44226	8337.72	SANDSTONE BEDROCK	350	41	628.656	1453.15	1269.03	0	1269.03
24	4.44226	6680.11	SANDSTONE BEDROCK	350	41	513.958	1188.03	964.039	0	964.039
25	4.44226	4386.25	SANDSTONE BEDROCK	350	41	365.383	844.591	568.962	0	568.962

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 2.31152

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	16.2181	140.143	0	0	0
2	20.6603	140.393	901.402	0	0
3	25.1026	140.774	2154.9	0	0
4	29.5448	141.285	4004.18	0	0
5	33.9871	141.928	5949.12	0	0
6	38.4293	142.706	7854.9	0	0
7	42.8716	143.619	9690.73	0	0
8	47.3139	144.672	11411.1	0	0
9	51.7561	145.865	12956.8	0	0
10	56.1984	147.204	14267.4	0	0
11	60.6406	148.692	15300.4	0	0
12	65.0829	150.334	16030.8	0	0
13	69.5251	152.135	16442.2	0	0
14	73.9674	154.101	16526	0	0
15	78.4097	156.239	16281.8	0	0
16	82.8519	158.558	15717.6	0	0
17	87.2942	161.068	14812.2	0	0
18	91.7364	163.778	13541.9	0	0
19	96.1787	166.703	11899.2	0	0
20	100.621	169.857	9910.95	0	0
21	105.063	173.259	7617.24	0	0
22	109.505	176.93	5079.93	0	0
23	113.948	180.897	2387.89	0	0
24	118.39	185.193	-270.793	0	0
25	122.832	189.858	-2485.08	0	0

26	127.274	194.946	797.079	0	0
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List Of Coordinates

Tension Crack

X	Y
92.5396	182.513
98.551	182.513
120.665	194.946
167	194.946

External Boundary

X	Y
0	139.455
0	120
167	120
167	200
148.5	200
129.773	200
125	200
121.846	199.297
117.526	198
116	197.215
112.5	195.272
104.161	190
94.7981	184
85.6851	178
84.0155	177.231
82.2368	176
59.1891	165.526
51.6091	162
37.9449	154.446
28.0492	150
26.6824	149.037
25.2835	146.852
23.8366	144.497
23.0631	144
21.2599	143.248
19.3992	142.227
16	140
11	139.933
11	139.562

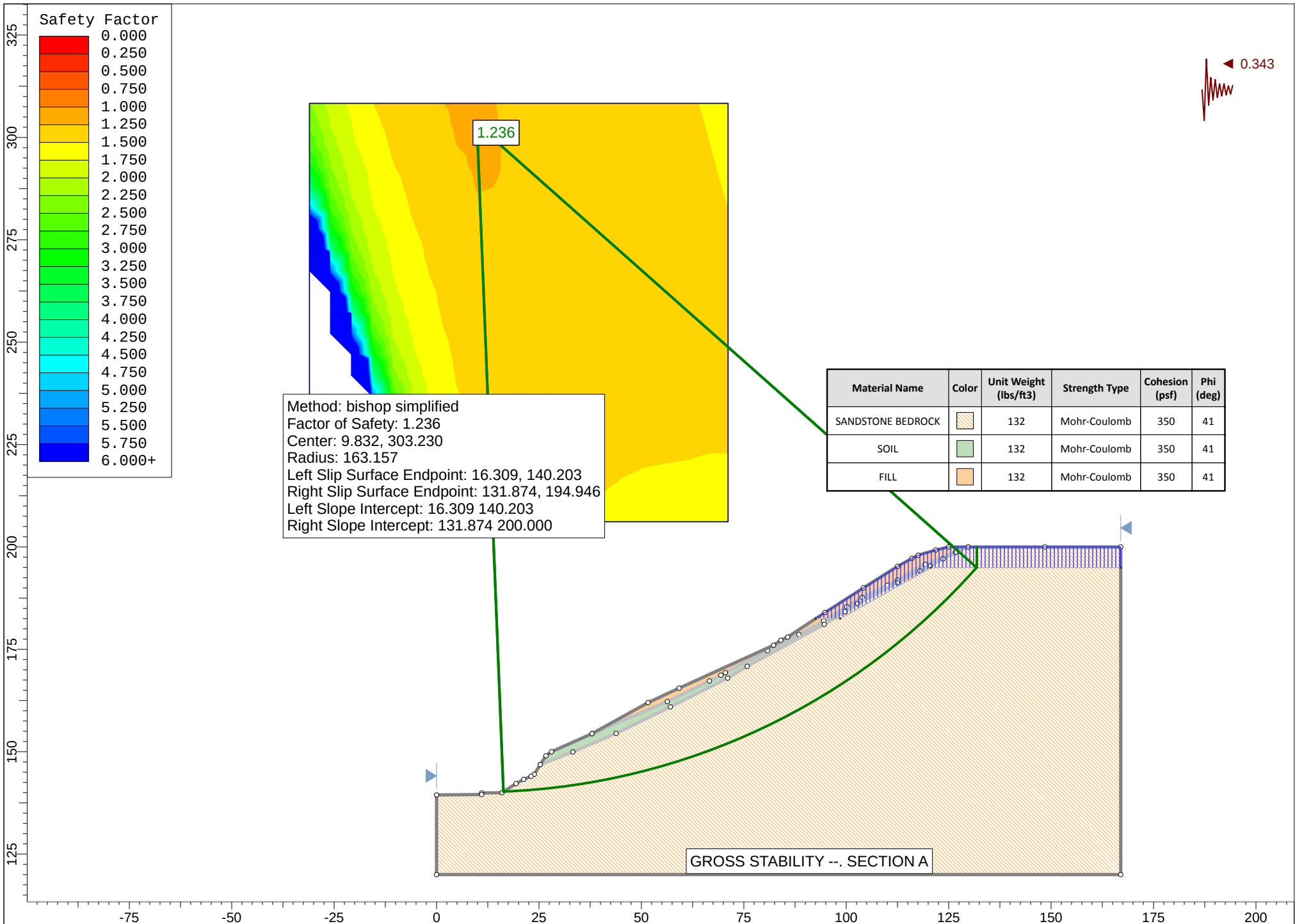
Material Boundary

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X	Y
37.9449	154.446
56.313	162.27
66.5963	167.287
69.3965	168.704
70.488	169.322
80.7675	174.697
88.4485	178.635
94.4992	181.928
100.137	185.41
103.894	187.676
110	190.638
112.5	191.92
119.231	195.742
126.638	198.684
129.773	200

Material Boundary

X	Y
25.2835	146.852
33.2733	149.963
43.8505	154.48
57.057	160.966
71.042	167.973
75.8176	170.866
94.6124	181.107
99.6785	184.212
102.759	186.197
112.5	191.291
117.994	194.164
120.538	195.404
123.625	197.108
126.638	198.684



Slide Analysis Information

Project Summary

File Name: IC06017 HollandChadwickSeismic
Slide Modeler Version: 6.029

General Settings

Units of Measurement: Imperial Units
Time Units: seconds
Permeability Units: feet/second
Failure Direction: Right to Left
Data Output: Standard
Maximum Material Properties: 20
Maximum Support Properties: 20

Analysis Options

Analysis Methods Used

Bishop simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50
Check $m\alpha < 0.2$: Yes
Initial trial value of FS: 1
Steffensen Iteration: Yes

Groundwater Analysis

Groundwater Method: Water Surfaces
Pore Fluid Unit Weight: 62.4 lbs/ft³
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: Grid Search
Radius Increment: 10

Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Loading

Seismic Load Coefficient (Horizontal): 0.343

Tension Crack

Tension crack Water level: filled with water

Material Properties

Property	SANDSTONE BEDROCK	SOIL	FILL
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	132	132	132
Cohesion [psf]	350	350	350
Friction Angle [deg]	41	41	41
Water Surface	None	None	None
Ru Value	0	0	0

Global Minimums

Method: bishop simplified

FS: 1.235630
Center: 9.832, 303.230
Radius: 163.157
Left Slip Surface Endpoint: 16.309, 140.203
Right Slip Surface Endpoint: 131.874, 194.946
Left Slope Intercept: 16.309 140.203
Right Slope Intercept: 131.874 200.000
Resisting Moment=3.35859e+007 lb-ft
Driving Moment=2.71813e+007 lb-ft
Total Slice Area=1762.53 ft2

Valid / Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces: 4408
Number of Invalid Surfaces: 443

Error Codes:

Error Code -98 reported for 66 surfaces
 Error Code -103 reported for 8 surfaces
 Error Code -106 reported for 6 surfaces
 Error Code -1000 reported for 363 surfaces

Error Codes

The following errors were encountered during the computation:

- 98 = Circular slip surface is entirely within the tension crack zone.
- 103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
- 106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
- 1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.23563

Slice Number	Width [ft]	Weight [lbs]	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]
1	4.62261	831.4	SANDSTONE BEDROCK	350	41	394.836	487.871	158.602	0	158.602
2	4.62261	2377.35	SANDSTONE BEDROCK	350	41	609.763	753.441	464.107	0	464.107
3	4.62261	5209.38	SANDSTONE BEDROCK	350	41	998.151	1233.35	1016.17	0	1016.17
4	4.62261	6298.76	SANDSTONE BEDROCK	350	41	1130.58	1396.98	1204.41	0	1204.41
5	4.62261	7143.87	SANDSTONE BEDROCK	350	41	1224.7	1513.27	1338.19	0	1338.19
6	4.62261	8115.22	SANDSTONE BEDROCK	350	41	1331.9	1645.74	1490.58	0	1490.58
7	4.62261	9069.46	SANDSTONE BEDROCK	350	41	1432.56	1770.11	1633.66	0	1633.66
8	4.62261	9920.95	SANDSTONE BEDROCK	350	41	1515.82	1872.99	1752	0	1752
9	4.62261	10503.1	SANDSTONE BEDROCK	350	41	1561.4	1929.31	1816.78	0	1816.78
10	4.62261	10936.9	SANDSTONE BEDROCK	350	41	1586.17	1959.92	1852	0	1852
11	4.62261	11256.7	SANDSTONE BEDROCK	350	41	1595.32	1971.22	1865	0	1865
12	4.62261	11479.5	SANDSTONE BEDROCK	350	41	1591.58	1966.6	1859.69	0	1859.69
13	4.62261	11603.1	SANDSTONE BEDROCK	350	41	1575.29	1946.48	1836.54	0	1836.54
14	4.62261	11623.7	SANDSTONE BEDROCK	350	41	1546.61	1911.04	1795.78	0	1795.78

15	4.62261	11678.7	SANDSTONE BEDROCK	350	41	1521.6	1880.14	1760.23	0	1760.23
16	4.62261	11884.7	SANDSTONE BEDROCK	350	41	1512.74	1869.19	1747.62	0	1747.62
17	4.62261	12142.3	SANDSTONE BEDROCK	350	41	1508.13	1863.49	1741.08	0	1741.08
18	4.62261	12249	SANDSTONE BEDROCK	350	41	1485.95	1836.08	1709.54	0	1709.54
19	4.62261	12198.9	SANDSTONE BEDROCK	350	41	1446.5	1787.34	1653.47	0	1653.47
20	4.62261	11994.6	SANDSTONE BEDROCK	350	41	1391.03	1718.8	1574.62	0	1574.62
21	4.62261	11621	SANDSTONE BEDROCK	350	41	1319.06	1629.87	1472.33	0	1472.33
22	4.62261	10924.6	SANDSTONE BEDROCK	350	41	1217.16	1503.96	1327.48	0	1327.48
23	4.62261	9528.04	SANDSTONE BEDROCK	350	41	1052.94	1301.05	1094.05	0	1094.05
24	4.62261	7454.49	SANDSTONE BEDROCK	350	41	834.458	1031.08	783.494	0	783.494
25	4.62261	4608.38	SANDSTONE BEDROCK	350	41	559.884	691.81	393.207	0	393.207

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.23563

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	16.3091	140.203	0	0	0
2	20.9317	140.452	1496.24	0	0
3	25.5543	140.833	3316.03	0	0
4	30.1769	141.347	5610.17	0	0
5	34.7996	141.996	7883.1	0	0
6	39.4222	142.78	10031.8	0	0
7	44.0448	143.701	12017.1	0	0
8	48.6674	144.763	13778.4	0	0
9	53.29	145.968	15255.4	0	0
10	57.9126	147.319	16399.1	0	0
11	62.5352	148.821	17182.7	0	0
12	67.1578	150.477	17590.9	0	0
13	71.7804	152.292	17617.4	0	0
14	76.403	154.273	17264.5	0	0
15	81.0256	156.426	16543.8	0	0
16	85.6483	158.759	15448.8	0	0
17	90.2709	161.281	13941.8	0	0
18	94.8935	164.002	11995.2	0	0
19	99.5161	166.934	9634.85	0	0
20	104.139	170.091	6902.35	0	0

21	108.761	173.489	3853.07	0	0
22	113.384	177.147	563.684	0	0
23	118.007	181.09	-2804.14	0	0
24	122.629	185.346	-5872.09	0	0
25	127.252	189.95	-8187.44	0	0
26	131.874	194.946	797.079	0	0

List Of Coordinates

Tension Crack

X	Y
92.5396	182.513
98.551	182.513
120.665	194.946
167	194.946

External Boundary

X	Y
0	139.455
0	120
167	120
167	200
148.5	200
129.773	200
125	200
121.846	199.297
117.526	198
116	197.215
112.5	195.272
104.161	190
94.7981	184
85.6851	178
84.0155	177.231
82.2368	176
59.1891	165.526
51.6091	162
37.9449	154.446
28.0492	150
26.6824	149.037
25.2835	146.852
23.8366	144.497
23.0631	144
21.2599	143.248
19.3992	142.227
16	140

11 139.933

11 139.562

Material Boundary

X	Y
37.9449	154.446
56.313	162.27
66.5963	167.287
69.3965	168.704
70.488	169.322
80.7675	174.697
88.4485	178.635
94.4992	181.928
100.137	185.41
103.894	187.676
110	190.638
112.5	191.92
119.231	195.742
126.638	198.684
129.773	200

Material Boundary

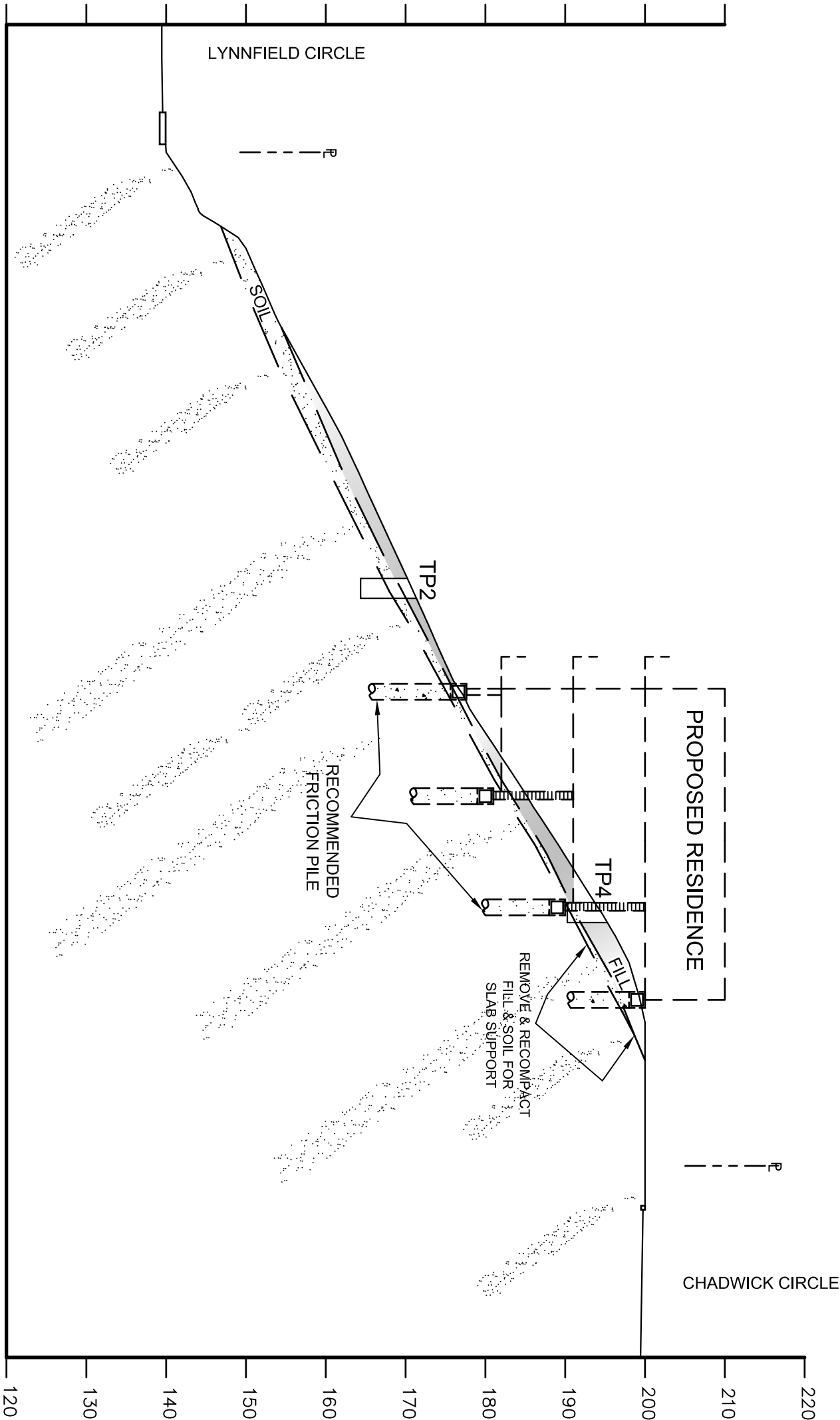
X	Y
25.2835	146.852
33.2733	149.963
43.8505	154.48
57.057	160.966
71.042	167.973
75.8176	170.866
94.6124	181.107
99.6785	184.212
102.759	186.197
112.5	191.291
117.994	194.164
120.538	195.404
123.625	197.108
126.638	198.684

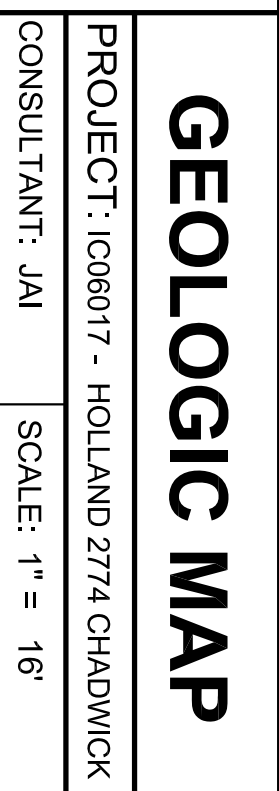


SECTION A - A

PROJECT: IC06017 - HOLLAND 2774 CHADWICK

CONSULTANT: JAI SCALE: 1" = 16'





FD. NOTHING
SET NOTHING
EST. PER TIES
CEFB 8119/33

A line segment with a perpendicular tick mark and the number 48 below it.

A decorative horizontal flourish with a central scroll-like element. The word "NORTH" is written in a small, bold, sans-serif font on the left side of the flourish.

LEGAL DESCRIPTION:
LOT NO. 224 AND PORTION OF LOTS
223 AND 225
TRACT NO. 7477
M.B. 82\30-31

GRAPHY SURVEY MAP OF LOT 224, CHADWICK CIRCLE,

FD. NOTHING
SET NOTHING
EST. PER TIES
CERB 819\18

GEOTECHNICAL Inc

CONSULTANT: JAI

SCALE: 1"

LEGEND

- NUMBER AND LOCATION OF HAND DUG TEST PIT
- GEOLOGIC CONTACT
- STRIKE AND DIP OF BEDDING

The figure is a detailed geotechnical survey map of Lot 224, located at Chadwick Circle. The map features topographic contour lines ranging from 140.00 to 180.00 feet. A proposed residence is shown in the center-right area, with four hand-dug test pits (TP1, TP2, TP3, TP4) marked with diamond symbols. The map also identifies geological features, including 'SANDSTONE BEDROCK (FILL & SOIL COVER)' and 'EXISTING CONCRETE SIDEWALK'. A dashed line indicates the 'PROPOSED RESIDENCE' boundary. The map includes various survey points, such as 'SET L&T 4.35' O/S NE'LY OF P.G. ON P.L. PRGD.' and 'SET L&T 4.27' O/S NE'LY OF P.G. ON P.L. PRGD.'. A north arrow is located in the upper right corner, pointing towards the top right. The map is bounded by Chadwick Circle to the north and east, and Lynnfield Circle to the south and west. The map is titled 'GRAPHY SURVEY MAP OF LOT 224, CHADWICK CIRCLE,' at the top.