EAST COUNTY SOIL CONSULTATION AND ENGINEERING, INC.

ADDRESS:
10925 HARTLEY ROAD, SUITE "I"
SANTEE CALIFORNIA 92071
619 258-7901

INVOICE

DATE
August 6, 2024

BILL TO:	PROJECT NUMBER	SITE ADDRESS
Breeze Andersonj 6719 Torenia Trail, San Diego, Calfornia 92130	Project No. 24-12 1H6	11642 Hi Ridge Road, Lakeside, Ca. 92040

DESCRIPTION		AMOUNT
PRELIMINARY GEOTECHNICAL INVESTIGATION		$2700.00
TOTAL DUE		**$2700.00**

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AND ENGINEERING, INC.
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SANTEE, CALIFORNIA 92071
TEL. 619-258-7901**

Breeze Anderson
6719 Torenia Trail
San Diego, California 92130

August 6, 2024
Project No. 24-1211H6

Subject: **Geotechnical Investigation for Proposed Single Family Residence
11642 Hi Ridge Road, Lakeside Area
County of San Diego, California 92040**

Dear Mr. Anderson:

In accordance with your request, we have performed a geotechnical investigation at the subject site to determine the geotechnical site conditions and provide recommendations for design and construction of the proposed single-family residence.

SCOPE OF SERVICES

The following scope of work was performed for this investigation:

- Site reconnaissance and review of published geologic, seismologic and geotechnical reports and maps pertinent to the project area.
- Subsurface exploration consisting of two (2) borings excavated within the area of the proposed construction. The borings were logged by our project supervisor.
- Collection of representative soil samples at selected depths. The obtained samples were sealed in moisture-resistant containers and transported to the soil testing laboratory for subsequent analysis.
- Laboratory testing of soil samples obtained during the subsurface exploration.
- Geotechnical analysis of the field and laboratory data, which provided the basis for our conclusions and recommendations.
- Preparation of this report, which summarizes the results of our analysis and presents our findings and recommendations for the proposed construction.

REFERENCES

1. "2022 California Building Code, California Code of Regulations, Title 24, Part 2, Volume 2 of 2", Published by International Code Council.

2. "Geologic Map of the San Diego 30' x 60' Quadrangle, California", by Michael P. Kennedy and Siang S. Tan, 2008.

3. "Geotechnical and Foundation Engineering: Design and Construction", by Robert W. Day, 1999.

4. "1997 Uniform Building Code, Volume 2, Structural Engineering Design Provisions", Published by International Conference of Building Officials.

5. "Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada to be used with 1997 Uniform Building Code", Published by International Conference of Building Officials.

6. "Geologic Maps of the Northwestern Part of San Diego County, California", Department of Conservation, Division of Mines and Geology, by Siang S. Tan and Michael P. Kennedy, 1996.

7. "Bearing Capacity of Soils, Technical Engineering and Design Guides as Adapted from the US Army Corps of Engineers, No. 7", Published by ASCE Press, 1994.

8. "Foundations and Earth Structures, Design Manual 7.2", by Department of Navy Naval Facilities Engineering Command, May 1982, Revalidated by Change 1 September 1986.

9. "Ground Motions and Soil Liquefaction during Earthquakes", by H.B. Seed and I.M. Idriss, 1982.

10. 'Geologic Map of California, Olaf P. Jenkins Edition, Santa Ana Sheet, Compilation by Thomas H. Rogers, 1965

FIGURE 6
SEISMIC DESIGN VALUES

11642 Hi Ridge Rd, Lakeside, CA 92040, USA
Latitude, Longitude: 32.890365, -116.939376

Date	7/26/2024, 2:50:28 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	C - Very Dense Soil and Soft Rock

Type	Value	Description
S_S	0.781	MCE_R ground motion. (for 0.2 second period)
S_1	0.287	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.937	Site-modified spectral acceleration value
S_{M1}	0.431	Site-modified spectral acceleration value
S_{DS}	0.625	Numeric seismic design value at 0.2 second SA
S_{D1}	0.287	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	1.5	Site amplification factor at 1.0 second

FIGURE 5

RETAINING WALL DRAINAGE

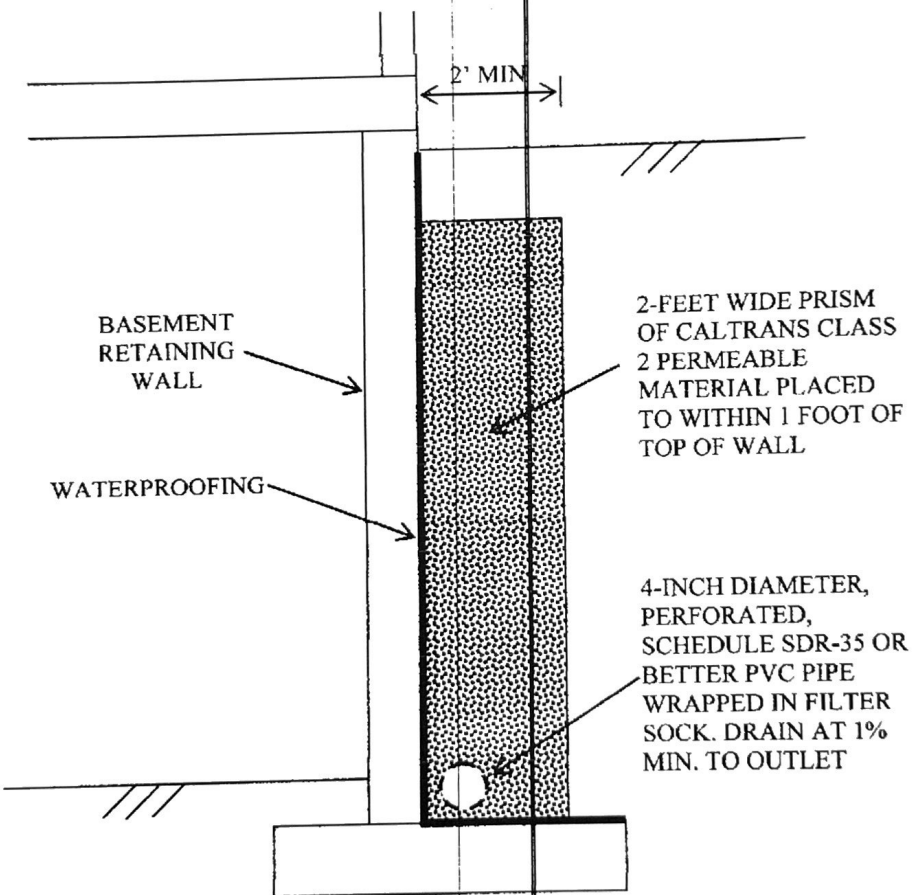


FIGURE 4
RESULTS OF LABORATORY TESTS

EXPANSION INDEX TEST
(ASTM D 4829)

TEST LOCATION	INITIAL MOISTURE CONTENT (%)	SATURATED MOISTURE CONTENT (%)	INITIAL DRY DENSITY (PCF)	EXPANSION INDEX	EXPANSION POTENTIAL
B-1 @ 1.0'	8.7	19.2	114.3	0	Very Low

MAXIMUM DENSITY TEST
(ASTM D 1557)

TEST LOCATION	SOIL DESCRIPTION	MAXIMUM DRY DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)
B-1 @ 1.0'	REDDISH BROWN SILTY SAND	128.5	9.5

PARTICLE SIZE ANALYSIS (ASTM D422)

U.S. Standard Sieve Size	Percent Passing B-1 @ 1.0'
1"	-
¾"	-
1/2"	-
3/8"	100
#4	98
#8	94
#16	88
#30	78
#50	52
#100	34
#200	27
USCS	**SM**

FIGURE 3
LOGS OF BORINGS

BORING NO. 1

DEPTH	SOIL DESCRIPTION	Y	M
Surface	**FILL** reddish brown, dry, loose silty fine to medium grained sand		
2.0'	" " " " " " " " " "	91.2	2.7
4.0'	reddish brown, dry to moist, silty, fine to medium grained sand	97.2	4.8
4.5	**TOPSOIL** dark brown, dry, loose, porous, silty sand with rootlets		
5.0'	**COLLUVIUM** reddish brown, dry to moist, loose, silty sand		
6.0'	**GRANITIC ROCKS** gray brown, dry, dense, silty sand bottom of boring, no caving, no groundwater boring backfilled 7-16-24		

BORING NO. 2

DEPTH	SOIL DESCRIPTION	Y	M
Surface	**TOPSOIL** dark brown, dry, loose, porous, silty sand with rootlets		
0.5'	**COLLUVIUM** reddish brown, dry, loose, silty sand		3.0
1.5'	**GRANITIC ROCKS** gray brown, dry, dense, silty sand bottom of boring, no caving, no groundwater boring backfilled 7-16-24		

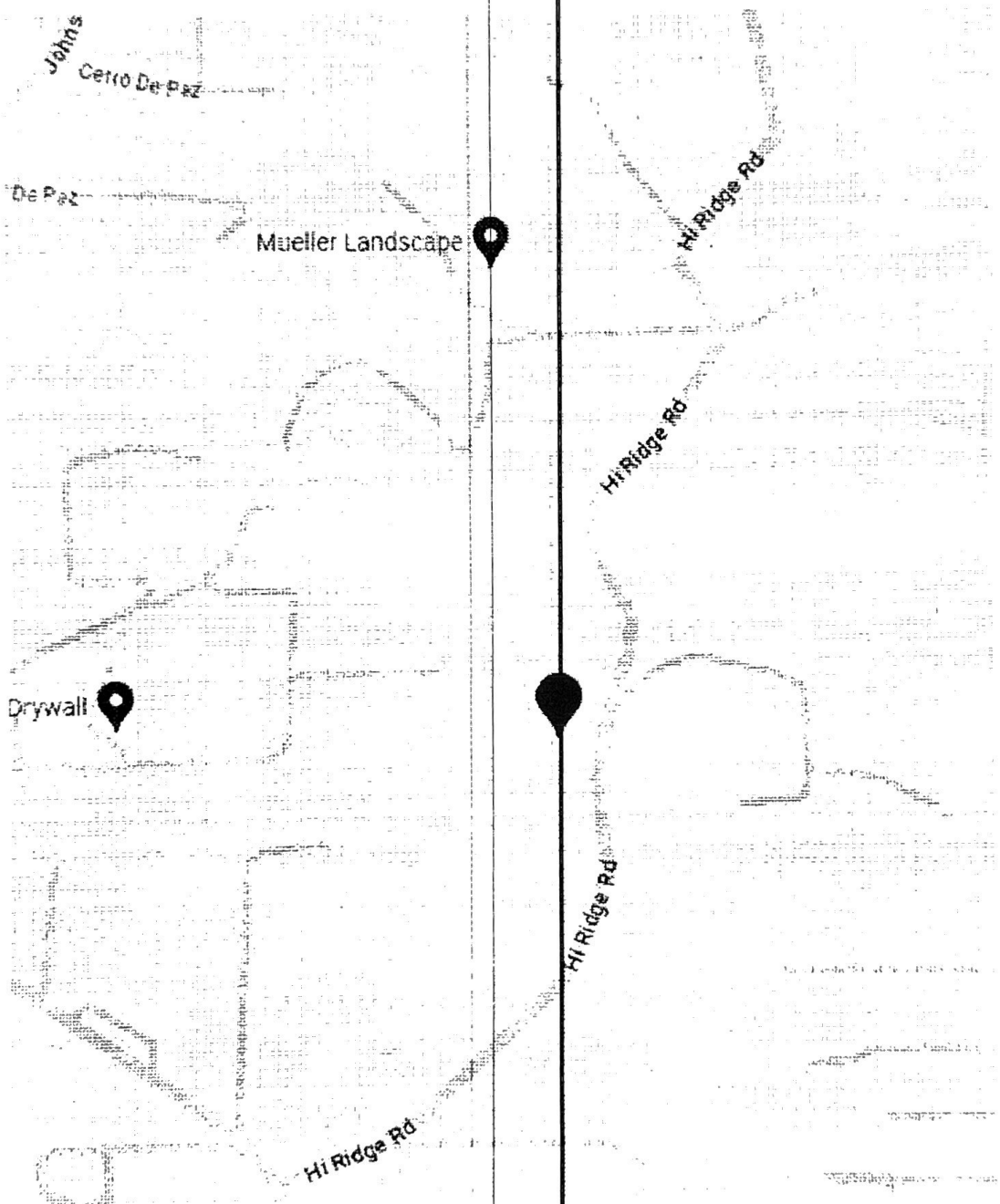
Y = DRY DENSITY IN PCF
M = MOISTURE CONTENT IN %

FIGURE 2
LOCATIONS OF TEST PITS



B-1 EXPLORATORY BORINGS

FIGURE 1
VICINITY MAP



This opportunity to be of service is appreciated. If you have any questions, or we can be of further service, please do not hesitate to call or contact us.

Respectfully Submitted,



Mamadou Saliou Diallo, PE, GE
Geotechnical Engineer

Attachments: Figures 1 through 6 and References

SOIL VALUES FOR RETAINING WALL DESIGN

The proposed keystone retaining wall may be designed for an active equivalent fluid soil pressure of 35 pcf assuming a level backfill. Should the wall be subject to a uniform surcharge load behind the wall, it should be designed for an additional, uniform lateral pressure equal to one-third the anticipated surcharge pressure. These pressures assume the backfill soils will be free draining and very low expansive (EI equal or less than 20).

For seismic design of retaining walls over 6 feet in height, a horizontal seismic coefficient Kh = SDS/2.5 should be used. An inverted, triangular soil pressure distribution should be assumed against the retaining wall. The resultant, horizontal earthquake force F = 3/8*Kh*Soil density*Wall height (H)^2 may be assumed to act at a distance of 0.6*H above the base of the wall. A soil density of 125 pcf may be assumed.

RETAINING WALL FOUNDATIONS

Soil design criteria, such as bearing capacity, passive earth pressure and sliding resistance as recommended earlier may be incorporated in the retaining wall design.

RETAINING WALL DRAINAGE AND BACKFILLING

The keystone retaining wall should be provided with appropriate wall drainage as required in the Keystone Design Manual.

Wall drainage and backfill materials should be approved by our field representative prior to placement and compaction. Backfill soils should be very low expansive (EI equal or less than 20).

Wall backfill should be compacted to at least 90 percent relative compaction based on ASTM D 1557 and observed and tested as necessary by our field representative. All grading and fill compaction should be performed in accordance with the County of San Diego grading requirements.

SURFACE DRAINAGE

Adequate measures should be undertaken so that drainage water is directed away from foundations, footings, floor slabs and the tops of slopes via rain gutters, downspouts, surface swales and subsurface drains towards the natural drainage for this area. As required in the current California Building Code, a minimum gradient of 2 percent is recommended in hardscape areas adjacent to the structure. In earth areas, a minimum gradient of 5 percent away from the structure for a distance of at least 10 feet should be provided. If this requirement cannot be met due to site limitations, drainage can be done through a swale in accordance with Section 1804.4 of the current 2022 California Building Code. Earth swales should have a minimum gradient of 2 percent. Drainage should be directed to approved drainage facilities. Proper surface and subsurface

drainage will be required to minimize the potential of water seeking the level of the bearing soils under the foundations, footings and floor slabs, which may otherwise result in undermining and differential settlement of the structure and other improvements.

LIMITATIONS OF INVESTIGATION

Our investigation was performed using the skill and degree of care ordinarily exercised under similar circumstances by reputable soil engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report. This report provides no warranty, either expressed or implied, concerning future building performance. Future damage from geotechnical or other causes is a possibility.

This report is prepared for the sole use of our client and may not be assigned to others without the written consent of the client and ECSC&E, Inc.

The samples collected and used for testing, and the observations made, are believed representative of site conditions; however, soil and geologic conditions can vary significantly between exploration trenches, test borings and surface exposures. As in most major projects, conditions revealed by construction excavations may vary with preliminary findings. If this occurs, the changed conditions must be evaluated by a representative of ECSC&E and designs adjusted as required or alternate designs recommended.

This report is issued with the understanding that it is the responsibility of the owner, or of his/her representative to ensure that the information and recommendations contained herein are brought to the attention of the project architect and engineer. Appropriate recommendations should be incorporated into the structural plans. The necessary steps should be taken to see that the contractor and subcontractors carry out such recommendations in the field.

The findings of this report are valid as of this present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside of our control. Therefore, this report is subject to review and should be updated after a period of two years.

ADDITIONAL SERVICES

A review of plans and specifications, field observations and testing under our direction are integral parts of the recommendations made in this report. If East County Soil Consultation and Engineering, Inc. is not retained for these services, the client agrees to assume our responsibility for any potential claims that may arise during construction. Observation and testing are additional services which are provided by our firm, and should be budgeted within the cost of development.

TEMPORARY VERTICAL EXCAVATIONS

Temporary vertical excavations for utility trenches should not exceed 5 feet. Any excavations greater than 5 feet in height should be shored or laid back at a 1:1 (horizontal to vertical) slope ratio. CAL-OSHA guidelines for temporary slopes and trench excavation safety should be implemented during construction.

FOUNDATIONS AND FLOOR SLABS

- The proposed two-story structure should be founded in properly compacted fill soil or dense, granitic rocks. Footings should have a minimum depth of 18 inches below building pad grade or lowest adjacent, finished grade, whichever is deeper. Continuous footings should be at least 15 inches wide and reinforced with a minimum of four #4 steel bars; two bars placed near the top of the footings and the other two bars placed near the bottom of the footings. Individual footings should be at least 18 inches square and reinforced with a grid of #4 bars spaced 12 inches on centers (each way) and placed on concrete blocks at the bottom of the footings.

- Floor slabs should be at least 5 inches thick and reinforced with #4 bars placed at 18 inches on center in two directions in the middle of the slab. The reinforcing steel should be supported on steel chairs or concrete blocks. Floor slabs should be underlain by 2 inches of clean sand over a 10-mil visqueen moisture barrier over 2 inches of clean sand. To minimize the potential for shrinkage cracks, the maximum concrete slump should be 4 inches and the maximum water-cement ratio 0.5. Some shrinkage cracks are still possible.

- An allowable soil bearing value of 2,000 pounds per square foot may be used for the design of continuous and individual spread footings at least 12 inches wide and founded a minimum of 12 inches into properly compacted fill soils or dense granitic rock as set forth in the 2022 California Building Code, Table 1806.2. This value may be increased by 400 psf for each additional foot of depth or width to a maximum value of 4,000 psf. Another 1/3 increase is allowed for wind and seismic loads.

- Lateral resistance to horizontal movement may be provided by the soil passing pressure and the friction of concrete to soil. An allowable passive pressure of 250 pounds per square foot per foot of depth may be used. A coefficient of friction of 0.35 is recommended. The soil's passive pressure may be increased by 1/3 for wind and seismic loading.

- All footing excavations should be observed and approved by our representative.

- For design purposes, total and differential settlements of ½ inch may be utilized.

inspected for buried objects that need to be rerouted or removed prior to construction. All holes, trenches, or loose soil pockets left by the removal of these objects should be properly backfilled with compacted fill materials.

b. Soil Removal

The existing, loose surface soils within the proposed building area and to a distance of at least 5 feet outside building limits should be removed to their full depth (about 6 feet) exposing the underlying, dense materials.

c. Compaction and Method of Filling

Prior to fill placement, the exposed subgrade soils should be scarified to a depth of 6 to 8 inches, moisture conditioned to 2 percent above the optimum moisture content and compacted to at least 90 percent relative compaction.

Any imported fill soils should be predominantly granular and approved by our field representative.

All fill and trench backfill should be compacted to a minimum relative compaction of 90 percent as determined by ASTM D1557. Fill should be placed at a moisture content slightly above the optimum moisture content, in lifts 6 to 8 inches thick, with each lift compacted by mechanical means.

All grading, fill placement, and compaction should be performed in accordance with the grading requirements of the County of San Diego. Fill placement and compaction should be observed and tested as necessary by our field representative.

EROSION CONTROL

Due to the nature of the on-site soils, areas of recent grading or exposed ground may be subject to erosion. During construction, surface water should be controlled via berms, gravel/sandbags, silt fences, straw wattles, siltation or bioretention basins, positive surface grades or other methods to avoid damage to the finish work or adjoining properties. All site entrances and exits must have coarse gravel or steel shaker plates to minimize offsite sediment tracking. Best Management Practices (BMPs) must be used to protect storm drains and minimize pollution. The contractor should take measures to prevent erosion of graded areas until such time as permanent drainage and erosion control measures have been installed. After completion of grading, all excavated surfaces should exhibit positive drainage and eliminate areas where water might pond.

SOIL PROPERTIES

a. Compressible Soils

Our field observations and testing indicate the fill, topsoil and colluvium to the maximum depth of about 6.0 feet are compressible.

b. Expansive Soils

An expansion index test was performed on a representative sample of the fill soil. The results of the tests are shown on Figure 4. An expansion index of 0 was obtained, which indicates the soils have a very low expansion potential.

GEOLOGY

From published geologic maps, the site is underlain at depth by dense granitic rock.

There are no known geologic hazards such as landslides, liquefaction-prone areas, or active earthquake faults at the site. However, the proposed residence is subject to ground shaking and possible damage from earthquakes on nearby, or more distant, active faults.

GROUNDWATER

No groundwater was encountered in the test borings.

SEISMIC DESIGN VALUES

Seismic design values are presented on Figure 5.

CONCLUSIONS

Construction of the proposed two-story residence is feasible from a geotechnical standpoint, provided the recommendations presented in this report are properly implemented during construction.

RECOMMENDATIONS

SITE GRADING

a. Site Clearing

The area of the proposed construction should be cleared of vegetation, concrete debris and other unsuitable materials, which should be properly disposed of off-site. The area should be thoroughly

SITE DESCRIPTION AND PROPOSED CONSTRUCTION

The site location is shown on the attached Vicinity Map, Figure 1. The site is a rectangular-shaped parcel located on the west side of Hi Ridge Road, in the Lakeside area of the County of San Diego, California. The site is vacant. The lot slopes steeply to the east. Vegetation consists of grass, shrubs and a few trees. The parcel is bordered by Hi Ridge Road to the east and similar residential parcels to the remaining directions.

The preliminary plans prepared by Patrick Rymer of Lakeside, California show the proposed construction will consist of a single-family residence. The structure will be a two-story, wood-framed structure supported on continuous and/or individual spread footings with a slab-on-grade floor.

SUBSURFACE EXPLORATION AND LABORATORY TESTING

The subsurface exploration consisted of excavating two borings to a maximum depth of 6.0 feet below existing grade on July 16, 2024 with an electric jackhammer and shovels. The approximate locations of the borings are shown on Figure 2. Logs of the borings are shown on Figure 3.

Following the subsurface exploration, laboratory testing was performed to evaluate the pertinent engineering properties of the foundation soils. The laboratory tests included in-place moisture content and dry density, maximum dry density and optimum moisture, sieve analysis and an expansion index. The tests were performed in accordance with ASTM standards. The test results are shown on the logs of the test borings, Figure 3 and on Figure 4, Results of Laboratory Tests.

SUBSURFACE SOIL CONDITIONS

The subsurface soil descriptions were interpreted from conditions encountered during the subsurface exploration and/or inferred from the geologic literature. Detailed descriptions of the subsurface materials are presented on the logs of the test borings, Figure 3. The following are general descriptions of the encountered soils:

Fill: Fill soils were encountered to a depth of 4.5 feet in boring No. 1. The fill consisted of reddish brown, dry, loose to medium dense, silty sand.

Topsoil: Topsoil was encountered with a thickness of approximately 6 inches. The topsoil consisted of dark brown, dry, loose, porous, silty sand with rootlets.

Colluvium: Colluvium was encountered beneath the topsoil with a thickness of 1 foot. The soil consisted of reddish brown, dry to moist, silty sand, that was loose in consistency.

Granitic Rock: Dense granitic rock was encountered to the maximum explored depth of 6.0 feet. The granitic rock consisted of gray brown. dry, dense, silty sand that was hard to excavate.