

August 10, 2020

VBSB, LLC
c/o LJC Enterprises
P.O. Box 2739
Mammoth Lakes, CA 93456

Attention: Mr. Larry Canale

Subject: Geotechnical Feasibility Investigation
Proposed Woodcrest Retail Center
NWC Van Buren Boulevard and Washington Street
Woodcrest, Riverside County, California
GPI Project No. 2995.I

Dear Mr. Canale:

In accordance with your request, this letter present the results of our geotechnical feasibility investigation for the subject project. The site location is shown on the Site Location Map, Figure 1.

We understand that our evaluation of the site is desired to determine the feasibility of the project by VBSB, LLC. The primary purpose of our review is to determine whether any significant geotechnical conditions ("fatal flaws") are present at the site that may impact the site for the proposed retail center development. This letter is not intended to be a design-level document and should not be submitted to any regulatory agency for building design purposes.

PROJECT DESCRIPTION

A new retail development is planned for a site covering 8.1 acres. Specifically, the retail center will include a market (Stater Bros.), a shops building, and three satellite buildings. The buildings will be single-story structures. The market will cover a footprint of approximately 46,500 square feet (sf) and the other buildings range from 3,000 to 5,000 sf. The satellite building at the southeast corner of the site will be a gas station. New paved and landscaped areas are also planned. The preliminary site configuration is shown on Figure 2, Site Plan.

The existing site is mostly undeveloped except directly adjacent to the corner of Van Buren Boulevard and Washington Street where there is an existing single-story retail center. A single-family home was formerly located near the northeast portion of the site. The site has, in general, sparse vegetation with isolated areas of mature trees. The site currently slopes downward to the west. We understand grades will be adjusted to allow the site pavements to slope east towards Washington Street.

2995-I-01LR.doc (8/20)

We have assumed masonry block walls and wood-frame-type construction with slab-on-grade floors for the buildings. Based on our experience with similar projects, we have assumed maximum column loads of approximately 100 kips and maximum wall loads on the order of 4 to 5 kips per linear foot for the market. For the smaller buildings, we have assumed maximum wall loads on the order of 2 to 3 kips per lineal foot. Finish grades are expected to be within approximately 2 to 3 feet of existing grades within the building footprints.

SCOPE OF WORK

Our scope of work included review of published information, limited subsurface exploration, engineering evaluations, and preparation of this feasibility-level geotechnical letter report.

Our current field investigation consisted of ten exploratory hollow-stem auger borings. The borings were performed to depths of 6 to 21 feet below the existing grade. A description of field procedures and logs of the borings are presented in Appendix A. The approximate locations of the subsurface explorations are shown on the Site Plan, Figure 2.

Limited laboratory soil tests were performed on selected representative samples as an aid in soil classification and to evaluate the engineering properties of the soils. The geotechnical laboratory testing program included determinations of moisture content and dry density, maximum dry density, and direct shear testing. Laboratory testing procedures and results are summarized in Appendix B.

SOIL CONDITIONS

The natural soils consist of a surficial layer of residual soil deposits underlain by slightly to moderately weathered granite bedrock. The residual soils consist predominately of sands with varying amounts of clays and silts and extend to approximately 1 to 5 feet below the existing grade. The residual soils are decomposed granite formed by the weathering over time of the underlying bedrock. The weathered bedrock is moderately weathered near the ground surface with less weathering with depth. The soils in the weathered bedrock consist predominantly of sand, silty sand, and clayey sand varying from dense to very dense. In general, at depths of 6 to 16 feet, the bedrock becomes less weathered, more intact, and very dense or hard. Pieces of intact bedrock were encountered in samples from some of the borings. The geologic map of Riverside (USGS, 2001) characterizes the bedrock at the site as tonalite. It should be anticipated that areas of hard granite rock may be encountered during excavations and may require special handling.

Detailed descriptions of the materials encountered are shown on the Logs of Borings in Appendix A.

Groundwater was not measured at depths of 21 feet below existing grade in the borings performed at the site. However, we did encounter a perched groundwater condition in several borings near the bottom of the residual soils or near the depth of refusal to drilling at intact bedrock. The historical high groundwater has not been determined in the Woodcrest area by the State of California.

CONCLUSIONS AND PRELIMINARY RECOMMENDATIONS

Based on our observations and findings, subsurface investigation, and experience in the area, we conclude the following:

1. The site is not located in a Special Studies Fault Zone. The closest active faults are the Elsinore and San Jacinto Faults, which are at distances of approximately 11 and 12 miles from the site, respectively (earthquake.usgs.gov).
2. The site is not located in a Seismic Hazard Zone for liquefaction as the State of California or the County of Riverside (Riverside, 2018). Based on the presence of near surface bedrock, liquefaction will not impact the site.
3. A Site Class C may be used for the seismic design of the proposed buildings at the subject site in accordance with the 2019 California Building Code (CBC).
4. There is a potential that the site development will be subjected to strong ground motion during its life. Based on published information (seismicmaps.org), the site could be subjected to a peak horizontal ground acceleration (PGA_M) of 0.6g in accordance with the 2019 CBC and ASCE 7-16. This acceleration has a 2 percent chance of being exceeded in 50 years.
5. The natural soils at approximately 2 to 3 feet below grade are suitable for foundation support of the proposed structures. If undocumented fills are present below the foundation level, they are not suitable for foundation support and should be excavated and replaced as properly compacted fill.
6. Based on our preliminary evaluation, the structures may be supported on spread footings with slab-on-grade floors.
7. We did not encounter significant amounts of clayey soils in our borings at the site. The majority of the near surface soils are sandy which can be anticipated to exhibit very low expansion potential.
8. Significant ripping and slow earthwork operations should be anticipated for excavations greater than about 3 to 6 feet or deeper from the existing ground surface in portions of the site. While not encountered in our borings, buried boulders or outcrops of hard granitic rock near the existing surface may be encountered and may require chipping, blasting, and/or special handling.
9. Rock greater than 12 inches in greatest dimension generated from removal of rock outcrops, buried boulders, or ripping of the weathered bedrock will need to be broken to achieve smaller sizes, removed from the site, or incorporated into landscape areas.

10. Trench and tank excavations greater than 6 to 8 feet below existing grade may be difficult and will likely require large excavators with rock breakers in portions of the excavations.
11. In the building pads, overexcavation to the maximum depth of the planned pad utilities with large excavating equipment may be a preferred construction method to the local use of lighter backhoes. Utility subcontractors may have difficulties to excavate the narrow plumbing lines in the moderately weathered bedrock underlying the building pad.
12. Static groundwater is anticipated to be significantly deeper than any excavations at the site. However, localized perched groundwater may be encountered in trench and tank excavations underlying the residual soils or weathered bedrock. The Contractor should be prepared to control perched groundwater in deeper excavations.
13. The presence of the perched groundwater indicates very poor conditions with respect to subsurface water infiltration.
14. Storm water infiltration is not to be feasible at the site. Guidelines for storm water infiltration by the County of Riverside (Riverside, 2011) requires that infiltration should be at least 5 feet higher than the bedrock (impermeable layer).
15. In general, we did not find evidence of extraordinary geotechnical constraints that have or will significantly impact the development of the project site other than those described above. Further investigation as described below will be necessary for a design-level geotechnical investigation.

FURTHER INVESTIGATION

A design-level geotechnical investigation will be required to provide specific design and construction recommendations for the proposed development. The design-level investigation will need to be reviewed and approved by the appropriate regulatory agency.

As part of a design-level geotechnical investigation for the proposed retail center, we recommend at least 6 backhoe test pits be performed with the footprint of the buildings and parking areas. The backhoe test pits will help determine the excavation characteristic of weathered bedrock with standard construction equipment, the depth of the residual soils at the site, and the potential impact of perched groundwater. If a backhoe cannot sufficiently reach depths of greater than 5 to 10 feet, it may be beneficial to bring excavators to the site to better assess the site excavation characteristics prior to obtaining bids for grading.

While limited laboratory testing has been performed on the site soils as part of this feasibility investigation, we recommend that further sampling of soils be performed during the test pit program. Further testing may include moisture content, grain size, expansion potential, and corrosivity testing.

A seismic refraction survey may be considered to better assess the rippability of the weathered bedrock. If deeper utility corridors are planned for the site it may be beneficial to traverse the utility alignment. The measured seismic velocities can be used to assess resistant rock may preclude conventional methods of excavations. We recommend that the determination of the need and scope of a seismic refraction survey be determined after our test pit program.

LIMITATIONS

The geotechnical investigation reported herein was performed for the exclusive use by VBSB, LLC, and their consultants, in evaluating the feasibility of constructing the proposed improvements. This report should not be used for evaluating the feasibility of developing the site for other uses or for the detailed design of the proposed project, because this report does not contain sufficient or appropriate information for such use.

Soil deposits may vary in type, strength, and many other important properties between points of exploration due to non-uniformity of the geologic formations or to man-made cut and fill operations. While we cannot evaluate the consistency of the properties of materials in areas not explored, the conclusions drawn in this report are based on the assumption that the data obtained in the field and laboratory are reasonably representative of field conditions and are conducive to interpolation and extrapolation.

As noted previously, additional geotechnical investigations will be needed for design and construction. Furthermore, our recommendations were developed with the assumption that a proper level of field observation and construction review will be provided by a qualified geotechnical consulting firm during grading, excavation, and foundation construction. If design- and construction-phase geotechnical services are performed by others they must accept full responsibility for all geotechnical aspects of the project.

Our investigation and evaluations were performed using generally accepted engineering approaches and principles available at this time and the degree of care and skill ordinarily exercised under similar circumstances by reputable Geotechnical Engineers practicing in this area. No other representation, either expressed or implied, is included or intended in our report.

Respectfully submitted,
Geotechnical Professionals Inc.



Donald A. Cords, G.E.
Principal



James E. Harris, G.E.
Principal

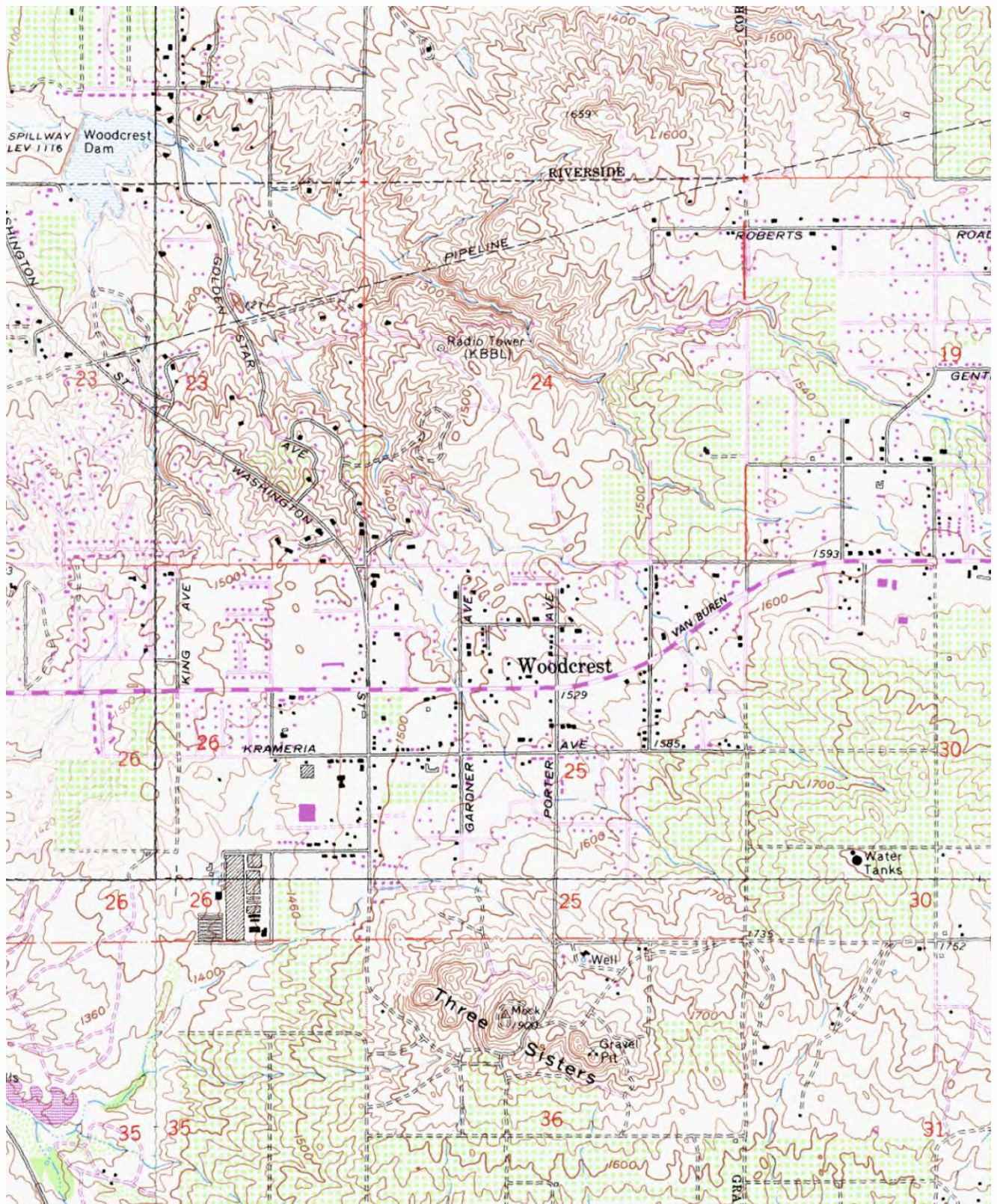


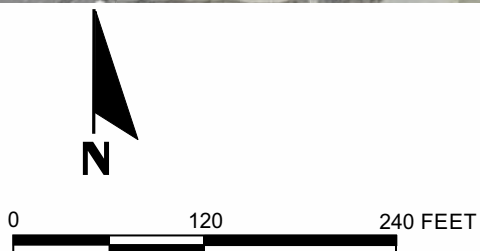
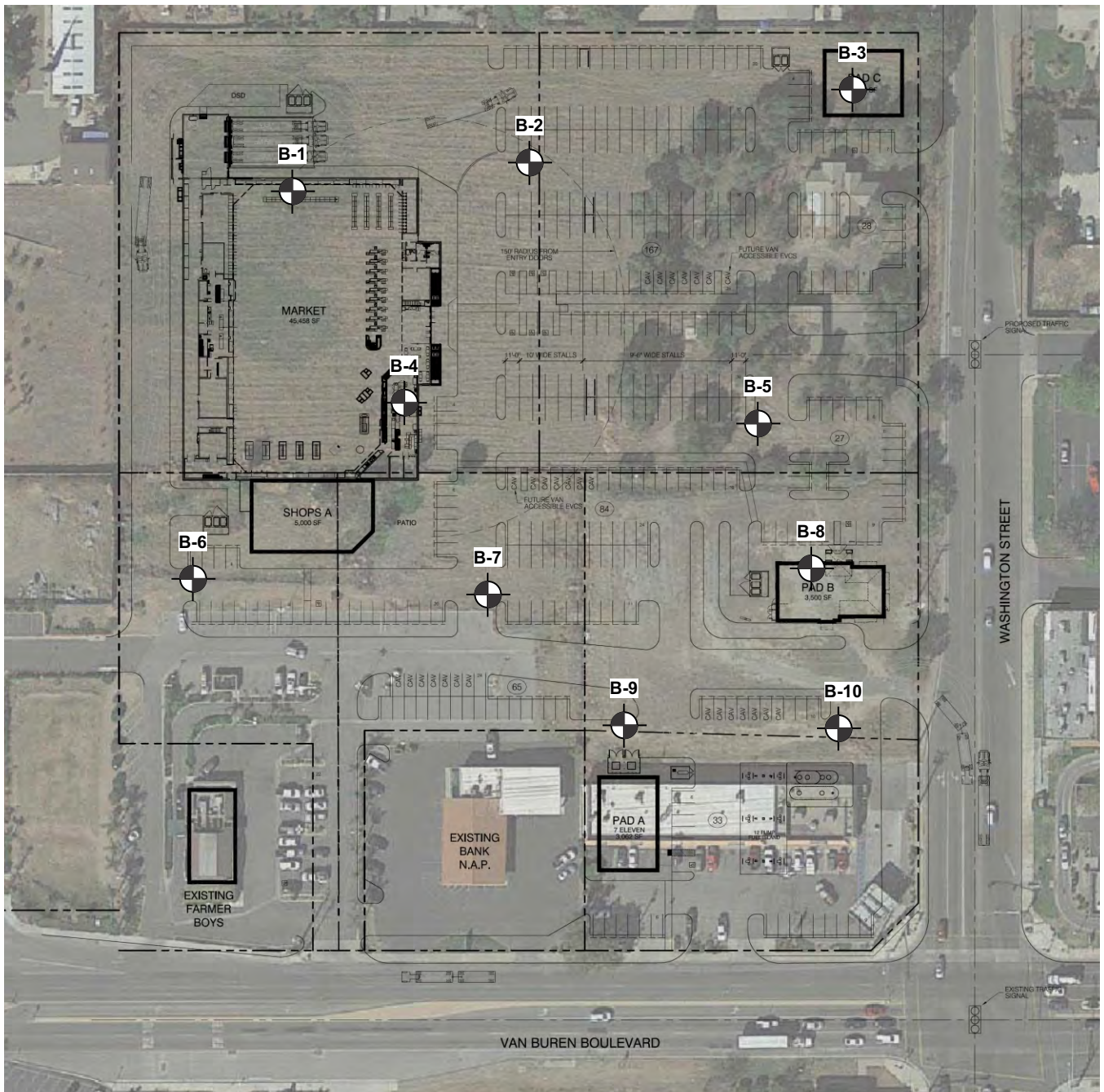
Enclosures: References
Site Location Map - Figure 1
Site Plan - Figure 2
Appendix A - Exploratory Borings
Appendix B - Laboratory Testing

Distribution: Addressee (via email)

REFERENCES

- Riverside, County of, "Liquefaction Map Overlays", developed by Earth Consultants International, <https://koordinates.com/layer/96846-riverside-county-ca-liquefaction>, September 12, 2018.
- Riverside, County of, Department of Public Works (2011), "Appendix VII – Infiltration Rate Evaluation Protocol and Factor of Safety Recommendations," dated May 19, 2011.
- Structural Engineers Association of California/Office of Statewide Health Planning and Development, U.S Seismic Design Maps, <https://seismicmaps.org/>.
- United States Geologic Survey, "Geologic Map of the Riverside East 7.5' Quadrangle, Riverside County, California," Open File Report 01-452, Version 1.0, Martin, D. and Cox, B., 2001.
- United States Geological Survey, 2008 National Seismic Hazard Maps, Source Parameters, http://geohazards.usgs.gov/cfusion/hazfaults_search/hf_search_main.cfm.





EXPLANATION

B-10 APPROXIMATE LOCATION AND NUMBER OF EXPLORATORY BORING

BASE PLAN REPRODUCED FROM CONCEPTUAL SITE PLAN SCHEME Cv6 BY GK PIERCE ARCHITECTURE DATED JAN 24, 2020



WOODCREST RETAIL

GPI PROJECT NO.: 2995.1

SCALE: 1" = 120'

SITE PLAN

FIGURE 2

APPENDIX A

APPENDIX A

EXPLORATORY BORINGS

The subsurface conditions at the site were investigated by drilling and sampling ten exploratory borings. The borings were advanced to depths of 6 to 21 feet below the existing ground surface. The exploration locations are shown on the Site Plan, Figure 2.

The borings were drilled using truck-mounted hollow-stem auger equipment. Relatively undisturbed samples were obtained using a brass-ring lined sampler (ASTM D 3550). The brass-rings have an inside diameter of 2.42 inches. The ring samples were driven into the soil by a 140-pound hammer dropping 30 inches. The number of blows needed to drive the sampler into the soil was recorded as the penetration resistance.

At selected locations, disturbed samples were obtained using a split-spoon sampler by means of the Standard Penetration Test (SPT, ASTM D 6066). The spoon sampler was driven into the soil by a 140-pound hammer dropping 30 inches, employing two turns of rope around the cathead. After an initial seating drive of 6 inches, the number of blows needed to drive the sampler into the soil a depth of 12 inches was recorded as the penetration resistance. These values are the raw uncorrected blowcounts.

The field exploration for the investigation was performed under the continuous technical supervision of GPI's representative, who visually inspected the site, maintained detailed logs of the borings, classified the soils encountered, and obtained relatively undisturbed samples for examination and laboratory testing. The soils encountered in the boring were classified in the field and through further examination in the laboratory in accordance with the Unified Soils Classification System. Detailed logs of the borings are presented in Figures A-1 to A-10 in this appendix.

The boring locations were laid out in the field by measuring from existing features at the site. The borings were backfilled with the excavated soil cuttings. The ground surface elevations at the boring locations were estimated from Google Earth and should be considered approximate.

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS		ELEVATION (FEET)
						This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.		
				B	0		<u>Residual Soils:</u> SILTY SAND (SM) brown, moist, very dense, decomposed granite	1490
	10.5 17.4	102 96	50/5"	D	5		SANDY CLAY (CL) red brown, moist, hard, decomposed granite	1485
	5.5		76	S			<u>Weathered Granitic Bedrock:</u> SAND WITH SILT (SP-SM) light brown, slightly moist, very dense, highly weathered	
	3.6		50/5"	S	10		SAND (SP) light brown, slightly moist to dry, very dense, highly weathered @ 12 feet, brown- grey, moderately weathered	1480
	2.2		50/3"	S			@ 15 feet, perched groundwater	
	2.2		50/4"	S	15		Refusal @ 15.5 feet	

SAMPLE TYPES

- [C] Rock Core
- [S] Standard Split Spoon
- [D] Drive Sample
- [B] Bulk Sample
- [T] Tube Sample

DATE DRILLED:
7-17-20

EQUIPMENT USED:
8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

PROJECT NO.: 2995.I

WOODCREST RETAIL

LOG OF BORING NO. B-1

FIGURE A-1

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS		ELEVATION (FEET)
						This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.		
					0		Residual Soils: SILTY SAND (SM) brown, moist, decomposed granite	
	13.0 3.6	112 122	90/8"	D			Weathered Granitic Bedrock: CLAYEY SAND (SC)/SILTY SAND (SM) orange brown, moist to slightly moist, very dense, moderately weathered	1490
	3.7	121	50/4"	D	5		SAND WITH SILT (SP-SM) brown, slightly moist to dry, very dense, hard rock pieces, moderately weathered	
	2.3	109	50'/4"	D				
	2.6	116	51	D	10			1485
							@ 14 feet, perched groundwater	
	10.8	119	50/4"	D	15		@ 15 feet, grey, very moist, slightly weathered, difficult drilling and chattering	1480
							Total Depth 16 feet	

SAMPLE TYPES

- ☒ Rock Core
- ☐ Standard Split Spoon
- ☐ Drive Sample
- ☐ Bulk Sample
- ☐ Tube Sample

DATE DRILLED:
7-17-20

EQUIPMENT USED:
8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encountered

PROJECT NO.: 2995.I

WOODCREST RETAIL

LOG OF BORING NO. B-2

FIGURE A-2

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS		ELEVATION (FEET)
						This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.		
	16.1	107	64	D	0		<u>Residual Soils:</u> SILTY SAND (SM) brown, moist, decomposed granite	1500
	13.7	110			<u>Weathered Granitic Bedrock:</u> SILTY SAND (SM) brown, wet to very moist, very dense, moderately weathered			
	6.5	110	98/9"	D	5	SAND (SP) light brown, moist, very dense, moderately weathered @ 7 feet, dry <		

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
						This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
	4.3	136	80/10"	D	0	<u>Residual Soils:</u> SILTY SAND (SM) orange brown, slightly moist. decomposed granite	
			50/4"	D	5	<u>Weathered Granitic Bedrock:</u> SAND WITH SILT (SP-SM) orange brown, slightly moist to moist, very dense	1485
			50/4"	D			
			50/4"	D	10		1480
			50/3"	D	15	@ 15 feet, grey, wet, perched groundwater Refusal @ 16 feet	1475

SAMPLE TYPES
☐ Rock Core
☒ Standard Split Spoon
☐ Drive Sample
☐ Bulk Sample
☐ Tube Sample

DATE DRILLED:
 7-17-20

EQUIPMENT USED:
 8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft):
 Not Encountered

LOG OF BORING NO. B-4

PROJECT NO.: 2995.I

WOODCREST RETAIL

FIGURE A-4

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS		ELEVATION (FEET)
						This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.		
				B	0		<u>Residual Soil:</u> SAND WITH SILT (SP-SM) brown, moist, decomposed granite	1495
7.7 1.5	106 113	80/10"	D				<u>Weathered Granitic Bedrock:</u> SILTY SAND (SM) orange brown, moist to dry, very dense, moderately weathered	
2.5	122	90/9"	D		5		SAND WITH SILT (SP-SM) grey, dry, very dense	1490
2.8	103	50/4"	D				@ 7 feet, difficult drilling and chattering, pieces of rock, slightly weathered	
						Total Depth 8 feet		

SAMPLE TYPES

- ☒ Rock Core
- ☐ Standard Split Spoon
- ☐ Drive Sample
- ☐ Bulk Sample
- ☐ Tube Sample

DATE DRILLED:
7-17-20

EQUIPMENT USED:
8 " Hollow Stem Auger

GROUNDWATER LEVEL (ft):
Not Encoutered

PROJECT NO.: 2995.I

WOODCREST RETAIL

LOG OF BORING NO. B-5

FIGURE A-5

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
						This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
	2.9	124	50/4"	D	0	<u>Residual Soils:</u> SILTY SAND (SM) brown, moist, decomposed granite	1480
			50/4"	D	5	<u>Weathered Granitic Bedrock:</u> SAND WITH SILT (SP-SM) gray brown, dry, very dense, moderately weathered	
						Refusal @ 6 feet	

SAMPLE TYPES ☐ Rock Core ☐ Standard Split Spoon ☐ Drive Sample ☐ Bulk Sample ☐ Tube Sample	DATE DRILLED: 7-17-20 EQUIPMENT USED: 8 " Hollow Stem Auger GROUNDWATER LEVEL (ft): Not Encountered	 LOG OF BORING NO. B-6	PROJECT NO.: 2995.I WOODCREST RETAIL
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FIGURE A-6

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS	ELEVATION (FEET)
						This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	
	3.3	129	87/9"	D	0	<u>Residual Soils:</u> SILTY SAND (SM) brown, moist, decomposed granite	1485
						<u>Weathered Granitic Bedrock:</u> SAND WITH SILT (SP-SM) orange brown, dry, very dense, moderately weathered	
	4.6	120	92/10"	D	5	@ 5 feet, slightly moist	
	8.1	120	82/11"	D		@ 7 feet, moist, slightly weathered, hard drilling and chattering	
						Total Depth 8 feet	

SAMPLE TYPES ☐ C Rock Core ☐ S Standard Split Spoon ☐ D Drive Sample ☐ B Bulk Sample ☐ T Tube Sample	DATE DRILLED: 7-17-20 EQUIPMENT USED: 8 " Hollow Stem Auger GROUNDWATER LEVEL (ft): Not Encountered	 LOG OF BORING NO. B-7	PROJECT NO.: 2995.I WOODCREST RETAIL
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FIGURE A-7

					DESCRIPTION OF SUBSURFACE MATERIALS		ELEVATION (FEET)
					This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.		
	16.2	105	29	D	0 5 Residual Soils: SILTY SAND (SM) brown, moist, decomposed granite Weathered Granitic Bedrock: SAND WITH SILT (SP-SM) light brown, slightly moist, medium dense, highly weathered @ 5 feet, very dense, moderately weathered @ 7 feet, with clay, wet, slightly weathered, hard drilling and chattering Total Depth 8 feet	1490	
	4.4	174	50/4"	D			
	32.9	86	73	D			
SAMPLE TYPES					DATE DRILLED: 7-17-20		PROJECT NO.: 2995.I WOODCREST RETAIL
☒ Rock Core					EQUIPMENT USED:		
☐ Standard Split Spoon					8 " Hollow Stem Auger		
☐ Drive Sample					GROUNDWATER LEVEL (ft):		
☐ Bulk Sample					Not Encoutered		LOG OF BORING NO. B-8
☐ Tube Sample							FIGURE A-8

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS		ELEVATION (FEET)
						This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.		
	7.9	123	30	D	0		<u>Residual Soils:</u> SILTY SAND (SM) brown, moist, decomposed granite	1490
	9.0	123	30	D	<u>Weathered Granitic Bedrock:</u> SILTY SAND (SM) brown, moist to very moist, medium dense, highly weathered			
	17.4	110	20	D	@ 7 feet, wet		1485	
	14.6	119	58/11"	D	SAND WITH SILT (SP-SM) brown, wet, very dense, slightly weathered, difficult drilling and chattering			
								Total Depth 11 feet

	MOISTURE (%)	DRY DENSITY (PCF)	PENETRATION RESISTANCE (BLOWS/FOOT)	SAMPLE TYPE	DEPTH (FEET)	DESCRIPTION OF SUBSURFACE MATERIALS		ELEVATION (FEET)
						This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.		
	16.6	110	31	D	0		<u>Residual Soils:</u> SILTY SAND (SM) brown, moist, decomposed granite	1490
					<u>Weathered Granitic Bedrock:</u> SANDY CLAY (CL) brown, moist, stiff, highly weathered			
	5.3 2.6	59 60	50/4"	D	5		SILTY SAND (SM) brown, slightly moist to dry, very dense, moderately weathered	
			50/3"	D		SAND WITH SILT (SP-SM) gray, moist, very dense, slightly weathered, difficult drilling and chattering		
						Total Depth @ 8 feet		
SAMPLE TYPES						DATE DRILLED:		PROJECT NO.: 2995.I WOODCREST RETAIL
☐ Rock Core ☐ Standard Split Spoon ☐ Drive Sample ☐ Bulk Sample ☐ Tube Sample						EQUIPMENT USED: 8 " Hollow Stem Auger		
						GROUNDWATER LEVEL (ft): Not Encountered		LOG OF BORING NO. B-10
								FIGURE A-10

APPENDIX B

APPENDIX B

LABORATORY TESTS

INTRODUCTION

Representative undisturbed soil samples and bulk samples were carefully packaged in the field and sealed to prevent moisture loss. The samples were then transported to our Cypress office for examination and testing assignments. Laboratory tests were performed on selected representative samples as an aid in classifying the soils and to evaluate the physical properties of the soils affecting foundation design and construction procedures. Detailed descriptions of the laboratory tests are presented below under the appropriate test headings. Test results are presented in the figures that follow.

MOISTURE CONTENT AND DRY DENSITY

Moisture content and dry density were determined from a number of the ring samples from the borings. The samples were first trimmed to obtain volume and wet weight and then were dried in accordance with ASTM D 2216. After drying, the weight of each sample was measured, and moisture content and dry density were calculated. Moisture content and dry density values are presented on the boring logs in Appendix A.

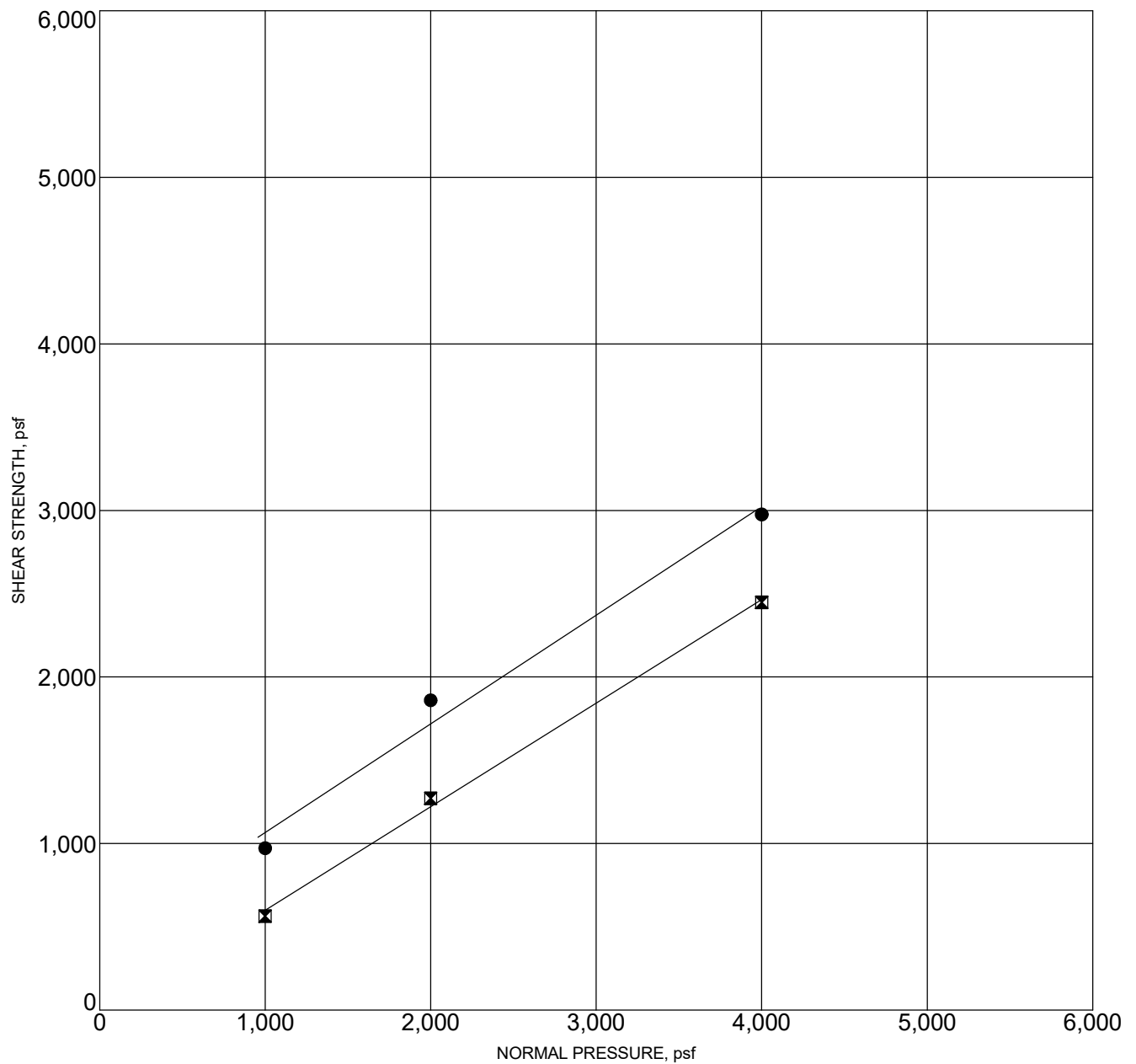
DIRECT SHEAR

Direct shear tests were performed on undisturbed and remolded bulk samples in accordance with ASTM D 3080. The bulk sample was remolded to approximately 95 percent of the maximum dry density. The test specimens were placed in the shear machine, and a normal load comparable to the in-situ overburden stress was applied. The samples were inundated, allowed to consolidate, and then were sheared to failure. The tests were repeated on additional test specimens under increased normal loads. Shear stress and sample deformation were monitored throughout the tests. The results of the direct shear tests are presented in Figures B-1 to B-3.

COMPACTION TEST

A maximum dry density/optimum moisture tests was performed in accordance with ASTM D 1557 on a representative bulk sample of the site soils. The test result are as follows:

BORING NO.	DEPTH (ft)	SOIL DESCRIPTION	OPIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)
B-1	0-5	Silty Sand (SM)	8.5	137



● **PEAK STRENGTH**

Friction Angle= 33 degrees

Cohesion= 414 psf

⊠ **ULTIMATE STRENGTH**

Friction Angle= 32 degrees

Cohesion= 0 psf

Note: Samples remolded to 95% of maximum dry density

Sample Location		Classification	DD,pcf	MC,%
B-1	0-5	SILTY SAND (SM)	130	8.5

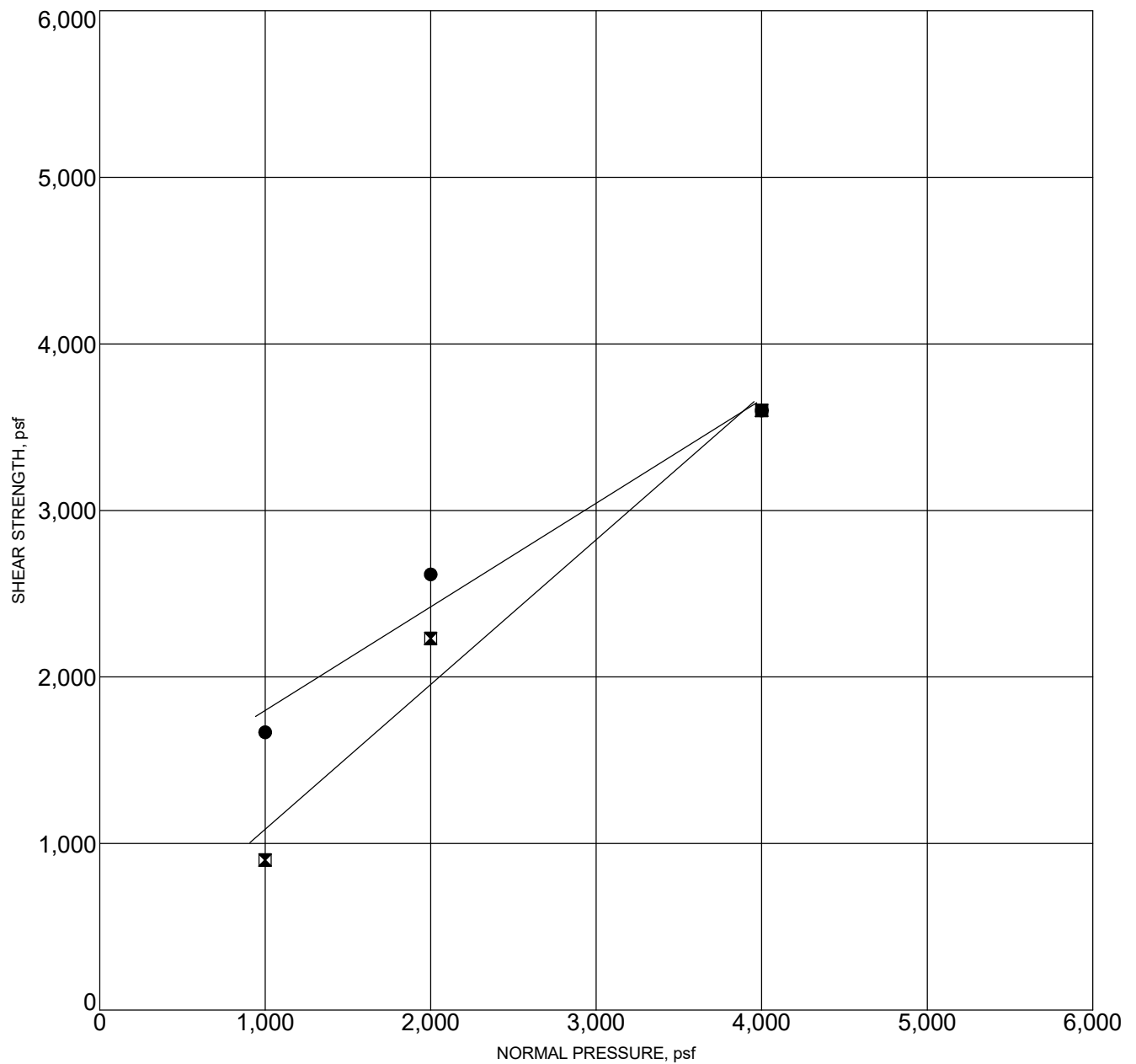
PROJECT: WOODCREST RETAIL

PROJECT NO.: 2995.I



DIRECT SHEAR TEST RESULTS

FIGURE B-1



● **PEAK STRENGTH**
Friction Angle= 32 degrees
Cohesion= 1176 psf

✕ **ULTIMATE STRENGTH**
Friction Angle= 41 degrees
Cohesion= 216 psf

Sample Location		Classification	DD,pcf	MC,%
B-4	1.0	<u>Weathered Bedrock</u> SAND WITH SILT (SP-SM)	136	4.3

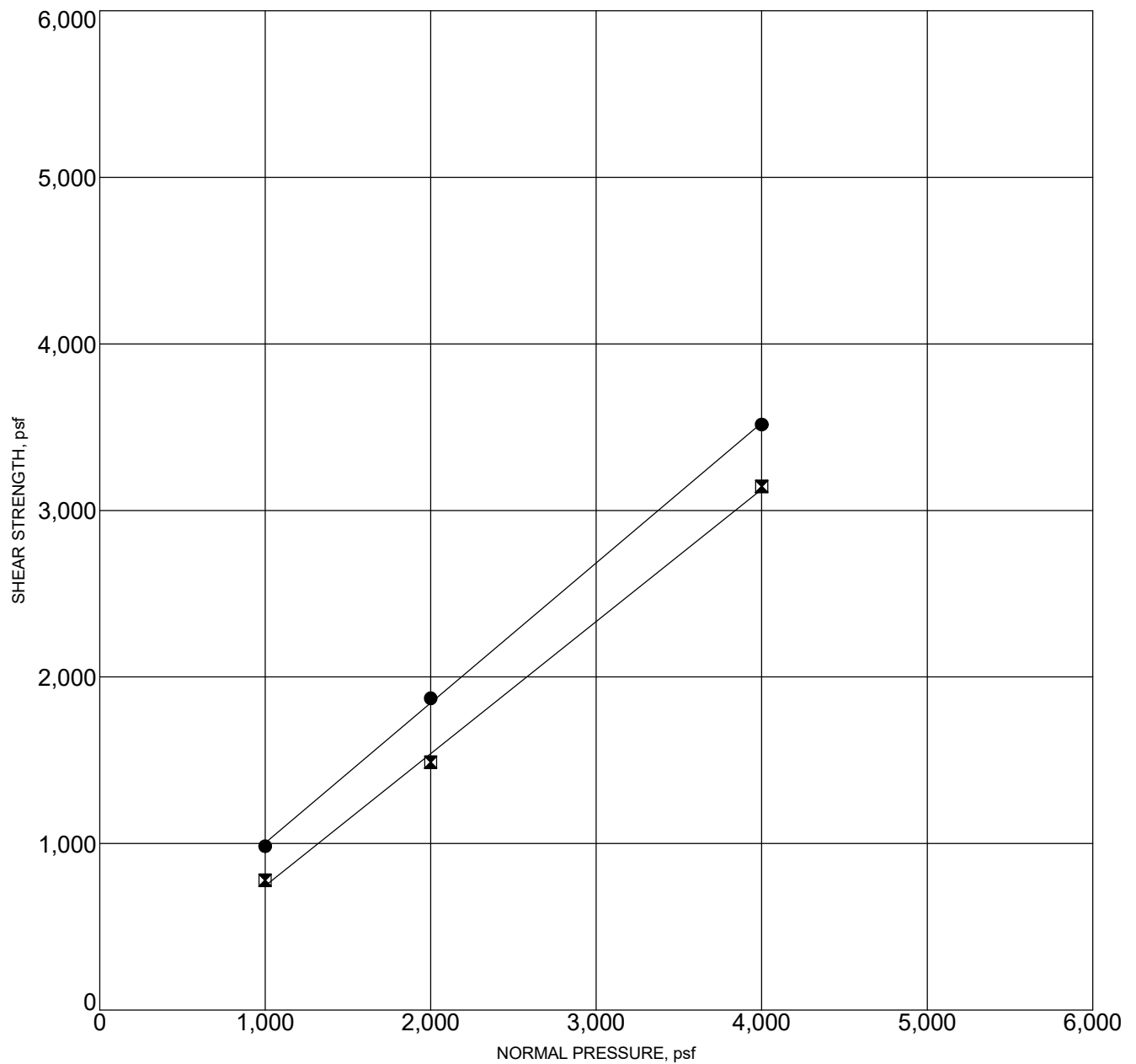
PROJECT: WOODCREST RETAIL

PROJECT NO.: 2995.I



DIRECT SHEAR TEST RESULTS

FIGURE B-2



● PEAK STRENGTH
 Friction Angle= 40 degrees
 Cohesion= 162 psf

✕ ULTIMATE STRENGTH
 Friction Angle= 38 degrees
 Cohesion= 0 psf

Sample Location		Classification	DD,pcf	MC, %
B-9	5.0	<u>Weathered Bedrock</u> SILTY SAND (SM)	123	9.0

PROJECT: WOODCREST RETAIL

PROJECT NO.: 2995.I



DIRECT SHEAR TEST RESULTS

FIGURE B-3