BYER GEOTECHNICAL, INC.

March 3, 2016
BG 21103

Mr. Albert Davityan
8160 McGroarty Street
Sunland, California 91040-3333

Subject

Transmittal of Geologic and Soils Engineering Exploration Update
Proposed Tentative Tract Map # 73957
Thirteen-Lot Subdivision, Ten New Residences
Arb. 2, Portion of Lot 202½, Western Empire Tract
8200 West McGroarty Street
Sunland, California

Dear Mr. Davityan:

Byer Geotechnical has completed our update report dated March 3, 2016, which describes the geologic and soils engineering conditions with respect to the proposed development. The reviewing agency for this document is the City of Los Angeles, Department of Building and Safety (LADBS). The reviewing agency requires two unbound copies, one with a wet signature, a CD (PDF format), an application form, and a filing fee. Four copies of the report and the CD are enclosed.

It is our understanding that you will file the report and CD with the LADBS. Please review the report carefully prior to submittal to the governmental agency. Questions concerning the report should be directed to the undersigned. Byer Geotechnical appreciates the opportunity to offer our consultation and advice on this project.

Very truly yours,
BYER GEOTECHNICAL, INC.

James E. Tucker
Project Consultant

BYER GEOTECHNICAL, INC.

GEOLOGIC AND SOILS ENGINEERING EXPLORATION UPDATE

PROPOSED TENTATIVE TRACT MAP # 73957

THIRTEEN-LOT SUBDIVISION, TEN NEW RESIDENCES

ARB. 2, PORTION OF LOT 202½, WESTERN EMPIRE TRACT

8200 WEST McGROARTY STREET

SUNLAND, CALIFORNIA

FOR MR. ALBERT DAVITYAN

BYER GEOTECHNICAL, INC., PROJECT NUMBER BG 21103

MARCH 3, 2016

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INTRODUCTION

This report has been prepared per our signed Agreement and summarizes findings of Byer Geotechnical, Inc., geologic and soils engineering exploration update performed on the subject 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 development of the proposed subdivision. This report is intended to assist in the design and completion of the proposed project and to reduce geotechnical risks that may affect the project. The professional opinions and advice presented in this report are based upon commonly accepted exploration standards and are subject to the AGREEMENT with TERMS AND CONDITIONS, and the GENERAL CONDITIONS AND NOTICE section of this report. No warranty is expressed or implied by the issuing of this report.

PROPOSED PROJECT

The scope of the proposed project was determined from the Grading Plan for Tentative Tract Map #73957, dated January 5, 2016, prepared by Techna Land Company, Inc. The project consists of subdividing the site into 13 lots. Two of the lots will contain the existing two residences (proposed Lots 3 and 8). A third existing residence will remain as a guest house on proposed Lot 12. Ten, two-story residences are proposed on the remaining lots. Retaining walls up to 10 feet high are planned to support grade changes. Grading will consist of cut-and-fill operations associated with development of residential building pads on the proposed lots. Cut slopes are planned at a 1½:1 gradient, up to 60 feet high. Fill slopes are planned at a 2:1 gradient, up to 15 feet high. Access will be provided by private streets and driveways.

EXPLORATION

The Grading Plan for Tentative Tract Map #73957 prepared by Techna Land Company, Inc., dated January 5, 2016, was a guide to our work on this project. Exploration was conducted by Kovacs-Byer and Associates Inc., as part of a previous geologic and soils engineering report prepared for the site. This report is limited to the area of the exploration and the proposed project as shown on the enclosed Geologic Map and cross sections. The scope of this exploration did not include an assessment of general site environmental conditions for the presence of contaminants in the earth materials and groundwater. Conditions affecting portions of the property outside the area explored are beyond the scope of this report.

Exploration was conducted on March 1, 2, and 15, 1990, by Kovacs-Byer and Associates, Inc., with the aid of a tractor-mounted backhoe and a bucket-auger drill rig. It included excavating 17 test pits and drilling 4 borings to depths of 4 to 36 feet. In addition, three borings were drilled by GeoSystems, Inc., on March 24, 2010, on the western-central portion of the site (proposed Lot 8),

within the footprint of the existing two-story residence, as shown on the enclosed Geologic Map. As part of our work on this project, the site was visited on November 24, 2015.

Office tasks included review of published maps and photos for the area, review of the previously-prepared geologic and soils engineering reports for the site, review of agency files, preparation of cross sections, preparation of the Geologic Map, slope stability calculations, engineering analysis, and preparation of this report. Earth materials exposed in the test pits and borings by Kovacs-Byer and Associates (KBA) and GeoSystems, Inc. (GSI), are described on the enclosed KBA Log of Test Pits, KBA Log of Borings (Plates A-1 through A-6), and GSI Boring Logs B-1 through B-3.

The proposed project, surface geologic conditions, and the locations of the test pits and borings are shown on the enclosed Geologic Map. Subsurface distribution of the earth materials, projected geologic structure, and the proposed project are shown on Sections A through I. Sections D and I form the basis for the slope stability calculations.

RESEARCH - PRIOR WORK

Agency records contain the following geotechnical reports, which were prepared for the property.

> *Preliminary Geologic and Soils Engineering Exploration, Proposed Residential Subdivision, Portion of Lot 202-1/2, Western Empire Tract, McGroarty Street and McVine Avenue, Sunland, California,* by **Kovacs-Byer and Associates, Inc.**, dated March 28, 1990;
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> *Geologic and Soils Engineering Exploration Update, Proposed Residence, Portion of Lot 202½, Western Empire Tract, 8200 McGroarty Street, Sunland, California*, by **Byer Geotechnical, Inc.**, dated January 25, 2010;
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> *Soils and Engineering Geologic Investigation for Proposed Single-Family Residence, 8150W. McGroarty Street, Lot 202½, Western Empire Tract, Sunland, California*, by **GeoSystems, Inc.**, dated April 19, 2010;

Response to the Geology and Soils Report Correction Letter dated May 18, 2010, 8150 W. McGroarty Street, Lot 202½, Western Empire Tract, Sunland, California, by **GeoSystems, Inc.**, dated July 8, 2010; and

Soils Compaction Report, Tract Western Empire Tract, Lot 202 ½, 8150 W. McGroarty Street, Los Angeles, California, Grading Permit# 10030 20000 09784, by **A.G.I. Geotechnical, Inc.**, dated December 16, 2010.

No record of LADBS review of the KBA and BG reports was located. The reports by GeoSystems, Inc., were reviewed and conditionally approved by the City of Los Angeles, Department of Building and Safety (LADBS), in the Geology and Soils Report Approval Letter dated August 18, 2010 (enclosed). The AGI compaction report dated December 16, 2010, was approved by the LADBS in the letter dated December 27, 2010 (enclosed).

The data contained in these reports was reviewed and considered as part of our work on this project. Byer Geotechnical concurs with their findings and agrees to assume geotechnical responsibility for the use of the field data and laboratory test results of Kovacs-Byer and Associates, Inc., GeoSystems, Inc., and AGI Geotechnical, Inc.

SITE DESCRIPTION

The subject property consists of a partially-graded hillside parcel (approximately 20 acres) on the north flank of the Verdugo Mountains, in the Sunland section of the city of Los Angeles, California (34.2516° N Latitude, 118.3104° W Longitude). It is located on the southeast corner of the intersection of McGroarty Street and McVine Trail, approximately one-half of a mile south of Foothill Boulevard, and is occupied by three single-family residences on proposed Lots 3, 8, and 12.

A drywell is located adjacent to the southeast corner of McGroarty Street and McVine Trail (on proposed Lot 4), which collects storm-water runoff from the existing two-story residence located within the western-central portion of the site (proposed Lot 8).

Past grading on the site has consisted of minor cut-and-fill operations associated with construction of the existing residences in the east and southeast portions of the site. As part of the development of the residence in the western-central portion of the site (proposed Lot 8), a compacted-fill pad was graded. The compacted fill is approximately five feet thick and was certified as primary structural fill by A.G.I. Geotechnical, Inc., in the above-referenced compaction report dated December 16, 2010.

The north portion of the site consists of a relatively-level area that slopes gently to the north. The south portion of the site consists of mountainous terrain. On the western-northwestern portion of the site, two major north-south trending canyons converge to form a single north-south canyon. Two other north-south-trending canyons transect the central and eastern portions of the site. The intervening ridges descend at gradients ranging from 2:1 to 3:1 to the north. Ridge flanks ascend from the canyon bottoms at an average gradient of 1½:1 to as steep as 1:1. Physical relief is about 330 feet to the top of the offsite ridgeline to the south.

Vegetation on the site consists of planter areas, scattered grasses, and trees around the existing residences, and a thick assemblage of native chaparral on the slopes to the south. Surface drainage is by sheetflow runoff down the contours of the land to the north. The drainage is concentrated within the three north-south-trending canyons that transect the property.

GROUNDWATER

In *Seismic Hazard Zone Report for the Sunland 7.5-Minute Quadrangle*, the California Geological Survey has estimated the historically-highest groundwater level at the site was greater than 40 feet below ground surface. Groundwater was not encountered in the borings and test pits to a maximum depth of 36 feet. Seasonal fluctuations in groundwater levels occur due to variations in climate, irrigation, development, and other factors not evident at the time of the exploration. Groundwater levels may also differ across the site. Groundwater can saturate earth materials causing subsidence or instability of slopes.

EARTH MATERIALS

Fill

Fill, associated with previous site grading, underlies the existing driveways and access roads on the site and the axis of the north portion of the canyon in the east portion of the site. The fill consists of silty to gravelly sand, which is brown, slightly moist to dry, and slightly dense. The fill was observed to be on the order of six feet thick in the axis of the east canyon.

Compacted Fill

Compacted fill was placed as part of the grading and development of the residence in the western-central portion of the site. The compacted fill is approximately five feet thick and was certified as primary structural fill by A.G.I. Geotechnical Inc., in the referenced compaction report dated December 16, 2010. This compaction report was approved by the LADBS in the letter dated December 27, 2010 (enclosed).

Soil

Natural residual soil overlies the bedrock on the ascending slopes in the south portion of the site. The soil consists of silty to gravelly sand, which is medium brown, slightly moist, and slightly to medium dense. The soil layer observed is up to two feet thick.

Alluvium

Natural alluvium underlies the axes of the canyons and the northwest portion of the site. The alluvium was observed to range from 4½ to 25 feet thick in the test pits and borings and is anticipated to thicken toward the north. The alluvium consists of silty to gravelly sand, which is light brown, slightly moist, and medium dense, with occasional cobbles and boulders.

Bedrock

Bedrock underlying the site and encountered in the borings and test pits consists of Wilson diorite. The bedrock is also exposed in slopes across the site. The bedrock is light brown, gray and white, massive, moderately hard to hard, weathered and jointed.

GEOLOGIC STRUCTURE

The bedrock described above is common to this area of the Verdugo Mountains and the geologic structure is consistent with regional trends. The bedrock is generally massive and lacks significant structural planes. Joint planes mapped are randomly oriented and steeply dipping. The massive nature of the bedrock is favorable for the gross stability of the site and proposed project.

GENERAL SEISMIC CONSIDERATIONS

The subject property is located in an active seismic region. Moderate to strong earthquakes can occur on numerous local faults. The United States Geological Survey, California Geological Survey (CGS), private consultants, and universities have been studying earthquakes in southern California for several decades. Early studies were directed toward earthquake prediction and estimation of the effects of strong ground shaking. Studies indicate that earthquake prediction is not practical and not sufficiently accurate to benefit the general public. Governmental agencies now require earthquake-resistant structures. The purpose of the code seismic-design parameters is to prevent collapse during strong ground shaking. Cosmetic damage should be expected.

Southern California faults are classified as "active" or "potentially active." Faults from past geologic periods of mountain building that do not display evidence of recent offset are considered "potentially active." Faults that have historically produced earthquakes or show evidence of movement within the past 11,000 years are known as "active faults." No known active faults cross the subject

property, and the property is not located within a currently-designated Alquist-Priolo Earthquake Fault Zone (CGS, 2000).

The following table lists the applicable City of Los Angeles Building Code seismic coefficients for the project:

SEISMIC COEFFICIENTS (2014 City of Los Angeles Building Code - Based on ASCE 7-10 Standard)		
Latitude = 34.2516° N Longitude = 118.3104° W	Short Period (0.2s)	One-Second Period
Earth Materials and Site Class from Table 20.3-1, ASCE Standard 7-10	Compacted Fill/Alluvium - D	
Mapped Spectral Accelerations from Figures 1613.3.1 (1) and 1613.3.1 (2) and USGS	S_s = 2.584 (g)	S_1 = 0.932 (g)
Site Coefficients from Tables 1613.3.3 (1) and 1613.3.3 (2) and USGS	F_A = 1.00	F_V = 1.5
Maximum Considered Spectral Response Accelerations from Equations 16-37 and 16-38, 2013 CBC	S_{MS} = 2.584 (g)	S_{M1} = 1.397 (g)
Design Spectral Response Accelerations from Equations 16-39 and 16-40, 2013 CBC	S_{DS} = 1.723 (g)	S_{D1} = 0.932 (g)
Maximum Considered Earthquake Geometric Mean (MCE_G) Peak Ground Acceleration, adjusted for Site Class effects	PGA_M = 0.944 (g)	

Reference: U.S. Geological Survey, **Geologic Hazards Science Center, U. S. Seismic Design Maps,** http://earthquake.usgs.gov/designmaps/us/application.php

The Risk Category for a residence is II. The mapped spectral response acceleration parameter for the site for a 1-second period (S_1) is greater than 0.75g. Therefore, the project is considered to be in Seismic Design Category E.

The principal seismic hazard to the proposed project is strong ground shaking from earthquakes produced by local faults. Modern buildings are designed to resist ground shaking through the use of shear panels, moment frames, and reinforcement. Additional precautions may be taken, including

strapping water heaters and securing furniture to walls and floors. It is likely that the subject property will be shaken by future earthquakes produced in southern California.

Ground Motion

To determine the ground motion for the project site, a probabilistic seismic deaggregation analysis was performed, using the USGS 2008 Interactive Deaggregation application available online (http://geohazards.usgs.gov/deaggint/2008/) for a 10 percent probability of exceedance in 50 years (475-year return period), and using a shear-wave velocity estimate of 340 meters-per-second (Site Class C). The results are shown on the enclosed PSH Deaggregation chart. The analysis indicates a peak ground acceleration (PGA) of 0.56g, a modal earthquake magnitude (M_w) of 6.61, and a modal fault distance of 4.0 kilometers.

Pseudo-static seismic coefficients (k_h) were derived according to the screening procedure described in Blake and others (2002) and referenced in SP117A, pages 28 - 31, using a peak ground acceleration equivalent to two-thirds of PGA_M. For a tolerable slope displacement (u) of 5 centimeters (2 inches), the seismicity factor (f_{eq}) is equal to 0.46, and the horizontal pseudo-static seismic coefficient (k_h) is equal to 0.29g.

Liquefaction

The CGS has not mapped the site within an area where historic occurrence of liquefaction or geological, geotechnical, and groundwater conditions indicate a potential for permanent ground displacement such that mitigation as defined in Public Resources Code Section 2693 (c) would be required (CGS, 1999), as shown on the enclosed Seismic Hazard Zones Map.

SLOPE STABILITY

Gross Stability

The CGS has not designated the property within a state zone requiring seismic landslide investigation per Public Resources Code, Section 2693 (c) (CGS, 1999), as shown on the enclosed Seismic Hazard Zones Map.

Slopes analyzed for stability include a 330-foot-high, 2:1 to 3:1 natural slope. The gross stability of the slope was analyzed using computerized versions of Bishops methods. Section I forms the basis for the stability analysis. In addition, 1½:1 cut slopes, with a maximum height of 60 feet, are proposed to be in the bedrock (Section D).

The analysis shows that the existing and proposed slopes will be grossly stable with a factor of safety in excess of 1.5 under static conditions and above 1.0 under pseudo-static (seismic) conditions. The calculations use the shear tests of samples believed to be representative of the strength of the bedrock encountered during exploration. The pseudo-static analyses use a k_h value of 0.29g. The cross section and geologic structure used are the most critical for the slopes analyzed.

Surficial Stability

Based upon the enclosed calculations, it is reasonable to assume that the proposed 2:1 compacted-fill slopes will be surficially stable. The method of analysis used is the "parallel seepage model" recommended by the American Society of Civil Engineers and the Building and Safety Advisory Committee (August 16, 1978). 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, on how closely the assumptions model the field conditions.

CONCLUSIONS AND RECOMMENDATIONS

General Findings

The conclusions and recommendations of this exploration are based upon review of the preliminary plans, review of published maps, 7 bucket-auger borings by KBA and GSI, 17 test pits by KBA, field geologic mapping, research of available records, laboratory testing, engineering analysis, and years of experience performing similar studies on similar sites. It is the finding of Byer Geotechnical, Inc., that the proposed subdivision and the single-family residences are 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 for the proposed residences is future compacted fill. The recommended bearing materials for the proposed retaining walls is bedrock and future compacted fill. Soils to be exposed at finished grade are expected to exhibit a very low expansion potential.

SITE PREPARATION - REMOVALS

Surficial materials consisting of uncertified fill and disturbed alluvium are present on portions of the site. Remedial grading is recommended to improve site conditions. The following general grading specifications may be used in preparation of the grading plan and job specifications. Byer Geotechnical would appreciate the opportunity of reviewing the plans to ensure that these recommendations are included. The grading contractor should be provided with a copy of this report.

A. The areas to receive compacted fill should be prepared by removing all vegetation, debris, existing fill, soil, and disturbed alluvium. The exposed excavated area should be observed by the geologist prior to placing compacted fill. The exposed grade should be scarified to a depth of six inches, moistened to optimum moisture content, and recompacted to 95 percent of the maximum dry density.

B. Areas of the proposed buildings shall be excavated to a minimum depth of three feet below the bottom of all footings. The excavation shall extend beyond the edge of the exterior footing a minimum of three feet or to the depth of fill below the footing, whichever is greater. The excavated areas shall be observed by the soils engineer/geologist prior to placing compacted fill.

C. For transition lots, the cut portion of the building pad shall be undercut five feet and replaced as compacted fill to provide a more uniform foundation condition. The undercut area shall include the entire cut portion of the pad.

D. Fill, consisting of soil approved by the soils engineer, shall be placed in horizontal lifts, moistened as required, and compacted in six-inch layers with suitable compaction equipment. The excavated onsite materials are considered satisfactory for reuse in the controlled fills. Any imported fill shall be observed by the soils engineer prior to use in fill areas. Rocks larger than six inches in diameter shall not be used in the fill.

E. The moisture content of the fill should be near the optimum moisture content. When the moisture content of the fill is too wet or dry, the fill shall be moisture conditioned and mixed until the proper moisture is attained.

F. The fill shall be compacted to at least 95 percent of the maximum laboratory dry density for the material used. The maximum dry density shall be determined by ASTM D 1557-12 or equivalent.

G. Field observation and testing shall be performed by the soils engineer during grading to assist the contractor in obtaining the required degree of compaction and the proper moisture content. Where compaction is less than required, additional compactive effort shall be made with adjustment of the moisture content, as necessary, until 95 percent relative compaction is obtained. A minimum of one compaction test is required for each 500 cubic yards or two vertical feet of fill placed.

Fill Slopes

Fill slopes may be constructed at a 2:1 gradient. Compacted fill should be keyed and benched into bedrock or alluvium. Keyways should be a minimum of 12 feet wide and 3 feet into bedrock or alluvium, as measured on the downhill side. The base of all fills and the axis of drainage courses require subdrains. Fill slopes shall be overbuilt about two feet and trimmed to expose the compacted inner core. Trackwalking of slopes is not acceptable to Byer Geotechnical. Spoils from drain excavations should be removed from the site and not cast over the finished slope.

Cut Slopes

Cut slopes in the bedrock may be excavated at a 1½:1 gradient up to 60 feet high.

Debris Basins

Debris basins are recommended within each of the three canyons that transect the property to protect the future development from concentrated drainage and runoff. The basins should be designed for a maximum capacity of 400 cubic-yards-per-acre of tributary area. Subsurface exploration and field geologic mapping indicate that the natural slopes are blanketed with soil ranging in thickness from a few inches to two feet. Evidence of past mudflows or surficial instability was not observed during the field exploration by Kovacs-Byer and Associates or during the field mapping performed as part of this report. It is the opinion of Byer Geotechnical Inc., that the site is not subject to mudflows, but is subject to soil erosion.

Seepage Pit Abandonment

Sites that were developed prior to the public sewer may have a private sewage disposal system. These can consist of a septic tank and drain field, or seepage pits. Should they be encountered during grading, it will be necessary to remove the tank. The pit should be cleaned and backfilled with slurry, gravel, or compacted fill. A five-foot compacted-fill cap should be placed over the slurry.

Excavation Characteristics

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

FOUNDATION DESIGN

Spread Footings

Continuous and/or pad footings may be used to support the proposed residences, provided they are founded in future compacted fill. Continuous footings should be a minimum of 12 inches in width. Pad footings should be a minimum of 24-inches square. The following chart contains the recommended design parameters.

Bearing Material	Minimum Embedment Depth of Footing (Inches)	Vertical Bearing (psf)	Coefficient of Friction	Passive Earth Pressure (pcf)	Maximum Earth Pressure (psf)
Future Compacted Fill	18	2,000	0.35	260	3,500

Increases in the bearing value are allowable at a rate of 400 pounds-per-square-foot for each additional foot of footing width or depth to a maximum of 3,500 pounds-per-square-foot. For bearing calculations, the weight of the concrete in the footing may be neglected.

The bearing value shown above 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. When combining passive and friction for lateral resistance, the passive component should be reduced by one-third.

Footings adjacent to retaining walls should be deepened below a 1:1 plane from the bottom of the lower retaining wall, or the footings should be designed as grade beams to bridge from the wall to the 1:1 plane.

All continuous footings should be reinforced with a minimum of four #4 steel bars: two placed near the top and two near the bottom of the footings. Footings should be cleaned of all loose soil, moistened, free of shrinkage cracks, and approved by the geologist or geotechnical engineer prior to placing forms, steel, or concrete.

Foundation Settlement

Settlement of the foundation system is expected to occur on initial application of loading. A total settlement of one-fourth to one-half of an inch may be anticipated. Differential settlement should not exceed one-fourth of an inch.

Foundation Setback

The California Building Code requires that foundations be a sufficient depth to provide a horizontal setback from a descending slope steeper than 3:1. The required setback is one-third the height of the slope, with a maximum of 40 feet, measured horizontally, from the base of the foundation to the slope face. The required setback for a swimming pool is one-sixth the height of the slope, with a minimum of five feet and a maximum of 20 feet, measured horizontally, from the bottom of the pool to the slope face.

Toe of Slope Clearance

The building code requires a level rear-yard setback, between the toe of an ascending slope steeper than 3:1 and the proposed structure, of one-half the slope height to a maximum 15-foot clearance. For retained slopes, the face of the retaining wall is considered the toe of the slope. For a swimming pool, the setback is one-fourth the slope height to a maximum 7.5.

RETAINING WALLS

General Design

Retaining walls up to 12 feet high with a 1½:1 backslope may be designed for an active equivalent fluid pressure of 55 pounds-per-cubic-foot (see Calculation Sheet #1). Retaining walls up to 12 feet high with a 2:1 backslope or flatter may be designed for an equivalent fluid pressure of 43 pounds-per-cubic-foot. Retaining walls should be provided with a subdrain or weepholes covered with a minimum of 12 inches of ¾-inch crushed gravel.

Seismic analysis of the proposed retaining walls indicates that no additional loading due to seismic forces is required, since the calculated seismic thrust is less than the static active thrust for a retained height up to 12 feet (see Calculation Sheet #2). A pseudo-static seismic coefficient, k_h, of one-third the PGA_M (0.31g) was incorporated in the seismic analysis.

Backfill

Retaining wall backfill should be compacted to a minimum of 95 percent of the maximum dry density as determined by ASTM D 1557-12, or equivalent. Where access between the retaining wall and the temporary excavation prevents the use of compaction equipment, retaining walls should be backfilled with ¾-inch crushed gravel to within two 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 two feet of backfill above the gravel should consist of a compacted-fill blanket to the surface. Restrained walls should not be backfilled until the restraining system is in place.

Foundation Design

Retaining wall footings may be sized per the following table:

Bearing Material	Minimum Embedment Depth of Footing (Inches)	Vertical Bearing (psf)	Coefficient of Friction	Passive Earth Pressure (pcf)	Maximum Earth Pressure (psf)
Bedrock	12	4,000	0.50	450	8,000
Future Compacted Fill	18	2,000	0.35	260	3,500

Increases in the bearing value for the bedrock are allowable at a rate of 800 pounds-per-square-foot for each additional foot of footing or depth to a maximum of 8,000 pounds-per-square-foot. Increases in the bearing value for the future compacted fill are allowable at a rate of 400 pounds-per-square-foot for each additional foot of footing or depth to a maximum of 3,500 pounds-per-square-foot for the bedrock For bearing calculations, the weight of the concrete in the footing may be neglected.

The bearing values shown above are 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. When combining passive and friction for lateral resistance, the passive component should be reduced by one-third.

Footings should be cleaned of all loose soil, moistened, free of shrinkage cracks, and approved by the geologist prior to placing forms, steel, or concrete.

Retaining Wall Deflection

It should be noted that non-restrained retaining walls can deflect up to one percent of their height in response to loading. This deflection is normal and results in lateral movement and settlement of the backfill toward the wall. The zone of influence is within a 1½:1 plane from the bottom of the wall.

Hard surfaces or footings placed on the retaining wall backfill should be designed to avoid the effects of differential settlement from this movement. Decking that caps a retaining wall should be provided with a flexible joint to allow for the normal 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.

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.

TEMPORARY EXCAVATIONS

Temporary excavations will be required during grading to construct the proposed retaining walls. The excavations will be up to 12 feet in height and will expose soil over bedrock. The soil should be trimmed to 1:1 for wall excavations. The bedrock is capable of maintaining vertical excavations up to 10 feet, per the enclosed calculations. Where vertical excavations in the bedrock exceed 10 feet in height, the upper portion should be trimmed to 1:1 (45 degrees). The fill and alluvium are capable of maintaining vertical excavations up to five feet. Where vertical excavations in the fill and alluvium exceed five feet in height, the upper portion should be trimmed to 1:1 (45 degrees).

The 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.

FLOOR SLABS

Floor slabs should be cast over approved compacted fill placed in accordance with the "Site Preparations - Removals" section of this report. Floor slabs should be reinforced with a minimum of #4 bars on 16-inch centers, each way. Slabs that will be provided with a floor covering should be protected by a polyethylene plastic vapor barrier. The barrier should be sandwiched between the layers of sand, about two inches each, to prevent punctures and aid in the concrete cure. A low-slump concrete may be used to minimize possible curling of the slab. The concrete should be allowed to cure properly before placing vinyl or other moisture-sensitive floor covering.

It should be noted that cracking of concrete slabs is common. The cracking occurs because concrete shrinks as it cures. 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 performance of the slab. 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.

EXTERIOR CONCRETE DECKS

Decking should be cast over a minimum of 12 inches of approved compacted fill and reinforced with a minimum of #3 bars placed 18 inches on center, each way. 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. The subgrade should be moistened prior to placing concrete.

PAVING

Prior to placing paving, the existing fill and soil should be removed, moistened as required to obtain optimum moisture content, and recompacted to 95 percent of the maximum dry density, as determined by ASTM D 1557-12. Trench backfill below paving should be compacted to 95 percent of the maximum dry density. Irrigation water should be prevented from migrating under paving.

For rigid concrete pavement, four inches of concrete with four inches of aggregate base can be used. Concrete should be reinforced for heavy load application.

The Class II aggregate base and top one foot of subgrade should be compacted to a minimum of 95 percent of maximum dry density. Crushed aggregate base should meet the requirements of "Greenbook" (Standard Specification for Public Works Construction) Section 200-2.2.

The following table shows the recommended flexible pavement section:

Service	Pavement Thickness (Inches)	Base Course (Inches)
Light Passenger Cars and Moderate Trucks	3	4

DRAINAGE

Control of site drainage is important for the performance of the proposed project. Roof gutters are recommended. Pad and roof drainage should be collected and transferred to the street 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. Planters located next to raised-floor-type construction also should be sealed to the depth

of the footings. Drainage control devices require periodic cleaning, testing, and maintenance to remain effective.

Low-Impact Development (LID) Requirements

The requirement for onsite infiltration of surface drainage is relatively recent. To date, implementation and practice vary widely. For decades, the civil and geotechnical engineering communities have designed projects so that surface drainage is collected and conducted offsite in non-erosive devices. With the intent that discharge into waterways is clean, the use of onsite infiltration is being required for new construction. Unfortunately, water is the trigger behind nearly all geotechnical-related damage. The majority of the proposed lots are underlain by hard bedrock that will not percolate. It remains the recommendation of Byer Geotechnical, Inc., that all of the roof and pad drainage be conducted to the street. Infiltration pits are not recommended for proposed lots underlain by bedrock. For lots underlain by alluvium infiltration systems should be planned at least 10 feet from adjacent property lines or public right-of-way, and 15 feet from a 1:1 plane projected from the bottom of adjacent structural foundations.

As an alternative, a flow-through biofiltration system may be installed on the site in accordance with the City of Los Angeles, Best Management Practices (City of Los Angeles, 2011). A planter box may be used to capture and treat storm-water runoff through different soil layers before discharging water to the street or storm drain. Planter boxes should be impermeable. Planter boxes may be situated above ground and placed adjacent to buildings. Planter boxes should be designed as freestanding and for an inward equivalent fluid pressure of 43 pounds-per-cubic-foot. This fluid pressure includes possible vehicular surcharge. Byer Geotechnical, Inc., should be provided with the final plans to verify the location of the planter boxes.

Irrigation

Control of irrigation water is a necessary part of site maintenance. Soggy ground and perched water may result if irrigation water is excessively applied. Irrigation systems should be adjusted to provide the minimum water needed. Adjustments should be made for changes in climate and rainfall.

Rodent Control

Gophers and other burrowing rodents should be eliminated, as their burrows provide access for surface drainage to saturate the subsurface. A rodent control program is important to the future performance of graded slopes. It is recommended that a licensed pest control company be utilized to develop and maintain effective rodent control procedures.

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 daylights to the atmosphere. The subdrain should be covered with ¾-inch crushed gravel to help the collection of water. Landscape 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 Byer Geotechnical. Any change in scope of the project may require additional work.

SITE OBSERVATIONS DURING CONSTRUCTION

The building department requires that the geotechnical engineer provide site observations during grading and construction. Foundation excavations should be observed and approved by the geotechnical engineer or geologist prior to placing steel, forms, or concrete. The engineer/geologist should observe bottoms for fill, compaction of fill, temporary slopes, permanent cut slopes, and subdrains. All fill that is placed should be approved by the geotechnical engineer and the building department prior to use for support of structural footings and floor slabs.

Please advise Byer Geotechnical, Inc., at least 24 hours prior to any required site visit. The building department stamped plans, the permits, and the geotechnical reports should be at the job site and available to our representative. The project consultant will perform the observation and post a notice at the job site with the findings. This notice should be given to the agency inspector.

FINAL REPORTS

The geotechnical engineer will prepare interim and final compaction reports upon request.

CONSTRUCTION SITE MAINTENANCE

It is the responsibility of the contractor to maintain a safe construction site. The area should be fenced and warning signs posted. All excavations must be covered and secured. Soil generated by foundation excavations should be either removed from the site or placed as compacted fill. Soil should not be spilled over any descending slope. Workers should not be allowed to enter any unshored trench excavations over five feet deep. Water shall not be allowed to saturate open footing trenches.

GENERAL CONDITIONS AND NOTICE

This report and the exploration are subject to the following conditions. Please read this section carefully; it limits our liability.

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 Byer Geotechnical, Inc., and the conclusions and recommendations are modified or reaffirmed after such review.

The subsurface conditions, excavation characteristics, and geologic structure described herein have been projected from test excavations on the site and may not reflect any variations that occur between these test 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, and recommendations 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, issued and made for the sole use and benefit of the client, is not transferable. Any liability in connection herewith shall not exceed the Phase I fee for the exploration and report or a negotiated fee per the Agreement. No warranty is expressed, implied, or intended in connection with the exploration performed or by the furnishing of this report.

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

Byer 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,
BYER GEOTECHNICAL, INC.

James E. Tucker
P. G. 6628

Raffi S. Babayan
P. E. 72168

Robert I. Zweigler
E. G. 1210/G. E. 2120

JET:RSB:RIZ:mh
S:\FINAL\BG\21103_Davityan\21103_Davityan_Geo_and_Soils_Update_3.3.16.wpd

ENCLOSURES AND DISTRIBUTION

Enc: List of References
LADBS, conditional approval letters dated August 18 and December 27, 2010 (5 Pages)
Appendix I - Kovacs-Byer and Associates, excerpts from report dated March 28, 1990
- Laboratory Testing (4 Pages)
- Shear Diagrams (3 Pages)
- Consolidation Tests (2 Pages)
- Log of Test Pits 1 - 17 (5 Pages)
- Log of Borings 1 - 4 (6 Pages)

Appendix II - GeoSystems, Inc., excerpts from report dated April 19, 2010
- Shear Test Diagrams (2 Pages)
- Consolidation Diagrams (6 Pages)
- Boring Logs 1 - 3 (3 Pages)

Appendix III - A.G.I. Geotechnical, Inc., excerpts from report dated December 16, 2010
- Compaction Map
- Grading Division, Certificate of Compliance

Appendix IV - Calculation Sheets and Figures
- PSH Deaggregation Chart
- Calculation Sheets (28 Pages)
- Aerial Vicinity Map
- Regional Topographic Map
- Regional Geologic Map
- Regional Fault Map
- Seismic Hazard Zones Map

In Pocket: Sections A through I (4 Sheets)
Geologic Map

As PDF on CD: Kovacs-Byer and Associates, Inc., report dated March 28, 1990

xc: (4) Addressee (E-mail and Mail)

REFERENCES

2014 City of Los Angeles Building Code.

California Building Standards Commission (2013), **2013 California Building Code,** Based on the 2012 International Building Code (IBC), Title 24, Part 2, Vol. 1 and 2.

California Department of Conservation (1999), **State of California, Seismic Hazard Zones, Sunland Quadrangle**, Official Map, Division of Mines and Geology.

California Department of Conservation (2008), **Special Publication 117A, Guidelines for Evaluating and Mitigating Seismic Hazards in California.**

California Geological Survey (Formerly California Division of Mines and Geology), 2000, **Digital Images of Official Maps of Alquist-Priolo Earthquake Fault Zones, Southern Region,** DMG CD 2000-003.

City of Los Angeles (2011), **Development Best Management Practices Handbook, Working Draft of LID Manual, Part B**, Department of Public Works, Sanitation Division, Fourth Edition, June 2011.

City of Los Angeles, Department of Building and Safety (2014), **Geology and Soils Engineering Firms Practicing in the City of Los Angeles**, Correspondence Regarding 2014 Los Angeles Building Code (LABC) Requirements, dated July 16, 2014.

Dibblee, T. W. (1991), **Geologic Map of the Sunland and Burbank (North ½) Quadrangles, Los Angeles County, California**, 1:24,000 scale, Dibblee Foundation, Santa Barbara, California, Map DF-32.

Jennings, C. W., and Bryant, W. A. (2010), **Fault Activity Map of California**, California Geological Survey, 150th Anniversary, Map No. 6.

U.S. Geological Survey, **Geologic Hazards Science Center, U. S. Seismic Design Maps,** http://earthquake.usgs.gov/designmaps/us/application.php.

Software

Slide 6.0, Rocscience, Inc., 2010.

CITY OF LOS ANGELES
CALIFORNIA

GEOLOGY AND SOILS REPORT APPROVAL LETTER

August 18, 2010

LOG # 70604-01
SOILS/GEOLOGY FILE - 2

Albert Davityan
9411 Hillrose Street
Sunland, CA 91040

TRACT: Western Empire Tract (MB 18-162/163 - SHT 4)
LOT(S): 202 ½
LOCATION: 8150 W. McGroarty Street

CURRENT REFERENCE REPORT/LETTER(S)	REPORT NO.	DATE(S) OF DOCUMENT	PREPARED BY
Geology/Soil Report	GS10-0305	07/08/2010	GeoSystems
Oversized Documents	"	"	"

PREVIOUS REFERENCE REPORT/LETTER(S)	REPORT NO.	DATE(S) OF DOCUMENT	PREPARED BY
Correction Letter	Log # 70604	05/18/2010	LADBS
Geology/Soil Report	GS10-0305	04/19/2010	GeoSystems

The referenced reports concerning the proposed construction of a new dwelling and garage on the subject property, have been reviewed by the Grading Division of the Department of Building and Safety. The regional topographic map (Plate 2 in the 04/19/2010 report), shows the proposed dwelling in relation to the two existing dwellings located on the property. The earth materials at the subsurface exploration locations consist of alluvium soils quartz diorite bedrock.

A mud/debris flow evaluation was performed (see the 07/08/2010 response report). The tributary drainage area is approximately 19.7 acres. A protective deflection wall over 200 feet in length is planned with a minimum free-standing height of 3 feet and a 5-feet-wide channel. A splash wall is planned to not direct flows toward the adjacent off-site property to the west.

The consultants recommend to support the proposed structure on conventional foundations bearing on native undisturbed soils or on a blanket of properly placed fill a minimum of 3 feet thick.

The referenced reports are acceptable, provided the following conditions are complied with during site development:

(Note: Numbers in parenthesis ( ) refer to applicable sections of the 2008 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. The protective deflection wall (and splash wall) shall have a minimum free-standing height of 3 feet designed for a minimum efp of 125 pcf with a 5-feet-wide channel, as recommended.

2. In order to best inform future owners of the potential for mud/debris flows and the need for periodic maintenance of the protective deflection wall and channel, notice of this letter and the consultant's reports shall be recorded with the Office of the County Recorder, prior to the issuance of any permits. Note: The agreement form must be approved by the Grading Division, prior to being recorded.

3. As recommended, foundations shall be entirely supported in firm undisturbed competent alluvium or entirely supported on certified compacted fill placed on competent alluvium, but not both.

4. 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. (7006.1)

5. All recommendations of the reports which are in addition to or more restrictive than the conditions contained herein shall be incorporated into the plans.

6. 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)

7. A grading permit shall be obtained for all structural fill and retaining wall backfill. (106.1.2)

8. All new graded slopes shall be no steeper than 2H:1V (7010.2 & 7011.2).

9. 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)

10. If import soils are used, no footings shall be poured until the soils engineer has submitted a compaction report containing in-place shear test data and settlement data to the Grading Division of the Department, and obtained approval. (7008.2)

11. Compacted fill shall extend beyond the footings a minimum distance equal to the depth of the fill below the bottom of footings or a minimum of three feet whichever is greater.

12. Existing uncertified fill shall not be used for support of footings, concrete slabs or new fill.

(1805.1)

13. Adequate temporary erosion control devices acceptable to the Department, and if applicable the Department of Public Works, shall be provided and maintained during the rainy season. (7013.12)
6262 Van Nuys Blvd. Ste 351, Van Nuys (818) 374-4605

14. 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)

15. Unsurcharged temporary excavations over 5 feet shall be trimmed back at a gradient not exceeding 1:1, as recommended.

16. Buildings adjacent to ascending slopes steeper than 3:1 (H:V) in gradient shall be set back from the toe of the slope a level distance equal to one-half the vertical height of the slope, but need not exceed 15 feet. (1805.3.1)

17. The seismic design shall be based on a Site Class D as recommended. All other seismic design parameters shall be reviewed by LADBS building plan check.

18. Cantilever retaining walls up to 12 feet in height shall be designed for the minimum lateral earth pressures specified on page 16 of the 04/19/2010 report. All surcharge loads shall be included into the design.

19. Retaining walls at the base of ascending slopes shall be provided with a minimum freeboard of 12 inches, as recommended.

20. 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.

21. 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)

22. With the exception of retaining walls designed for hydrostatic pressure, 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. (1805.5.6)

23. Installation of the subdrain system shall be inspected and approved by the soils engineer of record and the City grading/building inspector. (108.9)

24. The dwelling shall be connected to the public sewer system. (P/BC 2008-27)

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 Section and the consulting geologist and soils engineer. (7013.10)

26. Any recommendations prepared by the geologist and/or the soils engineer for correction of geological hazards found during grading shall be submitted to the Grading Division of the Department for approval prior to utilization in the field. (7008.3)

27. 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 & 1704.7)

28. 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 City Building Inspector has also inspected and approved the footing excavations. A written certification to this effect shall be filed with the Grading Division of the Department upon completion of the work. (108.9 & 7008.2)

29. Prior to excavation, an initial inspection shall be called with LADBS Inspector at which time protection fences and dust and traffic control will be scheduled. (108.9.1)

30. Prior to the placing of compacted fill, a representative of the soils engineer shall inspect and approve the bottom excavations. He shall post a notice on the job site for the City 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 shall be included 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 Division of the Department upon completion of the compaction. In addition, an Engineer's Certificate of Compliance with the legal description as indicated in the grading permit and the permit number shall be included. (7011.3)

31. No footing/slab shall be poured until the compaction report is submitted and approved by the Grading Division of the Department.

STEPHEN DAWSON
Engineering Geologist II

J. ADOLFO ACOSTA
Geotechnical Engineer I

SD/JAA:sd/jaa
Log No. 70604-01
213-482-0480

cc: GeoSystems, Inc., Project Consultant
VN District

CITY OF LOS ANGELES
CALIFORNIA

12-27-10 Log # 72805

Albert Davityan
9411 Hillrose St
Sunland, CA 91040

TRACT: Western Empire
BLOCK:
LOT : 202 1/2
LOCATION: 8150 McGroarty St

PERMIT NO. 10030-20000-09784
DISTRICT MAP: 201B193
COUNTY REF. MP 18-162/163

SUBJECT: **PRIMARY STRUCTURAL FILL**

FILL SOILS CLASSIFICATION, PER TABLE 18.1.A.
LOTS HAVING COMPACTED FILL: same

Soils Compaction Report No. 20-3466-10, date 12-16-10, prepared by A.G.I. Geotechnical, Inc.

Approval is granted for compacted fill constructed on the above lots as described in the compaction report. Approval is limited to the area shown in the report and by the following conditions:

1. Compacted fill shall extend beyond the footings a minimum distance equal to the depth of fill below the footings.
2. Footing bearing pressure for all structures shall not exceed a value of 1500 psf at 18 inches minimum embedment into approved compacted fill.
3. Isolated footing bearing pressure for all structures shall not exceed a value of / psf a t / inches minimum embedment into approved compacted fill.
4. The soil engineer shall inspect the footing excavations to determine that they are founded in the recommended strata before calling the Department for footing inspection.
5. Slope erosion control, planting, and irrigation of fill slopes, and run-off control are required as per Los Angeles City Building Code Sections 91.7012 and 91.7013.
6. Dwelling foundations located partially or wholly upon compacted fill ground shall meet the requirements of Section 91.1806.10 of the Los Angeles City Building Code.

GRADING INSPECTOR
Gayk Manukyan
cc: Manukyan-VN Office
A.G.I. Geotechnical, Inc.

NOTE. Grading oversized document is not attached. (Document Type 92)

APPENDIX I

Kovacs-Byer and Associates, excerpts from report dated March 28, 1990

Surficial Stability

Based upon the enclosed calculations, it is reasonable to assume that 2:1 compacted fill slopes will be surficially stable.

The method of analysis used is based on the "parallel seepage model" recommended by the ASCE and the Building and Safety Advisory Committee (8/16/78). This method is currently considered acceptable by the Los Angeles Department of Building and Safety for the analysis of surficial slope stability.

LABORATORY TESTING

Relatively undisturbed and bulk samples of the alluvium and bedrock were obtained from the test pits and borings and transported to the laboratory for testing and analysis. The samples were obtained by driving a steel sampler with successive drops of the Kelly bar and hand sampler weight. Experience has shown the sampling using a slide hammer causes some disturbance of the sample, however, the test results remain within a

reasonable range. The samples were retained in brass rings of 2.50 inches inside diameter and 1.00 inches in height. The central portion of the samples were stored in close fitting, waterproof containers for transportation to the laboratory.

Moisture-Density

The field moisture content and dry unit weight were determined for each of the samples with the results shown on Plates A-1 through A-7. The field moisture content is determined as a percentage of the dry unit weight.

Maximum Density

A bulk sample of the alluvium was obtained to determine the maximum dry density of the future compacted fill using the ASTM D 1557-78, a five-layer standard. The results are summarized in the "Compaction Character" section of this report.

Remolded samples of the existing alluvium which represents the future compacted fill were prepared at 90% of the maximum density. The remolded samples were tested for shear strength and expansiveness.

Compaction Character

Boring	Depth (Feet)	Soil Type	Maximum Density (pcf)	Optimum Moisture (%)	Expansion Index
1	10	Alluvium	134.0	9.0	0

Shear-Tests

Shear tests were performed on samples of future compacted fill, alluvium and bedrock using a strain controlled, direct shear machine manufactured by Geometrics, Inc. The rate of deformation was approximately 0.025 inches per minute. Each sample was sheared under varying confining pressures in order to determine the Mohr-Coulomb shear strength parameters of the cohesion intercept and the angle of internal friction. The samples were tested in an artificially saturated condition. Following the shear test, the moisture content of the samples was determined. The results are plotted on the "Shear Test Diagrams", Plates B-1 through B-3.

Consolidation

Consolidation tests were performed on insitu samples of the alluvium with the results shown on Plates C-1 and C-2. Loads were

applied in several increments in a geometric progression, and the resulting deformations were recorded at selected time intervals. Porous stones were placed in contact with the top and bottom of each specimen to permit addition and release of pore fluid. Water was added to the samples at a specific load to determine the effects of saturation.

Expansion Test

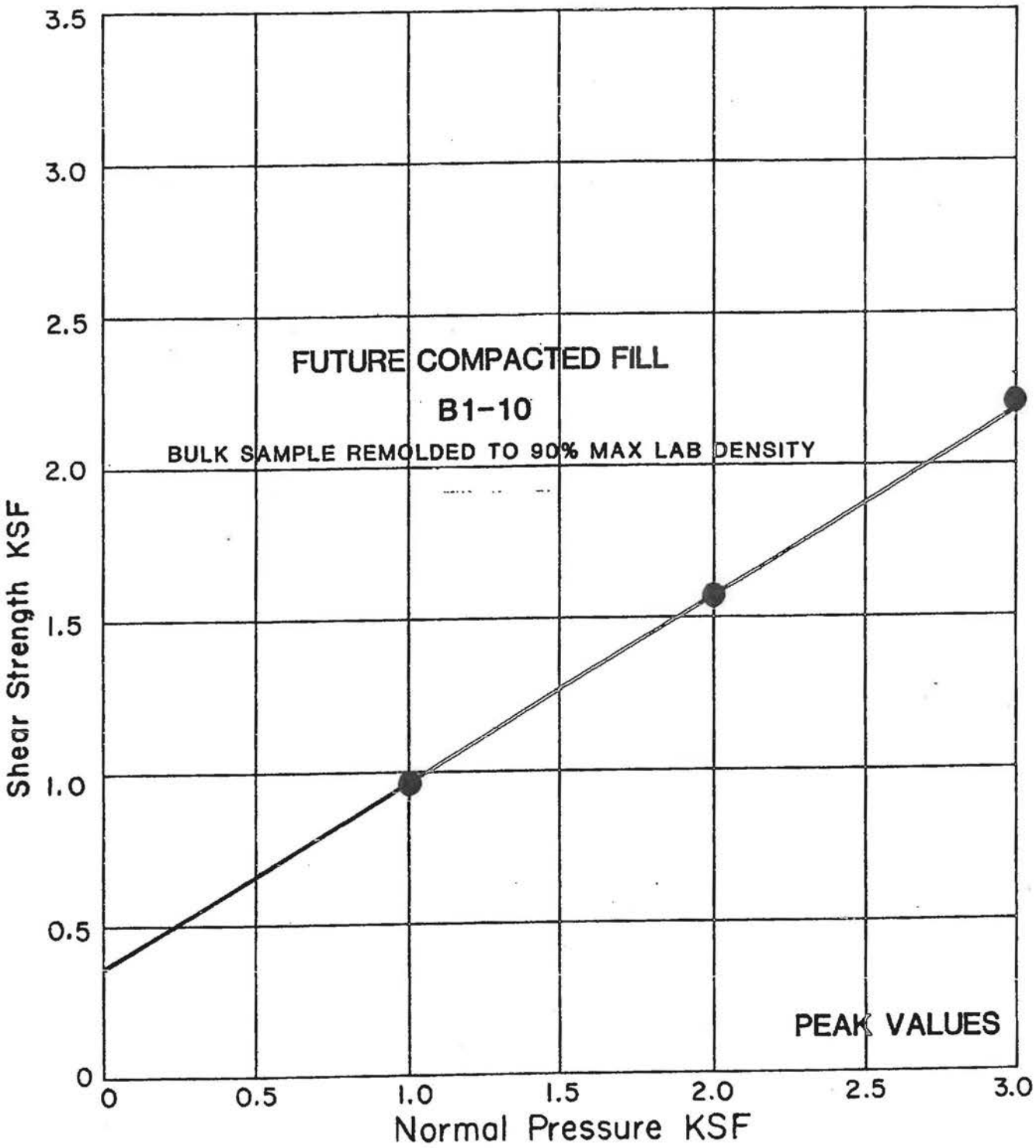
The expansiveness of the future compacted fill was determined using the Expansion Index Test, ASTM Standard D 4829. A bulk sample of the existing alluvium was remolded with a degree of saturation between 40 and 60 percent. A confining pressure of 144 pounds per square inch was applied to the sample with the rate of deformation measured over a 24 hour period. The classification of a potentially expansive soil is based on the following table:

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

11430 VENTURA BLVD., STUDIO CITY, CALIFORNIA 91604-3182 (818) 980-0825 (213) 877-2757 FAX (818) 980-1524

SHEAR TEST DIAGRAM

Project MCVINE JOINT VENTURE KB 13372-G

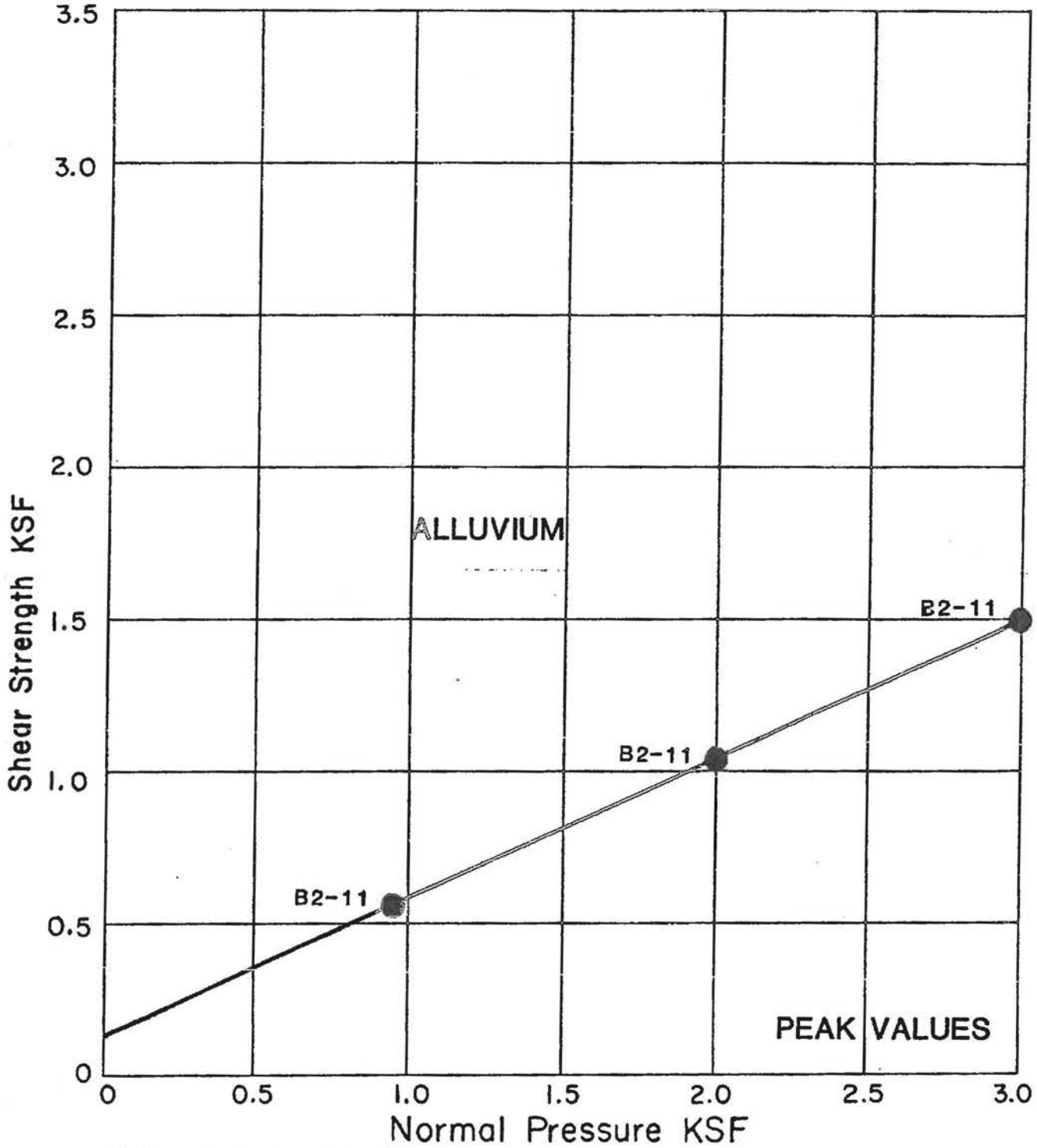


○ Direct Shear at Field Moisture
● Direct Shear, Saturated
∪ Unconfined Compression Test
⊕ Vane Shear Test
⊙ Penetrometer

KOVACS-BYER and ASSOCIATES Inc. PLATE B-1

SHEAR TEST DIAGRAM

Project MCVINE JOINT VENTURE KB 13372-G



○ Direct Shear at Field Moisture
● Direct Shear, Saturated
∪ Unconfined Compression Test
⊕ Vane Shear Test
⊙ Penetrometer

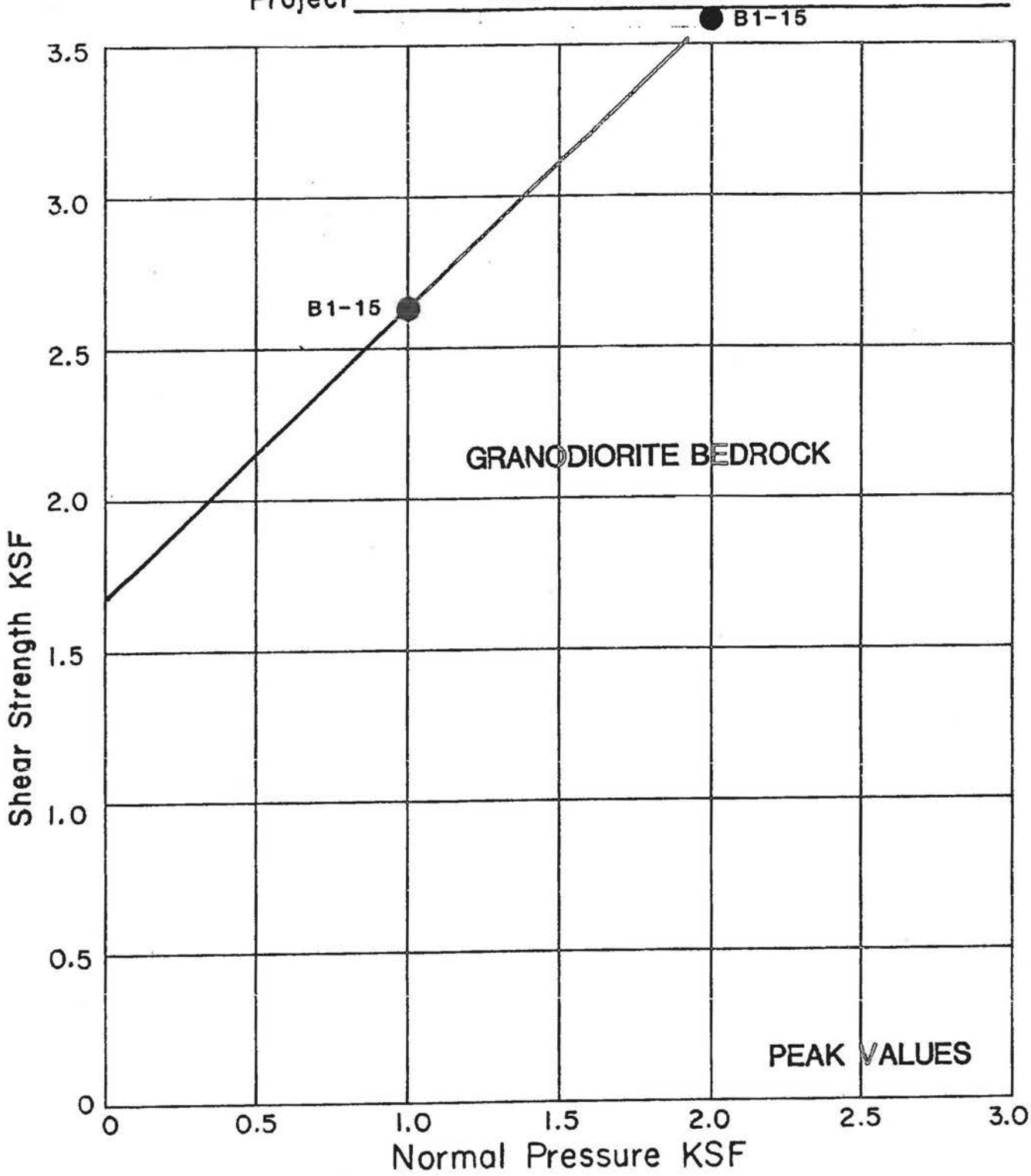
W(BEFORE TEST)	W(AFTER TEST)
5.7%	15.5%

γ_d = 110.2 PCF

KOVACS-BYER and ASSOCIATES Inc. PLATE B-2

SHEAR TEST DIAGRAM

Project MCVINE JOINT VENTURE KB 13372-G



○ Direct Shear at Field Moisture
● Direct Shear, Saturated
◡ Unconfined Compression Test W(BEFORE TEST) W(AFTER TEST)
⊕ Vane Shear Test 1.2% 8.5%
⊙ Penetrometer

γ_d = 137.2 PCF

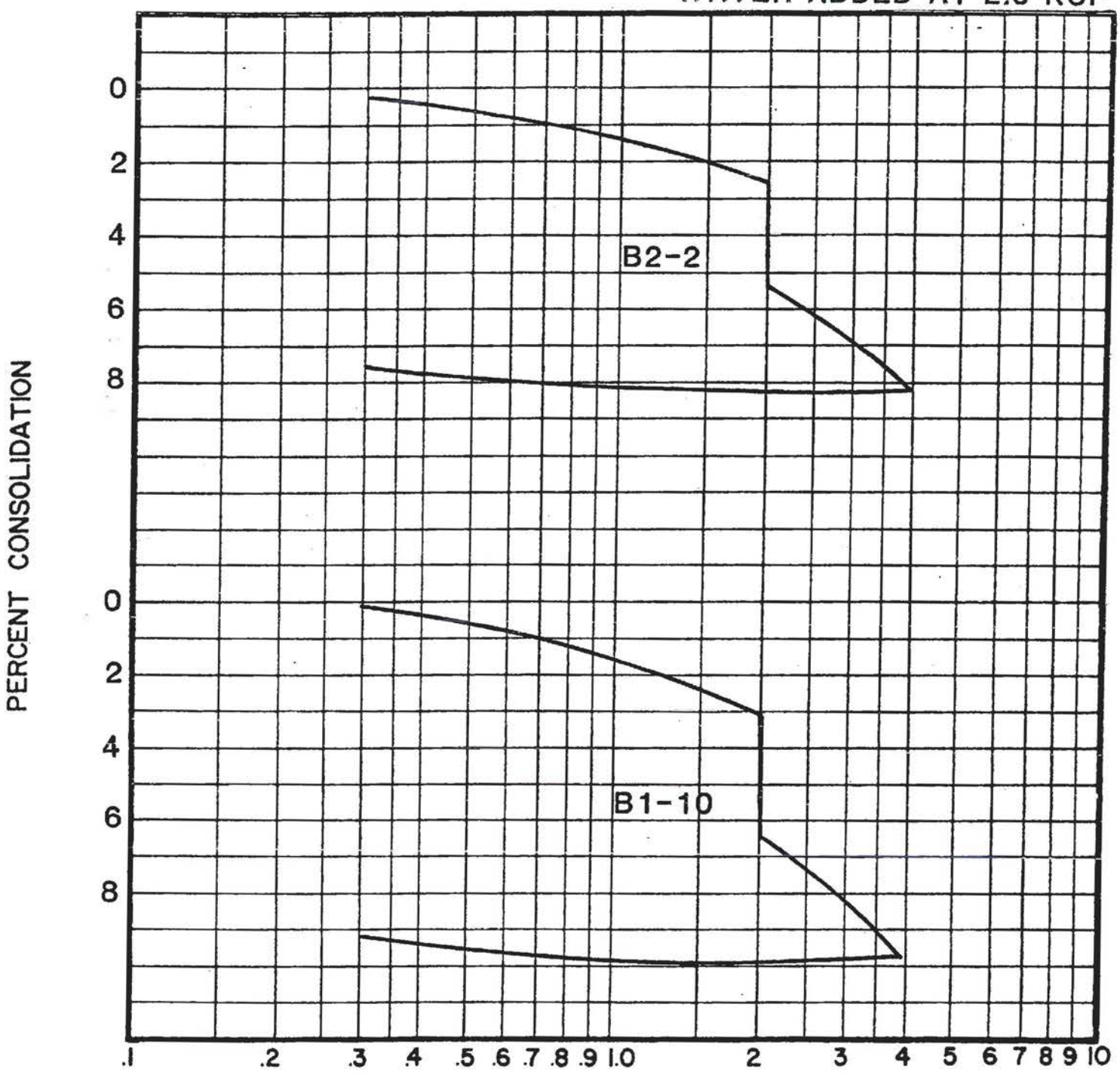
KOVACS-BYER and ASSOCIATES Inc. PLATE B-3

CONSOLIDATION TEST

Project MCVINE JOINT VENTURE KB 13372-G

Sample ALLUVIUM

WATER ADDED AT 2.0 KSF



KOVACS BYER and ASSOCIATES

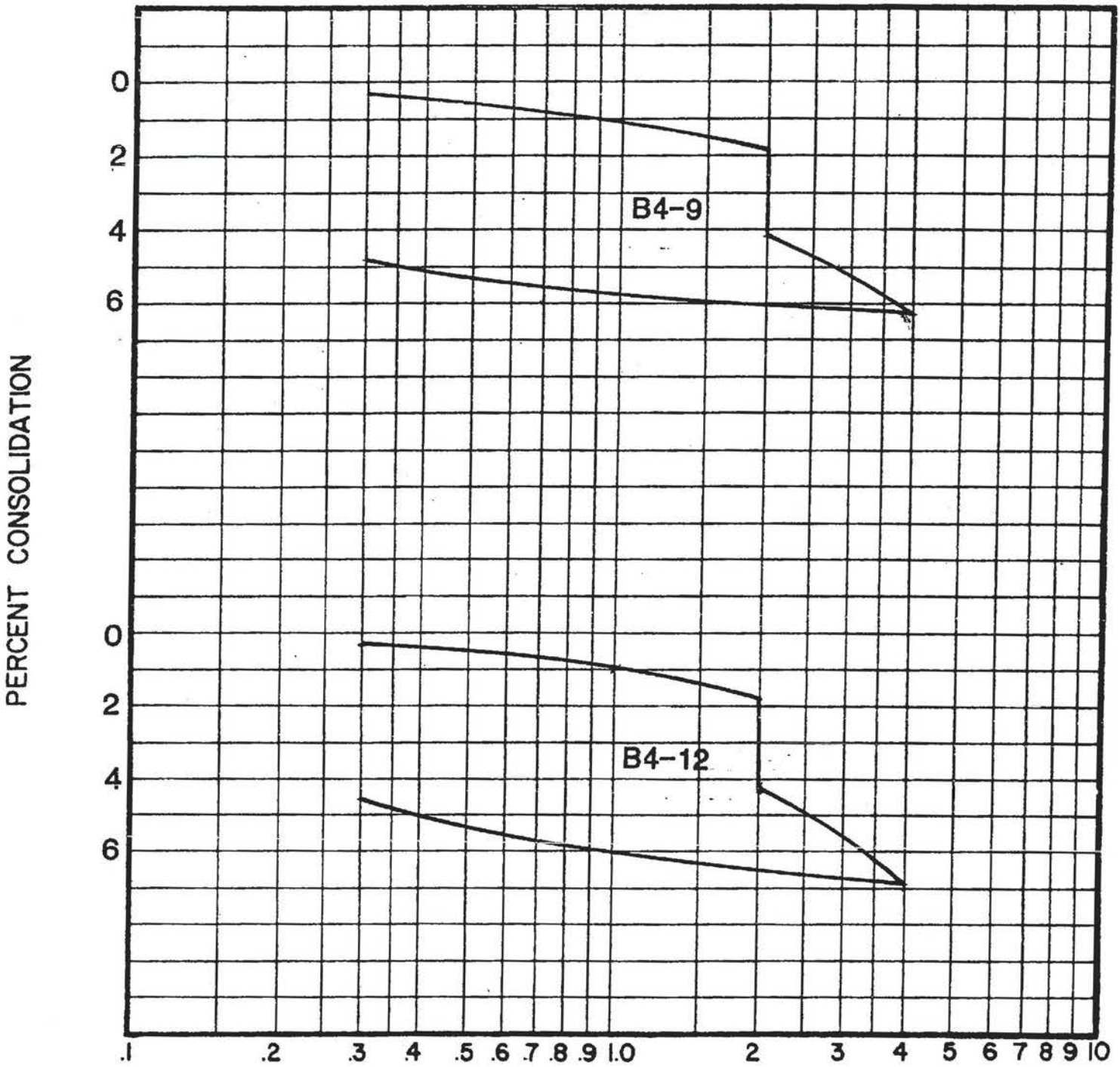
PLATE C-1

CONSOLIDATION TEST

Project MCVINE JOINT VENTURE KB 13372-G

Sample ALLUVIUM

WATER ADDED AT 2.0 KSF



KOVACS BYER and ASSOCIATES

PLATE C-2

TABLE I

LOG OF TEST PITS

Test Pit Number	Depth (Feet)	Description
1	0 - 7	ALLUVIUM: Silty to Gravelly Sand, medium brown, slightly moist, slightly dense, roots, occasional cobbles
	7 - 8-1/2	BEDROCK: Granodiorite, light brown, massive, fractured, jointed, hard, moderately weathered
		End at 8-1/2 feet; No Water; Caving at 0-7 feet; No Fill No Downhole Inspection
2	0 - 3	ALLUVIUM: Silty Sand, medium brown, moist, slightly dense, cobbles, upper 6" very moist, water seeping at 12"
	3 - 4	BEDROCK: Granodiorite, brown and white, massive, hard, moderately weathered, jointed
		End at 4 feet; Water Seepage as noted; No Caving; No Fill Note: Metal pipe observed along side of canyon. Possible leach line within canyon axis.
3	0 - 2-1/2	SOIL: Silty Sand, medium brown, slightly moist, medium dense, roots
	2-1/2 - 5	WEATHERED BEDROCK: Granodiorite, brown, very fractured, massive, moderately hard
	5 -10	BEDROCK: Granodiorite, brown and white, massive, hard, moderately weathered, fractured, jointed
		End at 10 feet; No Water; No Caving; No Fill

(continued)

TABLE I - LOG OF TEST PITS (continued)

Test Pit Number	Depth (Feet)	Description
4	0 - 1/2	RECENT SLOPE WASH: Gravelly Sand, light brown, dry, loose
	1/2 - 2	SOIL: Silty Sand, medium brown, slightly moist, roots
	2 - 7	BEDROCK: Granodiorite, grey and white, massive, jointed, weathered, moderately hard to hard, occasional rootlets to 7'
		End at 7 feet; No Water; No Caving; No Fill
5	0 - 2-1/2	SOIL: Silty Sand, medium brown, slightly moist, slightly to medium dense, roots, cobbles
	2-1/2 - 4-1/2	WEATHERED BEDROCK: Granodiorite, gray and light brown, massive, fractured, jointed, open fractures, roots, soil
	4-1/2 - 8	BEDROCK: Granodiorite, gray, white and light brown, massive, moderately hard to hard, weathered, fractured, jointed
		End at 8 feet; No Water; No Caving; No Fill Joint N20W 67SW at 4-1/2 feet
6	0 - 1	SOIL: Silty Sand, brown, slightly moist, slightly dense
	1 - 7	BEDROCK: Granodiorite, grey, white and brown, massive, upper 2 feet highly weathered, coarse, moderately hard, weathered, rootlets to 3'
		End at 7 feet; No Water; No Caving; No Fill 1" rusted metal pipe encountered buried at toe of slope

(continued)

11430 VENTURA BLVD., STUDIO CITY, CALIFORNIA 91604-3182 (818) 980-0825 (213) 877-2757 FAX (818) 980-1524

TABLE I - LOG OF TEST PITS (continued)

Test Pit Number	Depth (Feet)	Description
7	0 - 2	FILL: Silty Sand, medium brown, slightly moist, loose, concrete pieces, pipe
	2 - 3-1/2	SOIL: Silty Sand, medium brown, slightly moist, slightly dense
	3-1/2 - 6	BEDROCK: Granodiorite, light brown, massive, very weathered, moderately hard
		End at 6 feet; No Water; No Caving; Fill to 2 feet
8	0 - 2	SOIL: Silty to Clayey Sand, medium brown, moist, medium dense, roots
	2 - 6	BEDROCK: Granodiorite, dark gray, brown and white, massive, moderately hard, non-cemented, very weathered, roots to 5 feet
		End at 6 feet; No Water; No Caving; No Fill
9	0 - 4	ALLUVIUM: Gravelly Sand, medium brown, slightly moist, slightly dense, roots, slight caving
	4 - 9	silty sand, light brown, dry, slightly dense, occasional cobbles and boulders, occasional roots to 10 feet
	9 -13	occasional boulders, dry
		End at 13 feet; No Water; No Caving; No Fill

(continued)

TABLE I - LOG OF TEST PITS (continued)

Test Pit Number	Depth (Feet)	Description
10	0 - 1-1/2	SOIL: Silty Sand, medium brown, slightly moist, slightly to medium dense, roots
	1-1/2 - 5	BEDROCK: Granodiorite, light brown and white, massive, non-cemented, moderately hard, weathered, fractured
	5 - 5-1/2	slightly harder
		End at 5-1/2 feet; No Water; No Caving; No Fill
11	0 - 1	SOIL: Silty Sand, medium brown, slightly moist, loose, roots
	1 - 4-1/2	BEDROCK: Granodiorite, white and light brown, massive, non-cemented, moderately hard to hard, weathered
	4-1/2 - 6	less weathered, harder
		End at 6 feet; No Water; No Caving; No Fill
12	0 - 1	SOIL: Silty Sand, medium grown, slightly moist, slightly dense, roots
	1 - 7	BEDROCK: Granodiorite, light brown, massive, hard, non-cemented, jointed, weathered, upper 2 feet very weathered
		End at 7 feet; No Water; No Caving; No Fill
13	0 - 1/2	SOIL: Silty Sand, medium brown, slightly moist, roots
	1/2 - 3	BEDROCK: Granodiorite, orange-brown, massive, moderately hard, weathered
	3 - 4	grades to light brown, slightly harder
		End at 4 feet; No Water; No Caving; No Fill

(continued)

TABLE I - LOG OF TEST PITS (continued)

Test Pit Number	Depth (Feet)	Description
14	0 - 4-1/2	ALLUVIUM: Silty Sand, medium brown, slightly moist, some roots, occasional cobbles, slightly dense
	4-1/2 - 7	BEDROCK: Granodiorite, gray, white and light brown, massive, hard, moderately weathered, jointed
		End at 7 feet; No Water; No Caving; No Fill
15	0 - 1/2	SOIL: Silty Sand, medium brown, slightly moist, slightly to medium dense, roots
	1/2 - 6	BEDROCK: Granodiorite, light gray and white, massive, hard, slightly weathered, fractured, jointed
		End at 6 feet; No Water; No Caving; No Fill
16	0 - 1	SOIL: Silty Sand, dark brown, slightly moist, slightly dense, rootlets
	1 - 2	grades to reddish brown clayey sand
	2 - 4	WEATHERED BEDROCK: Granodiorite, brown and white, massive, very weathered, moderately hard
	4 - 5-1/2	BEDROCK: Granodiorite, gray and white, massive, hard, moderately weathered
		End at 5-1/2 feet; No Water; No Caving; No Fill
17	0 - 1/2	SOIL: Silty Sand, medium brown, slightly moist, slightly dense
	1/2 - 6	BEDROCK: Diorite, dark gray and white, massive, hard, weathered
		End at 6 feet; No Water; No Caving; No Fill

NOTE: The stratification depth represent the approximate boundary between earth types; the transition may be gradual.

BORING LOG NUMBER 1

Drilling Date 3/1/90 Elevation

Project KB 13372-G McVINE

Sample Depth ft.	Blows per ft.	Moisture Content %	Dry Unit Weight p.c.f.	Depth in feet	Graphic Log	Description Surface Conditions
				1		FILL: Gravelly Sand, medium brown, slightly moist, medium dense, occasional boulders, roots
5	4	3.5	112.2	5		
						ALLUVIUM: Gravelly Sand, medium brown, slightly moist, medium dense
10	4	5.7	110.2	10		
						roots end at 11 feet
13	12/8"	4.1	128.2			BEDROCK: Granodiorite, light brown and white, massive, moderately hard to hard, fractured, weathered
15	20	1.2	137.2	15		
20	10/6"	6.6	112.3	20		End at 20 feet; No Water; Slight Caving 0-6 feet; Fill to 6 feet
				25		

BORING LOG NUMBER 2

Drilling Date _____ Elevation _____

Project KB 13372-G McVINE

Sample Depth ft.	Blows per ft.	Moisture Content %	Dry. Unit Weight p.c.f.	Depth in feet	Graphic Log	Description Surface Conditions
				1		ALLUVIUM: Gravelly Sand, dark brown, slightly moist to moist, medium dense, some silt and clay binder
2	3	3.1	106.5			
5	4	4.5	104.5	5		slightly porous, grades to slightly moist, medium brown, denser
7	7	4.5	107.1			
9	7	4.8	111.3			occasional roots
				10		
11	6	4.9	103.9			slightly to moderately porous
13	11	7.6	122.1			grades very dense, slightly more clay in matrix
						gravelly
15	12	13.5	107.5	15		
						very gravelly
20	16	6.9	122.4	20		BEDROCK: Granodiorite, brown and white, massive, hard, weathered
						easy drilling with 24" bucket
				25		

BORING LOG NUMBER 2 (continued)

Drilling Date _____ Elevation _____

Project KB 13372-G McVINE

Sample Depth ft.	Blows per ft.	Moisture Content %	Dry Unit Weight p.c.f.	Depth in feet	Graphic Log	Description Surface Conditions
				26		
				30		grades slightly denser
				35		
				40		End at 36 feet; No Water; No Caving; No Fill
				45		
				50		

KOVACS-BYER and ASSOCIATES INC.

PLATE A-3

BORING LOG NUMBER 3

Drilling Date _____ Elevation _____

Project KB 13372-G McVINE

Sample Depth ft.	Blows per ft.	Moisture Content %	Dry Unit Weight p.c.f.	Depth in feet	Graphic Log	Description Surface Conditions
				1		FILL: Gravelly Sand, medium brown, moist, medium dense, occasional cobbles
3	7	4.0	119.5			slight to moderate caving 3-11'
				5		ALLUVIUM: Gravelly Sand, medium brown, slightly moist to moist, medium dense, occasional cobbles
6	3	3.2	107.8			large roots to 8'
						becomes dense
9	5	4.2	106.1	10		
						more gravelly, several cobbles and small boulders
12	8	3.2	116.5			
15	14	5.4	115.3	15		
20	13	8.1	109.2	20		BEDROCK: Granodiorite, light gray, massive, moderately hard to hard, weathered
				25		End at 24 feet; No Water; Caving as noted; Fill to 5 feet

KOVACS-BYER and ASSOCIATES INC.

PLATE A-4

BORING LOG NUMBER 4

Drilling Date 3/2/90 Elevation

Project KB 13372-G McVINE

Sample Depth ft.	Blows per ft.	Moisture Content %	Dry Unit Weight p.c.f.	Depth in feet	Graphic Log	Description Surface Conditions
				1		FILL: Gravelly Sand, medium brown, moist, slightly to medium dense, rootlets
3	2	2.4	119.5			
				5		ALLUVIUM: Gravelly Sand, medium to light brown, slightly moist, dense, cobbles and occasional boulders
6	6	3.8	104.5			
9	10	10.0	117.5	10		
12	9	9.8	125.3			
15	10	3.3	110.9	15		
18	9	15.7	114.3			
				20		
				25		BEDROCK: Granodiorite, dark gray and black, massive, hard

BORING LOG NUMBER 4 (continued)

Drilling Date _____ Elevation _____

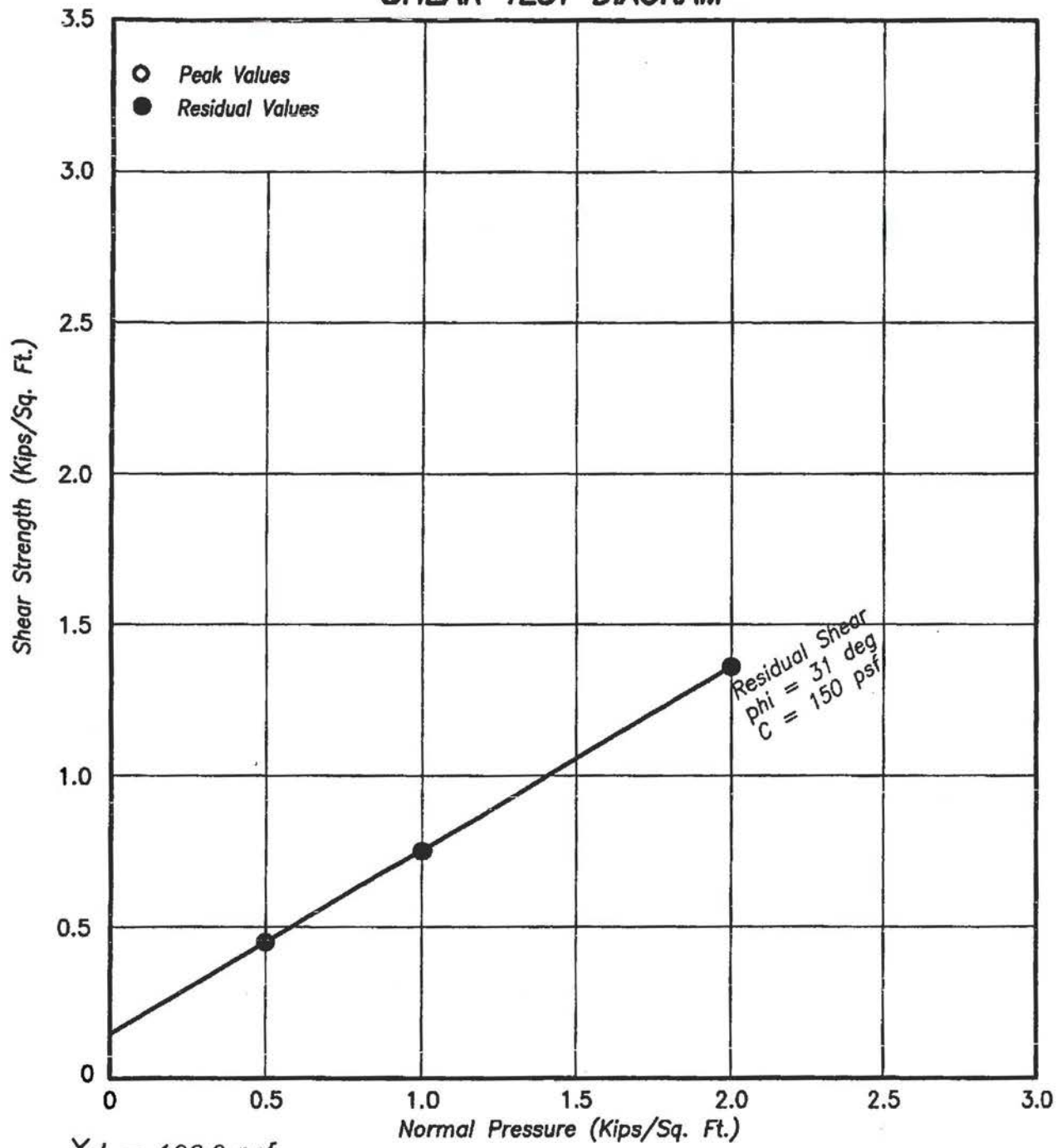
Project KB 13372-G McVINE

Sample Depth ft.	Blows per ft.	Moisture Content %	Dry Unit Weight p.c.f.	Depth in feet	Graphic Log	Description Surface Conditions
				26		very hard drilling
						End at 27 feet; No Water; No Caving; Fill to 4 feet
				30		
				35		
				40		NOTE PLATES A-1 THROUGH A-6: The stratification line represents the approximate boundary between earth types; the transition may be gradual.
				45		
				50		

APPENDIX II

GeoSystems, Inc., excerpts from report dated April 19, 2010

SHEAR TEST DIAGRAM



γd = 106.0 pcf

Wi = 7.6 %

Wf = 21.9 %

Sample Location: B-1 Depth: 5 ft.

Material: Alluvium Saturated, Undisturbed

GEOSYSTEMS
ENVIRONMENTAL AND GEOTECHNICAL CONSULTANTS
1545 VICTORY BLVD, 2ND FLOOR GLENDALE CA 91201-0240
PHONE 818-500-9533 FAX 818-500-0134

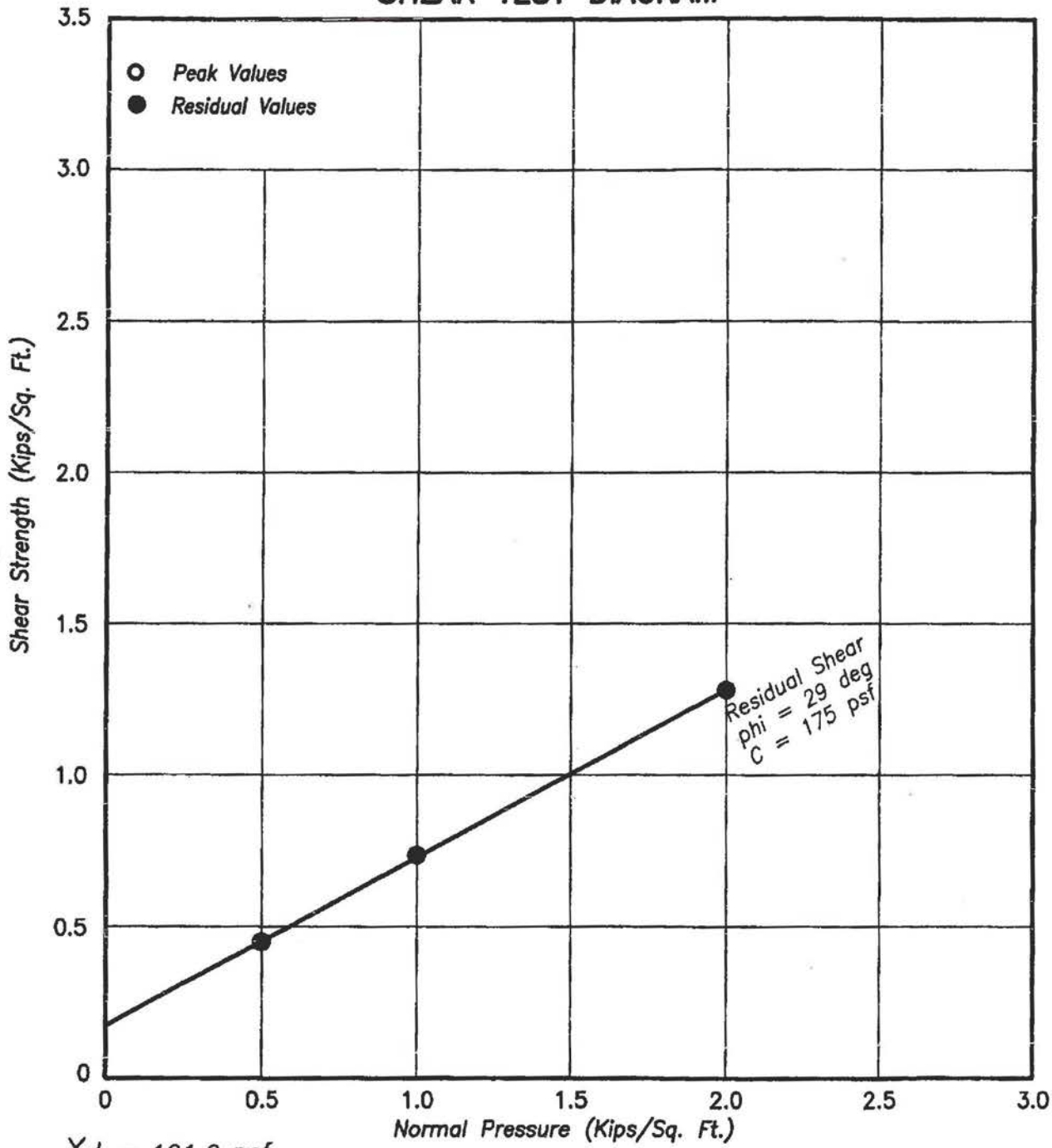
Project: 8150 W. McGroarty Street
Los Angeles, California

Date: April, 2010

GS # 10-0305

PLATE DS-1

SHEAR TEST DIAGRAM



γd = 121.0 pcf

Wi = 11.7 %

Wf = 21.4 %

Sample Location: B-1 Depth: 0-10 ft.

Material: Alluvium Saturated, Remolded to 90%

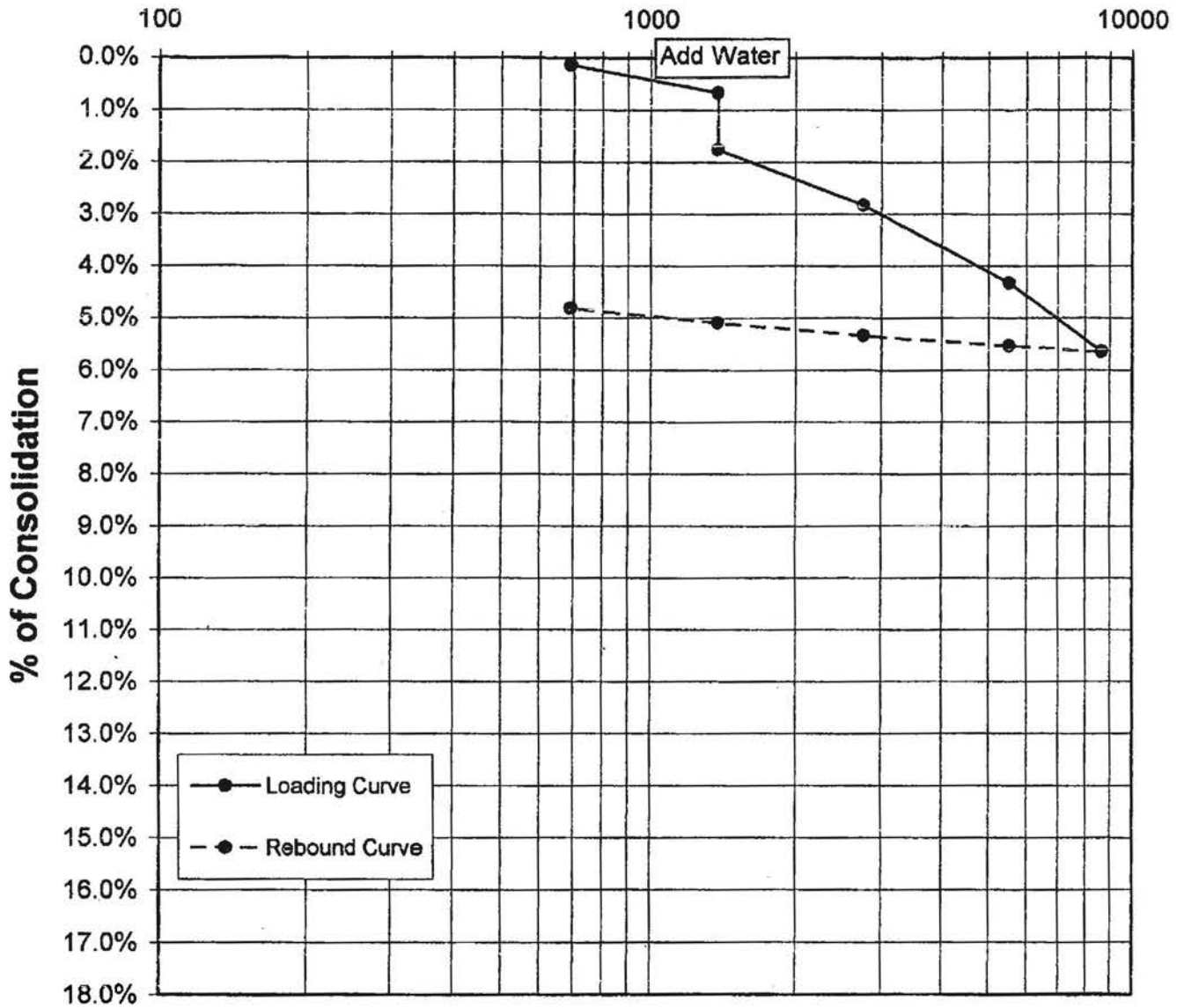
GEOSYSTEMS
ENVIRONMENTAL AND GEOTECHNICAL CONSULTANTS
1548 VICTORY BLVD, 2ND FLOOR GLENDALE CA 91201-6240
PHONE 818-500-9533 FAX 818-500-0134

Project: 8150 W. McGroarty Street
Los Angeles, California

Date: April, 2010

GS # 10-0305

PLATE DS-2



Sample Location : B-3

Depth : 15 feet

Material : Qal

γ_d = 117.9 pcf

ω_i = 4.7%

ω_f = 15.2%

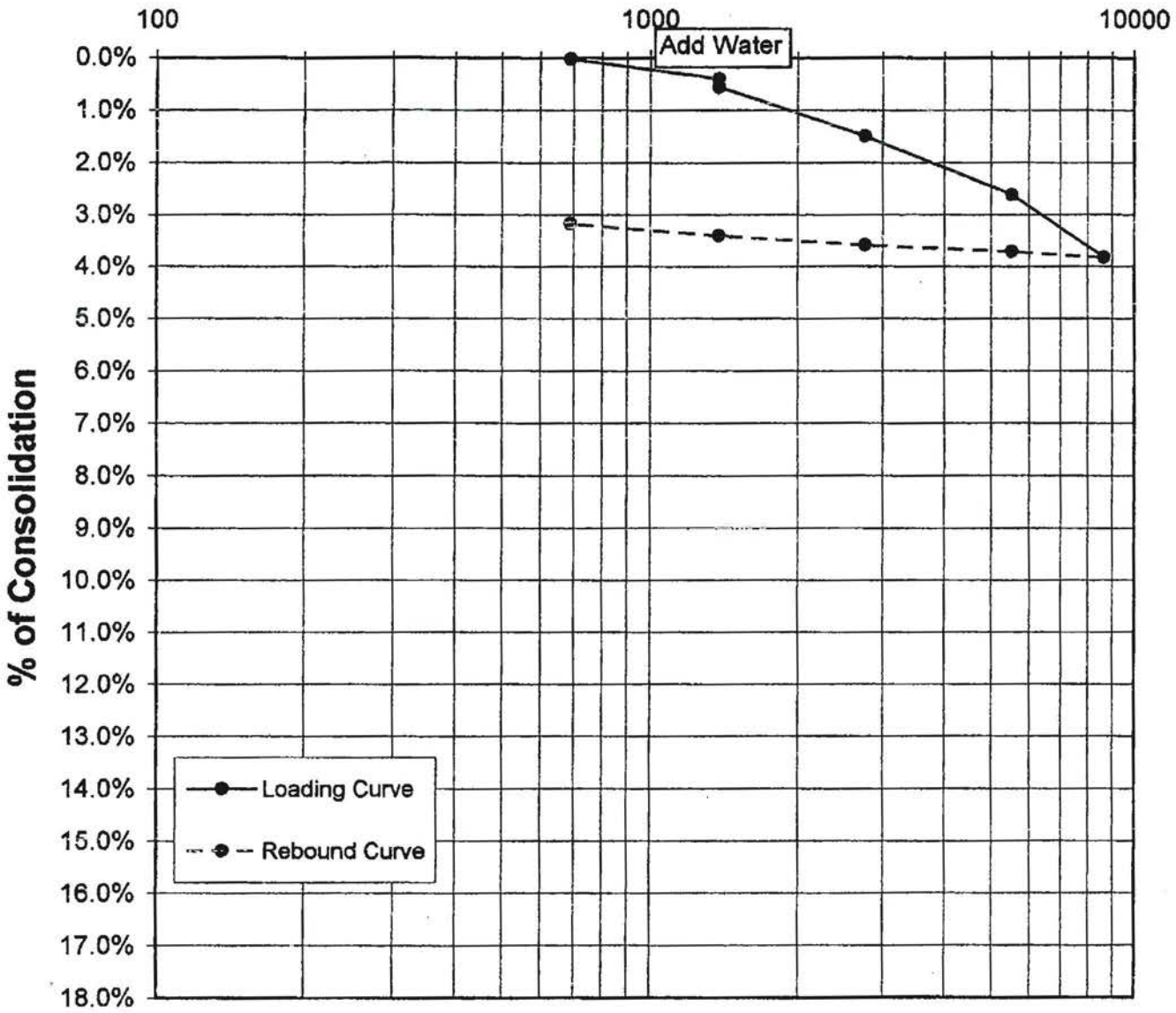
GEOSYSTEMS, Inc.
ENVIRONMENTAL, ENGINEERING-GEOLOGY AND GEOTECHNICAL ENGINEERING
1545 VICTORY BLVD., 2ND FLR., GLENDALE, CA 91201-9240
PHONE 818-500-9533 FAX 818-500-0134

CONSOLIDATION-PRESSURE CURVE

8150 W. McGroarty Steet

Sunland , California

DATE: 04/01/10	GS 10-0305	PLATE C-6



Sample Location : B-3

Depth : 3 feet

Material : Qal

γ_d = 107.4 pcf

ω_i = 6.2%

ω_f = 16.8%

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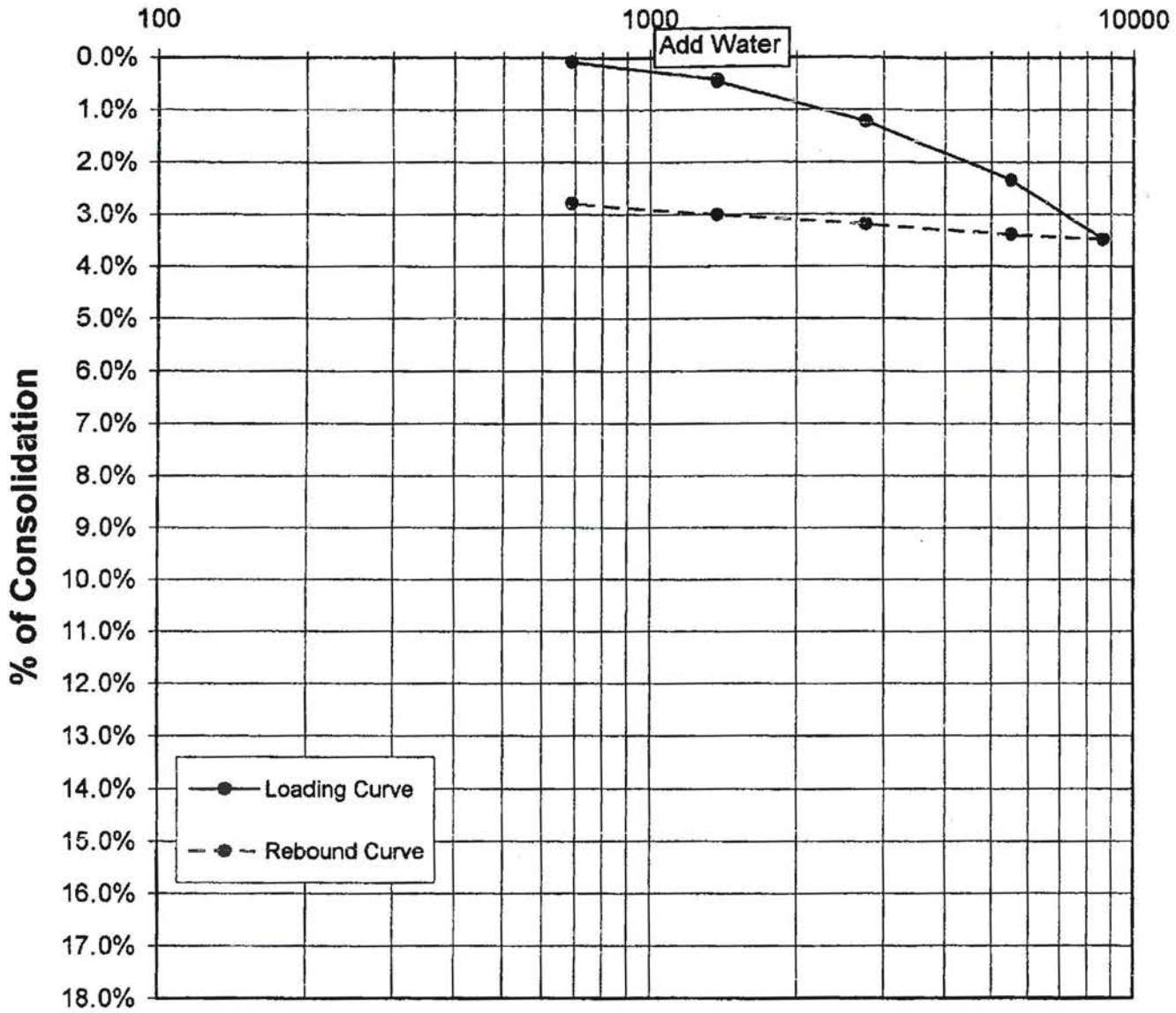
PHONE 818-500-9533 FAX 818-500-0134

CONSOLIDATION-PRESSURE CURVE

8150 W. McGroarty Steet

Sunland , California

DATE: 04/01/10	GS 10-0305	PLATE C-5



Sample Location : B-2

Depth : 5 feet

Material : Qal

γ_d = 108.5 pcf

ω_i = 6.2%

ω_f = 16.0%

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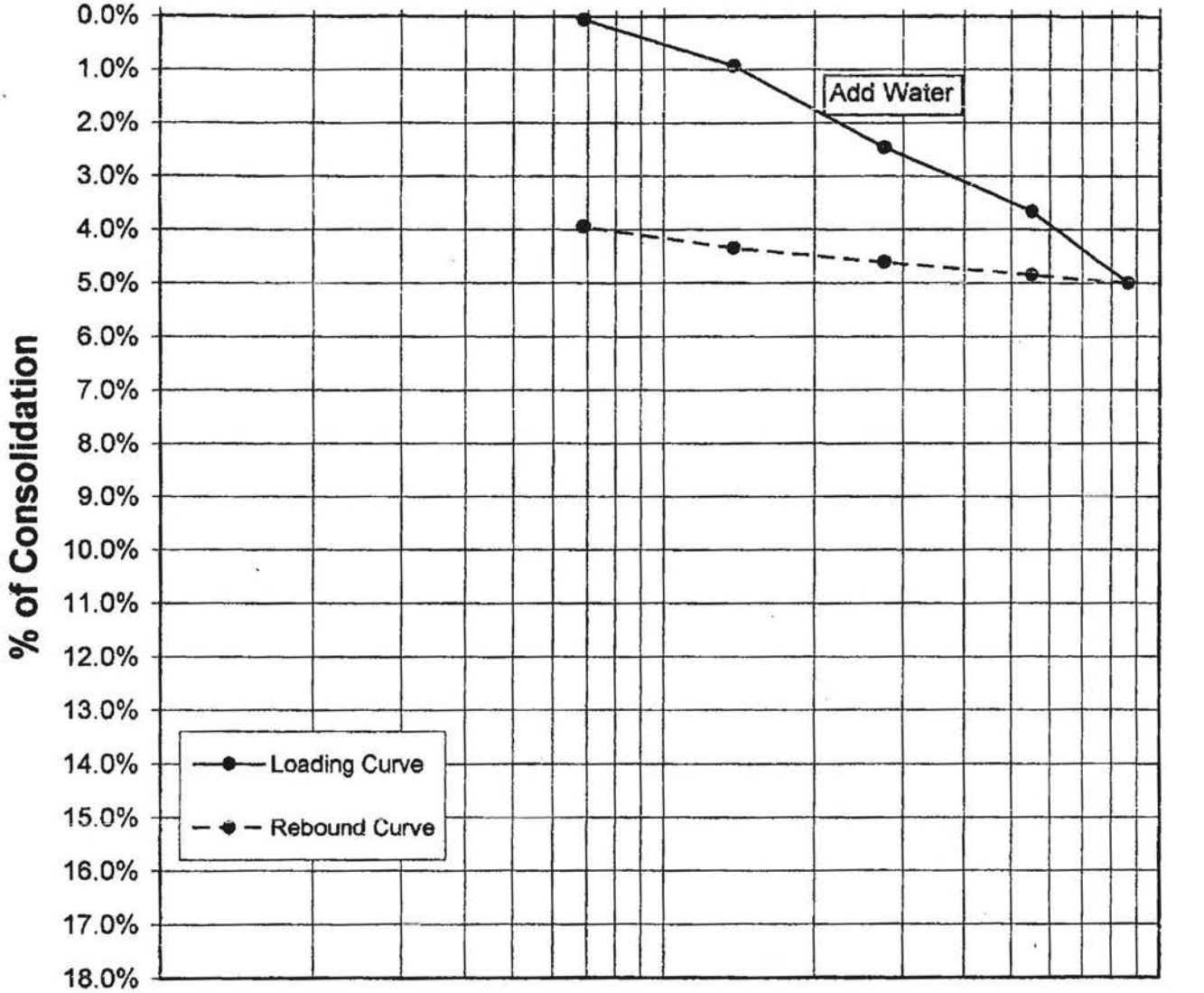
PHONE 818-500-9533 FAX 818-500-0134

CONSOLIDATION-PRESSURE CURVE

8150 W. McGroarty Steet

Sunland , California

DATE: 04/01/10	GS 10-0305	PLATE C-4



Sample Location : B-1

Depth : 20 feet

Material : Qal

γ_d = 118.3 pcf

ω_i = 7.4%

ω_f = 14.9%

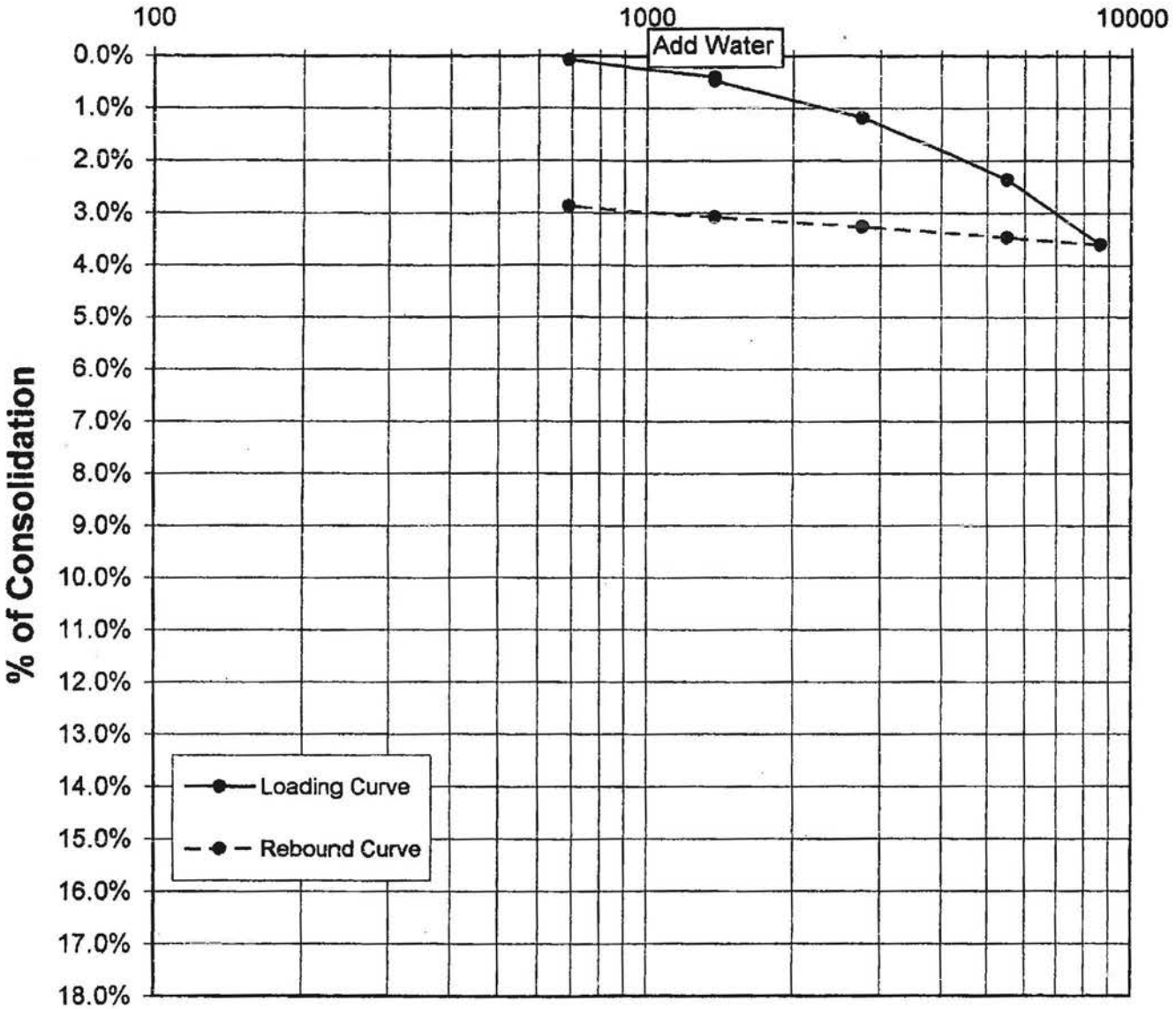
GEOSYSTEMS, Inc.
ENVIRONMENTAL, ENGINEERING-GEOLOGY AND GEOTECHNICAL ENGINEERING
1545 VICTORY BLVD., 2ND FLR., GLENDALE, CA 91201-9240
PHONE 818-500-9533 FAX 818-500-0134

CONSOLIDATION-PRESSURE CURVE

8150 W. McGroarty Steet

Sunland , California

DATE: 04/01/10	GS 10-0305	PLATE C-3



Sample Location : B-1

Depth : 10 feet

Material : Qal

γ_d = 110.4 pcf

ω_i = 9.1%

ω_f = 16.4%

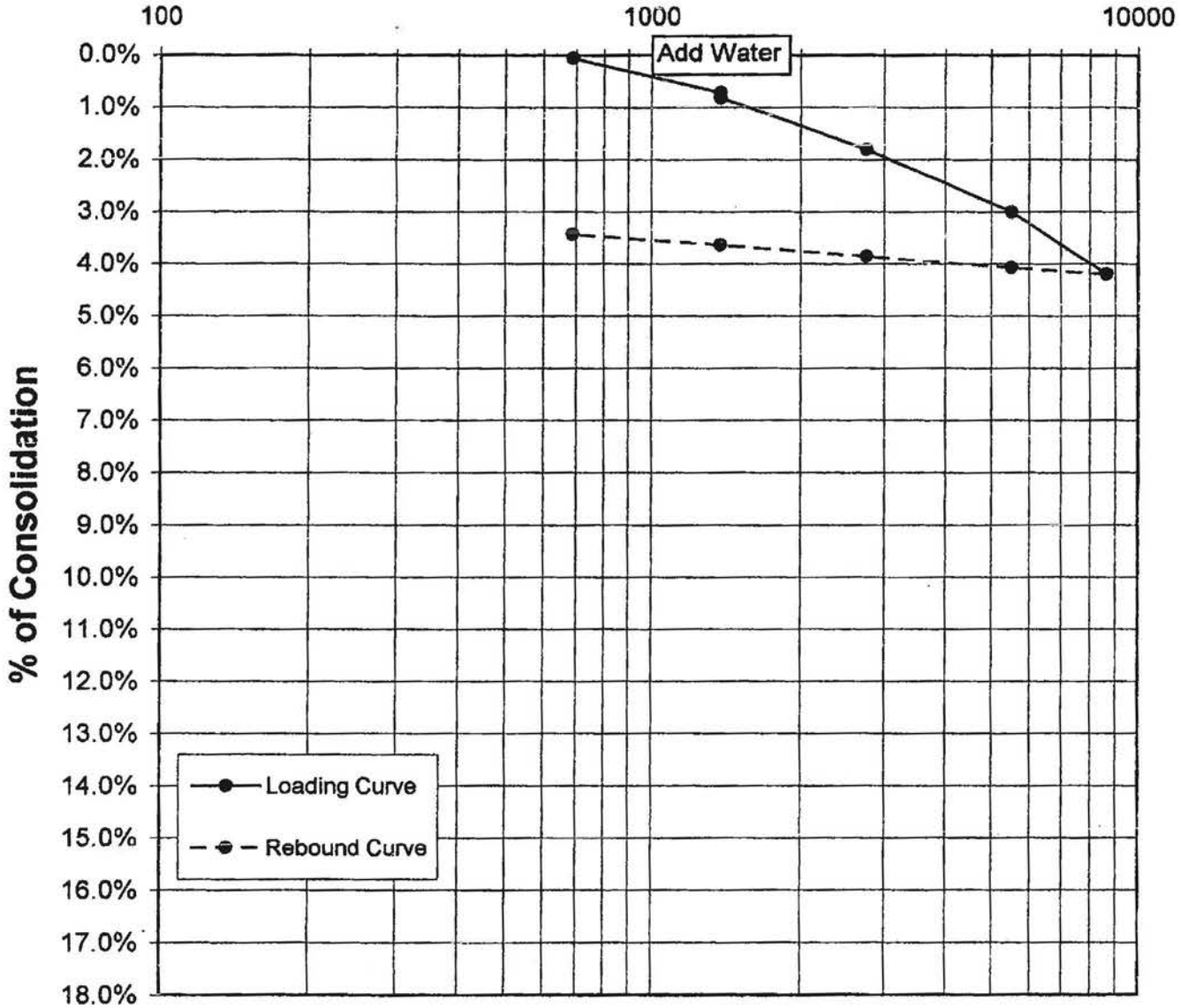
GEOSYSTEMS, Inc.
ENVIRONMENTAL, ENGINEERING-GEOLOGY AND GEOTECHNICAL ENGINEERING
1545 VICTORY BLVD., 2ND FLR., GLENDALE, CA 91201-9240
PHONE 818-500-9533 FAX 818-500-0134

CONSOLIDATION-PRESSURE CURVE

8150 W. McGroarty Steet

Sunland , California

DATE: 04/01/10	GS 10-0305	PLATE C-2



Sample Location : B-1

Depth : 5 feet

Material : Qal

γ_d = 103.5 pcf

ω_i = 6.2%

ω_f = 18.0%

GEOSYSTEMS, Inc.
ENVIRONMENTAL, ENGINEERING-GEOLOGY AND GEOTECHNICAL ENGINEERING
1545 VICTORY BLVD., 2ND FLR., GLENDALE, CA 91201-9240
PHONE 818-500-9533 FAX 818-500-0134

CONSOLIDATION-PRESSURE CURVE

8150 W. McGroarty Steet

Sunland , California

DATE: 04/01/10	GS 10-0305	PLATE C-1

R = Ring Sampler (2.4" i.d.) = Sample location

BORING LOG B-1

No Groundwater Encountered
No Caving
Total Depth: 30.0 ft.

Dry Density (pcf)	Moisture (%)	Blowcount (per ft.)	Sample Type	Depth (ft)	U.S.C.S. Class.	Lithologic Description
		5/6/6	R			**0–25' Alluvium (Qal)** Gravelly silty sand, fine to coarse grained, orange brwon to brown, moderately firm to firm, dry to slightly moist, few small rock fragments
		6/8/8	R	5		@3' Medium to coarse sand, dark orange brown, slightly moist, minor rock fragments up to 3/4–inch
						@5' Medium to coarse sand, orange brown to brown, slightly moist
		6/10/10	R	10		@10' Medium to coarse sand, orange brown, moderately firm, dry to slightly moist
		18/30/32	R	15		@15' Silty snad, fine to medium grained, light brown, firm, dry, minor small rock fragments
		35/50–5"	R	20		@20' Silty sand, fine to medium grained, light brown to brown, dense, dry
						25–30' Bedrock–wilson diorite (wd) Coarsely crystalline, black and white, hard to very hard, dense, dry to slightly moist
		33/50–6"	R	25		
		100–3"	R	30		@30' Bedrock– Coarsely crystalline, black and white, very hard, unable to sample
				35		
				40		

No Groundwater Encountered
No Caving
Total Depth: 30.0 ft.

GEOSYSTEMS, Inc.
ENVIRONMENTAL, ENGINEERING GEOLOGY AND GEOTECHNICAL ENGINEERING
1545 VICTORY BLVD., 2ND FLR., GLENDALE, CA 91201-9240
PHONE 818-500-9533 FAX 818-500-0134

Project: 8150 W. Mc Groarty Street
Los Angeles, California
Date Drilled: 3/24/10 Elevation: +/–1547 ft.
Rig Type: 8 in. o.d. Truck–Mounted Hollow Stem
Logged By: MH
GS # 10–0305

This log of subsurface conditions applies only at the specific location and the date indicated. Subsurface conditions may differ at other locations and times.

PLATE B-1

R = Ring Sampler (2.4" i.d.) = Sample location

BORING LOG B–2

No Groundwater Encountered
No Caving
Total Depth: 25.0 ft.

Dry Density (pcf)	Moisture (%)	Blowcount (per ft.)	Sample Type	Depth (ft)	U.S.C.S. Class.
		6/8/9	R	5	
		10/18/25	R	10	
		23/50–6"	R	15	
				20	
		100–6"	R	25	
				30	
				35	
				40	

Lithologic Description

0–23.5' Alluvium (Qal)

Gravelly silty sand, fine to coarse grained, orange brwon to brown, moderately firm to firm, dry to slightly moist, few small rock fragments

@5' Silty sand fine to medium grained with minor small rock fragments, orange brown to brown, slightly moist to moist

@10' Silty sand, fine grained, light brown, moderately firm, dry to slightly moist

@15' Silty sand, fine grained, light brown to orange brown, firm, dry

23.5–25' Bedrock–wilson diorite (wd)

Coarsely crystalline, black and white, hard to very hard, dense, dry to slightly moist

@25' Bedrock– Coarsely crystalline, pinkish white to black, very hard sample

No Groundwater Encountered
No Caving
Total Depth: 25.0 ft.

GEOSYSTEMS, Inc.
ENVIRONMENTAL, ENGINEERING-GEOLOGY AND GEOTECHNICAL ENGINEERING
1545 VICTORY BLVD., 2ND FLR., GLENDALE, CA 91201-9240
PHONE 818-500-9533 FAX 818-500-0134

Project: 8150 W. Mc Groarty
Los Angeles, California
Date Drilled: 3/24/10 Elevation: +/–1545 ft.
Rig Type: 8 in. o.d. Truck-Mounted Hollow Stem
Logged By: MH
GS # 10-0305

R = Ring Sampler (2.4" i.d.) = Sample location

BORING LOG B-3

No Groundwater Encountered
No Caving
Total Depth: 25.0 ft.

Dry Density (pcf)	Moisture (%)	Blowcount (per ft.)	Sample Type	Depth (ft)	U.S.C.S. Class.
		5/6/9	R		
		5/8/13	R	5	
		15/50-2"	R		
				10	
		20/35/50-6"	R	15	
				20	
		40/50-3"	R		
		50-5"/75-6"	R	25	
				30	
				35	
				40	

Lithologic Description

0-23' Alluvium (Qal)

Gravelly silty sand, fine to coarse grained, orange brwon to brown, moderately firm to firm, dry to slightly moist, few small rock fragments

@3' Silty sand, fine to medium grained, orange brown to brown, slightly moist to moist

@5' Silty sand, fine to medium grained, orange brown to brown, moderately firm, slightly moist to moist

@7' Silty sand \, fine to medium grained, light orange brown to brown, dense, slightly moist

@15' Silty sand, fine to medium grained, orange brown to brown, firm, slightly moist

23-25' Bedrock-wilson diorite (wd)

Coarsely crystalline, black and white, hard to very hard, dense, dry to slightly moist

@23' Bedrock- Coarsely crystalline, black and white, hard to very hard, dry

@25' Bedrock- Coarsely crystalline, black and white, very hard, unable to sample

No Groundwater Encountered
No Caving
Total Depth: 25.0 ft.

GEOSYSTEMS, Inc.
ENVIRONMENTAL, ENGINEERING GEOLOGY AND GEOTECHNICAL ENGINEERING
1545 VICTORY BLVD., 2ND FLR., GLENDALE, CA 91201-9240
PHONE 818-500-9533 FAX 818-500-0134

Project: 8150 W. Mc Groarty Street
Los Angeles, California
Date Drilled: 3/24/10 Elevation: +/-1542 ft.
Rig Type: 8 in. o.d. Truck-Mounted Hollow Stem
Logged By: MH
GS # 10-0305

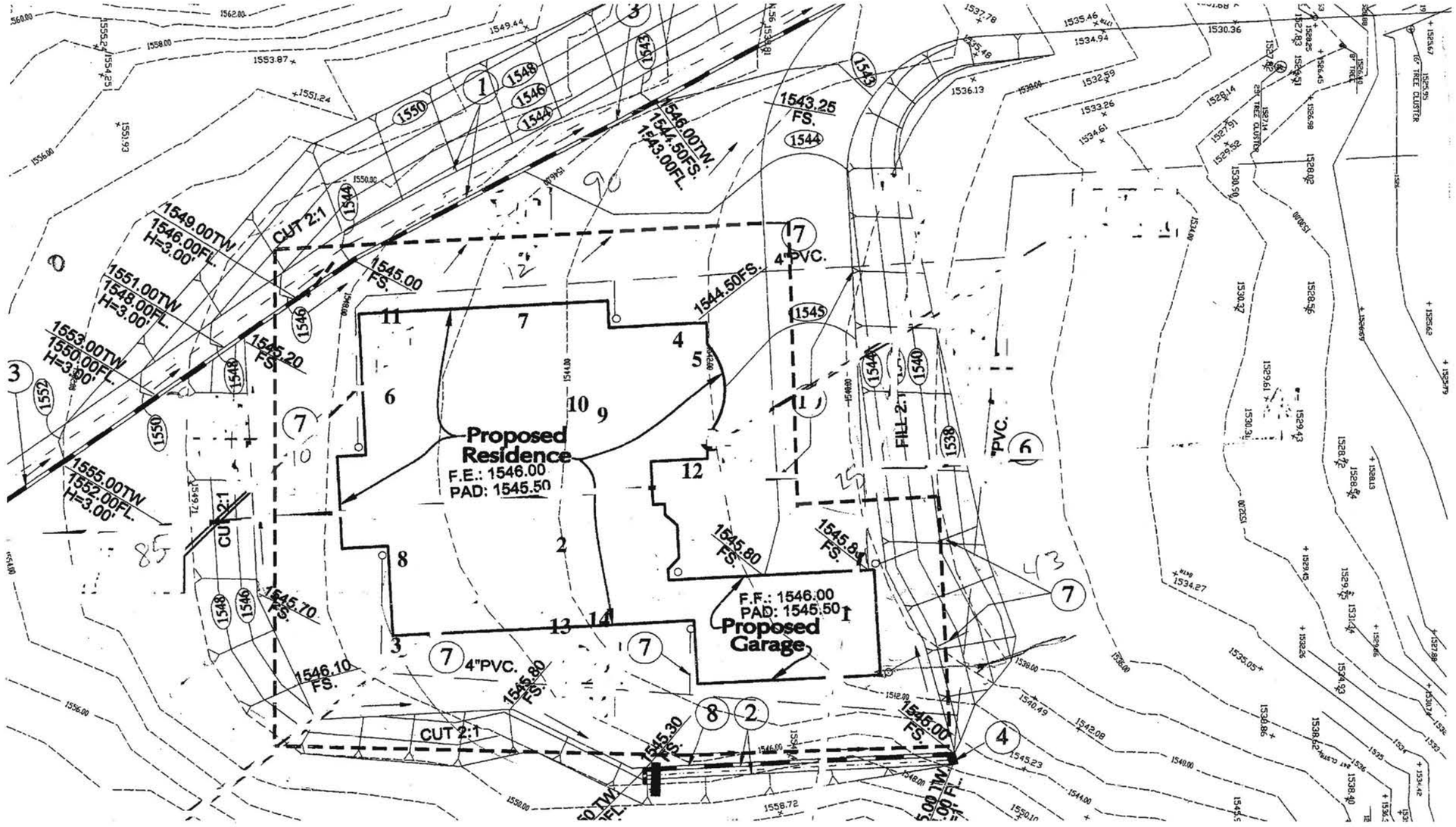
This log of subsurface conditions applies only at the specific location and the date indicated. Subsurface conditions may differ at other locations and times.

PLATE B-3

March 3, 2016
BG 21103

APPENDIX III

A.G.I. Geotechnical, Inc., excerpts from report dated December 16, 2010



Legend

Approxmate Limits of Compacted Fill

9 Approximate Location of Compaction Tests

Source of Map: Geosystems July 2010 Geotechnical Map

N

Compaction Map

A.G.I. GEOTECHNICAL, INC.
16555 Sherman Way, Suite A Van Nuys, CA 91406
(818) 785-5244 Fax (818) 785-6251

Project No: 20-3466-10	Date: 12/16/10
Scale: 1" = ~~10'~~ 20	Revised:
Approved By: JAV	Drawn By: MG

GRADING DIVISION
CERTIFICATE OF COMPLIANCE
CITY OF LOS ANGELES/DEPT OF BUILDING & SAFETY

DATE: December 16, 2010

LOCATION OF FILL:TRACT Western Empire Tract **BLOCK:** _____ **LOT:** 202 1/2

JOB ADDRESS: 1805 W McGroarty Street, Los Angeles

PROPERTY OWNER'S NAME: Albert Davityan

PROPERTY OWNER'SADDRESS: 9411 Hillrose Street, Sunland 91040

SOIL TESTING AGENCY: A.G.I. Geotechnical, Inc. **PROJECT #:** 20-3466-10

PERMIT #: 10030-20000-09784 **DATE:** **WORK STARTED:** 12/08/10

WORK COMPLETED: 12/14/10

TO THE SUPERINTENDENT OF BUILDING:

I hereby certify that I have personally observed and tested the placement of compacted fill on the above described property, and, on the basis of these observations and test results, it is my professional opinion that the same was placed in conformity with the requirements of the City of Los Angeles Building Code.

Juan A. Vidal
Civil Engineer (Print Name)

861
License #

REGISTERED PROFESSIONAL ENGINEER
JUAN A. VIDAL
No. 861
Exp. 12-31-11
GEOTECHNICAL
STATE OF CALIFORNIA

Civil Engineer Signature

Stamp

DO NOT AMEND, ALTER, CHANGE, DELETE, APPEND, OR ATTACH TO ANY PRINTED PORTION OF THIS CERTIFICATE AS IT WILL RENDER IT NULL AND VOID.

For the purpose of this certificate to "have personally observed and tested" shall include observations and testing performed by any person responsible to the licensed engineer of record signing this certificate. Where the observations and testing of all or a part of work above is delegated, full responsibility shall be assumed by the licensed engineer of record whose signature is affixed hereon.

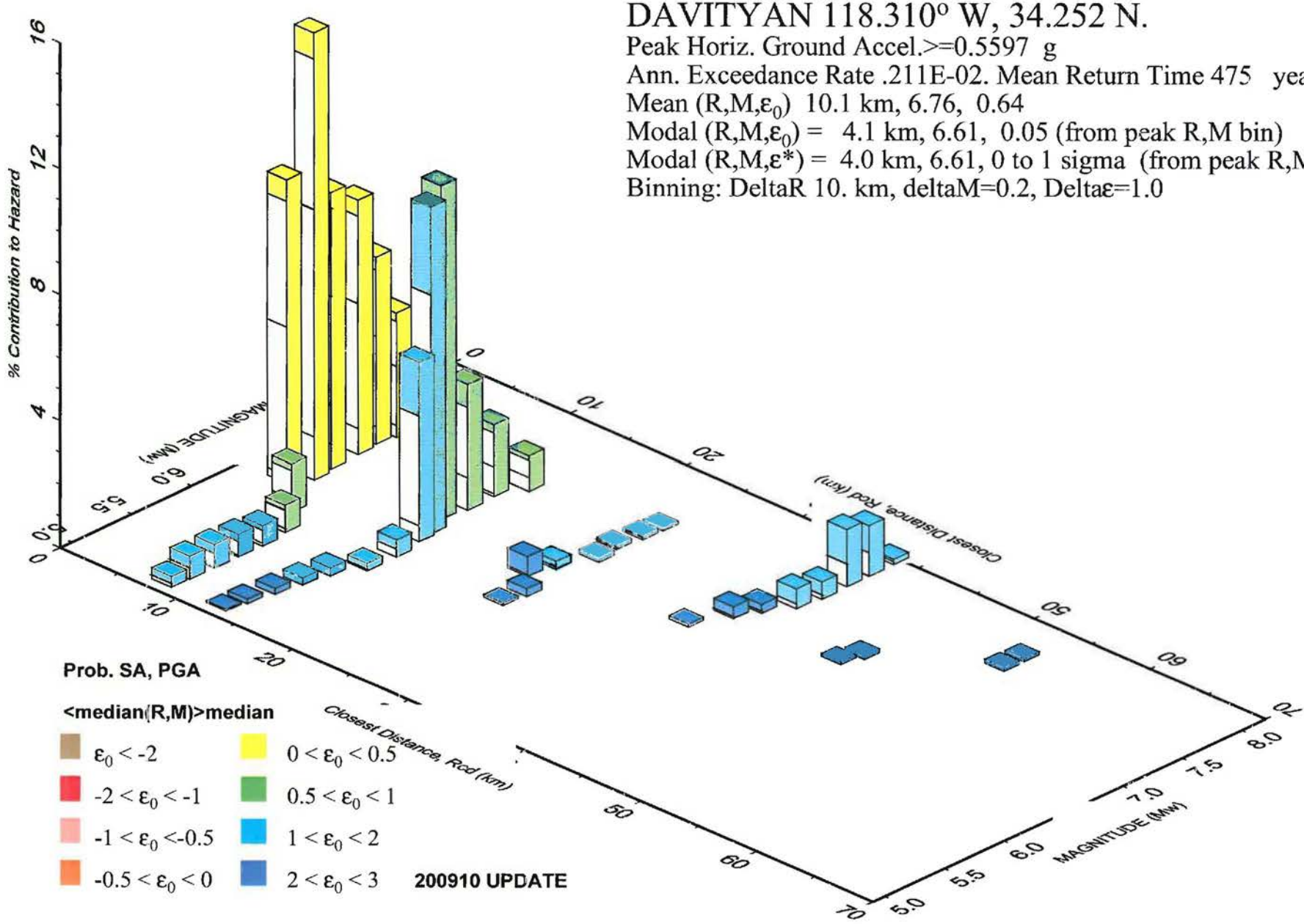
March 3, 2016
BG 21103

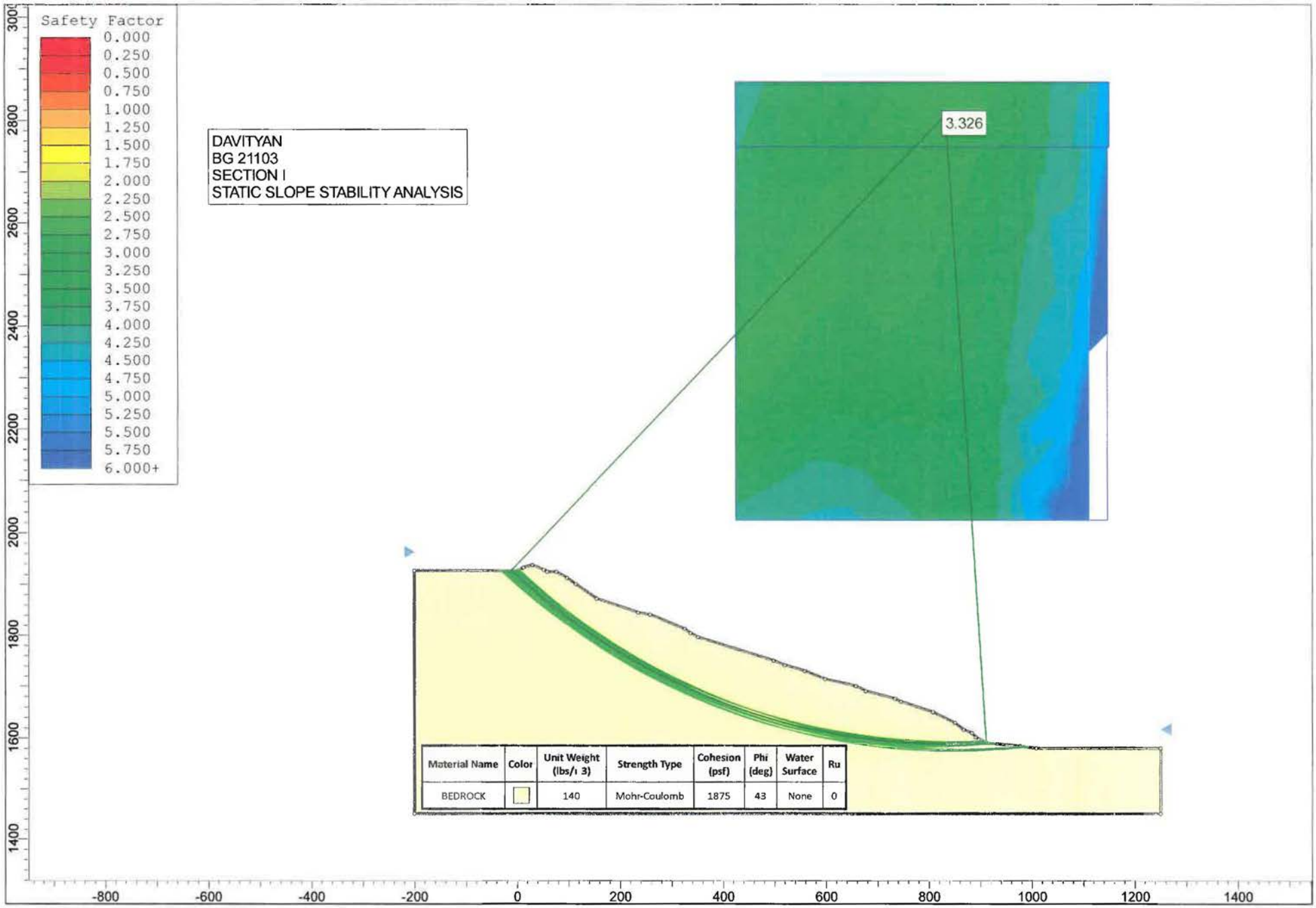
APPENDIX IV

Calculation and Figures

PSH Deaggregation on NEHRP CD soil
DAVITYAN 118.310° W, 34.252 N.

Peak Horiz. Ground Accel.>=0.5597 g
Ann. Exceedance Rate .211E-02. Mean Return Time 475 years
Mean (R,M,ε_0) 10.1 km, 6.76, 0.64
Modal (R,M,ε_0) = 4.1 km, 6.61, 0.05 (from peak R,M bin)
Modal (R,M,ε^*) = 4.0 km, 6.61, 0 to 1 sigma (from peak R,M,ε bin)
Binning: DeltaR 10. km, deltaM=0.2, Deltaε=1.0

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0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
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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+
DAVITYAN
BG 21103
SECTION I
STATIC SLOPE STABILITY ANALYSIS
3.326
Material Name
Color
Unit Weight (lbs/ı 3)
Strength Type
Cohesion (psf)
Phi (deg)
Water Surface
Ru
BEDROCK
140
Mohr-Coulomb
1875
43
None
0
3000
2800
2600
2400
2200
2000
1800
1600
1400
-800
-600
-400
-200
0
200
400
600
800
1000
1200
1400

BYER GEOTECHNICAL, INC.
1461 E. CHEVY CHASE DR., SUITE 200
GLENDALE, CA 91206
818.549.9959 TEL
818.543.3747 FAX

RETAINING WALL

BG: **21103** ENGINEER: **JET**
CLIENT: **DAVITYAN**
CALCULATION SHEET # **1**

CALCULATE THE DESIGN ACTIVE EQUIVALENT FLUID PRESSURE (EFP) FOR THE PROPOSED RETAINING WALL. ASSUME BACKFILL IS SATURATED AND THERE IS NO HYDROSTATIC PRESSURE THE RETAINED HEIGHT AND BACKSLOPE AND SURCHARGE CONDITIONS ARE LISTED BELOW. USE THE MONONOBE-OKABE METHOD FOR SEISMIC FORCES.

CALCULATION PARAMETERS

EARTH MATERIAL:	BEDROCK	WALL HEIGHT	12 feet
SHEAR DIAGRAM:		BACKSLOPE ANGLE:	34 degrees
COHESION:	1875 psf	SURCHARGE:	0 pounds
PHI ANGLE:	43 degrees	SURCHARGE TYPE:	p Point
DENSITY	135 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):	1250.0 psf	FINAL TENSION CRACK:	20 feet

PHID = ATAN(TAN(PHI)/FS) = 31.9 degrees

HORIZONTAL PSEUDO STATIC SEISMIC COEFFICIENT (k_h) 0 g

VERTICAL PSEUDO STATIC SEISMIC COEFFICIENT (k_v) 0 g

CALCULATED RESULTS

CRITICAL FAILURE ANGLE	43 degrees
AREA OF TRIAL FAILURE WEDGE	11.9 square feet
TOTAL EXTERNAL SURCHARGE	0.0 pounds
WEIGHT OF TRIAL FAILURE WEDGE	1602.6 pounds
NUMBER OF TRIAL WEDGES ANALYZED	1020 trials
LENGTH OF FAILURE PLANE	1.4 feet
DEPTH OF TENSION CRACK	11.7 feet
HORIZONTAL DISTANCE TO UPSLOPE TENSION CRACK	1.0 feet
CALCULATED HORIZONTAL THRUST ON WALL	**-1164.0 pounds**
CALCULATED EQUIVALENT FLUID PRESSURE	**-16.2 pcf**
DESIGN EQUIVALENT FLUID PRESSURE	**55.0 pcf**

CONCLUSION:

THE CALCULATION INDICATES THAT THE PROPOSED RETAINING WALLUP TO 12 FEET HIGH WITH A 1½:1 BACKSLOPE MAY BE DESIGNED FOR AN EQUIVALENT FLUID PRESSURE OF 55 POUNDS PER CUBIC FOOT.

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RETAINING WALL

BG: **21103** ENGINEER: **JET**
CLIENT: **DAVITYAN**

CALCULATION SHEET # **2**

CALCULATE THE DESIGN SEISMIC FORCE FOR THE PROPOSED RETAINING WALL. ASSUME BACKFILL IS SATURATED AND THERE IS NO HYDROSTATIC PRESSURE THE RETAINED HEIGHT AND BACKSLOPE AND SURCHARGE CONDITIONS ARE LISTED BELOW. USE THE MONONOBE-OKABE METHOD FOR SEISMIC FORCES.

CALCULATION PARAMETERS

EARTH MATERIAL:	BEDROCK	WALL HEIGHT	12 feet
SHEAR DIAGRAM:		BACKSLOPE ANGLE:	34 degrees
COHESION:	1875 psf	SURCHARGE:	0 pounds
PHI ANGLE:	43 degrees	SURCHARGE TYPE:	p Point
DENSITY	135 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):	1875.0 psf	FINAL TENSION CRACK:	20 feet

PHID = ATAN(TAN(PHI)/FS) = 43.0 degrees

HORIZONTAL PSEUDO STATIC SEISMIC COEFFICIENT (k_h) 0.31 g

VERTICAL PSEUDO STATIC SEISMIC COEFFICIENT (k_v) 0 g

CALCULATED RESULTS

CRITICAL FAILURE ANGLE	42 degrees
AREA OF TRIAL FAILURE WEDGE	11.9 square feet
TOTAL EXTERNAL SURCHARGE	0.0 pounds
WEIGHT OF TRIAL FAILURE WEDGE	1604.8 pounds
NUMBER OF TRIAL WEDGES ANALYZED	1020 trials
LENGTH OF FAILURE PLANE	1.3 feet
DEPTH OF TENSION CRACK	11.8 feet
HORIZONTAL DISTANCE TO UPSLOPE TENSION CRACK	1.0 feet
CALCULATED HORIZONTAL THRUST ON WALL	**-1376.1 pounds**

CONCLUSIONS:

THE CALCULATION INDICATES THAT NO ADDITIONAL SEISMIC LOADING IS REQUIRED FOR THE PROPOSED RETAINING WALL UP TO 12 FEET HIGH, WITH A 1½:1 BACKSLOPE. THE CALCULATED SEISMIC THRUST FOR A FACOTR OF SAFETY OF 1.0 IS NEGATIVE.

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SURFICIAL STABILITY

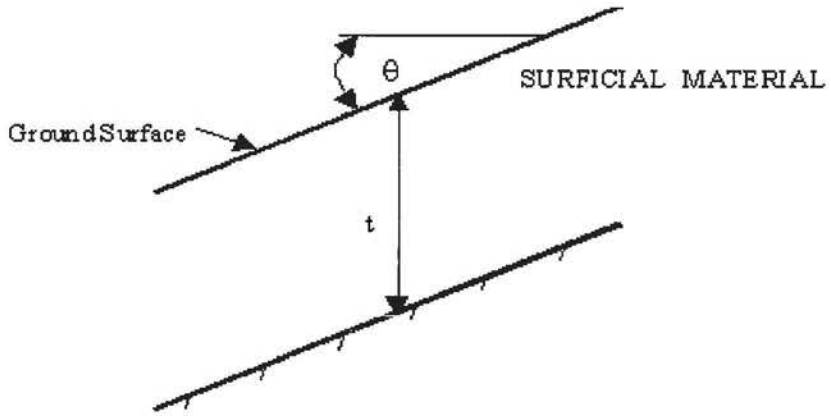
BG: 21103 CONSULT: JET
CLIENT: DAVITYAN

CALCULATION SHEET # 3

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:	FUTURE FILL		
COHESION:	370 psf	SHEAR DIAGRAM:	
PHI ANGLE:	32 degrees	SLOPE ANGLE:	27 degrees
DENSITY:	135 pcf	SATURATION DEPTH (t):	3.0 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 = 2.92

CONCLUSIONS:

THE CALCULATION INDICATES THAT THE PROPOSED 2:1 COMPACTED FILL SLOPES WILL BE SURFICIALLY STABLE.

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TEMPORARY EXCAVATION HEIGHT

BG: **21103** ENGINEER: **JET**
CLIENT: **DAVITYAN**
CALCULATION SHEET # **4**

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:		BACKSLOPE ANGLE:	34 degrees
COHESION:	1875 psf	SURCHARGE:	0 pounds
PHI ANGLE:	43 degrees	SURCHARGE TYPE:	p Point
DENSITY:	135 pcf	INITIAL FAILURE ANGLE:	20 degrees
SAFETY FACTOR:	1.25	FINAL FAILURE ANGLE:	70 degrees
WALL FRICTION:	0 degrees	INITIAL TENSION CRACK:	1 feet
CD (C/FS):	1500.0 psf	FINAL TENSION CRACK:	20 feet
PHID = ATAN(TAN(PHI)/FS) =	36.7 degrees		

CALCULATED RESULTS

CRITICAL FAILURE ANGLE	39 degrees
AREA OF TRIAL FAILURE WEDGE	9.9 square feet
TOTAL EXTERNAL SURCHARGE	0.0 pounds
WEIGHT OF TRIAL FAILURE WEDGE	1340.9 pounds
NUMBER OF TRIAL WEDGES ANALYZED	1020 trials
LENGTH OF FAILURE PLANE	1.3 feet
DEPTH OF TENSION CRACK	9.9 feet
HORIZONTAL DISTANCE TO UPSLOPE TENSION CRACK	1.0 feet
CALCULATED HORIZONTAL THRUST	**-1495.0 pounds**
CALCULATED EQUIVALENT FLUID PRESSURE	**-29.9 pcf**
MAXIMUM HEIGHT OF TEMPORARY EXCAVATION	**10.0 feet**

CONCLUSIONS:

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

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: Section I static
Slide Modeler Version: 6.025
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 2/11/2016, 1:55:04 PM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Left to Right
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 malpha < 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

Material Properties

Property	BEDROCK
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	140
Cohesion [psf]	1875
Friction Angle [deg]	43
Water Surface	None
Ru Value	0

Global Minimums

Method: bishop simplified

FS: 3.326380
Center: 831.791, 2811.784
Radius: 1223.956
Left Slip Surface Endpoint: -12.871, 1926.000
Right Slip Surface Endpoint: 910.342, 1590.351
Resisting Moment=1.45808e+010 lb-ft
Driving Moment=4.38339e+009 lb-ft
Total Slice Area=79360.4 ft2

Valid / Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces: 9297
Number of Invalid Surfaces: 405

Error Codes:

Error Code -103 reported for 213 surfaces
Error Code -106 reported for 19 surfaces
Error Code -108 reported for 173 surfaces

Error Codes

The following errors were encountered during the computation:

-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.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 3.32638

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	36.9285	106470	BEDROCK	1875	43	1091.79	3631.72	1883.86	0	1883.86
2	36.9285	280876	BEDROCK	1875	43	2180.11	7251.86	5765.97	0	5765.97
3	36.9285	378913	BEDROCK	1875	43	2823.21	9391.08	8060.01	0	8060.01
4	36.9285	406935	BEDROCK	1875	43	3039	10108.9	8829.76	0	8829.76
5	36.9285	414318	BEDROCK	1875	43	3125.26	10395.8	9137.45	0	9137.45
6	36.9285	462506	BEDROCK	1875	43	3475.02	11559.2	10385.1	0	10385.1
7	36.9285	511150	BEDROCK	1875	43	3833.36	12751.2	11663.3	0	11663.3
8	36.9285	563329	BEDROCK	1875	43	4220.56	14039.2	13044.5	0	13044.5
9	36.9285	581686	BEDROCK	1875	43	4387.44	14594.3	13639.8	0	13639.8
10	36.9285	574056	BEDROCK	1875	43	4380.02	14569.6	13613.3	0	13613.3
11	36.9285	577640	BEDROCK	1875	43	4447.06	14792.6	13852.4	0	13852.4
12	36.9285	591194	BEDROCK	1875	43	4582.31	15242.5	14334.9	0	14334.9
13	36.9285	597789	BEDROCK	1875	43	4670.24	15535	14648.6	0	14648.6
14	36.9285	597242	BEDROCK	1875	43	4708.39	15661.9	14784.6	0	14784.6
15	36.9285	581136	BEDROCK	1875	43	4635.94	15420.9	14526.2	0	14526.2
16	36.9285	568388	BEDROCK	1875	43	4585.22	15252.2	14345.3	0	14345.3
17	36.9285	538264	BEDROCK	1875	43	4407.7	14661.7	13712.1	0	13712.1
18	36.9285	523233	BEDROCK	1875	43	4336.03	14423.3	13456.4	0	13456.4
19	36.9285	489477	BEDROCK	1875	43	4125.54	13723.1	12705.5	0	12705.5
20	36.9285	454983	BEDROCK	1875	43	3905.63	12991.6	11921.1	0	11921.1
21	36.9285	411699	BEDROCK	1875	43	3616.27	12029.1	10888.9	0	10888.9
22	36.9285	356816	BEDROCK	1875	43	3234.81	10760.2	9528.24	0	9528.24
23	36.9285	290989	BEDROCK	1875	43	2763.97	9194.03	7848.69	0	7848.69
24	36.9285	188643	BEDROCK	1875	43	2006.39	6674.02	5146.32	0	5146.32
25	36.9285	62719.8	BEDROCK	1875	43	1054.34	3507.12	1750.24	0	1750.24

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 3.32638

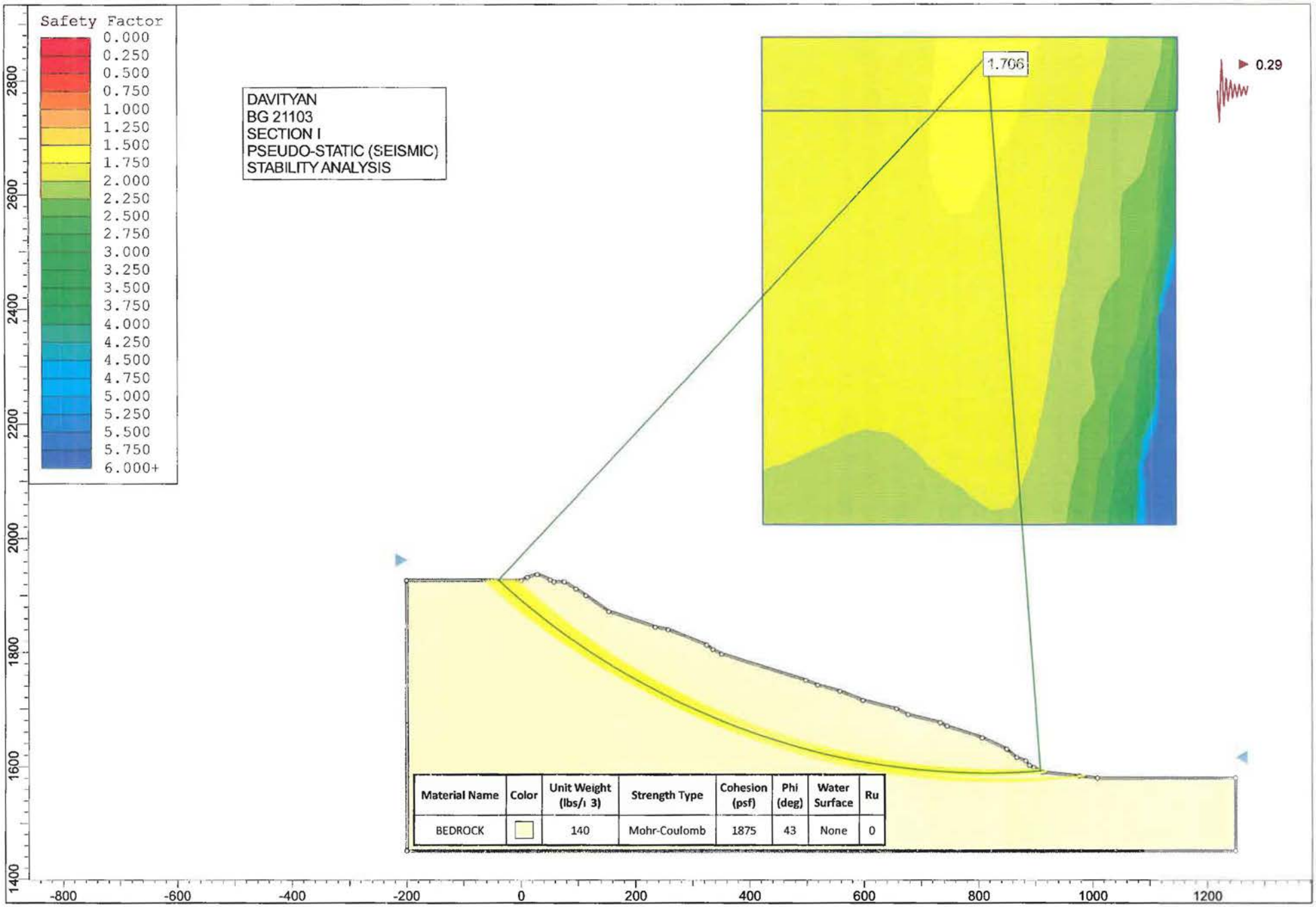
Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	-12.8713	1926	0	0	0
2	24.0572	1892.2	23355.5	0	0
3	60.9857	1861.03	122558	0	0
4	97.9142	1832.25	250319	0	0
5	134.843	1805.64	373051	0	0
6	171.771	1781.04	482436	0	0
7	208.7	1758.3	590207	0	0
8	245.628	1737.32	693407	0	0
9	282.557	1717.98	789795	0	0
10	319.485	1700.2	870225	0	0
11	356.414	1683.92	930198	0	0
12	393.342	1669.05	971855	0	0
13	430.271	1655.56	996054	0	0
14	467.199	1643.39	1.00187e+006	0	0
15	504.128	1632.5	988987	0	0
16	541.056	1622.86	957866	0	0
17	577.985	1614.43	909430	0	0
18	614.914	1607.2	845889	0	0
19	651.842	1601.13	767412	0	0
20	688.771	1596.21	677522	0	0
21	725.699	1592.43	578333	0	0
22	762.628	1589.78	473657	0	0
23	799.556	1588.25	368791	0	0
24	836.485	1587.84	269984	0	0
25	873.413	1588.54	192295	0	0
26	910.342	1590.35	0	0	0

List Of Coordinates

External Boundary

X	Y
-200	1450
1250	1450
1250	1580
1008	1580
976	1584
911	1590
896	1598
889	1602
882	1610
866	1616
849	1630

806	1650
744	1670
733	1676
676	1690
656	1700
597	1714
557	1730
518	1741
497	1750
350	1796
335	1804
324	1812
257	1840
234	1844
153	1872
113	1900
96	1912
75	1924
57	1924
51	1928
28	1937
11	1932
0	1926
-200	1926


Safety Factor
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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+
DAVITYAN
BG 21103
SECTION I
PSEUDO-STATIC (SEISMIC)
STABILITY ANALYSIS
1.706
0.29
Material Name | Color | Unit Weight (lbs/ı 3) | Strength Type | Cohesion (psf) | Phi (deg) | Water Surface | Ru
BEDROCK | | 140 | Mohr-Coulomb | 1875 | 43 | None | 0
2800
2600
2400
2200
2000
1800
1600
1400
-800
-600
-400
-200
0
200
400
600
800
1000
1200

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: Section I seismic
Slide Modeler Version: 6.025
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 2/11/2016, 1:55:04 PM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Left to Right
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 malpha < 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): 0.29

Material Properties

Property	BEDROCK
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	140
Cohesion [psf]	1875
Friction Angle [deg]	43
Water Surface	None
Ru Value	0

Global Minimums

Method: bishop simplified

FS: 1.706400
Center: 816.655, 2843.791
Radius: 1255.382
Left Slip Surface Endpoint: -39.875, 1926.000
Right Slip Surface Endpoint: 907.774, 1591.720
Resisting Moment=1.49544e+010 lb-ft
Driving Moment=8.76371e+009 lb-ft
Total Slice Area=86613.2 ft2

Valid / Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces: 9470
Number of Invalid Surfaces: 232

Error Codes:

Error Code -103 reported for 213 surfaces
Error Code -106 reported for 19 surfaces

Error Codes

The following errors were encountered during the computation:

-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.

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.7064

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	37.906	90122.3	BEDROCK	1875	43	1610.48	2748.12	936.311	0	936.311
2	37.906	298731	BEDROCK	1875	43	3724.99	6356.33	4805.64	0	4805.64
3	37.906	429047	BEDROCK	1875	43	5141.41	8773.31	7397.52	0	7397.52
4	37.906	504171	BEDROCK	1875	43	6040.14	10306.9	9042.1	0	9042.1
5	37.906	504040	BEDROCK	1875	43	6168.43	10525.8	9276.86	0	9276.86
6	37.906	519123	BEDROCK	1875	43	6457.96	11019.9	9806.66	0	9806.66
7	37.906	565890	BEDROCK	1875	43	7101.27	12117.6	10983.8	0	10983.8
8	37.906	613497	BEDROCK	1875	43	7770.98	13260.4	12209.3	0	12209.3
9	37.906	644374	BEDROCK	1875	43	8266.12	14105.3	13115.4	0	13115.4
10	37.906	646179	BEDROCK	1875	43	8432.78	14389.7	13420.3	0	13420.3
11	37.906	628736	BEDROCK	1875	43	8370.43	14283.3	13306.2	0	13306.2
12	37.906	639223	BEDROCK	1875	43	8637.66	14739.3	13795.3	0	13795.3
13	37.906	644245	BEDROCK	1875	43	8841.83	15087.7	14168.9	0	14168.9
14	37.906	642230	BEDROCK	1875	43	8960.5	15290.2	14386.1	0	14386.1
15	37.906	626411	BEDROCK	1875	43	8904.24	15194.2	14283.1	0	14283.1
16	37.906	609063	BEDROCK	1875	43	8823.02	15055.6	14134.5	0	14134.5
17	37.906	576754	BEDROCK	1875	43	8540.67	14573.8	13617.8	0	13617.8
18	37.906	553013	BEDROCK	1875	43	8360.7	14266.7	13288.5	0	13288.5
19	37.906	522925	BEDROCK	1875	43	8087.44	13800.4	12788.5	0	12788.5
20	37.906	478821	BEDROCK	1875	43	7611.7	12988.6	11917.9	0	11917.9
21	37.906	436293	BEDROCK	1875	43	7141.47	12186.2	11057.5	0	11057.5
22	37.906	375334	BEDROCK	1875	43	6394.3	10911.2	9690.17	0	9690.17
23	37.906	307341	BEDROCK	1875	43	5520.91	9420.88	8091.96	0	8091.96
24	37.906	202291	BEDROCK	1875	43	4075.92	6955.15	5447.79	0	5447.79
25	37.906	67986.1	BEDROCK	1875	43	2146.41	3662.63	1917	0	1917

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 1.7064

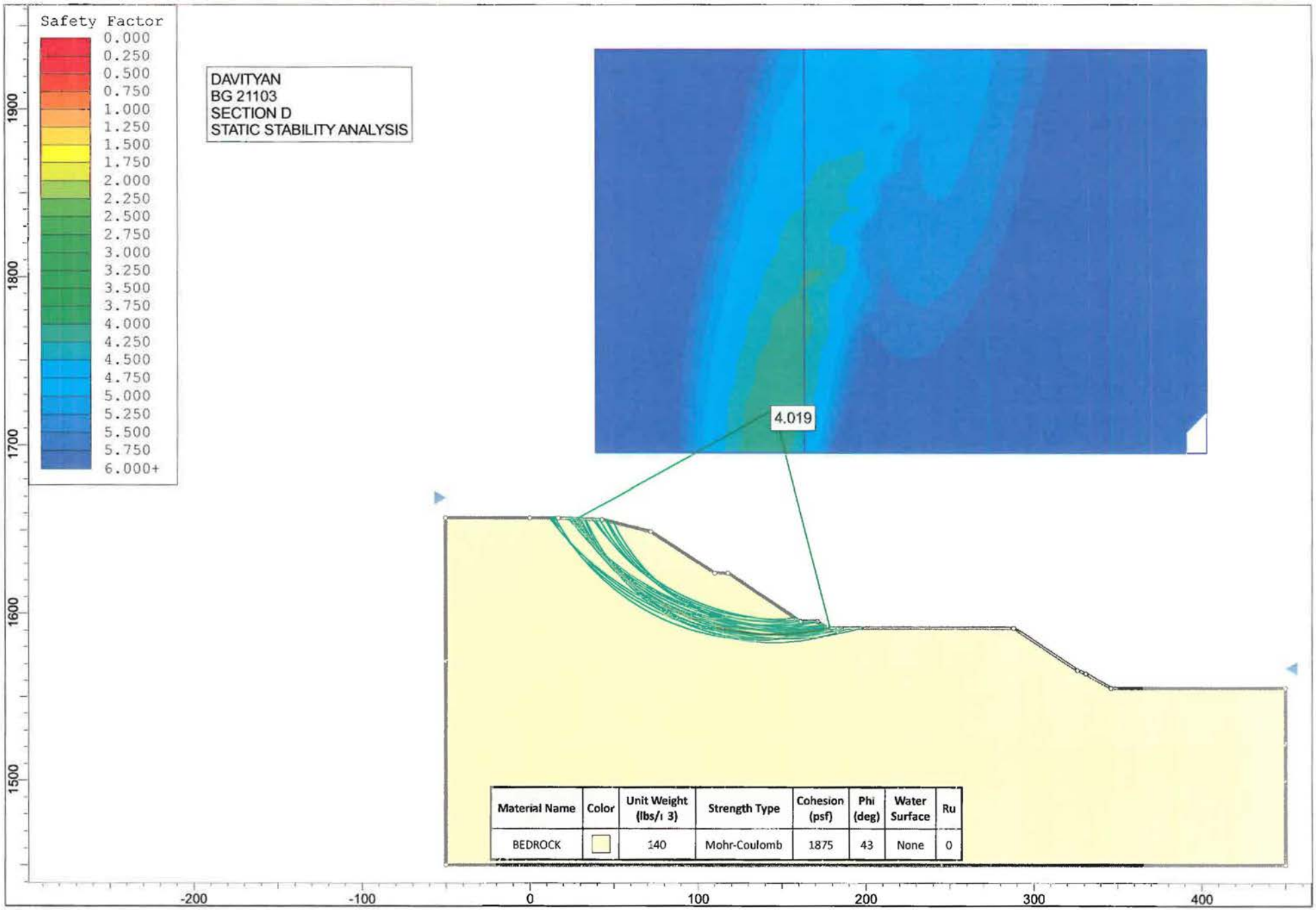
Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	-39.8754	1926	0	0	0
2	-1.96943	1892.04	-3033.23	0	0
3	35.9366	1860.7	93152.3	0	0
4	73.8426	1831.76	237060	0	0
5	111.749	1805	396553	0	0
6	149.655	1780.26	538673	0	0
7	187.561	1757.41	668833	0	0
8	225.467	1736.33	795687	0	0
9	263.373	1716.91	916462	0	0
10	301.279	1699.08	1.02427e+006	0	0
11	339.184	1682.75	1.11146e+006	0	0
12	377.09	1667.88	1.17483e+006	0	0
13	414.996	1654.4	1.21918e+006	0	0
14	452.902	1642.26	1.24321e+006	0	0
15	490.808	1631.43	1.24601e+006	0	0
16	528.714	1621.88	1.22709e+006	0	0
17	566.62	1613.56	1.18723e+006	0	0
18	604.526	1606.46	1.12784e+006	0	0
19	642.432	1600.56	1.05014e+006	0	0
20	680.338	1595.83	956042	0	0
21	718.244	1592.27	849159	0	0
22	756.15	1589.87	731904	0	0
23	794.056	1588.61	610839	0	0
24	831.962	1588.5	491846	0	0
25	869.868	1589.54	390564	0	0
26	907.774	1591.72	0	0	0

List Of Coordinates

External Boundary

X	Y
-200	1450
1250	1450
1250	1580
1008	1580
976	1584
911	1590
896	1598
889	1602
882	1610
866	1616

849	1630
806	1650
744	1670
733	1676
676	1690
656	1700
597	1714
557	1730
518	1741
497	1750
350	1796
335	1804
324	1812
257	1840
234	1844
153	1872
113	1900
96	1912
75	1924
57	1924
51	1928
28	1937
11	1932
0	1926
-200	1926


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+
DAVITYAN
BG 21103
SECTION D
STATIC STABILITY ANALYSIS
4.019
1900
1800
1700
1600
1500
-200
-100
0
100
200
300
400
Material Name | Color | Unit Weight (lbs/ı 3) | Strength Type | Cohesion (psf) | Phi (deg) | Water Surface | Ru
BEDROCK | | 140 | Mohr-Coulomb | 1875 | 43 | None | 0

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: Section D satic
Slide Modeler Version: 6.025
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 3/2/2016, 3:24:48 PM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Left to Right
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 malpha < 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

Material Properties

Property	BEDROCK
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	140
Cohesion [psf]	1875
Friction Angle [deg]	43
Water Surface	None
Ru Value	0

Global Minimums

Method: bishop simplified

FS: 4.019130
Center: 145.519, 1721.388
Radius: 134.471
Left Slip Surface Endpoint: 27.691, 1656.589
Right Slip Surface Endpoint: 178.404, 1591.000
Resisting Moment=1.09433e+008 lb-ft
Driving Moment=2.72279e+007 lb-ft
Total Slice Area=3817.29 ft2

Valid / Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces: 9561
Number of Invalid Surfaces: 75

Error Codes:

Error Code -103 reported for 6 surfaces
Error Code -106 reported for 3 surfaces
Error Code -108 reported for 66 surfaces

Error Codes

The following errors were encountered during the computation:

-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.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 4.01913

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	6.02853	4089.21	BEDROCK	1875	43	451.493	1814.61	-64.761	0	-64.761
2	6.02853	11589.2	BEDROCK	1875	43	691.334	2778.56	968.95	0	968.95
3	6.02853	17810.8	BEDROCK	1875	43	903.345	3630.66	1882.71	0	1882.71
4	6.02853	22388.3	BEDROCK	1875	43	1070.67	4303.16	2603.89	0	2603.89
5	6.02853	26123.5	BEDROCK	1875	43	1214.32	4880.49	3223	0	3223
6	6.02853	29285	BEDROCK	1875	43	1341.21	5390.51	3769.93	0	3769.93
7	6.02853	31955.5	BEDROCK	1875	43	1453.16	5840.44	4252.41	0	4252.41
8	6.02853	33747.8	BEDROCK	1875	43	1536.53	6175.5	4611.73	0	4611.73
9	6.02853	33613.7	BEDROCK	1875	43	1554.55	6247.93	4689.39	0	4689.39
10	6.02853	33000.6	BEDROCK	1875	43	1554.61	6248.18	4689.67	0	4689.67
11	6.02853	32065.8	BEDROCK	1875	43	1541.88	6197	4634.78	0	4634.78
12	6.02853	30831.5	BEDROCK	1875	43	1516.98	6096.93	4527.47	0	4527.47
13	6.02853	29315.3	BEDROCK	1875	43	1480.4	5949.93	4369.82	0	4369.82
14	6.02853	27732.8	BEDROCK	1875	43	1439.79	5786.69	4194.78	0	4194.78
15	6.02853	28325.2	BEDROCK	1875	43	1477.07	5936.54	4355.47	0	4355.47
16	6.02853	27602.6	BEDROCK	1875	43	1466.11	5892.5	4308.24	0	4308.24
17	6.02853	24991.1	BEDROCK	1875	43	1384.08	5562.81	3954.69	0	3954.69
18	6.02853	22144.6	BEDROCK	1875	43	1291.2	5189.52	3554.39	0	3554.39
19	6.02853	19066.8	BEDROCK	1875	43	1187.41	4772.37	3107.04	0	3107.04
20	6.02853	15759.8	BEDROCK	1875	43	1072.56	4310.76	2612.03	0	2612.03
21	6.02853	12224.4	BEDROCK	1875	43	946.411	3803.75	2068.32	0	2068.32
22	6.02853	8460.06	BEDROCK	1875	43	808.63	3249.99	1474.5	0	1474.5
23	6.02853	5814.4	BEDROCK	1875	43	712.393	2863.2	1059.72	0	1059.72
24	6.02853	4905.63	BEDROCK	1875	43	683.916	2748.75	936.979	0	936.979
25	6.02853	1577.71	BEDROCK	1875	43	556.673	2237.34	388.566	0	388.566

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 4.01913

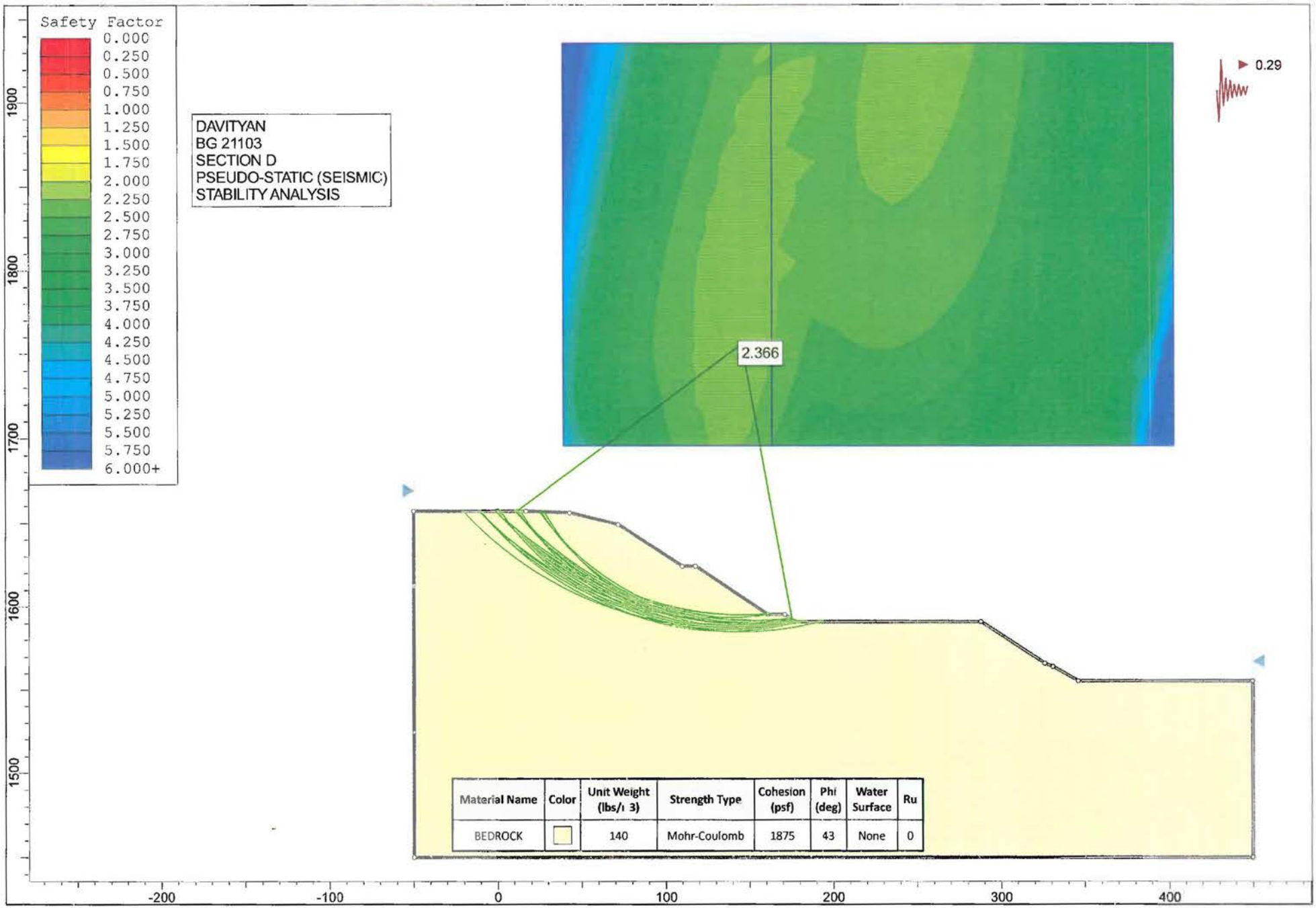
Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	27.691	1656.59	0	0	0
2	33.7195	1646.67	-3364.34	0	0
3	39.748	1638.35	524.156	0	0
4	45.7766	1631.2	8544.18	0	0
5	51.8051	1624.95	18362	0	0
6	57.8336	1619.44	28807.9	0	0
7	63.8621	1614.55	39155.9	0	0
8	69.8907	1610.2	48889.5	0	0
9	75.9192	1606.33	57472.9	0	0
10	81.9477	1602.89	64221.1	0	0
11	87.9763	1599.85	69114.6	0	0
12	94.0048	1597.18	72219	0	0
13	100.033	1594.84	73632.2	0	0
14	106.062	1592.84	73479.8	0	0
15	112.09	1591.14	71922.1	0	0
16	118.119	1589.74	69116.3	0	0
17	124.147	1588.63	65068.7	0	0
18	130.176	1587.8	60011.2	0	0
19	136.204	1587.24	54200.7	0	0
20	142.233	1586.96	47921.3	0	0
21	148.262	1586.94	41487.4	0	0
22	154.29	1587.2	35247.6	0	0
23	160.319	1587.73	29590.6	0	0
24	166.347	1588.54	24442	0	0
25	172.376	1589.63	19301.2	0	0
26	178.404	1591	0	0	0

List Of Coordinates

External Boundary

X	Y
-50	1450
450	1450
450	1555
346	1555
331	1564
326	1566
288	1591
177	1591
171	1595
161	1595
118	1624

110	1624
72	1649
43	1656
17	1657
0	1657
-50	1657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3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+
DAVITYAN
BG 21103
SECTION D
PSEUDO-STATIC (SEISMIC)
STABILITY ANALYSIS
0.29
2.366
1900
1800
1700
1600
1500
-200
-100
0
100
200
300
400
Material Name
Color
Unit Weight (lbs/ı 3)
Strength Type
Cohesion (psf)
Phi (deg)
Water Surface
Ru
BEDROCK
140
Mohr-Coulomb
1875
43
None
0

Slide Analysis Information

SLIDE - An Interactive Slope Stability Program

Project Summary

File Name: Section D SEISMIC
Slide Modeler Version: 6.025
Project Title: SLIDE - An Interactive Slope Stability Program
Date Created: 3/2/2016, 3:24:48 PM

General Settings

Units of Measurement: Imperial Units
Time Units: days
Permeability Units: feet/second
Failure Direction: Left to Right
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 malpha < 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): 0.29

Material Properties

Property	BEDROCK
Color	
Strength Type	Mohr-Coulomb
Unit Weight [lbs/ft3]	140
Cohesion [psf]	1875
Friction Angle [deg]	43
Water Surface	None
Ru Value	0

Global Minimums

Method: bishop simplified

FS: 2.366140
Center: 145.519, 1755.656
Radius: 166.200
Left Slip Surface Endpoint: 11.767, 1657.000
Right Slip Surface Endpoint: 175.286, 1592.143
Resisting Moment=1.36733e+008 lb-ft
Driving Moment=5.77876e+007 lb-ft
Total Slice Area=4177.34 ft2

Valid / Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces: 9627
Number of Invalid Surfaces: 9

Error Codes:

Error Code -103 reported for 6 surfaces
Error Code -106 reported for 3 surfaces

Error Codes

The following errors were encountered during the computation:

-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.

Slice Data

Global Minimum Query (bishop simplified) - Safety Factor: 2.36614

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	6.54074	3796.25	BEDROCK	1875	43	680.69	1610.61	-283.525	0	-283.525
2	6.54074	10795.7	BEDROCK	1875	43	1000.94	2368.37	529.078	0	529.078
3	6.54074	16911.5	BEDROCK	1875	43	1299.81	3075.54	1287.42	0	1287.42
4	6.54074	22354.7	BEDROCK	1875	43	1581.16	3741.24	2001.3	0	2001.3
5	6.54074	27192.3	BEDROCK	1875	43	1844.48	4364.29	2669.44	0	2669.44
6	6.54074	30707.2	BEDROCK	1875	43	2053.59	4859.07	3200.02	0	3200.02
7	6.54074	33408.8	BEDROCK	1875	43	2228.43	5272.78	3643.67	0	3643.67
8	6.54074	35705	BEDROCK	1875	43	2386.55	5646.9	4044.87	0	4044.87
9	6.54074	37629.8	BEDROCK	1875	43	2528.62	5983.07	4405.36	0	4405.36
10	6.54074	38430	BEDROCK	1875	43	2615.64	6188.96	4626.16	0	4626.16
11	6.54074	37249	BEDROCK	1875	43	2600.61	6153.41	4588.04	0	4588.04
12	6.54074	35710.4	BEDROCK	1875	43	2563.83	6066.37	4494.69	0	4494.69
13	6.54074	33883.8	BEDROCK	1875	43	2508.4	5935.22	4354.06	0	4354.06
14	6.54074	31781.6	BEDROCK	1875	43	2434.56	5760.5	4166.69	0	4166.69
15	6.54074	29414.2	BEDROCK	1875	43	2342.41	5542.46	3932.86	0	3932.86
16	6.54074	28687.5	BEDROCK	1875	43	2337.98	5531.98	3921.63	0	3921.63
17	6.54074	28591.5	BEDROCK	1875	43	2368.32	5603.77	3998.63	0	3998.63
18	6.54074	25491.3	BEDROCK	1875	43	2225.87	5266.72	3637.18	0	3637.18
19	6.54074	22032.4	BEDROCK	1875	43	2057.58	4868.53	3210.16	0	3210.16
20	6.54074	18335.4	BEDROCK	1875	43	1869.67	4423.91	2733.38	0	2733.38
21	6.54074	14402	BEDROCK	1875	43	1661.53	3931.41	2205.22	0	2205.22
22	6.54074	10232.7	BEDROCK	1875	43	1432.37	3389.18	1623.76	0	1623.76
23	6.54074	5895.25	BEDROCK	1875	43	1185.49	2805.03	997.33	0	997.33
24	6.54074	3946.06	BEDROCK	1875	43	1081.77	2559.62	734.163	0	734.163
25	6.54074	2242.89	BEDROCK	1875	43	990.635	2343.98	502.919	0	502.919

Interslice Data

Global Minimum Query (bishop simplified) - Safety Factor: 2.36614

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	11.7673	1657	0	0	0
2	18.308	1648.7	-5704.96	0	0
3	24.8488	1641.37	-5243.84	0	0
4	31.3895	1634.84	-431.347	0	0
5	37.9303	1628.98	7436.3	0	0
6	44.471	1623.7	17342.9	0	0
7	51.0117	1618.94	28050.8	0	0
8	57.5525	1614.64	38822.4	0	0
9	64.0932	1610.77	49242.4	0	0
10	70.634	1607.28	58974.4	0	0
11	77.1747	1604.16	67463.6	0	0
12	83.7155	1601.37	74028.7	0	0
13	90.2562	1598.91	78680.9	0	0
14	96.7969	1596.76	81482.6	0	0
15	103.338	1594.9	82525.8	0	0
16	109.878	1593.32	81931	0	0
17	116.419	1592.02	80052.8	0	0
18	122.96	1590.99	76969.3	0	0
19	129.501	1590.23	72583.4	0	0
20	136.041	1589.73	67130.4	0	0
21	142.582	1589.48	60887	0	0
22	149.123	1589.49	54167.1	0	0
23	155.664	1589.77	47326.2	0	0
24	162.204	1590.3	40753.5	0	0
25	168.745	1591.09	34241.5	0	0
26	175.286	1592.14	0	0	0

List Of Coordinates

External Boundary

X	Y
-50	1450
450	1450
450	1555
346	1555
331	1564
326	1566
288	1591
177	1591
171	1595
161	1595

118	1624
110	1624
72	1649
43	1656
17	1657
0	1657
-50	1657

BYER
GEOTECHNICAL
INC.
1461 E. CHEVY CHASE DR., SUITE 200
GLENDALE, CA 91206
818.549.9959 TEL
818.543.3747 FAX

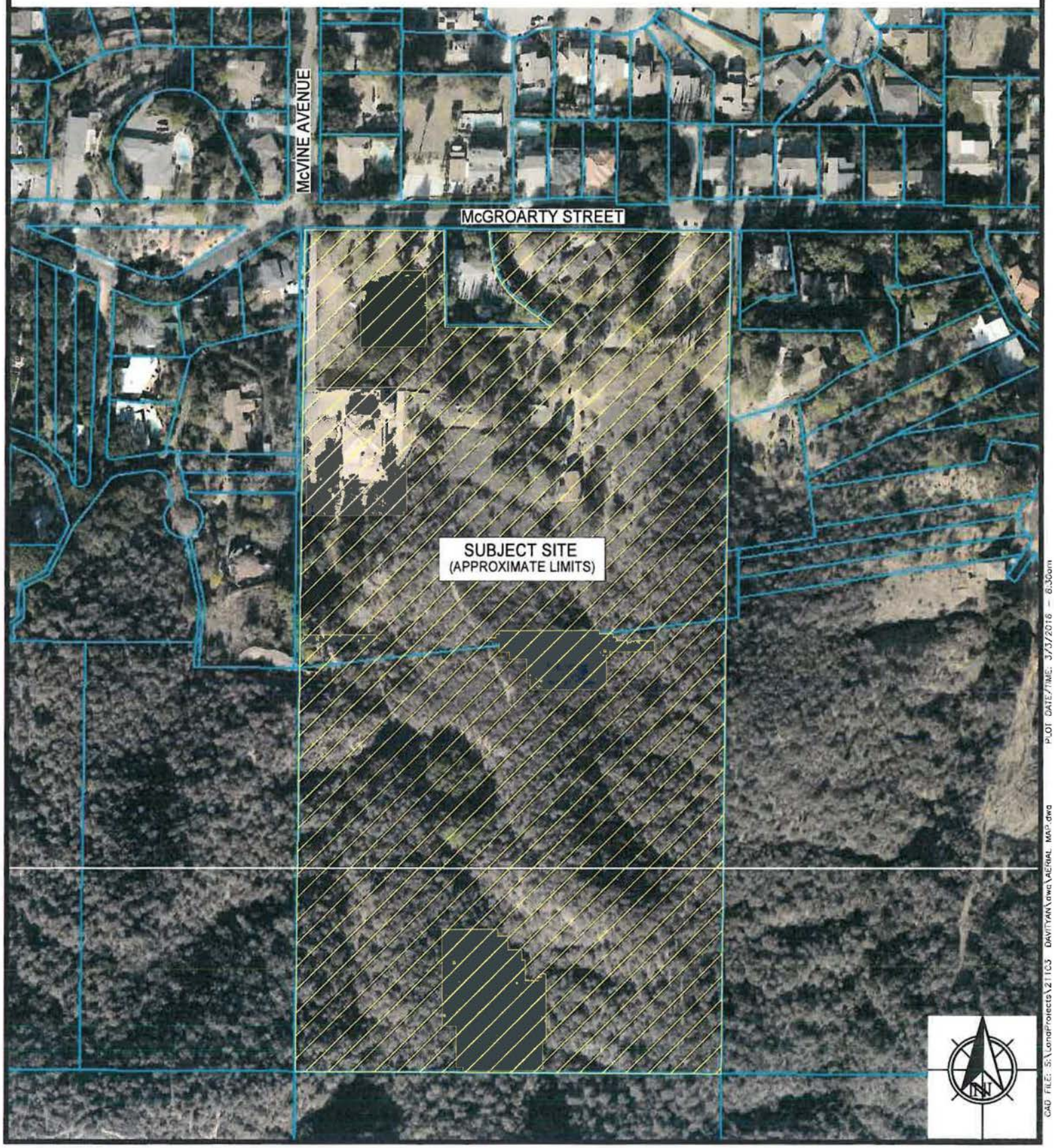
AERIAL VICINITY MAP

BG: 21103 DAVITYAN

CONSULTANT: JET

SCALE: 1" = 200'

REFERENCE: LOS ANGELES COUNTY DEPARTMENT OF REGIONAL PLANNING, GIS-NET, 2013, http://gis.planning.lacounty.gov/GIS-NET_Public/Viewer.html



CAD FILE: S:\LandProjects\21103 DAVITYAN\dwg\AERIAL MAP.dwg PLOT DATE/TIME: 3/3/2016 - 8:30am

BYER
GEOTECHNICAL
INC.
1461 E. CHEVY CHASE DR., SUITE 200
GLENDALE, CA 91206
818.549.9959 TEL
818.543.3747 FAX

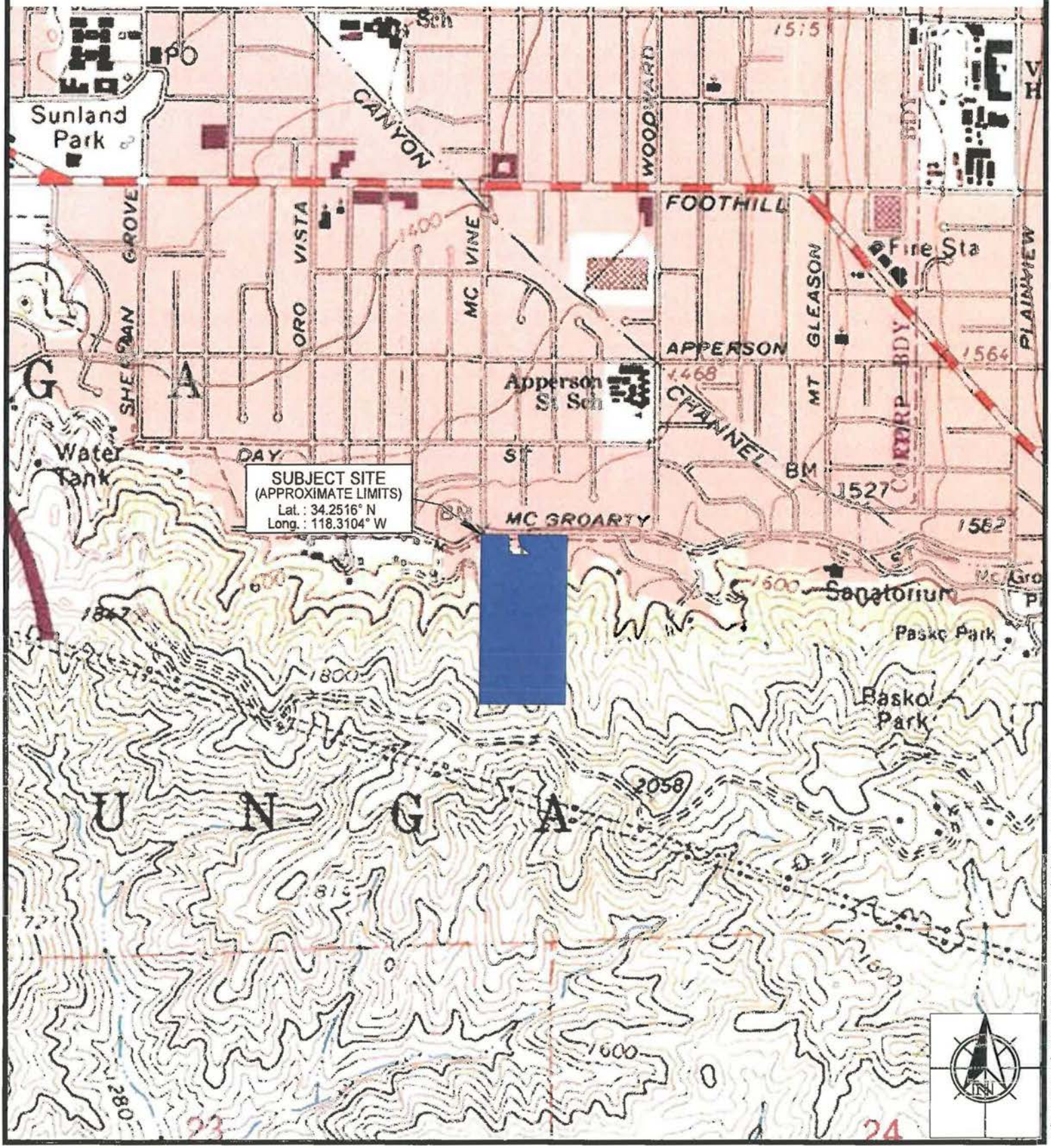
REGIONAL TOPOGRAPHIC MAP

BG: 21103 DAVITYAN .

CONSULTANT: JET

SCALE: 1" = 1000'

REFERENCE: USGS TOPOGRAPHIC MAP, SUNLAND 7.5-MINUTE SERIES QUADRANGLE, LOS ANGELES COUNTY, CALIFORNIA CREATED 1964.



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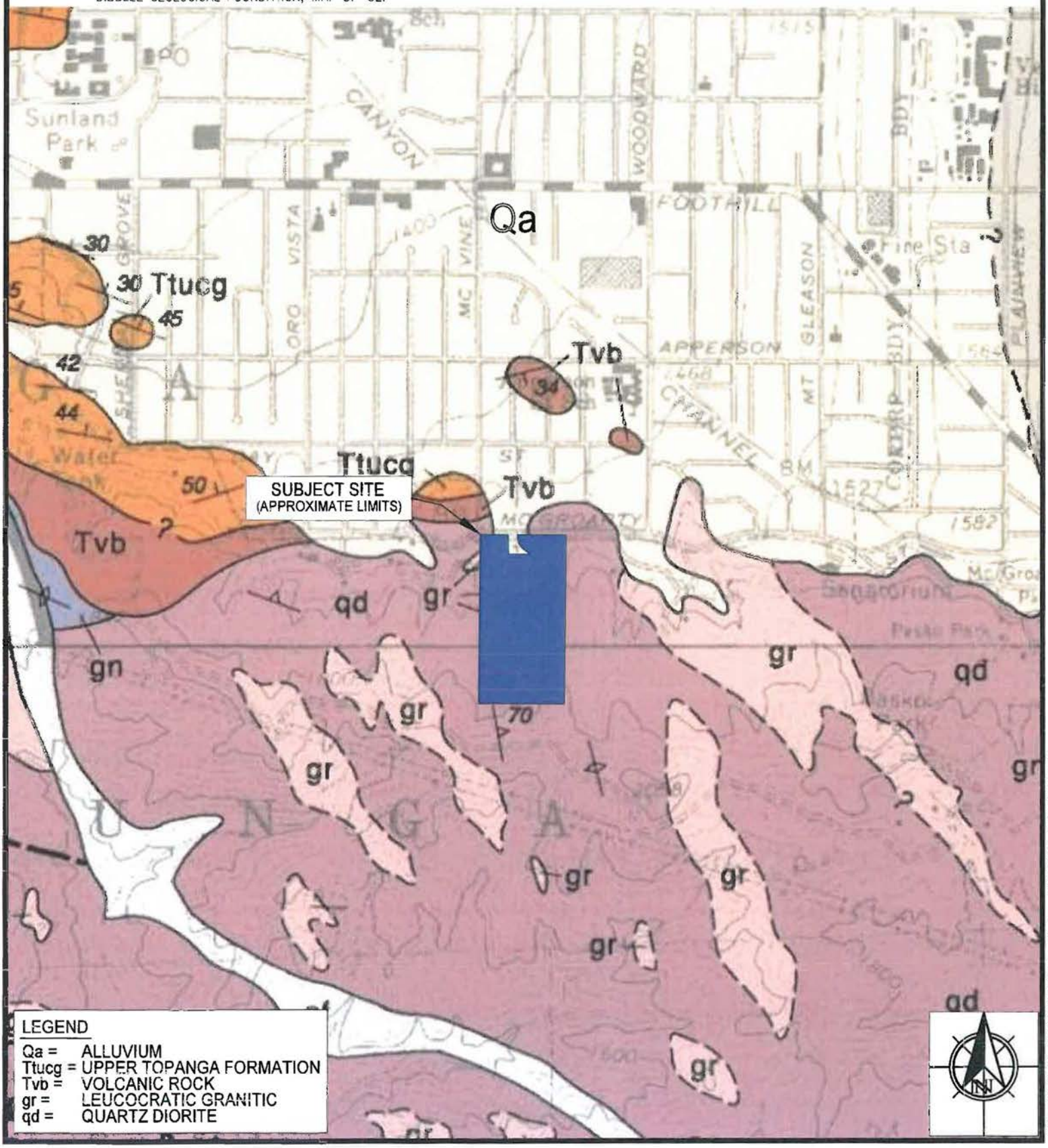
REGIONAL GEOLOGIC MAP

BG: 21103 DAVITYAN

CONSULTANT: JET

SCALE: 1" = 1000'

REFERENCE: DIBBLEE, T.W. (1991), GEOLOGIC MAP OF THE SUNLAND & BURBANK (NORTH 1/2) QUADRANGLES, LOS ANGELES, CALIFORNIA DIBBLEE GEOLOGICAL FOUNDATION, MAP DF-32.



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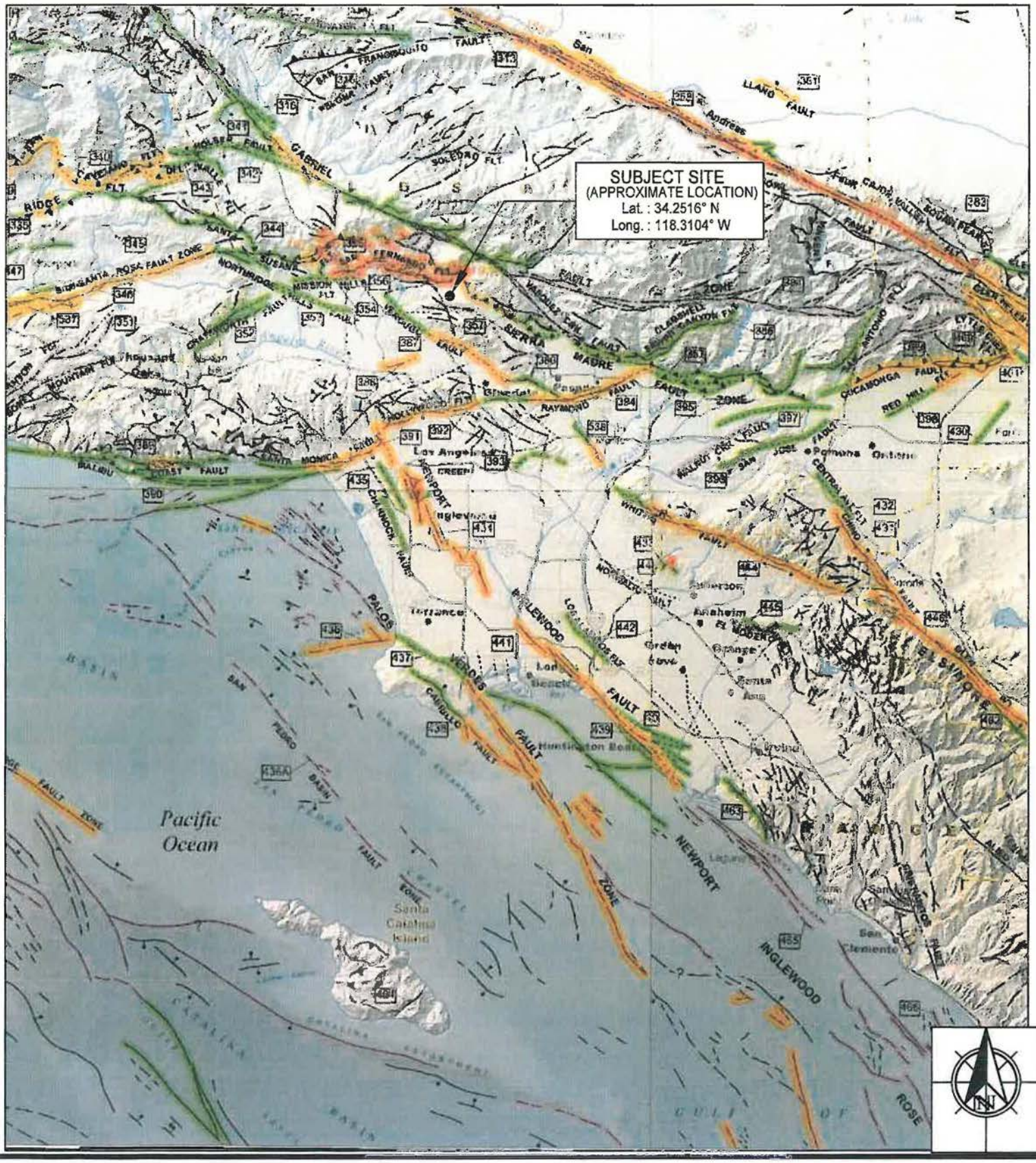
REGIONAL FAULT MAP

BG: 21103 DAVITYAN

CONSULTANT: JET

SCALE: 1" = 12 MILES

REFERENCE: JENNINGS, C.W., AND BRYANT, W.A.,2010, FAULT ACTIVITY MAP OF CALIFORNIA GEOLOGICAL SURVEY, 150th ANNIVERSARY, MAP No 6.



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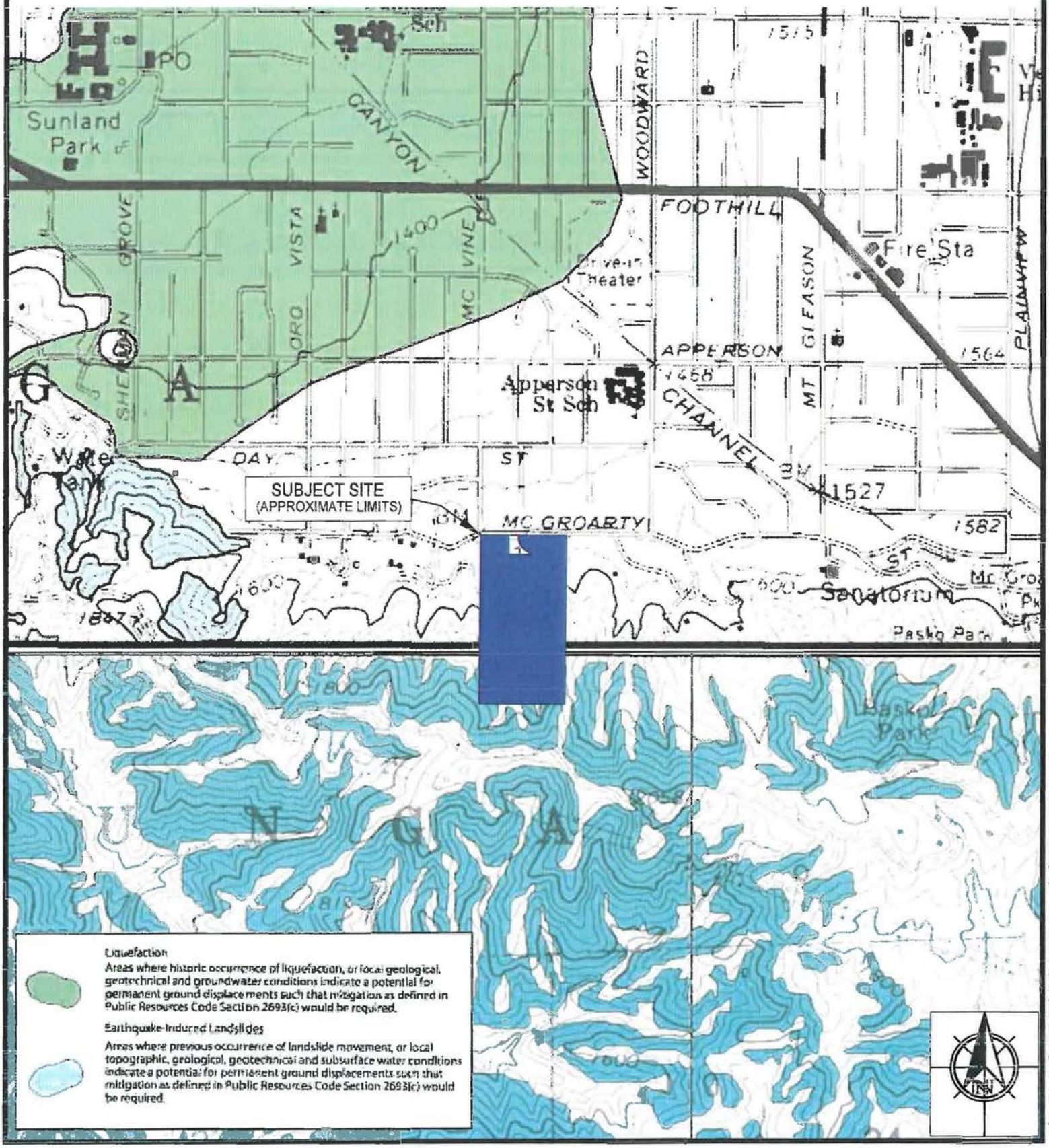
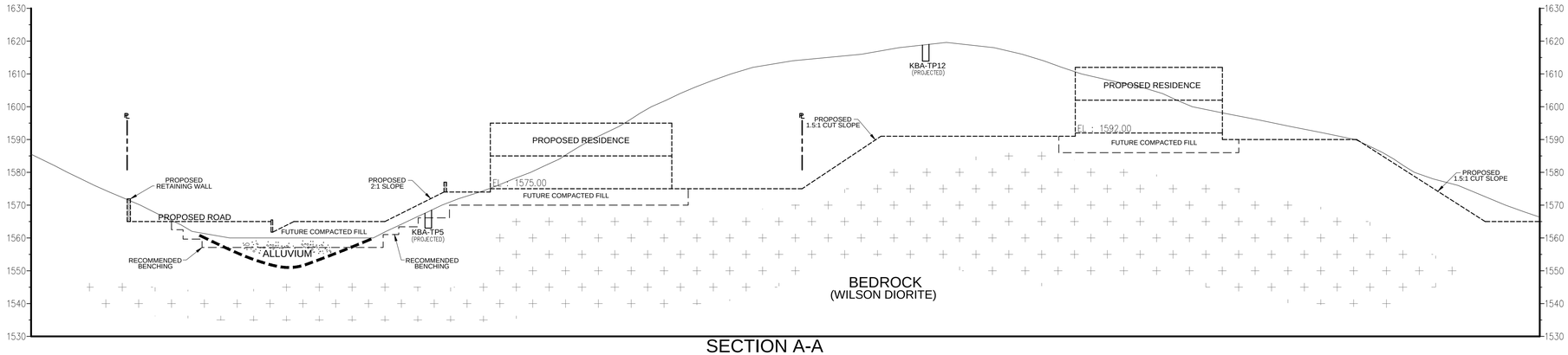
SEISMIC HAZARD ZONES MAP

BG: 21103 DAVITYAN

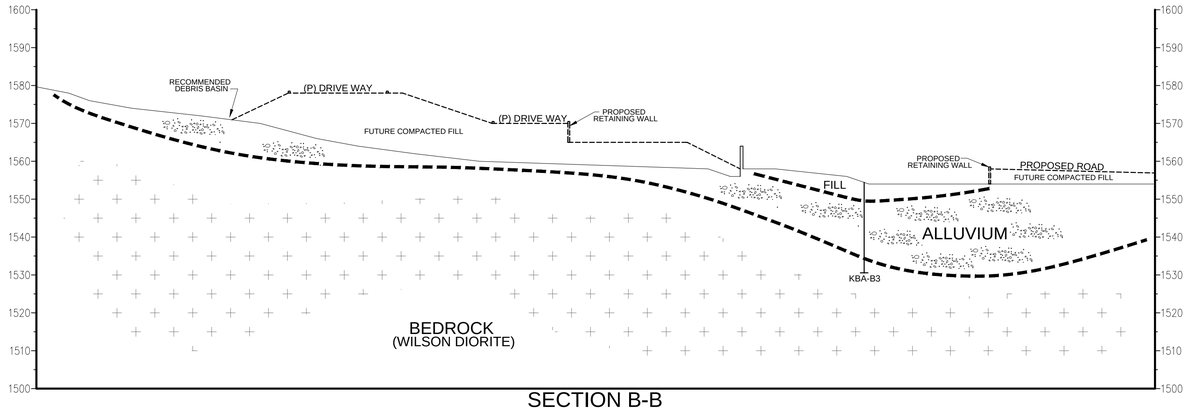
CONSULTANT: JET SCALE: 1" = 1000'

REFERENCE: STATE OF CALIFORNIA SEISMIC HAZARD ZONES, SUNLAND & BURBANK QUADRANGLE OFFICIAL MAP, CALIFORNIA GEOLOGICAL SURVEY, DATED MARCH 25, 1999.

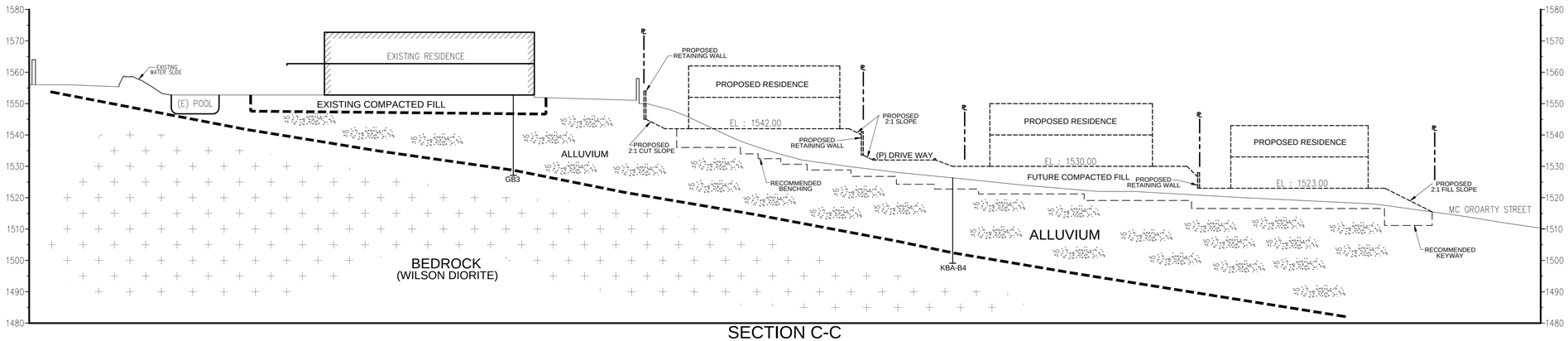




SECTION A-A



SECTION B-B



SECTION C-C

MARCH 3, 2016

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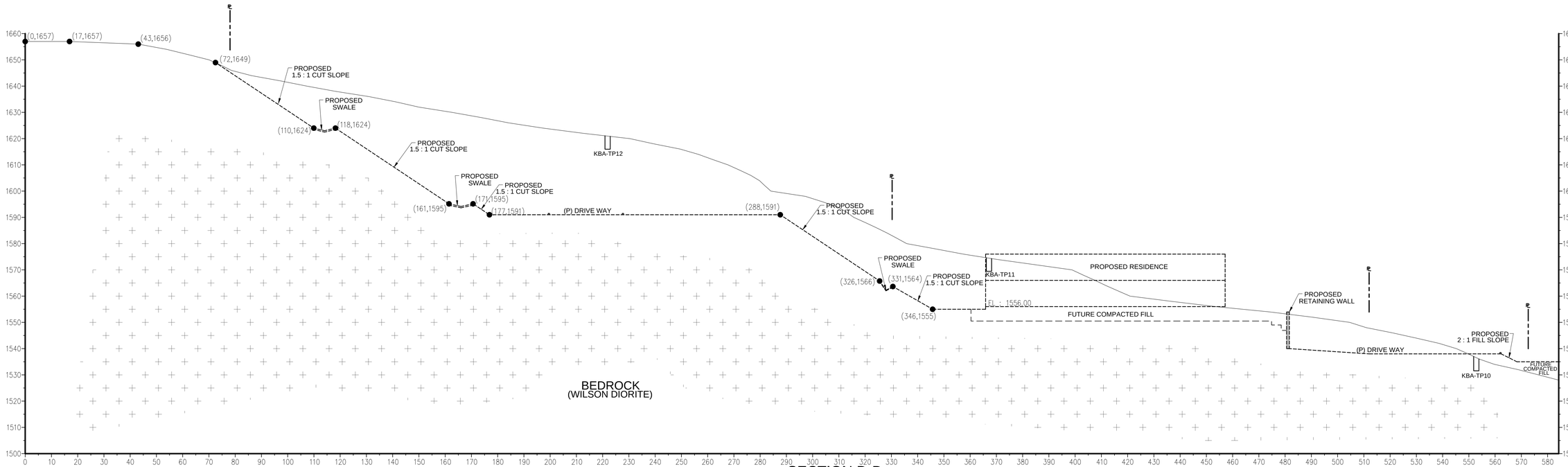
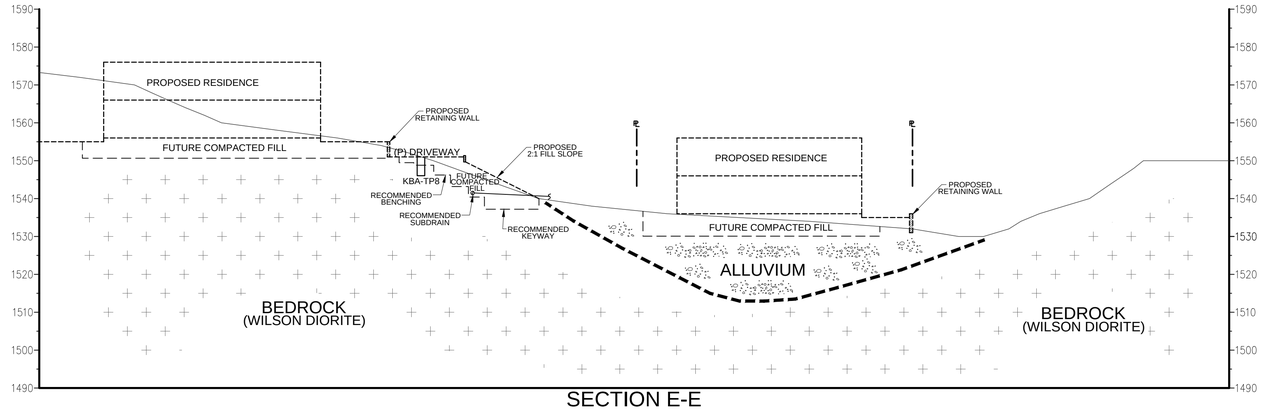
SECTIONS A, B, & C

BG: 21103 DAVITYAN

CONSULTANT: JET SCALE: 1" = 20'



SECTION D-D



SECTION E-E

MARCH 3, 2016

BYER GEOTECHNICAL INC.
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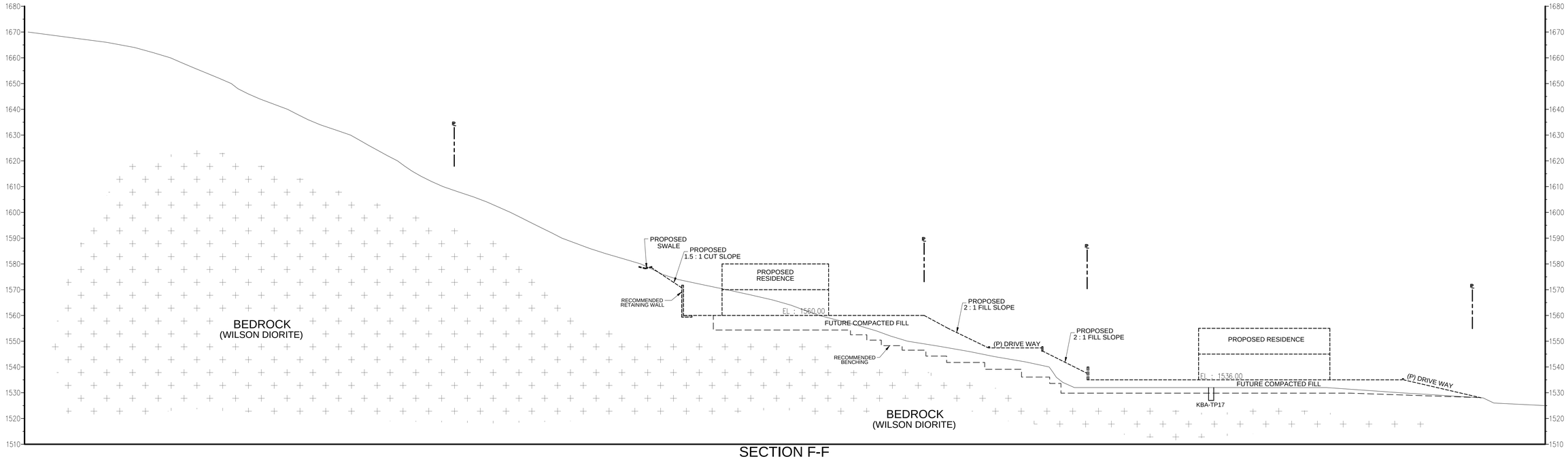
SECTIONS D & E

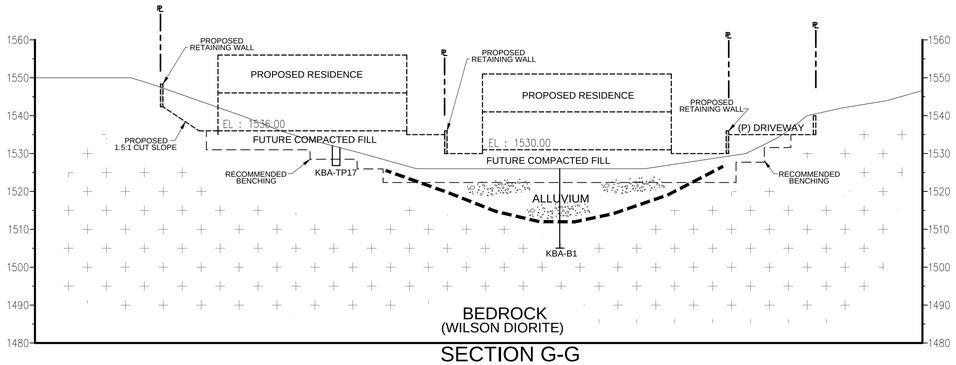
BG: 21103 DAVITYAN

CONSULTANT: JET

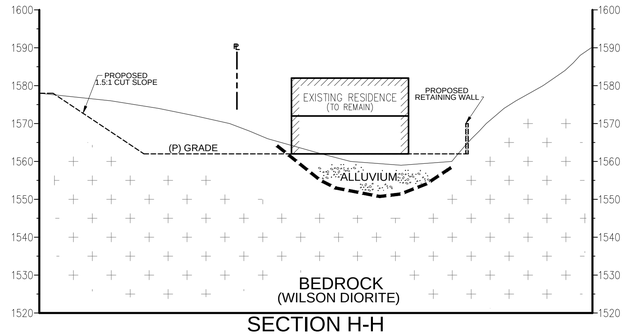
SCALE: 1" = 20'



SECTION F-F



SECTION G-G



SECTION H-H

MARCH 3, 2016

BYER GEOTECHNICAL INC.
1464 E. CHEVY CHASE DR., SUITE 200
GLENDALE, CA 91206
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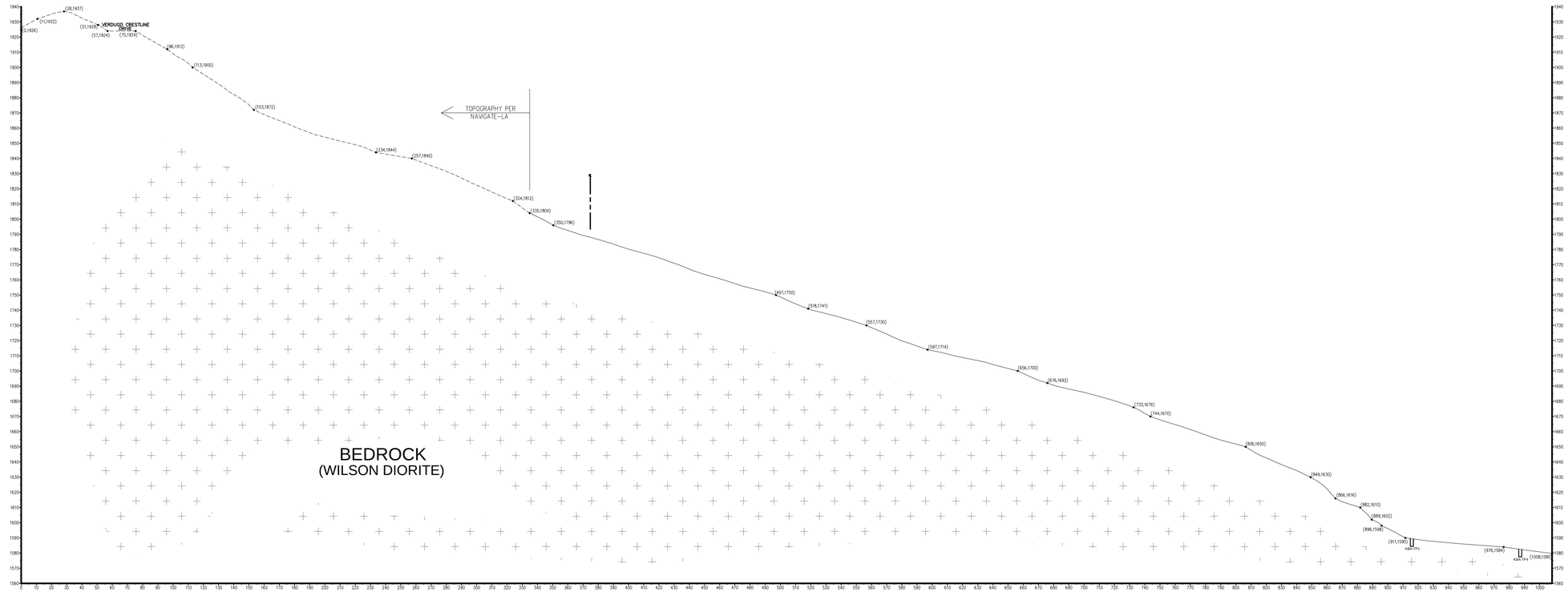
SECTIONS F, G, & H

BG: 21103 DAVITYAN

CONSULTANT: JET

SCALE: 1" = 20'



SECTION I-I

MARCH 3, 2016

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SECTION I

BG: 21103 DAVITYAN

CONSULTANT: JET

SCALE: 1" = 40'

PLOT DATE/TIME: 3/3/2016 - 9:06am

DWT/XW\Proj\GDMP_01182016.dwg

DIR FILE: S:\Live\Projects\21103