G E O M A X E N G I N E E R I N G, I N C.

GEOLOGY ● SOILS **INSPECTIONS ● TESTING**

7340 FLORENCE AVE., SUITE 229
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PRELIMINARY SOILS ENGINEERING
INVESTIGATION REPORT

PROPOSED TWO-STORY DWELLING WITH AN ATTACHED 2-CAR GARAGE
LOTS 155, 156, 158, 160, 161 & 162
LAND SURVEYORS MAP, BOOK 18, PAGES 21 AND 22
APN'S: 2845-005-011, 012, 014, 016, 018
KAGEL CANYON ROAD
SAN FERNANDO, L. A. COUNTY, CALIFORNIA

PROJECT No.: GE23018 **DATE: JUNE 20, 2023**

PREPARED FOR:
MRS. ARCELIA ARIAS
11486 GARRICK AVENUE
LAKEVIEW TERRACE, CALIFORNIA
91342

PRELIMINARY SOILS ENGINEERING

INVESTIGATION REPORT

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LOTS 155, 156, 158, 160, 161 & 162

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INTRODUCTION

This report presents the results of a soils engineering investigation performed on the property. The purpose of the investigation was to determine the soils parameters applicable to the design and construction of the proposed dwelling and garage.

Based on the findings, the soils conditions at the subject site are suitable for the construction of the proposed improvements provided the recommendations included herein are incorporated into their design and construction.

Section 111

In accordance with Section 111 of the County of Los Angeles Building Code, if the recommendations are implemented as stated herein, the proposed structures and grading will be safe from the hazards of future landslides, settlement or slippage. Furthermore, the proposed structures and grading will have no detrimental effect in the geologic stability of property outside the building site.

SCOPE

The scope of this investigation includes the following items:

1. Inspected site conditions.
2. Performed exploratory work involving exploratory borings to determine the type(s) of the earth materials present and to obtain samples.
3. Laboratory testing of representative soils samples to determine their physical properties.
4. Reviewed an undated, preliminary grading plan prepared by CSS Engineering, Inc.
5. Reviewed California Geological Survey, “Official Map of Seismic Hazard Zones, Sunland Quadrangle”.
6. Reviewed California Geological Survey, “Guidelines for Evaluating and Mitigating Seismic Hazards in California, Special Publication 117A”.
7. Reviewed ASCE/SEI 7-16, “Minimum Design Loads and Associated Criteria for Buildings and Other Structures”.

8. Reviewed United States Geological Survey “Design Maps Summary Report Website”.
9. Analyzed data, formulated conclusions and recommendations, and prepared the report.

PROPOSED IMPROVEMENTS

The preliminary site plan provided (reference # 4) shows that the proposed improvements include a two-story, single-family dwelling with an attached 2-car garage to be located on the vacant Lots 161 and 162 of the subject property. Grading, retaining walls and continuous footings will be necessary to place the proposed improvements on the up-sloping lots (Plate 1)

SITE CONDITIONS

The subject site is located on the westerly corner of Kagel Canyon Road and Nansen Drive (paper street) in San Fernando, unincorporated district of the Los Angeles County (Figure 1).

The property consists of six, vacant, up-sloping lots but the proposed dwelling and garage will be located only in Lots 161 and 162 which are fronting Quarry Drive (paper street) and have a combined width of 80 feet, and a length of 60 feet.

The surface ascends from Quarry Drive towards Kagel Canyon Road for about 22 feet at a slope gradient flatter than 3-horizontal to 1-vertical (Plate 1).

SUBJECT SITE

LOTS 155, 156, 160, 161 & 162
OF LAND SURVEYORS MAP, BOOK 18, PAGES 21 & 22
SAN FERNANDO, CA 912342

Drainage is by uncontrolled sheet flow towards the south. The surrounding properties are developed occupied by single-family dwellings.

FIELD EXPLORATION

On April 08, 2023, three exploratory pits were dug with hand-held tools to a maximum depth of 6 feet. The earth materials encountered were logged and classified using the visual and tactile field identification procedures of the Unified Soil Classification System. Undisturbed 2.5-inch diameter core and bulk samples of the earth materials were obtained for laboratory testing and chemical analyses. The earth materials encountered are described in the Earth Materials Section and on the logs of the borings included in the Appendix. The locations of the exploratory sites are shown on Plate 1.

EARTH MATERIALS

The earth materials encountered at the site consist of native gravelly sands which are moist, medium dense to dense and dark brown with abundant rocks up to 4 inches in maximum size.

The earth materials encountered are described graphically on the logs of the borings in the Appendix (Plates 2 thru 4).

LABORATORY TESTS

Laboratory tests were performed on representative samples of the native soil. Field moisture content, saturated moisture content, dry unit weight and direct shear strength characteristics were determined from these tests.

Direct Shear

These tests were performed on representative samples of the native soils that were saturated at least 24 hours under a normal load prior to application of the shear load. Each sample was sheared at a constant rate of displacement of 0.05 inches per minute in accordance with the consolidated-undrained shear test procedure (Plates 5 and 6).

Chemical analyses

Chemical analyses were performed by Enviro-Chem, Inc. Laboratories on February 04/12 & 13/ 2023 on a representative sample of the on-site soils. The results indicate that the on-site soils have a pH of 7.36, a resistivity of 5,620 Ohms/cm, and a sulfates and chlorides concentrations of 22.9 and 30 ppm, respectively. There are no chemical compounds in the on-site soils in amounts that can be deleterious to concrete made with normal Type II cement. Utility lines will be pvc pipes which are normally resistant to soils chemical. Therefore, mitigation measures are not necessary. The results of the chemical tests are shown on Plate 7.

CONCLUSIONS AND RECOMMENDATIONS

The site is considered geotechnically suitable for the construction of the proposed dwelling and garage provided the recommendations herein are considered in the design and followed during construction.

Foundations

The proposed two-story dwelling with the attached garage, and appurtenant retaining walls shall be supported on footings placed into dense native soils.

The bearing capacity for continuous and spread footings with a minimum width of 15 inches and a minimum depth of 24 inches is 2,000 psf for native soils. The bearing value may be increased 20 percent for each additional foot of width or depth to a maximum of 3,600 psf.

The bearing capacity allowed is for the total of dead and frequently applied live loads and may be increased by one-third for short duration wind and seismic loading.

Lateral Design

Resistance to lateral loads may be derived from the skin frictional forces acting at the base of footings and by passive pressure.

The friction coefficient for use with dead load forces is 0.25 for native soils. The unit passive pressure for the first foot of depth using both internal frictional and cohesive shear strength components is 300 psf for native soils with an increase of 50 percent for each additional foot of depth to a maximum of 3,000 pcf. If the passive and skin frictional components are combined, the passive components should be reduced by a factor of one third.

Temporary Excavation Walls

Temporary excavation walls (if needed) will be less than 5 feet with a horizontal and/or back-slopes flatter than 3:1. Special recommendations for temporary excavation walls are not necessary.

Retaining Walls

The preliminary grading plan provided shows that proposed retaining walls will have a maximum height of less than 4 feet with a horizontal and less than 3:1 back-surface. The proposed retaining walls shall be designed using values of 45 pcf and 57 pcf as equivalent fluid pressures (EFP) for retaining walls with horizontal and 3:1 back-surface, respectively.

The proposed retaining walls shall be provided with a sub-drainage system that shall consist of a 4-inch diameter, perforated pvc pipe placed at the bottom of the walls with perforations downward, wrapped with a filter fabric, covered with at least 1 cubic foot of ¾-inch diameter gravel per lineal foot of wall and outletted to open air. A minimum freeboard of 1 foot for a concrete v-gutter is also required.

Settlement

Settlement of the foundation is expected to occur immediately upon initial load application. Maximum settlement is expected to be less than ½-inch and differential settlement is expected to be less than ¼-inch provided all foundations are supported as recommended.

Expansive Soils

The native soils are gravelly sands. Although no actual expansion index test was performed, the gravelly-sandy soils are considered to be very low to-non-expansive. Nevertheless, footings into native soils should be provided with two, # 4 re-bars at top and bottom and slabs on-grade and concrete pavements shall be reinforced with # 3 re-bars spaced 18 inches on center each way.

Liquefaction Potential

The Seismic Hazard Map of the Sunland Quadrangle (reference # 5) shows that the subject site is not located within an area susceptible to soil liquefaction. Therefore, special recommendations to mitigate the potential of soil liquefaction are not necessary.

Seismic Coefficients

The proposed structures shall be designed in accordance with Chapter 16A, Section 1613A Earthquake Loads of the 2020 Los Angeles County Building Code, and with the provisions in document ASCE/SEI 7-16 “Minimum Design Loads and Associated Criteria for Buildings and Other Structures” (reference # 7). The seismic design values below have been obtained using the United States Geological Survey (USGS) Design Maps for the Seismic Design Values for Buildings (reference # 8, Plates 8 and 9).

Coordinates: 34.3177 N and -118.3716 W

Occupancy Category: II (Table 1604.5)

Site Class: (D) Native Soils (Table 1613.5.2 and Section 1623.5)

Mapped Spectral Accelerations: Ss = 2.44 (g) Short Period (0.2 s) (Fig. 1613.5(3)

S_1 = 0.78 (g) One-second Period (Fig. 1613.5(4)

Site Coefficients: F_a = 1.0 Short Period (0.2 s) (Table 1613.5.3(1)

F_v = 1.7 One-second Period) (Table 1613.5.3(2)

Spectral Response Accelerations: S_{MS} = 2.93 (g) Short Period (0.2 s) (Eq. 16-37)

S_{M1} = 1.33 (g) One-second Period) (Eq. 16-38)

Design Accelerations: S_{DS} = 1.95 (g) Short Period (0.2 s) (Eq. 16-39)

S_{D1} = 0.89 (g) One-second Period) (Eq. 16-40)

Seismic Design Category: D (Tables 1613.5.6(1) and 1613.5.6(2)

The southern California region can be subject to heavy shaking as a result of moderate to major earthquakes with a magnitude of 6 or greater. The use of the seismic coefficients herein above are intended to prevent loss of life and to minimize but not entirely eliminate structural damage.

Moreover, major foundation problems are not anticipated as a result of earthquake-induced liquefaction, fault ground rupture or displacement and settlement provided the proposed foundation system is constructed as recommended with the limitations mentioned herein.

Slabs On-Grade and Concrete Pavements

Floor slabs-on-grade and concrete pavements should be at least 4 inches of concrete reinforced with # 3 re-bars spaced at 18 inches each way on center supported on native soils. Slabs on-grade and pavements on cut/fill transition areas are not allowed.

Concrete slabs which are to be covered with flooring should be underlain by a plastic vapor barrier. Per Section 4.505.2.1 of the 2019 California Green Building Standards Code, a 4-inch thick base of ½-inch or larger clean aggregate base materials shall be provided with a vapor barrier in direct contact with concrete and a concrete mix design, which will address bleeding, shrinkage, and curling, shall be used. This base materials layer will protect the plastic sheet while the concrete is being placed. The sub-grade materials should be thoroughly-saturated prior to casting concrete.

Hydro-collapse

The phenomenon of hydro-collapse affects mostly granular soils that are transported and deposited by a fast, storm flow typical of deserts that drained rapidly without full saturation. The alluvial soils within the subject site and its vicinity are not subject to hydro-collapse.

Tsunami

The site is located approximately 2,174 feet above sea level. Based on this, the California Emergency Management Agency describes the site as not within a tsunami or seiche hazard zone.

Drainage

Roof and pad drainage should be collected and conveyed to a LID system via non-erodible conduits. Drainage should not be allowed to pond against the footings.

Inspections and Approval

All footing excavations should be inspected and approved by this firm prior to the placing forms and rebars. Approval by the County Inspector may also be required. Please advise this office at least 24 hours prior to any required inspection or compaction testing.

Limitations

This report has been prepared for the exclusive use of Mrs. Arcelia Arias. Once final plans are approved, this office should review the plans that must be in conformance with our recommendations. It is her responsibility or her representative to assure that the information and recommendations contained herein are made available to the designers and contractors of this project. This report is subject to review and approval by the Building Official.

This report is based on the information obtained from exploratory pits and sampling locations using generally-accepted soils engineering practice. However, conditions can be expected to vary between points of exploration.

No warranty, expressed or implied is made or intended in connection with this report or by any other oral or written statement. Any liability in connection herein shall not exceed the fees for the investigation.

The opportunity to be of professional service is sincerely appreciated. Please call if you have any questions concerning this report.

Respectfully submitted,

Geomax Engineering, Inc.

Manuel A. Espino
Chief Engineer
RCE C055526
Exp. 12-31-24

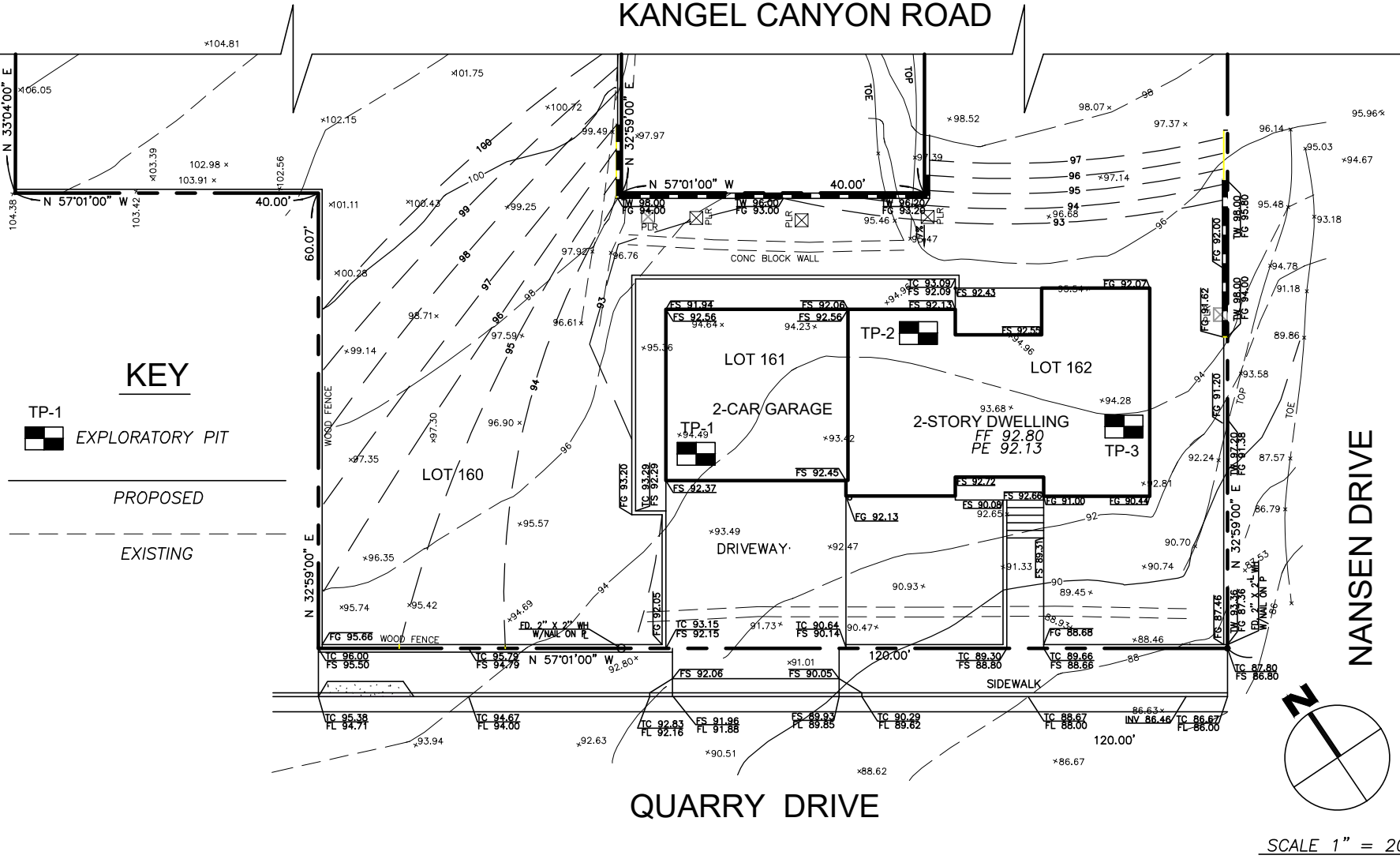
REGISTERED PROFESSIONAL ENGINEER
MANUEL A. ESPINO
No. C055526
EXP. 12/31/24
CIVIL
STATE OF CALIFORNIA

Hector Medina
Project Manager

MAE/HM: em

Attachments: Appendix with 9 Plates

APPENDIX



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PLOT PLAN

LOTS 155, 156, 158, 160, 161 & 162
LAND SURVEYOR'S MAP'S
BOOK 18, PAGES 21 & 22
SYLMAR, L.A. COUNTY, CA

DATE:	06-20-2023
SCALE:	1" = 20'
DRAWN:	EEM
JOB No.:	GE23014
PLATE	1

LOG OF BORING

PROJECT: KAGEL CANYON ROAD	PROJECT No.: GE23018		PIT No.: 1
LOCATION: SEE PLOT PLAN	LOGGED BY: HM	DATE: 04/08/23	PLATE: 2

GEOTECHNICAL DESCRIPTION	GRAPHIC LOG	DEPTH (FEET)	SAMPLE No.	SAMPLE DEPTH (FEET)	TUBE■ /BULK ●	DRY DENSITY (PCF)	WET DENSITY (PCF)	FIELD MOISTURE (%)	SATURATED MOISTURE (%)
(0–5') GRAVELLY SANDS (GM); SLIGHTLY MOIST TO MOIST, MEDIUM DENSE TO DENSE AND DARK BROWN; ABUNDANT ROCKS TO 3 INCHES IN MAXIMUM SIZE.		1	1	2	■	103	123	20	6
STOPPED @ 5'		2							
		3							
		4							
		5							
		6							
		7							
		8							
		9							
		10							

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LOG OF BORING

PROJECT: KAGEL CANYON ROAD	PROJECT No.: GE23018		PIT No.: 2
LOCATION: SEE PLOT PLAN	LOGGED BY: HM	DATE: 04/08/23	PLATE: 3

GEOTECHNICAL DESCRIPTION	GRAPHIC LOG	DEPTH (FEET)	SAMPLE No.	SAMPLE DEPTH (FEET)	TUBE■ /BULK ●	DRY DENSITY (PCF)	WET DENSITY (PCF)	FIELD MOISTURE (%)	SATURATED MOISTURE (%)
(0–6') GRAVELLY SANDS (GM); SLIGHTLY MOIST TO MOIST, MEDIUM DENSE TO DENSE AND DARK BROWN; ABUNDANT ROCKS TO 3 INCHES IN MAXIMUM SIZE.		1	1	2	●				
		2							
		3							
		4							
		5							
		6							
STOPPED @ 6'		7							
		8							
		9							
		10							

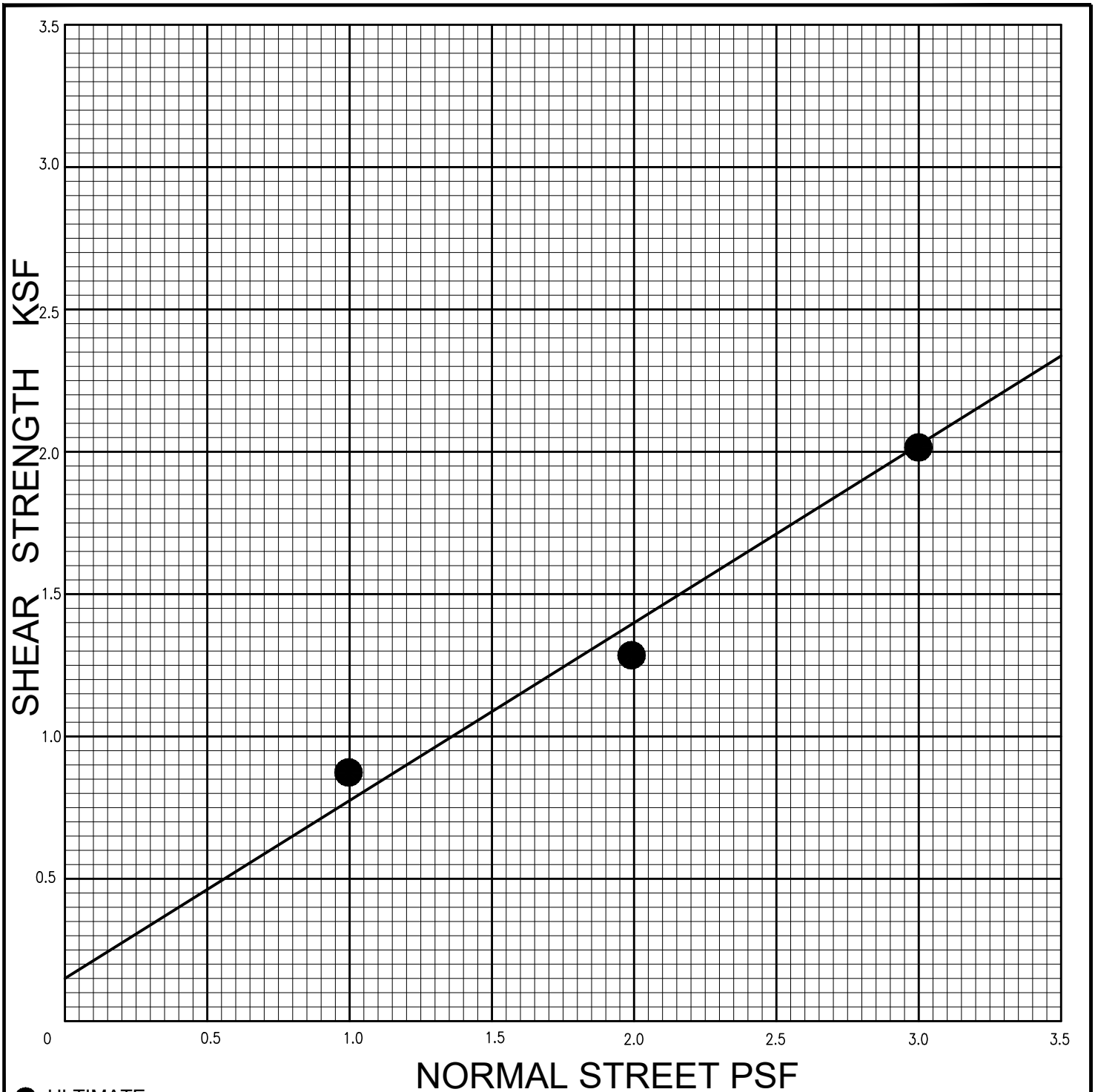
GEOMAX ENGINEERING, INC.

LOG OF BORING

PROJECT: KAGEL CANYON ROAD	PROJECT No.: GE23018		PIT No.: 3
LOCATION: SEE PLOT PLAN	LOGGED BY: HM	DATE: 04/08/23	PLATE: 4

GEOTECHNICAL DESCRIPTION	GRAPHIC LOG	DEPTH (FEET)	SAMPLE No.	SAMPLE DEPTH (FEET)	TUBE■ /BULK ●	DRY DENSITY (PCF)	WET DENSITY (PCF)	FIELD MOISTURE (%)	SATURATED MOISTURE (%)
(0–5') GRAVELLY SANDS (GM); SLIGHTLY MOIST TO MOIST, DENSE AND DARK BROWN; ABUNDANT ROCKS TO 4 INCHES IN MAXIMUM SIZE.		1							
		2							
		3							
		4	1	4	■	105	126	20	5
STOPPED @ 5'		5							
		6							
		7							
		8							
		9							
		10							

GEOMAX ENGINEERING, INC.



● ULTIMATE

SOIL CLASSIFICATION:NATIVE GRAVELLY SANDS (GM)			SAMPLE NO.: TB-1-1 @ 2'	
Ws: 19.7 %	Wf: 6.3 %	γd: 102.8 PCF	C= 150 PCF	φ 32 °

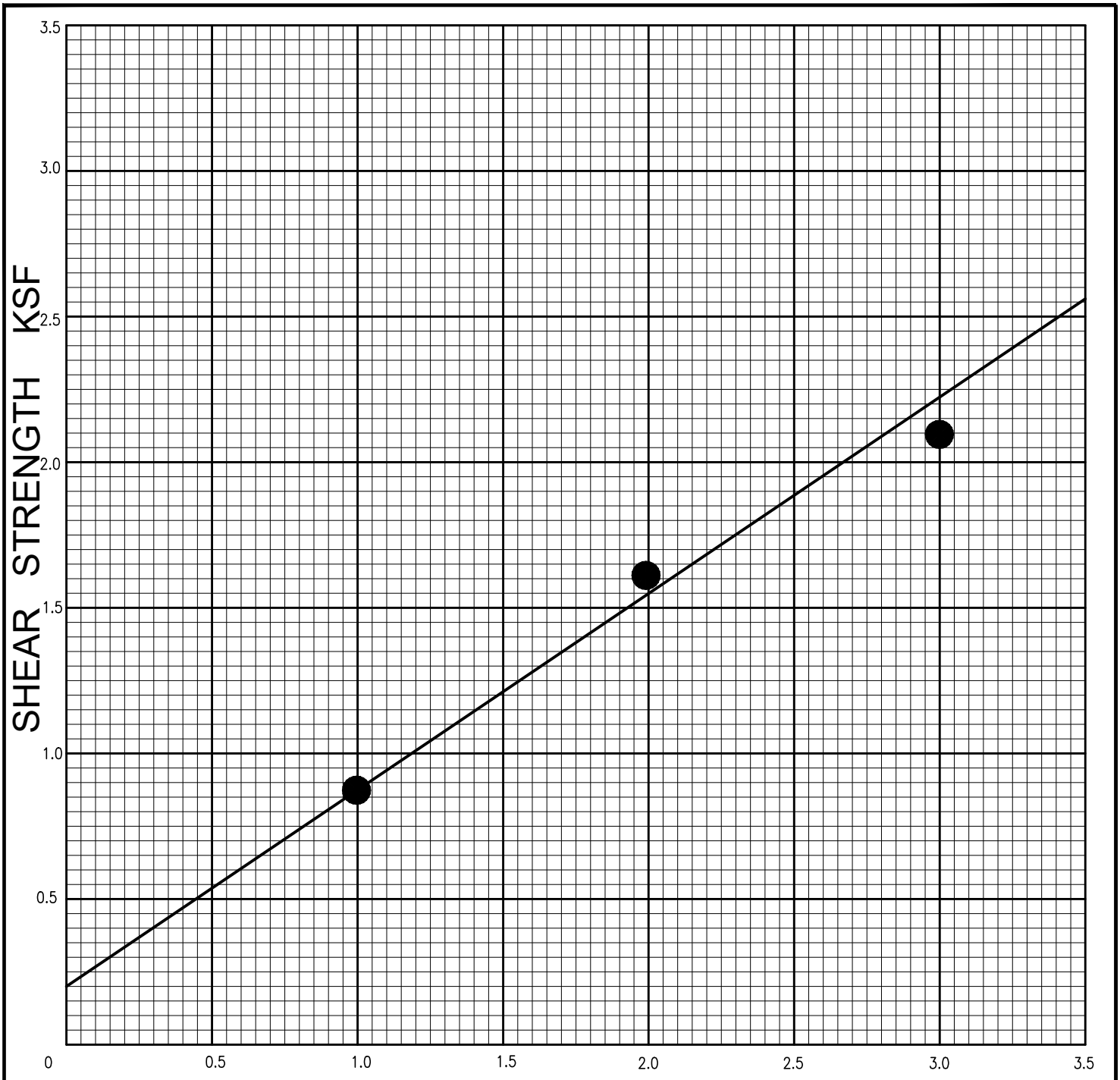
GEOMAX ENGINEERING, INC.

DIRECT SHEAR

DATE: 05-15-23

JOB #: GE23018

PLATE 5



● ULTIMATE

SOIL CLASSIFICATION:NATIVE GRAVELLY SANDS (GM)			SAMPLE NO.: TB-3-1 @ 4'	
Ws: 20.3 %	Wf: 5.1 %	γd: 104.7 PCF	C= 200 PCF	φ 34 °

GEOMAX ENGINEERING, INC.

DIRECT SHEAR

DATE: 05-15-23

JOB #: GE23018

PLATE 6

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **GEOMAX Engineering**
7340 Florence Ave., Suite 229
Downey, CA 90240
Tel: (562) 806-2173 E-Mail: GeomaxEng@GMail.com

PROJECT: **GE23018 / Kagel Canyon Road, Sylmar, CA**
MATRIX: SOIL DATE RECEIVED: 05/04/23
SAMPLING DATE: 04/08/23 DATE ANALYZED: 05/04&05/23
REPORT TO: MS. ELVIRA E. MEDINA DATE REPORTED: 05/11/23

SAMPLE I.D.: **2-1 @ 2.5'** LAB I.D.: 230504-56

PARAMETER	SAMPLE RESULT	UNIT	PQL	DF	METHOD
RESISTIVITY	5620	OHMS-CM	100000*	--	CALTRANS
SULFATE	22.9	mg/Kg	10	1	EPA 9038
CHLORIDE	30.0	mg/Kg	10	1	EPA 9253
pH	7.36	pH/Unit	--	--	EPA 9045C

COMMENTS
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = DF X PQL
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT
mg/Kg = MILLIGRAM PER KILOGRAM = PPM
OHMS-CM = OHMS-CENTIMETER @ 25.0 DEGREE CELSIUS
RESISTIVITY = 1/CONDUCTIVITY
* = HIGH LIMIT
pH ANALYSIS CONDUCTED ON 1:1 SOIL/DEIONIZED WATER EXTRACTION
pH ANALYZED AT TEMPERATURE OF 22.1 DEGREE CELSIUS

DATA REVIEWED AND APPROVED BY: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

PLATE 7

Hazards by Location

Search Information

Coordinates: 34.31777778, -118.3716667

Elevation: 2174 ft

Timestamp: 2023-06-27T15:46:01.213Z

Hazard Type: Seismic

Reference Document: ASCE7-16

Risk Category: II

Site Class: D-default

Basic Parameters

Name	Value	Description
S_S	2.442	MCE_R ground motion (period=0.2s)
S_1	0.782	MCE_R ground motion (period=1.0s)
S_{MS}	2.93	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	1.953	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

$S_{M1} = Fv \times S_1 = 1.7 \times 0.782 = 1.33$ g

$S_{D1} = 2/3\ S_{M1} = 2/3 \times 1.33 = 0.89$ g

* See Section 11.4.8

Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.905	Coefficient of risk (0.2s)
CR_1	0.892	Coefficient of risk (1.0s)
PGA	1.011	MCE_G peak ground acceleration

Fv = 1.7 per Table 11.4-2

PLATE 8

F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	1.213	Site modified peak ground acceleration
T_L	8	Long-period transition period (s)
SsRT	2.442	Probabilistic risk-targeted ground motion (0.2s)
SsUH	2.697	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.483	Factored deterministic acceleration value (0.2s)
S1RT	0.883	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.989	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.782	Factored deterministic acceleration value (1.0s)
PGAd	1.011	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Please note that the ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

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PLATE 9