Harrington Geotechnical Engineering, Inc.

March 13, 2020

Mr. Ilan Golcheh, President
GOLCHEH GROUP
1180 South Beverly Drive, Suite 300
Los Angeles, CA

RE: Geotechnical Investigation for Design and Construction of Proposed Convenience Store, Fuel Canopy and Fast Food, Car Wash and Self-Storage Buildings at 15209 Lincoln Street, Lake Elsinore, CA
HGEI Project No. 20-01-3952

Dear Mr. Golcheh:

This report presents the results of a geotechnical investigation performed at your request to establish information on the materials underlying the proposed development area and, based thereon, to provide recommendations for design and construction of the proposed convenience store, fuel canopy and fast food, car wash and self-storage buildings. Two percolation tests to establish an infiltration rate were performed as part of the investigation.

Preliminary design information was used in outlining the scope of the investigation and preparing this report in accordance with generally accepted geotechnical engineering practice in this area.

Based on analysis and evaluation of the data obtained it has been concluded that construction of the proposed buildings and associated parking lot as proposed is feasible from a geotechnical engineering standpoint provided the recommendations presented herein are incorporated into design and construction of the project.

Thank you for this opportunity to be of service. If you have any questions concerning this report or if we can be of further assistance, please call at your convenience.

Very truly yours,
HARRINGTON GEOTECHNICAL ENGINEERING, INC.

Joseph L. Welch, P.E., G.E.
Senior Geotechnical Engineer

Distribution: file
Addressee via E-mail

REGISTERED PROFESSIONAL ENGINEER
JOSEPH L. WELCH
No. GE2239
EXP. 11/30/20
GEOTECHNICAL
STATE OF CALIFORNIA

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INTRODUCTION

This report presents the results of a geotechnical investigation of the subject building site. The purposes of the investigation were to: 1) determine the type and condition of the soil materials at the site; 2) establish static physical and limited chemical properties of the materials; 3) determine groundwater conditions; and 4) provide recommendations for design and construction of the building foundations and floor slabs for the proposed convenience store, fuel canopy and fast food, car wash and self-storage buildings and pavement design for the associated parking lot.

SCOPE OF WORK

The scope of work for this geotechnical investigation consisted of the following:

Review of published regional geologic maps and reports (See References).

A field exploration was conducted on February 25, 2020 and consisted of drilling, logging, and sampling seven exploratory borings (B-1 to B-7) to depths of up to 21.5 feet. The field exploration is described in detail in Appendix A. Two percolation tests to establish an infiltration rate were performed as part of the investigation. The tests were conducted in borings I-1 and I-2. The results are discussed in Appendix D.

Selected samples were tested in HGEI's AMRL Accredited Geotechnical Laboratory to develop data necessary for analysis of subsurface conditions and used in preparation of this report. A description of the geotechnical laboratory testing conducted for the samples collected from the site and presentation of the results are found in the Laboratory Procedures & Test Results in Appendix B.

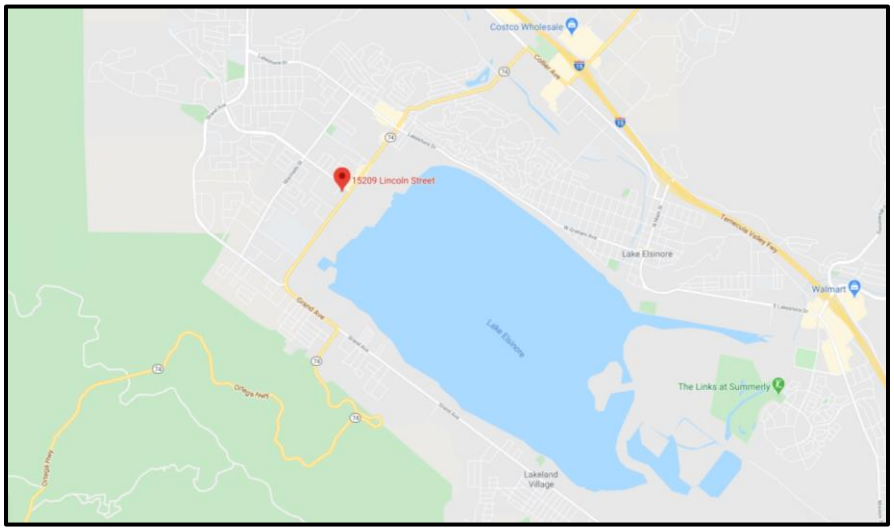
HGEI conducted engineering analysis, constructed figures, and prepared this report depicting the findings and conclusions of the investigation.

SITE LOCATION AND DESCRIPTION

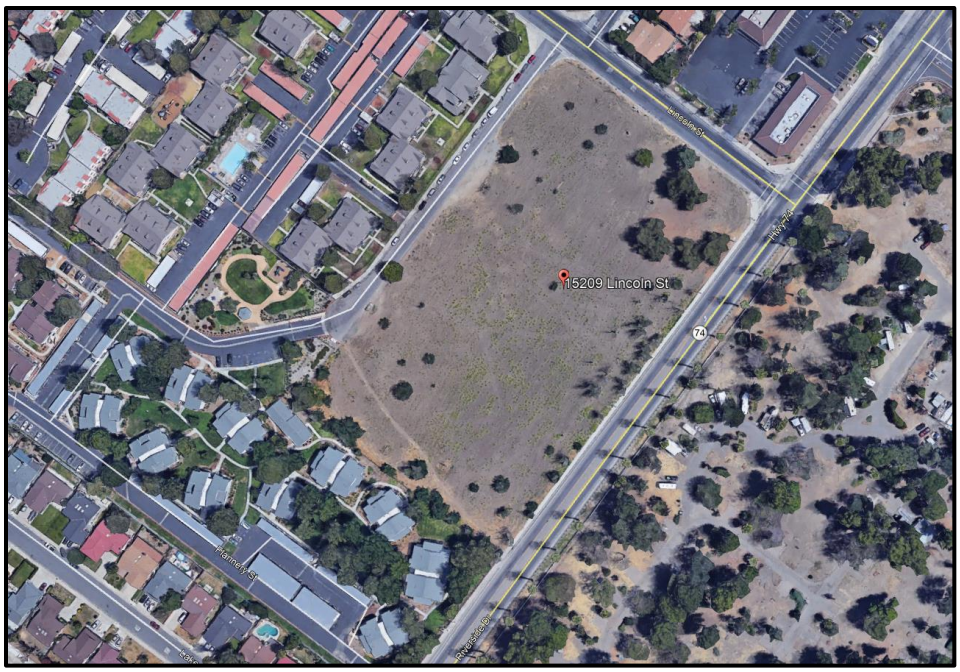
The site is located at 15209 Lincoln Street, Lake Elsinore, CA as shown on the Vicinity Map, Figure 1, which follows. As shown on the Air Photo, Figure 2, the relatively flat pad is bordered on the southeast by Riverside Drive, to the northeast by Lincoln Street, to the northwest by

Flannery Street. Adjacent residences are to the southwest. The lot is currently vacant and covered with grass and scattered trees.

Vicinity Map - Figure 1



Air Photo-Figure 2



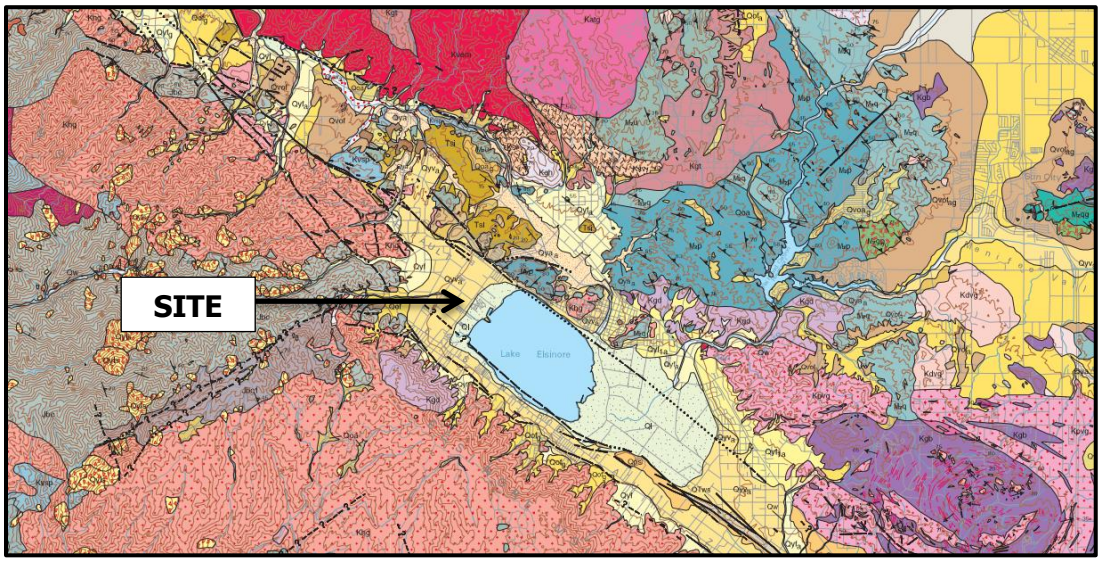
PROJECT DESCRIPTION

As shown on Plate A, the new development will be comprised of several single-story buildings that will be a convenience store, fast food, car wash and self-storage facility, a fuel canopy and associated parking lot. Minimal grade changes are anticipated. The building foundations will comprise continuous perimeter foundation with slab on grade floors. Typical single-story foundation loads, about 1,500 pounds per lineal foot have been considered in preparation of this report. The fuel canopy will be supported on reinforced concrete piers, supporting maximum vertical loads in the order of 10 kips.

REGIONAL GEOLOGIC SETTING

The subject site is situated along the central portion of the Peninsular Ranges Geomorphic Province of Southern California within the Elsinore extensional structural basin created by movements along the Elsinore fault zone. The Peninsular Ranges Geomorphic Province is characterized by elongated northwest to southeast trending ridges and valleys subparallel to faults branching from the San Andreas Fault. Published maps (Reference 4) have been used to identify the geologic unit underlying the property. As shown on Figure 3, these maps indicate that the property is underlain at depth by young alluvial valley deposits of Holocene to late Pleistocene geologic age.

Regional Geologic Map - Figure 3



Qyva – Young Alluvial Valley Deposits (Holocene and late Pleistocene) — Silty to sandy alluvium on valley floors; gray, unconsolidated

SUBSURFACE CONDITIONS

Earth Materials

Subsurface conditions encountered during this investigation are described in more detail in Appendix A. Logs of the borings are presented on Plates A-1 and A-7 and show the site to be immediately underlain by alluvial material comprised of silty sand to sandy silt that is damp to moist and moderately dense.

Groundwater

Groundwater was not encountered at the time of drilling. A groundwater monitoring well located approximately .75 miles northeast of the site and identified as State Well Number 6S05W02A001S indicates a groundwater depth of 298 feet below the ground surface recorded on 11/12/19 (Reference 3). Groundwater levels can fluctuate but groundwater is not expected to adversely affect the proposed development under normal conditions in the future.

Caving

Caving of the exploratory borings did not occur due to the types of soil encountered and is not expected to be a major concern during construction. The regulations of Cal/OSHA should be complied with during performance of all underground construction.

Expansion Potential

Based on the results of laboratory testing (Table 1, Appendix B) the Expansion Index for the typical near-surface material is 10. The 2019 California Building Code (Section 1803.5.3) categorizes this material as being non-expansive and special design is not required per Section 1808.6.

Water-Soluble Sulfate

A soil sample was delivered to a state approved analytical laboratory for testing to evaluate water-soluble sulfate content. Based on the results of laboratory testing (Table 2, Appendix B) a negligible (S0) exposure category is indicated (ACI 318, Table 4.2.1).

GEOLOGIC HAZARDS

Faulting/Fault Rupture

The site is in a portion of California that is seismically active and anticipated to be subjected to strong ground motions by earthquakes generated by active faults in the area. The site is not

within a presently designated earthquake fault zone as established by the Alquist-Priolo Fault Zoning Act (Reference 1).

The site is situated approximately 1.1 km from the nearest fault (Elsinore Glen Ivy) and 5.5 km from the next nearest fault (Elsinore-Temecula). The likelihood of surface rupture occurring at the site is considered low.

Liquefaction/Seismically Induced Settlement

The site has not been evaluated by California Geological Survey (CGS) for liquefaction hazard potential (Reference 1). The City of Lake Elsinore General Plan (Reference 3) indicates that the site is underlain by sediments that are moderately susceptible to liquefaction. Based on this classification and the depth to groundwater, a liquefaction/dry sand settlement assessment was not considered necessary.

CONCLUSIONS AND RECOMMENDATIONS

Based on conditions encountered/established during this investigation, it is our conclusion that construction of the currently planned convenience store, fuel canopy and fast food, car wash and self-storage buildings and associated parking lot is feasible from a geotechnical engineering standpoint provided the recommendations which follow are implemented during design and construction of the project.

Following our evaluation of conditions encountered in the field exploration and the analyses of laboratory test data, the following recommendations for grading the site and designing the footings, at-grade floor slabs and pavement section are being provided. Anticipated conditions and these recommendations are subject to confirmation during construction.

Additional recommendations may be provided during the course of work if warranted by conditions encountered. The foundation plan should be reviewed by the geotechnical engineer and any necessary recommendations provided in a review letter.

Site Clearing and Grading

It is recommended that grading be carried out in accordance with applicable sections of the Grading Specifications in Appendix E and the following site specific recommendations. Prior to grading, any existing vegetation should be stripped and disposed of offsite according to the city's requirements.

In order to develop adequate uniform support and alleviate the potential for differential settlement, the soil in the new structure areas plus five feet in each direction, should be removed to a minimum depth of 3 feet, or to the depth necessary to expose competent soil, the exposed soil scarified 12 inches deep, moisture conditioned to optimum moisture content, and compacted to a minimum relative compaction of 90% based on the results of compaction tests performed in accordance with ASTM Test Method D1557-12$^{\varepsilon 1}$.

New hardscape areas should be scarified 12 inches deep, and moisture conditioned and compacted as indicated above. New parking and drive areas should be over-excavated one foot deep, scarified 12 inches deep, and moisture conditioned and compacted as indicated above.

Replacement fill material should be spread in thin, loose lifts, and moisture conditioned and compacted as indicated above.

Imported soil shall be approved by the geotechnical engineer for expansion, sulfate, and strength qualities prior to being transported to the project site. Final acceptance of any imported soil will be based on observation and/or testing of soil actually delivered to the site.

It is recommended that grading operations be monitored by a representative of this office in order to confirm compliance with these recommendations and, in turn, the foundation design recommendations which follow.

Seismic Design

The provisions of Chapter 16, Section 1613, of the 2019 California Building Code and the Structural Engineer Associates of California guidelines are considered appropriate for design of the project.

Earthquake factors determined using the SEAOC/OSHPD data base website and Chapter 16 requirements are presented in Appendix C.

Fuel Canopy Foundation Design

An allowable, net, vertical bearing pressure of 3,000 pounds per square foot is recommended for design of 18-inch-diameter, or larger, piers at least 6 feet deep. This pressure may be increased by 600 pounds per square foot for each additional foot of embedment up to 5000 pounds per square foot.

An allowable lateral bearing pressure of 300 pounds per square foot per foot of depth limited to 2,000 pounds per square foot is recommended.

Minor caving/raveling may occur. Concrete should be placed as soon as possible to minimize this occurrence.

Building Foundation Design

New conventional footings embedded into approved fill material may be used. Footings with a minimum width of 12 inches and plan dimension depth of 18 inches (measured from the lowest adjacent finish grade) may be designed using an allowable, net, dead load plus live load soil bearing pressure up to 2,000 pounds per square foot (psf). The allowable soil bearing pressure can be increased by 250 psf for each additional foot of width or depth to a maximum allowable bearing capacity of 3,000 psf if deemed necessary by the structural engineer. A one-third increase in bearing may be assumed for short duration wind or seismic loading in combination with vertical loads. Minimum reinforcement recommended for any continuous footings is one No. 4 bar, top and bottom. Pad footing reinforcement, if any, will be governed by structural design.

For the purposes of resisting lateral forces, an allowable passive soil pressure of 300 pounds per square foot per foot of depth may be used in design. A coefficient of friction of 0.35 may be used for concrete placed on approved compacted fill. These values may be combined without reduction.

It is recommended that the foundation excavations be examined and, if necessary, tested by a representative of the geotechnical engineer to confirm anticipated conditions and/or provide additional recommendations should they be necessary.

Floor Slab Design/Construction

It is recommended that the floor slab be a nominal 4 inches thick, reinforced with No. 4 bars at 24 inches on center, each way.

A moisture vapor retarder installed in accordance with the manufacturer's instructions should be provided. We would recommend that 2 inches of clean sand be placed over a minimum 10 mil visqueen vapor barrier underlain by 4 inches of coarse sand or gravel to comply with the requirements of CALGREEN.

HGEI does not practice in the field of moisture vapor transmission evaluation/mitigation. Therefore, we recommend that a qualified consultant be engaged with to evaluate the general and specific moisture vapor transmission paths and any impact on the proposed construction.

This consultant should provide recommendations for mitigation of potential adverse impact of moisture vapor transmission on various components of the structure as deemed appropriate.

Settlement

Foundation settlement (total and differential) should not exceed ½-inch and ¼-inch, respectively. The horizontal distance over which differential settlement could occur is 20 feet.

Concrete Flatwork/Driveway

Miscellaneous flatwork should be a nominal 4 inches thick, reinforced at mid-depth with No 4 bars at 24 inches on center each way and provided with adequate control joints. Low slump concrete should be used for all flatwork to further minimize cracking. The driveway thickness should be 5 inches if constructed of concrete.

It should be noted that due to normal concrete shrinkage some minor cracking of the concrete flatwork may occur. Additional reinforcement beyond that recommended herein and careful control of concrete slump would be beneficial in reducing such cracking. Also, it is very important that all control joints be caulked and properly maintained to inhibit infiltration of surface water into the soil and thereby minimize expansion.

Pavement

Based on an estimated R-value of 40 and assumed Traffic Index of 4.5 for parking areas, it is recommended that automobile traffic areas be paved with 4 inches of asphalt concrete over 4 inches of Class II Base and automobile drive lanes with an assumed Traffic Index of 5 should be paved with 5 inches of asphalt concrete over 4 inches of Class II base. The sections should be placed on a minimum of two feet of soil compacted to at least 90 percent of the maximum dry density determined in accordance with ASTM Test Method D1557. (Ref. Caltrans Highway Design Manual Chapter 630).

As an alternative, based on an estimated R-value of 40 and assumed Traffic Index of 5, asphalt parking and drive lanes could be paved with a full depth section with 0.60 foot of asphalt concrete placed on a minimum of two foot of compacted soil. The foot immediately beneath the asphalt should be compacted to at least 95 percent of the maximum dry density determined in accordance with ASTM Test Method D1557. The other lower foot should be compacted to at least 90 percent of the maximum dry density determined in accordance with ASTM Test Method D1557. (Reference Caltrans Highway Design Manual Chapter 630).

Concrete Quality

A negligible amount of water-soluble sulfate is indicated for the prevalent surface material and special sulfate-resistant concrete will not be required on this project. The exposure class (ACI 318-11, Table 4.2.1) is S0. Based on this test result concrete may contain Type II cement (Section 1904.2 of the 2019 CBC and ACI 318, Section 4.3, Table 4.3.1).

Site Drainage

The 2019 CBC Section 1804.4 requires that the minimum drainage for the ground around the perimeter of a building should be 5% away from the foundation for a distance of 10 feet. Impervious surfaces within 10 feet of the building foundation shall be sloped a minimum of 2%. In no case should the surface waters be allowed to flow over the slope surfaces in an uncontrolled manner.

Utility Trench Backfills

Backfill for any trenches associated with this project should consist of site and/or similar material (the use of imported sand is not recommended) that must be adequately compacted to preclude detrimental settlement. It is recommended, therefore, that backfills placed below the building foundation and to a distance of five feet outside thereof, and below concrete flatwork, be placed in appropriate lifts, moisture conditioned and mechanically compacted to at least 90 percent of maximum dry density.

Plan Review

It is recommended that final project plans, details and specifications be submitted to this office for geotechnical review for compliance with the findings and recommendations of this report. Additional recommendations can then be provided if necessary.

Grading Observations and Testing

Grading and foundation construction should be observed and tested by members of our staff so that anticipated soil conditions can be confirmed and the recommendations contained herein validated. If deemed necessary, as a result of changed conditions, supplemental recommendations may then be provided. Results of those observations and tests should be provided in the final report which should include a statement by the geotechnical engineer concerning the adequacy of the completed work.

Pre-Construction Meeting

A pre-grade/construction meeting should be attended by the owner's representative, members of the design team, grading contractor, city/county inspector, and a representative from HGEI

at the site to review the findings and recommendations of this report and project plans and specifications prior to starting work on the project.

GENERAL COMMENTS

The services provided under the purview of this report have been performed in accordance with generally accepted geotechnical engineering principals and standards of practice in this area. The comments and recommendations presented are professional opinions based on observations and our best estimation of project conditions and requirements as indicated by presently available information and data. No further warranty, express or implied, is intended by issuance of this report.

The investigation did not include: 1) detailed study of geologic and seismic conditions; 2) assessment of the liquefaction potential; or 3) sampling, field measurements or laboratory tests for the presence of any toxic/hazardous substances in the earth materials at the site. However, this does not imply that the site is subject to any unusual geologic, seismic or environmental hazard.

Any unanticipated condition encountered in the course of grading and/or construction should be brought to the attention of the geotechnical engineer for evaluation prior to proceeding with the work.

This report has been developed for the sole use of the client and/or clients authorized representative. These conclusions and recommendations should be verified by a qualified geotechnical engineer based in part upon additional subsurface information obtained during grading and/or foundation construction. No part of the report should be taken out of context, nor utilized without full knowledge and awareness of its intent.

This report is issued on condition that HGEI will be retained to observe the grading and foundation construction operations. If another firm provides this service then that firm must review and accept this report, or provide alternate recommendations, and assume responsibility for the project. This report will be valid for a period of one year form date of issue and will then require updating.

0-0-0

REFERENCES

1. California Department of Conservation, California Geological Survey, Earthquake Zone App, https://maps.conservation.ca.gov/cgs/EQZApp/

2. Department of Water Resources (DWR), March 12, 2020. http://wdl.water.ca.gov/waterdatalibrary/

3. City of Lake Elsinore, General Plan, Chapter 3.0 Public Safety & Welfare, Section 3.6 - Seismic Activity, Adopted December 13, 2011.

4. USGS, 2004, Morton, D.M., Bovard, Kelly R., and Alvarez, Rachel M., 2004, Preliminary Digital Geologic Map of the Santa Ana 30'x 60' Quadrangle, Southern California, version 2.0: U.S. Geological Survey Open-File Report 99-0172.

5. OSHPD Seismic Design Maps, https://seismicmaps.org, March 12, 2020.

6. Blake, Thomas F., 2000, FRISKSP (Version 4.00), EQFAULT and EQSEARCH (Version 3.00), Computer Programs for calculating the site to fault distances, Deterministic peak horizontal ground accelerations for a Maximum Magnitude Earthquake, and historic seismicity for an area from selected known faults in the southern California region (Rev. 2000).

APPENDIX A

FIELD INVESTIGATION

The field investigation was conducted on February 25, 2020 and consisted of logging and sampling seven exploratory borings drilled with a truck mounted hollow stem 8-inch-diameter auger to depths of up to 21.5 feet. The subsurface exploration locations are indicated on Plate A and the logs of the borings are presented on Plates A-1 to A-7. Two additional borings (I-1 and I-2) were drilled for percolation testing to establish an infiltration rate. The results are discussed in Appendix D. The descriptions represent the prevalent soil types and slightly different material types may be present within the major groupings. Also, the transition from one soil type or condition to another may be gradual rather than abrupt as implied, and differing conditions may exist in unexplored areas.

Unified Soil Classification System Classification Criteria/Symbols are presented on Plate A-8.

A representative of the geotechnical engineer observed the field work, collected samples for transportation to our geotechnical laboratory, and prepared field logs by visual/tactile examination of the materials. Core samples were obtained at discreet intervals using a modified California split-spoon sampler loaded with 2.42" I.D. x 1"-long, thin-wall, brass rings. Bulk samples of the materials were also collected. Samples were placed in plastic bags immediately upon removal from the sampler to conserve moisture and labeled for identification.

The borings were backfilled with excavated soils immediately upon completion of sampling. Groundwater was not encountered at the time of drilling the borings.

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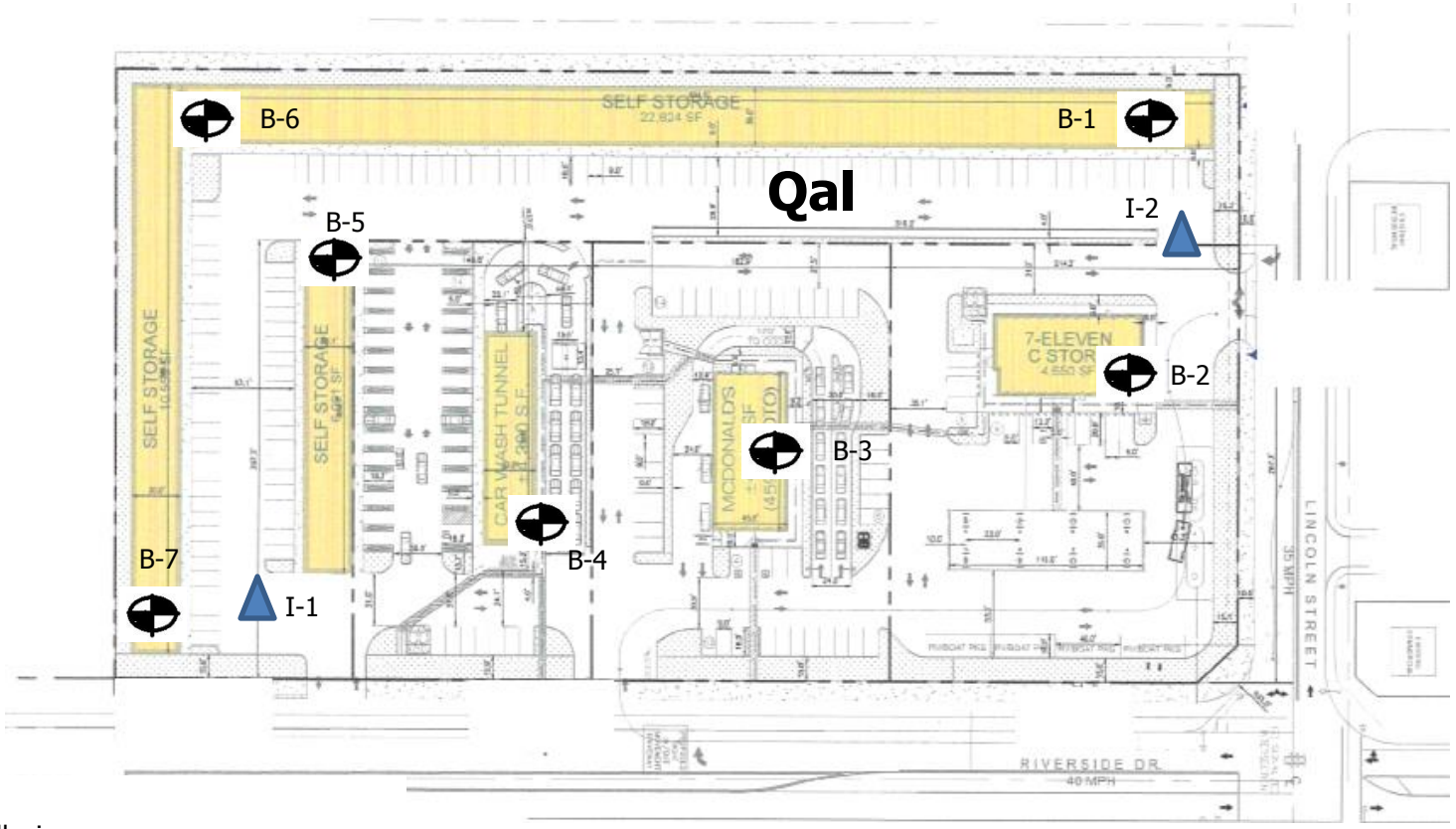

LEGEND:

Qal — Alluvium

Approximate Boring Location

Infiltration Test Location

HGEI Project No. 20-01-3952

Plate A

1590 N. Brian Street, Orange, CA 92867-3406 FAX (714) 637-3096 PHONE (714) 637-3093
Please visit our website at www.harringtongeotechnical.com

LOG OF BORING B-1

Project:
Job No.: 20-01-3952
Location: 15209 Lincoln Street, Lake Elsinore
Coordinates:

Surface Elev.: Grade
Top of Casing Elev.: N.A.
Drilling Method: HSA
Sampling Method: Core Barrel

Elevation, feet	Depth, feet	Sample No.	Sampler Graphics	Symbol / USCS	Recovery %	MATERIAL DESCRIPTION	Blow Counts	Dry Unit Weight, lb/cu ft.	Water Content %
	0					GRASS **ALLUVIUM (Qal):** SILTY SAND (SM), light olive brown, damp to moist, medium dense, fine to coarse grained	23	113	4
	5					SILTY SAND (SM), light olive brown, damp to moist, medium dense, fine to medium grained	36	99	7
							52	105	7
	10						30	107	6
							21	104	14
	15					SANDY SILT (ML), dark olive brown, moist, stiff, fine medium grained	28	105	20
							25	108	18
	20						33	115	15

Completion Depth: 20.0
Date Boring Started: 2/25/20
Date Boring Completed: 2/25/20
Logged By: SM
Drilling Contractor: OWD

Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Harrington Geotechnical Engineering, Inc.

PLATE A-1

LOG OF BORING B-2

Project:		Surface Elev.:	Grade
Job No.:	20-01-3952	Top of Casing Elev.:	N.A.
Location:	15209 Lincoln Street, Lake Elsinore	Drilling Method:	HSA
Coordinates:		Sampling Method:	Core Barrel

Elevation, feet	Depth, feet	Sample No.	Sampler Graphics	Symbol / USCS	Recovery %	MATERIAL DESCRIPTION	Blow Counts	Dry Unit Weight, lb/cu ft.	Water Content %
	0					GRASS ALLUVIUM (Qal): SILTY SAND (SM), light, olive gray, damp to moist, medium dense, fine to coarse grained	16	111	6
	5						21	117	1
						SILTY SAND (SM), light olive brown, moist, medium dense, fine to medium grained	30	102	11
	10						40	114	6
							32	104	11
	15					SILTY SAND (SM), olive brown, moist, medium dense to dense, fine to medium grained	45	105	10
							48	110	7
	20						56	115	7

Completion Depth:	20.0
Date Boring Started:	2/25/20
Date Boring Completed:	2/25/20
Logged By:	SM
Drilling Contractor:	OWD

Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Harrington Geotechnical Engineering, Inc.

PLATE A-2

LOG OF BORING B-3

Project:
Job No.: 20-01-3952
Location: 15209 Lincoln Street, Lake Elsinore
Coordinates:

Surface Elev.: Grade
Top of Casing Elev.: N.A.
Drilling Method: HSA
Sampling Method: Core Barrel

Elevation, feet	Depth, feet	Sample No.	Sampler Graphics	Symbol / USCS	Recovery %	MATERIAL DESCRIPTION	Blow Counts	Dry Unit Weight, lb/cu ft.	Water Content %
	0					GRASS **ALLUVIUM (Qal):** SILTY SAND (SM), light olive brown, damp, medium dense, fine to coarse grained	24	111	3
	5						34	110	2
						SILTY SAND (SM), olive brown, moist, medium dense, fine to medium grained	18	99	8
	10						28	97	9
							36	103	10
	15						36	79	9
							28	103	16
	20						30	109	17

Completion Depth: 20.0
Date Boring Started: 2/25/20
Date Boring Completed: 2/25/20
Logged By: SM
Drilling Contractor: OWD

Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

LOG OF BORING B-4

Project:
Job No.: 20-01-3952
Location: 15209 Lincoln Street, Lake Elsinore
Coordinates:

Surface Elev.: Grade
Top of Casing Elev.: N.A.
Drilling Method: HSA
Sampling Method: Core Barrel

Elevation, feet	Depth, feet	Sample No.	Sampler Graphics	Symbol / USCS	Recovery %	MATERIAL DESCRIPTION	Blow Counts	Dry Unit Weight, lb/cu ft.	Water Content %
	0					GRASS **ALLUVIUM (Qal):** SILTY SAND (SM), olive brown, damp to moist, medium dense, fine to coarse grained	12	98	7
	5						28	111	2
						SILTY SAND (SM), olive brown, moist, medium dense, fine to medium grained	33	95	11
	10						40	99	11
							45	110	9
	15						24 50/6"	105	8
							50	114	8
	20						43	106	14

Completion Depth: 20.0
Date Boring Started: 2/25/20
Date Boring Completed: 2/25/20
Logged By: SM
Drilling Contractor: OWD

Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Harrington Geotechnical Engineering, Inc.

PLATE A-4

LOG OF BORING B-5

Project:
Job No.: 20-01-3952
Location: 15209 Lincoln Street, Lake Elsinore
Coordinates:

Surface Elev.: Grade
Top of Casing Elev.: N.A.
Drilling Method: HSA
Sampling Method: Core Barrel

Elevation, feet	Depth, feet	Sample No.	Sampler Graphics	Symbol / USCS	Recovery %	MATERIAL DESCRIPTION	Blow Counts	Dry Unit Weight, lb/cu ft.	Water Content %
	0					GRASS **ALLUVIUM (Qal):** SILTY SAND (SM), olive brown, moist, medium dense, fine to medium grained	14	100	11
	5						23	108	7
							18	108	12
	10						26	98	16
							34	106	14
	15						46	110	14
							50	110	14
	20						47	107	14

Completion Depth: 20.0
Date Boring Started: 2/25/20
Date Boring Completed: 2/25/20
Logged By: SM
Drilling Contractor: OWD

Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Harrington Geotechnical Engineering, Inc.

PLATE A-5

LOG OF BORING B-6

Project:
Job No.: 20-01-3952
Location: 15209 Lincoln Street, Lake Elsinore
Coordinates:

Surface Elev.: Grade
Top of Casing Elev.: N.A.
Drilling Method: HSA
Sampling Method: Core Barrel

Elevation, feet	Depth, feet	Sample No.	Sampler Graphics	Symbol / USCS	Recovery %	MATERIAL DESCRIPTION	Blow Counts	Dry Unit Weight, lb/cu ft.	Water Content %
	0					GRASS **ALLUVIUM (Qal):** SILTY SAND (SM), olive brown, moist, medium dense, fine to medium grained			
							18	99	11
	5						16	104	7
							18	98	12
	10						29	105	16
							24	103	14
	15						34	108	14
							33	109	14
	20						50	109	14

Completion Depth: 20.0
Date Boring Started: 2/25/20
Date Boring Completed: 2/25/20
Logged By: SM
Drilling Contractor: OWD

Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

Harrington Geotechnical Engineering, Inc.

PLATE A-6

LOG OF BORING B-7

Project:		Surface Elev.:	Grade
Job No.:	20-01-3952	Top of Casing Elev.:	N.A.
Location:	15209 Lincoln Street, Lake Elsinore	Drilling Method:	HSA
Coordinates:		Sampling Method:	Core Barrel

Elevation, feet	Depth, feet	Sample No.	Sampler Graphics	Symbol / USCS	Recovery %	MATERIAL DESCRIPTION	Blow Counts	Dry Unit Weight, lb/cu ft.	Water Content %
	0					GRASS			
						ALLUVIUM (Qal):			
						SILTY SAND (SM), light olive brown, moist, medium dense, fine to medium grained	16	100	11
	5						19	91	10
							16	93	11
	10					SILTY SAND (SM), olive brown, moist, medium dense to dense, fine to medium grained	22	106	13
							25	104	23
	15						29	104	21
							53	107	19
	20						75	112	17

Completion Depth:	20.0
Date Boring Started:	2/25/20
Date Boring Completed:	2/25/20
Logged By:	SM
Drilling Contractor:	OWD

Remarks:

The stratification lines represent approximate boundaries. The transition may be gradual.

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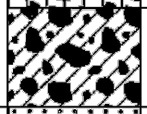
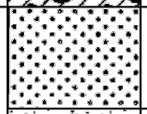
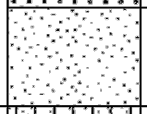
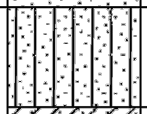
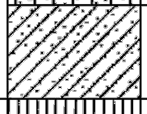
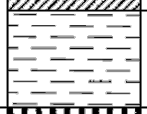
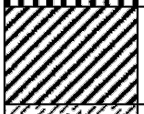
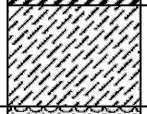
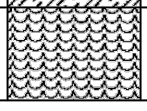
PLATE A-7

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SAND, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

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GEOTECHNICAL • ENGINEERING • INC.
1590 NORTH BRIAN STREET, ORANGE, CA. 92867 T: (714) 637-3093 F: (714) 637-3096

DRAWN BY: BBC | USCS | CHECKED BY: MVD

SOIL CLASSIFICATION CHART

HGEI Project No. 20-01-3952 | PLATE A-8

APPENDIX B

LABORATORY PROCEDURES & TEST RESULTS

The samples collected during the field investigation were examined and classified by the geotechnical engineer/geologist in the laboratory using the visual/tactile method and selected samples were assigned laboratory testing. Tests were performed in general accordance with latest ASTM standards. The following is a description of the laboratory testing and presents the results which are incorporated in the previous sections of the report.

Moisture and Density Determination (ASTM D2216-10 & D7263-09)

Field Moisture contents were determined for all samples. The core samples were trimmed and weighed and the dry densities of the material calculated. Moisture and dry density data are presented on the logs in Appendix A.

Expansion Index Test (ASTM D4829-11)

An Expansion Index Test was conducted on a sample considered representative of the site material to establish data on which to base recommendations for foundation design. The test result is presented in Table 1.

Water-Soluble Sulfate Tests (EPA 300.0)

In order to determine the proper cement type for the site, the amount of water-soluble sulfate present in a selected sample of the surface material was determined. The test result is presented in Table 2.

Compaction Test (ASTM D1557-12$^{\varepsilon 1}$)

Compaction tests were performed on samples of surface soil to develop values for initial use during grading and backfilling work. The results are presented in Table 3.

Direct Shear

Direct Shear tests were performed on undisturbed specimens to determine the static strength of the soils. The tests were performed at increased moisture contents and at various confining pressures using a displacement rate of 0.0012 in./min. to establish peak and ultimate strength parameters under adverse conditions of moisture. Results are presented on Plates B-1 to B-4.

Consolidation

Consolidation tests were performed on undisturbed samples to determine the magnitude and rate of consolidation of the soil when subjected to incrementally applied controlled-stress loading. Graphs of the test results are presented on Plates B-5 to B-7.

TABLE 1 Expansion Index Test Results (ASTM D4829)						
Sample Id.	Moisture Content (%)		Dry Unit Weight (pcf)		Calculated Expansion Index	Expansion Potential
	Initial	Final	Initial	Final		
B-7 @ 1'-4'	11.2	20.9	103.7	102.7	10	Very Low

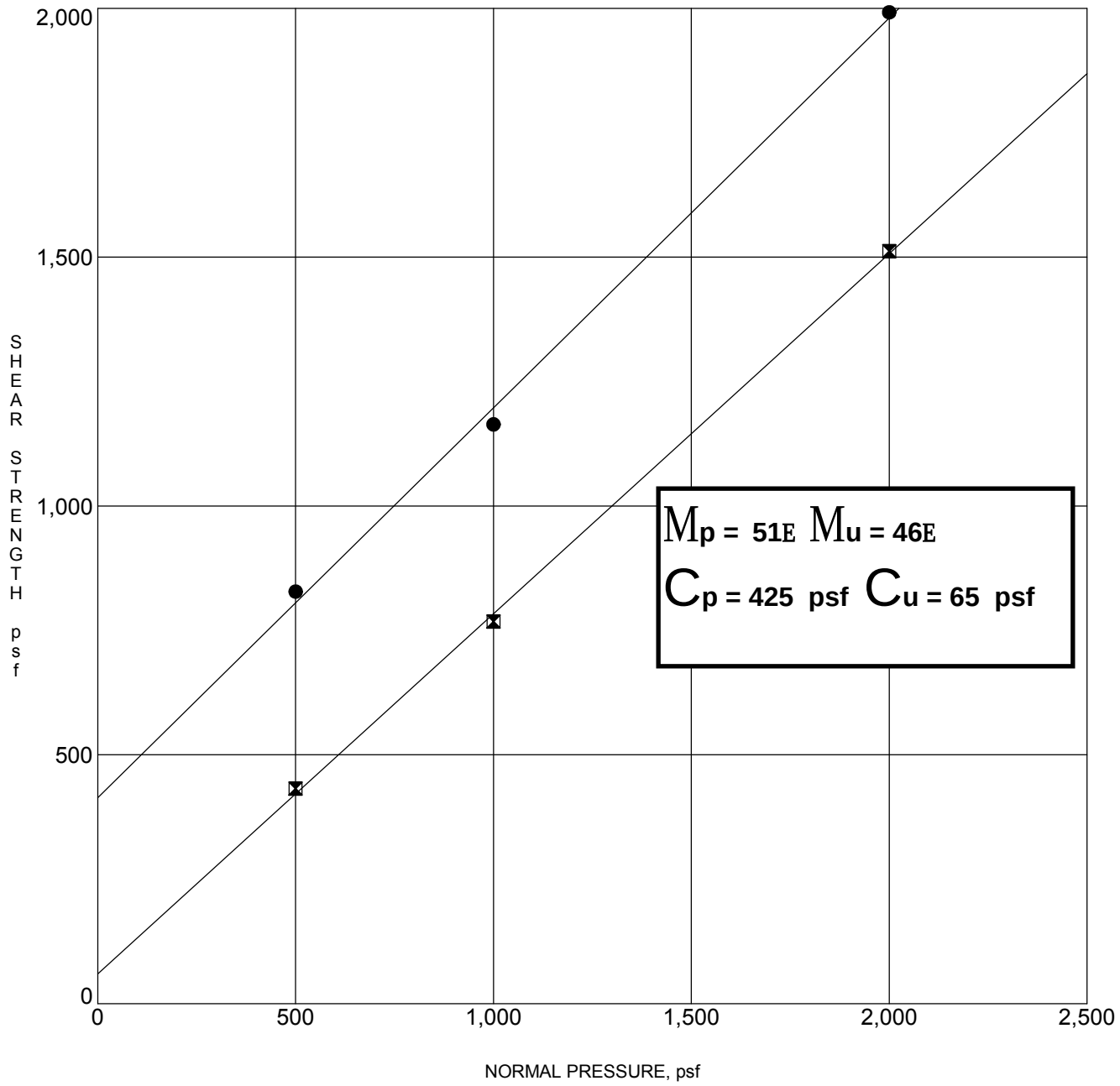
TABLE 2 Water-Soluble Sulfate (EPA 300.0)	
Sample ID	**Water-Soluble Sulfate (%)**
B-2 @ 1'-4'	0.036
B-7 @ 1'-4'	ND

TABLE 3 Compaction Test Results (ASTM D1557-12ε1)		
Sample ID	**Maximum Dry Density, pcf**	**Optimum Moisture Content, %**
B-2 @ 1'-4'	131.0	8.0
B-7 @ 1'-4'	116.5	14.5

SAMPLE STORAGE

Soil samples presently stored in our laboratory will be discarded 30 days after the date of this report unless this office receives a written request to retain the samples for a longer period. Note that prolonged storage will result in sample degradation and may render them unsuitable for testing.

0-0-0



Specimen Identification			Classification	DD	MC%
●	**B-2**	**1.0**	**SILTY SAND (SM) (Peak)**	**126**	**12**
⊠	**B-2**	**1.0**	**(Ultimate)**		

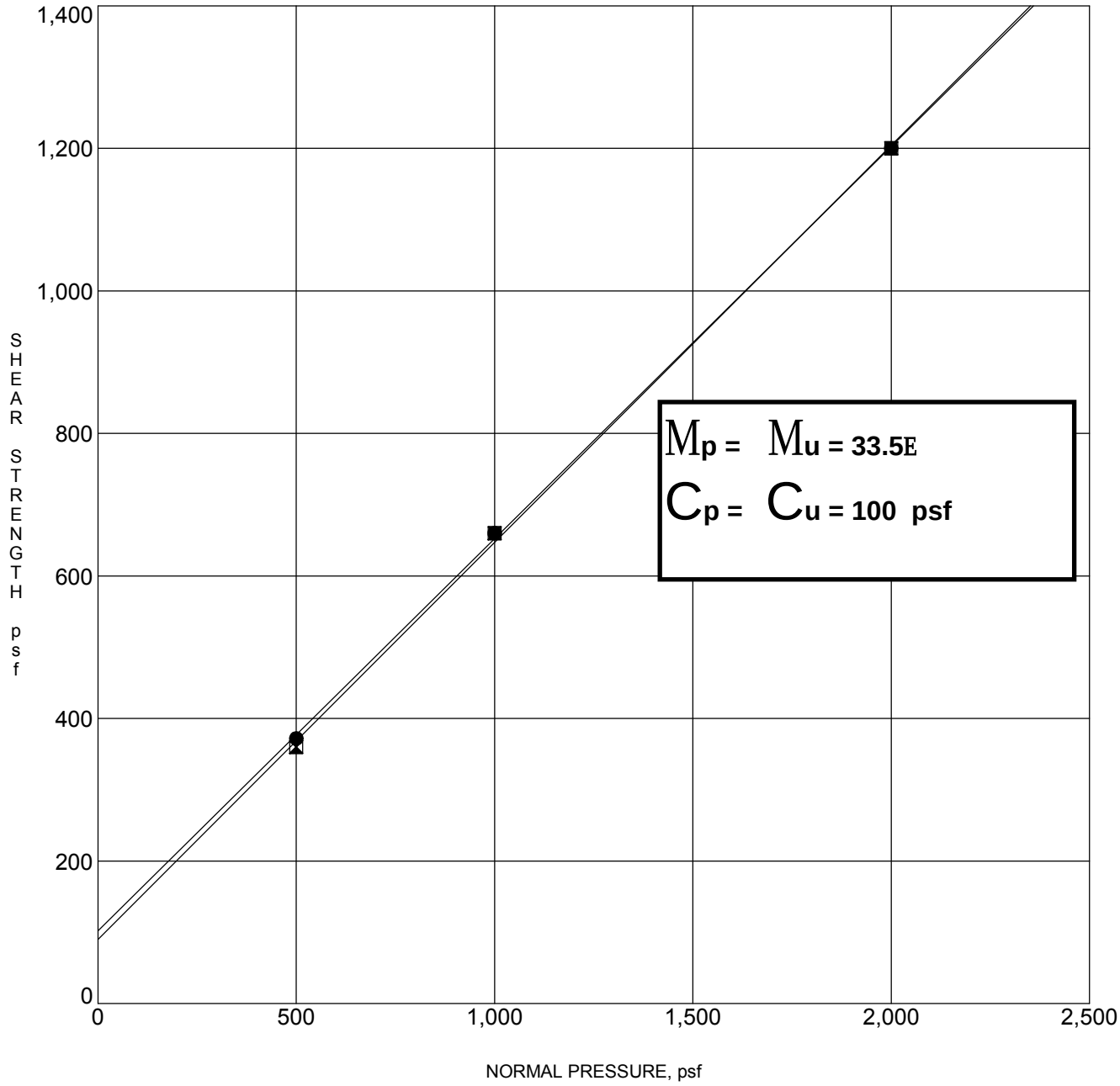
PROJECT **- Lake Elsinore** JOB NO. **20-01-3952**

DATE **3/13/20**

SHEAR TEST DIAGRAM

Harrington Geotechnical Engineering, Inc.

PLATE B-1



Specimen Identification			Classification	DD	MC%
●	**B-2**	**5.0**	**SILTY SAND (SM) (Peak)**	**94**	**27**
⊠	**B-2**	**5.0**	**(Ultimate)**		

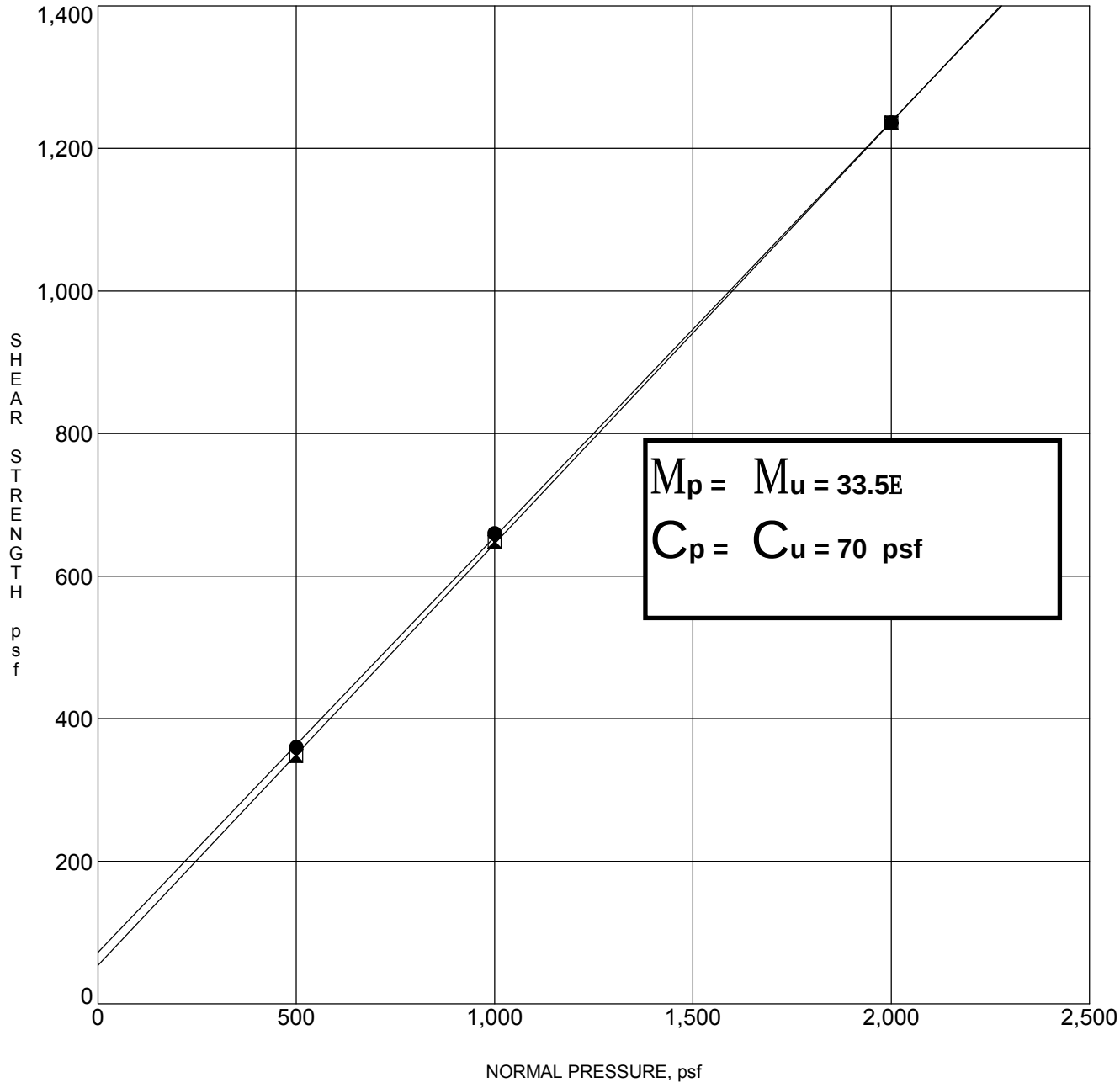
PROJECT **- Lake Elsinore** JOB NO. **20-01-3952**

DATE **3/13/20**

SHEAR TEST DIAGRAM

Harrington Geotechnical Engineering, Inc.

PLATE B-2



Specimen Identification			Classification	DD	MC%
●	**B-3**	**10.0**	**SILTY SAND (SM) (Peak)**	**92**	**26**
⊠	**B-3**	**10.0**	**(Ultimate)**		

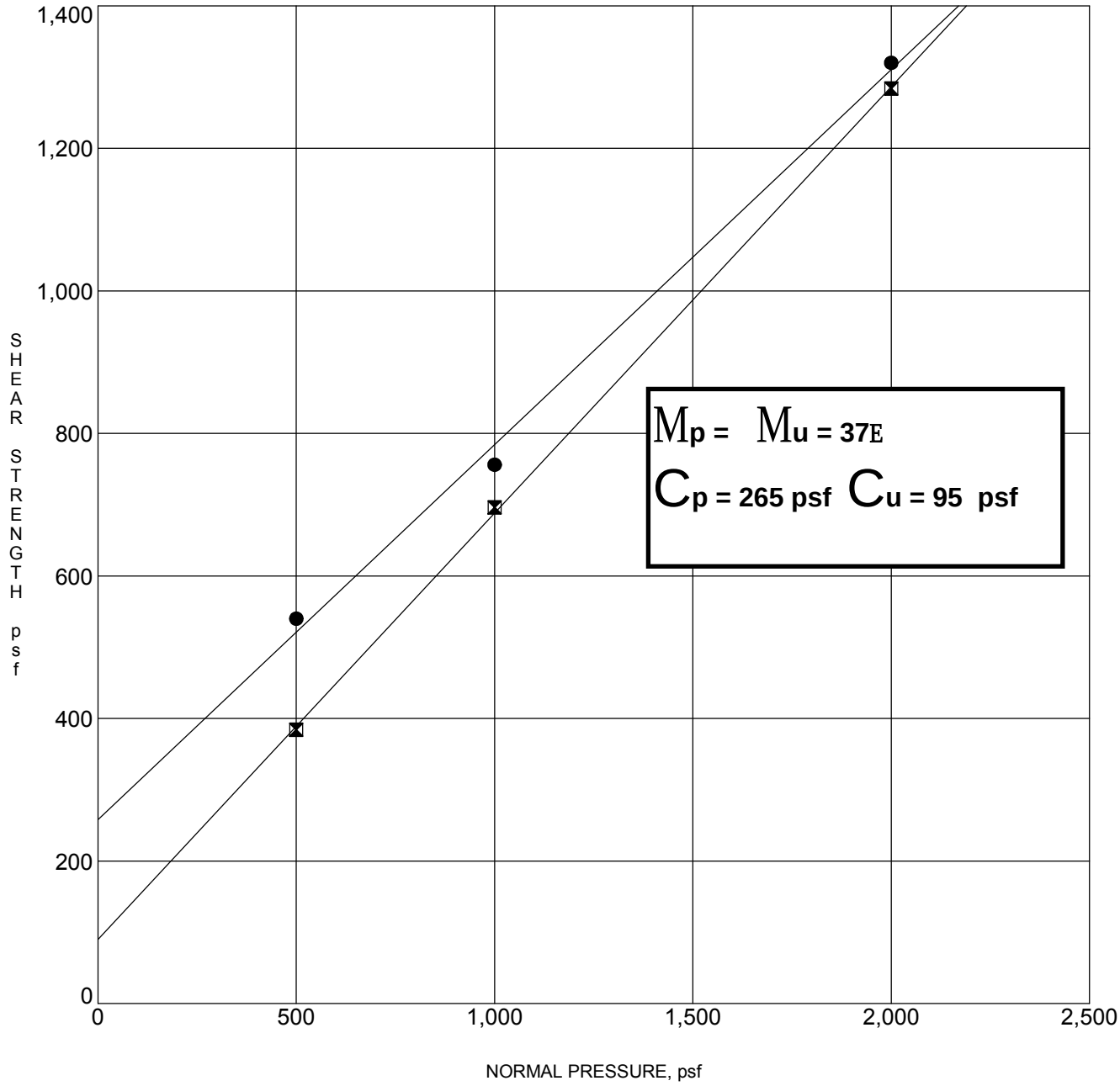
PROJECT **- Lake Elsinore** JOB NO. **20-01-3952**

DATE **3/13/20**

SHEAR TEST DIAGRAM

Harrington Geotechnical Engineering, Inc.

PLATE B-3



Specimen Identification			Classification	DD	MC%
●	B-6	7.5	SILTY SAND (SM) (Peak)	91	31
⊠	B-6	7.5	(Ultimate)		

PROJECT - Lake Elsinore

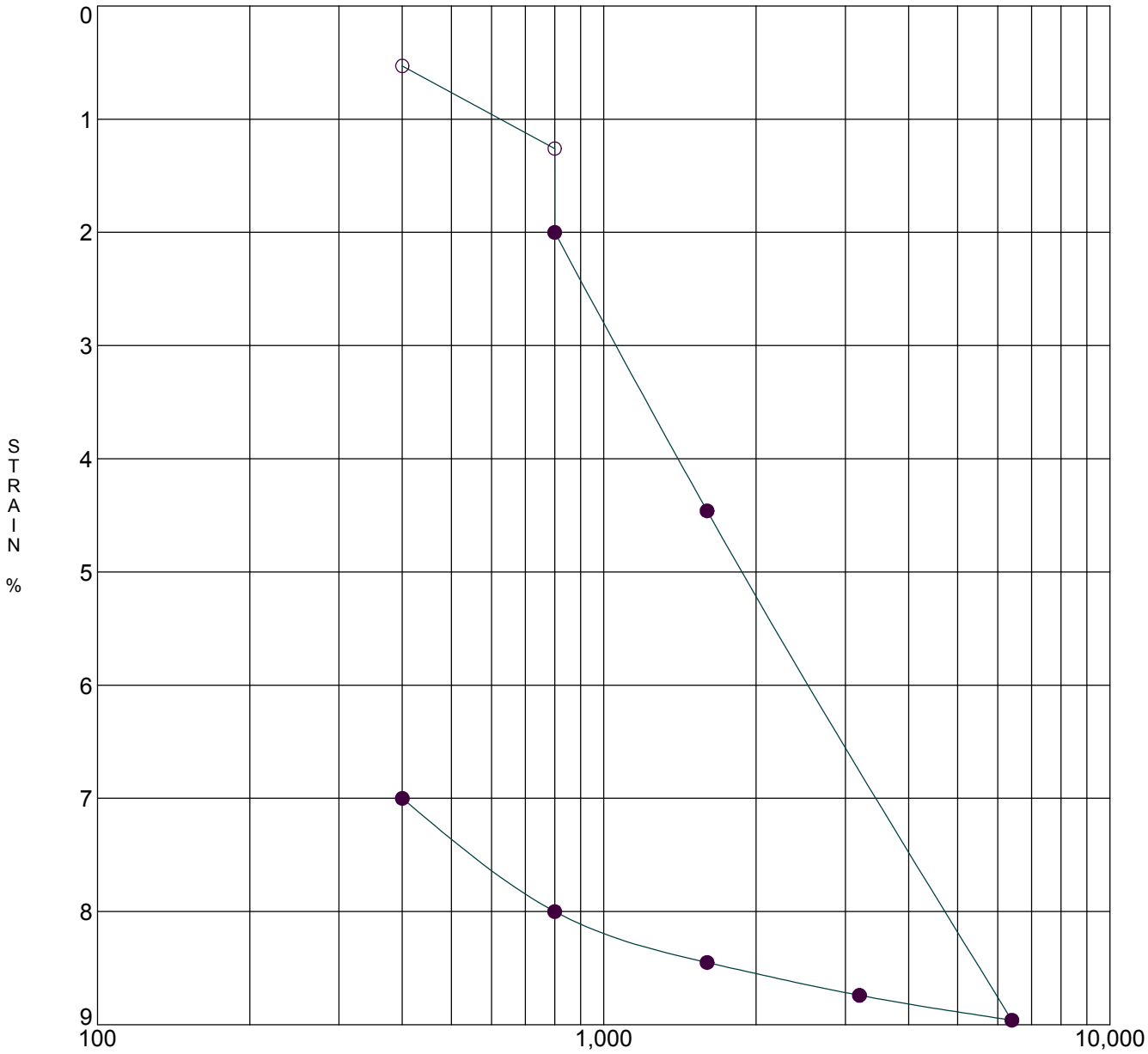
JOB NO. 20-01-3952

DATE 3/13/20

SHEAR TEST DIAGRAM

Harrington Geotechnical Engineering, Inc.

PLATE B-4



Legend

○ Before water

● After water

Specimen Identification			Classification	DD	MC%
●	**B-2**	**7.5**	**SILTY SAND (SM)**	**96**	**23**
⊠					
▲					
★					
○					
✪					

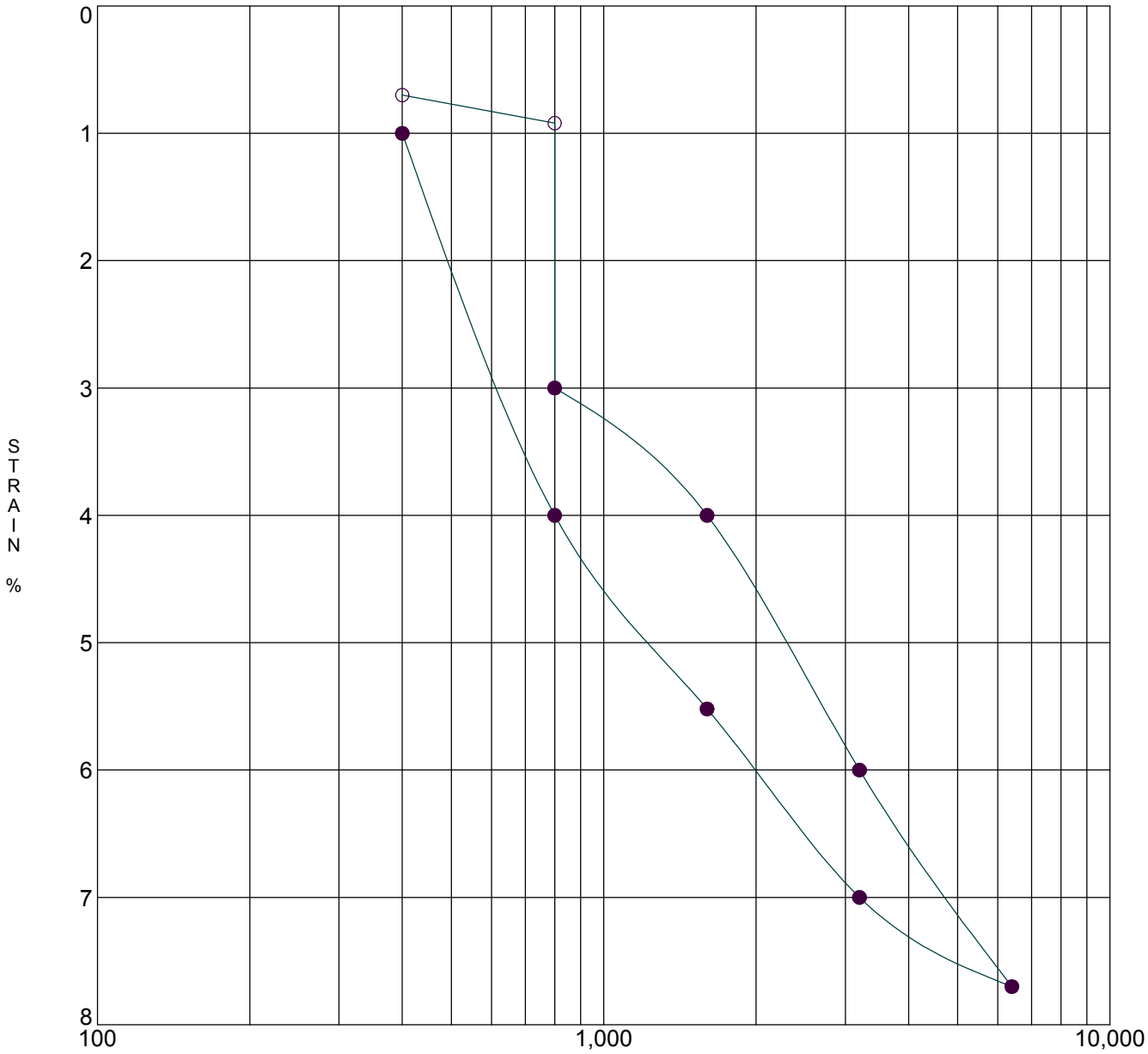
PROJECT **- Lake Elsinore** JOB NO. **20-01-3952**

DATE **3/13/20**

CONSOLIDATION TEST

Harrington Geotechnical Engineering, Inc.

PLATE B-5



Legend

○ Before water

● After water

Specimen Identification			Classification	DD	MC%
●	**B-3**	**5.0**	**SILTY SAND (SM)**	**106**	**16**
⊠					
▲					
★					
○					
✿					

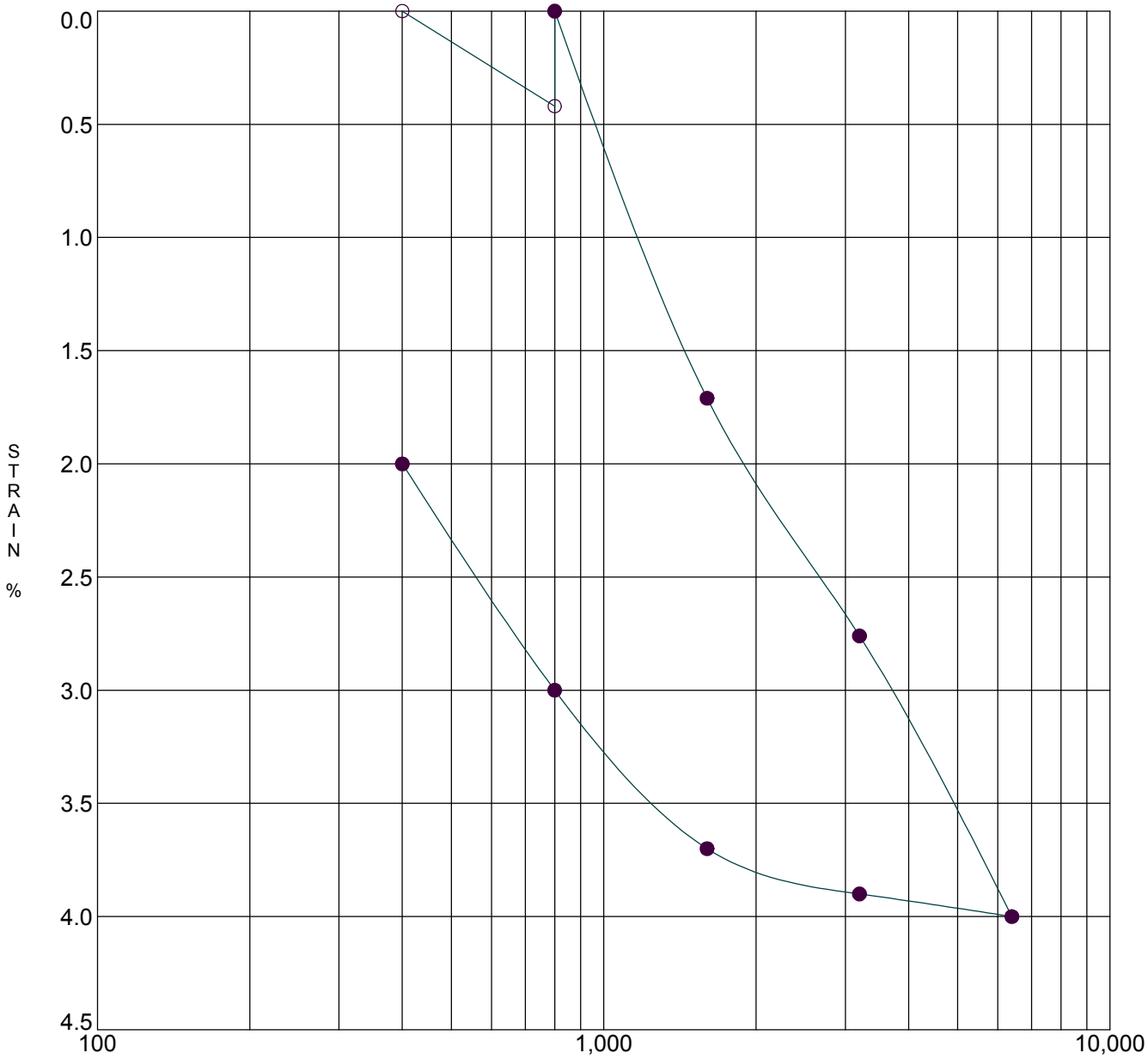
PROJECT **- Lake Elsinore** JOB NO. **20-01-3952**

DATE **3/13/20**

CONSOLIDATION TEST

Harrington Geotechnical Engineering, Inc.

PLATE B-6



Legend

○ Before water

● After water

Specimen Identification			Classification	DD	MC%
●	**B-6**	**5.0**	**SILTY SAND (SM)**	**95**	**24**
⊠					
▲					
★					
○					
✿					

PROJECT **- Lake Elsinore**

JOB NO. **20-01-3952**

DATE **3/13/20**

CONSOLIDATION TEST

Harrington Geotechnical Engineering, Inc.

PLATE B-7

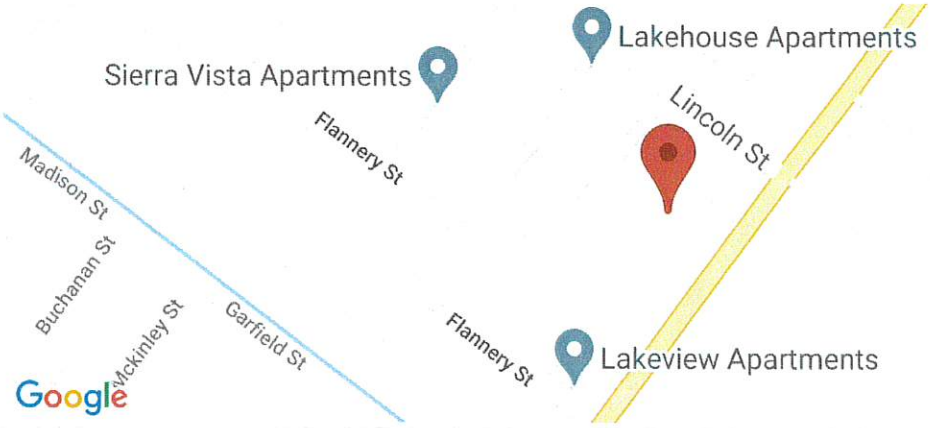
APPENDIX C

SEISMIC DATA AND RESPONSE SPECTRUM

Golcheh

15209 Lincoln St, Lake Elsinore, CA 92530, USA

Latitude, Longitude: 33.6759709, -117.375248



Map data ©2020

Date	3/12/2020, 2:11:55 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	2.244	MCE_R ground motion. (for 0.2 second period)
S_1	0.8	MCE_R ground motion. (for 1.0s period)
S_{MS}	2.244	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.496	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.96	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	1.056	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	2.244	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	2.5	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.463	Factored deterministic acceleration value. (0.2 second)
S1RT	0.8	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.893	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.

Type	Value	Description
S1D	0.98	Factored deterministic acceleration value. (1.0 second)
PGAd	1.037	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.898	Mapped value of the risk coefficient at short periods
C_{R1}	0.895	Mapped value of the risk coefficient at a period of 1 s

APPENDIX D

INFILTRATION TESTING

Scope of Services

In order to establish infiltration rates, the following was conducted:

- Equipment and personnel were provided to conduct two borehole infiltrometer tests at the locations shown on Plate A in accordance with Appendix A of the Riverside County Low Impact Development BMP Design Manual.

- The tests were conducted at depth of approximately 5 feet below ground surface on February 26, 2020. The data is attached on Percolation Data Sheets I-1 & I-2.

- Upon completion of the testing, the data was analyzed, appropriate engineering calculations were performed, and this report was prepared.

Infiltration Rate

Our interpretation of the results indicate a tested infiltration rate of 2.06 in/hr. for I-1 at a depth of 51 inches and a tested infiltration rate of 1.85 in/hr. for I-2 at a depth of 48 inches. The measured infiltration rate needs to exceed 0.3 in/hr. for the area to be considered potentially feasible. Table 1 of Appendix A also has a factor of safety based on Suitability Assessment and Design. We have listed our interpretation of how those values should be applied.

The factor of safety would be 3. The design infiltration rate would be 0.69 in/hr for I-1 and 0.62 in/hr for I-2

Soil Types

The site materials are mainly silty sand (SM).

Groundwater

Groundwater was not encountered in the deepest borings at 21.5 feet for the geotechnical investigation conducted in February 25, 2020. The recorded nearby groundwater depth is 298 feet (Reference 3).

Harrington Geotechnical Engineering, Inc.

Project:	Elsinore	**Project No.**	20-06-3952	**Date:**	2/26/20	
Test Hole No.	I-1	**Tested by:**	BM			
Depth of Test Hole, D_T:	51 inches	**USCS Soil Classification:**	SM			
Test Hole Dimensions (inches)				**Length**	**Width**	
Diameter(if round)=	8	Sides (if rectangular)				

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in)	Final depth to Water (in)	Change in Water Level (in.)	Greater than or Equal to 6" (y/n)
1	11:35	12:00	25	19.0	40.0	21.0	Y
2	12:15	12:40	25	13.0	26.0	13.0	Y

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (in./hr.)
1	1:15	1:25	10	16.5	26.5	10	60
2	1:25	1:35	10	26.5	32.0	5.5	33
3	1:35	1:45	10	32.0	37.0	5.0	30
4	1:45	1:55	10	37.0	39.5	2.5	15.0
5	1:55	2:05	10	39.5	43.5	4.0	24.0
6	2:05	2:15	10	43.5	45.0	1.5	9.0

$H_o = D_T - D_o = 51.0-43.5 = 7.5$

$H_f = D_T - D_F = 51.0-45.0 = 6.0$

$\Delta H = 7.5-6.0 = 1.5$

$H_{AVG} = (H_O + H_F)/2 = (7.5+6.0)/2 = 6.75$

$$I_T = \frac{\Delta H(60r)}{\Delta t(r + 2H_{AVG})} = \frac{1.5(60)4}{10(4.+2(6.75))} = 2.06 \text{ in/hr}$$

Plate I-1

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Project:	Elsinore	**Project No.**	20-06-3952	**Date:**	2/26/20	
Test Hole No.	I-2	**Tested by:**	BM			
Depth of Test Hole, D_T:	48 inches	**USCS Soil Classification:**	SM			
Test Hole Dimensions (inches)				**Length**	**Width**	
Diameter(if round)=	8	Sides (if rectangular)				

Sandy Soil Criteria Test*

Trial No.	Start Time	Stop Time	Time Interval, (min.)	Initial Depth to Water (in)	Final depth to Water (in)	Change in Water Level (in.)	Greater than or Equal to 6" (y/n)
1	11:45	12:10	25	15.5	31.0	15.5	Y
2	12:45	1:10	25	15.0	28.0	15.0	Y

Trial No.	Start Time	Stop Time	Δt Time Interval (min.)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Percolation Rate (in./hr.)
1	1:20	1:30	10	21.5	27.5	6.0	36.0
2	1:30	1:40	10	27.5	31.5	4.0	24.0
3	1:40	1:50	10	31.5	34.0	2.5	15.0
4	1:50	2:00	10	34.0	36.5	2.5	15.0
5	2:00	2:10	10	36.5	39.5	3.0	18.0
6	2:10	2:20	10	39.5	41.0	1.5	9.0

$H_o = D_T - D_o = 48.0-39.5 = 8.5$

$H_f = D_T - D_F = 48.0-41.0= 7.0$

$\Delta H= 8.5-7.0 = 1.5$

$H_{AVG} = (H_O + H_F)/2 = (8.5+7.0)/2 = 7.75$

$$I_T = \frac{\Delta H(60r)}{\Delta t(r + 2H_{AVG})} = \frac{1.5(60)4}{10(4.+2(7.75))} = 1.85 \text{ in/hr}$$

Plate I-2

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APPENDIX E

GRADING SPECIFICATIONS

GRADING SPECIFICATIONS

These specifications present generally accepted standards and minimum grading (earthwork) requirements for the development of the subject project. These specifications shall be the project guidelines for earthwork except where specifically superseded in the geotechnical report(s) for the subject project; including the approved grading plan; and/or approved grading permit.

The Project Geotechnical Engineer and Project Engineering Geologist should be properly notified for an opportunity to review the following recommendations in order to comment on the suitability of the recommendations for the proposed development.

1. General

1.1. The Contractor shall be responsible for the satisfactory completion of all earthwork (including grading of constructed fills and cuts) in accordance with the project plans and specifications.

1.2. The Project Geotechnical Engineer and Project Engineering Geologist or their authorized representatives shall perform observations, testing services and geotechnical consultation throughout the duration of the project.

1.3. It is the Contractor's responsibility to prepare the ground surface to receive the fill to the satisfaction of the Project Geotechnical Engineer and to place, spread, mix and compact the fill materials in accordance with the project specifications and as required by the Project Geotechnical Engineer. The Contractor shall also remove all material considered by the Project Geotechnical Engineer to be unsuitable for use in the construction of compacted fills.

1.4. The Contractor shall have suitable and sufficient equipment in operation to handle the volume of fill material being placed and provide support equipment to properly compact the material in accordance with project specifications. When necessary, equipment will be shut down temporarily in order to permit proper compaction of fills by support equipment.

2. Site Preparation

2.1. Excessive vegetation and all deleterious material shall be removed from the fill areas and disposed of offsite of the grading operation. Existing earth materials determined by the Project Geotechnical Engineer as being unsuitable (incompatible) for placement in compacted fill areas shall be removed and disposed of offsite of the grading

operation. When applicable, the Contractor may obtain the approval of the Project Geotechnical Engineer and the controlling authorities for the project to dispose of the above-described materials, or a portion thereof, in designated areas onsite.

2.2. The exposed surfaces in areas to receive fill shall be scarified to a depth specified by the geotechnical report or a nominal 6 inches as determined by the Project Geotechnical Engineer; moisture conditioned as necessary; and compacted. In areas where it is necessary to obtain the approval of the controlling agency prior to placing fill, it will be the Contractor's responsibility to arrange the required inspections.

2.3. Any underground structures, e.g. cesspools, cisterns, septic tanks, wells, pipelines, etc., encountered during the grading operation are to be removed or relocated and the ground prepared for fill (cut) in a proper manner as recommended by the Project Geotechnical Engineer and/or the controlling agency for the project.

3. Subdrains

3.1. All subdrains should be constructed below the fill areas. Horizontal subdrains should be constructed below sloping fill areas at approximate 30 feet vertical intervals. Typical subdrains (less than 300 linear feet in length) should of constructed of 4-inch-diameter, perforated, Schedule 40 PVC pipe surrounded by one cubic foot per linear foot of gravel and filter fabric. Canyon subdrains should consist of 8-inch-diameter, perforated, Schedule 40 PVC pipe surrounded by nine cubic feet per linear foot of approved gravel wrapped with filter fabric.

4. Compacted Fills/Fill Slopes

4.1. All material imported to the grading operation should be reviewed by the Project Geotechnical Engineer for compatibility prior to placement as fill. Laboratory testing of import materials may be required as recommended by the Project Geotechnical Engineer. Import materials deemed unacceptable for placement of fill should be removed from the fill areas and disposed of offsite of the grading operation.

4.2. All rock or rock fragments less than 8 inches in size should be incorporated into fill in a manner which will prevent nesting and the rock/rock fragments are completely surrounded with compacted fill.

4.3. All rocks greater than 8 inches in size shall be removed from the project site or placed in accordance with the recommendations of the Project Geotechnical Engineer and controlling agency code in areas designated as suitable for rock disposal.

4.4. All fill materials shall be placed in thin loose lifts, moisture conditioned as necessary and compacted in accordance with project specifications. Each layer shall be spread evenly

and shall be thoroughly mixed during the spreading to obtain a nearly uniform moisture condition and a nearly uniform blend of materials.

4.5. All wet materials proposed for placement in fill areas should be moisture conditioned as necessary (either air dried or mechanically mixed). The Project Geotechnical Engineer may recommend removal of materials deemed too wet for placement of fill.

4.6. All fills shall be compacted to minimum project standards in compliance with the testing methods specified in the geotechnical report and in accordance with recommendations of the Project Geotechnical Engineer. Unless otherwise specified, the compaction standard shall be ASTM D1557 (latest approved standard).

4.7. All proposed slopes receiving fill (or ground sloping in excess of a ratio of five horizontal to one vertical), the fill shall be keyed and benched through all unsuitable topsoil, colluvium, alluvium, or creep-prone material into competent bedrock in accordance with the recommendations and approval of the Project Geotechnical Engineer or Project Engineering Geologist.

4.8. All drainage terraces for proposed fill slopes shall be constructed in compliance with the approved Grading Plan and/or the recommendations of the Project Civil Engineer. The preparation of the ground for construction of the drainage terraces should be reviewed for suitability by the Project Geotechnical Engineer.

4.9. All fill slopes (including buttresses and stabilization fills) shall be graded to a ratio not to exceed two horizontal to one vertical. The Contractor shall be required to obtain the specified minimum relative compaction out to the proposed finish slope face of slope. This may be achieved by both overbuilding the slope and cutting back to expose the compacted core, or by direct compaction of the slope face with suitable equipment, or by any other procedure which produces the designated result.

5. Keying and Benching

5.1. All fill-over-cut slopes shall be properly keyed through topsoil, colluvium or creep-prone material into bedrock or other firm material, and the transition shall be stripped of all unsuitable materials prior to placing fill. See the Keying and Benching Detail, Figure 1. The cut portion should be completed and then evaluated by the Project Engineering Geologist prior to placement of fill. The minimum dimensions of the key should be determined by the Project Engineering Geologist. All keys should include a subdrain as specified in Section 3.

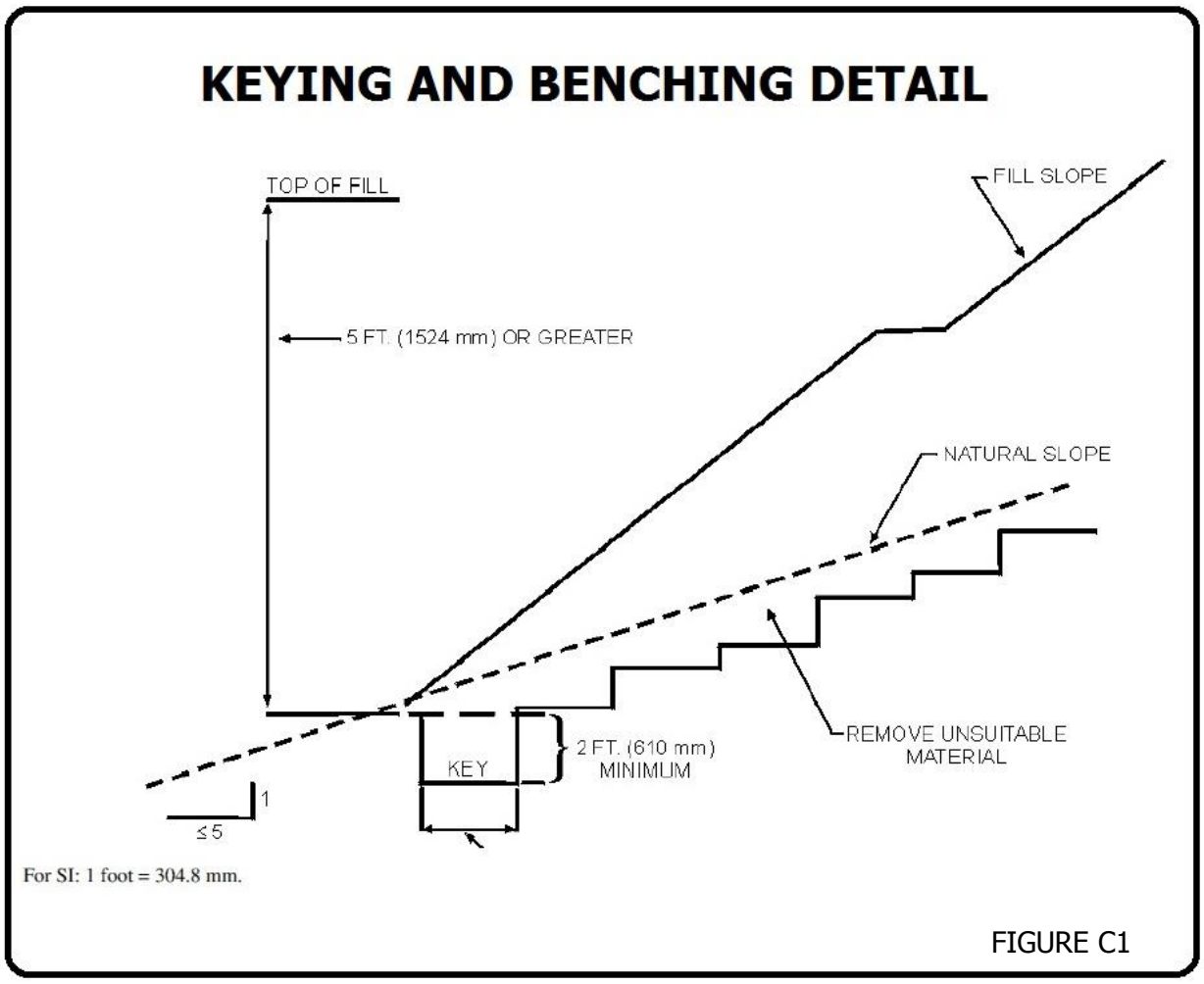

FIGURE C1

6. Cut Slopes

6.1. All cut slopes shall be inspected by the Project Engineering Geologist. The Contractor should notify the Project Engineering Geologist when cut slopes are started. If, during the course of grading, previously unforeseen and/or unanticipated adverse or potentially adverse geologic conditions are encountered, the Engineering Geologist and Geotechnical Engineer shall investigate, analyze and make recommendations for mitigation of these conditions.

6.2. All cut slopes shall be graded to a ratio not to exceed two horizontal to one vertical.

6.3. All drainage terraces for proposed cut slopes and shall be constructed in compliance with the approved Grading Plan and/or the recommendations of the Project Civil Engineer. The preparation of the ground for construction of the drainage terraces should be reviewed for suitability by the Project Geotechnical Engineer.

7. Retaining Wall Backfill

7.1. Retaining wall backfill should include a 12" wide blanket of granular soil (with a sand equivalent of at least 30) above a constructed subdrain and extend to within 3 feet of finished grade. The top 3 feet of backfill should consist of site material compacted to at least 90 percent relative compaction to impede surface water infiltration. Benches at least 2 feet wide should be cut into the excavation slope (backcut) at 2-foot vertical intervals during backfill placement.

7.2. The subdrain should consist of a 3-inch-diameter, perforated, Schedule 40 PVC or ABS SDR-35 pipe surrounded by one cubic foot/foot of 3/4-inch gravel wrapped in Mirafi 140 N geofabric or similar product. An adequate outlet for the subdrain should be provided and the location of the subdrain outlet should be reviewed by the project geotechnical engineer (engineering geologist) for suitability.

8. Utility Trench Backfills

8.1. Backfill for utility trenches should consist of site material that must be adequately compacted to preclude detrimental settlement. It is recommended, therefore, that backfills placed below the building foundation and to a distance of five feet outside thereof, and/or below concrete flatwork, be placed in appropriate lifts, moisture conditioned as necessary and mechanically compacted as to at least 90 percent of maximum dry density. Import materials (including sand) should be reviewed by the Project Geotechnical Engineer for suitability.

9. Grading Observations

9.1. Grading operations shall be observed by the Project Geotechnical Engineer (Geotechnical Technician) and where required, the Project Engineering Geologist.

9.2. All field density tests shall be made by the Geotechnical Technician to establish the relative compaction and moisture content of the fill in accordance with project specifications. Density tests shall generally be performed at (minimum) intervals not to exceed of 2 vertical feet or 1,000 cubic yards of material placed.

9.3. All field density testing of fill placed during the grading operation shall conform to the minimum project specifications. When test results indicate that the density of any layer of fill, or portion thereof, is below the required relative compaction (or outside the acceptable moisture range); the fill shall be reworked until the required density and/or

moisture content has been attained; or the material shall be removed. No additional fill shall be placed over an area until the last placed lift of fill has been tested and found to meet the density and moisture requirements and that lift has been approved by the Project Geotechnical Engineer.