
**GEOTECHNICAL INVESTIGATION REPORT
PROPOSED RESIDENTIAL BUILDING
STREET**

Garden Grove, California

Prepared for:

CONSTRUCTION

Prepared by:

GEOBODEN INC.
Irvine, CA 92620

December 9, 2024

Project No.

GEOBODEN INC.

**GEOTECHNICAL INVESTIGATION REPORT
PROPOSED RESIDENTIAL BUILDING
STREET
GARDEN GROVE, CALIFORNIA**

CONSTRUCTION

GEOBODEN INC.
5 Hodgenville
Irvine, California 92620

December 9, 2024

JOB NO.



December 9, 2024

Project No

Attention: David Nguyen Construction

**Subject: Geotechnical Investigation Report
Proposed Accessory Dwelling Unit
Street
Garden Grove, California**

Geoboden, Inc. (Geoboden) is pleased to submit herewith our geotechnical investigation report for the proposed Residential Building to be located at Street in the City of Garden Grove, California.

This report presents the results of our field investigation, laboratory testing and our engineering judgment, opinions, conclusions and recommendations pertaining to geotechnical design aspects of the proposed residence.

Should you have any questions regarding the contents of this report, or should you require additional information, please do not hesitate to contact us.

Respectfully submitted,
GEOBODEN, INC.

A handwritten signature in black ink, appearing to read "Rud", with a long horizontal flourish extending to the right.

Shahrokh (Cyrus) E Radvar,
Principal Engineer, G.E. 2742



Copies: 2/Addressee

GEOTECHNICAL INVESTIGATION REPORT

PROPOSED RESIDENTIAL BUILDING

GARDEN GROVE, CALIFORNIA

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GEOTECHNICAL INVESTIGATION REPORT PROPOSED RESIDENTIAL BUILDING STREET

Garden Grove, California

1.0 INTRODUCTION

This report presents the results of our geotechnical investigation performed by Geoboden, Inc. (Geoboden) for the proposed Residential Building to be located at _____ ird Street in the city of Garden Grove, California. The general location of the project is shown on Figure 1.

The purposes of this investigation were to determine the geotechnical properties of subsurface soil conditions, to evaluate their in-place characteristics, evaluate site seismicity, and to provide geotechnical recommendations with respect to site grading and for design and construction of proposed foundations and other site improvements.

The scope of the authorized investigation included performing a site reconnaissance, conducting field exploration and laboratory testing programs, performing engineering analyses, and preparing this Geotechnical Investigation Report. Evaluation of environmental issues or the potential presence of hazardous materials was not within the scope of services provided.

This report has been prepared for Client and their other project team members, to be used solely in the development of facilities described herein. This report may not contain sufficient information for other uses or the purposes of other parties.

2.0 SITE LOCATION AND PROJECT DESCRIPTION

The subject property is located at _____ d Street in the city of Garden Grove, California. The site is fairly level throughout and near the elevation of the adjacent properties and roadways. The site is currently developed with a residential building.

An Accessory Dwelling Unit (ADU) of single-story building is planned for construction. We understand that the building will be of wood frame construction with the floor slab constructed at-grade.

3.0 GEOTECHNICAL INVESTIGATION

Our geotechnical investigation included a field exploration program and a laboratory testing programs. These programs were performed in accordance with our scope of services. The field exploration and laboratory testing programs are briefly described below. A more detailed description of the field exploration and laboratory testing programs is provided in Appendix A and Appendix B, respectively.

3.1 FIELD EXPLORATION PROGRAM

One (1) exploratory boring was drilled using a hand auger. The boring was advanced to depth of 15 feet (below ground surface). The approximate location of exploratory boring is shown on Figure 2.

Log of subsurface conditions encountered in the boring was prepared in the field by a representative of our firm. Soil samples consisting of relatively undisturbed brass ring samples were collected at approximately 3 and 5-foot depth intervals and were returned to the laboratory for testing. Final boring log was prepared from the field log and is presented in Appendix A.

3.2 LABORATORY TESTING

Selected samples collected during drilling activities were tested in the laboratory to assist in evaluating controlling engineering properties of subsurface materials at the site. Physical tests performed included moisture and density determination, No. 200 Wash, Atterberg, expansion, direct shear, and corrosion. The results of laboratory testing are presented in Appendix B.

4.0 DISCUSSION OF FINDINGS

The following discussion of findings for the site is based on the results of the field exploration and laboratory testing programs.

4.1 SITE AND SUBSURFACE CONDITIONS

Fill soils were observed within boring. The existing fill was approximately 3 feet in thickness. The fill consisted primarily of silty sand. Observed subsurface native soils consisted of sandy clay to the maximum explored depth of 15 feet below ground surface (bgs). For a more

detailed description of the subsurface materials refer to the boring log included in Appendix A of this report.

4.2 GROUNDWATER CONDITIONS

Groundwater was encountered within our exploratory boring at 15 feet below ground surface during field exploration. Review of the available maps prepared by the State of California indicates that the historic high groundwater level is as shallow as 10 feet bgs (CDMG, 1998).

Fluctuations of the groundwater table, localized zones of perched water, and rise in soil moisture content should be anticipated during the rainy season. Irrigation of landscaped areas can also lead to an increase in soil moisture content and fluctuations of intermittent shallow perched groundwater levels.

4.3 SOIL ENGINEERING PROPERTIES

Physical tests were performed on the relatively undisturbed samples to characterize the engineering properties of the native soils. Moisture content determination was performed on the samples to evaluate the in-situ moisture content. Moisture content and dry unit weight results are shown on the boring log in Appendix A.

4.4 EXPANSIVE SOILS

Based on the results of laboratory testing, onsite soils materials exhibit medium expansion potential. We anticipate that the design and performance of the proposed new building will not be significantly affected by expansion of onsite soils.

5.0 STRONG GROUND MOTION POTENTIAL

The project site is located in a seismically active area typical of Southern California and likely to be subjected to a strong ground shaking due to earthquakes on nearby faults.

To accommodate effects of ground shaking produced by regional seismic events, seismic design can, at the discretion of the designing Structural Engineer, be performed in accordance with the 2022 edition of the California Building Code (CBC). Table below, 2022 CBC Seismic Parameters, lists (next) seismic design parameters based on the 2022 CBC methodology, which is based on ASCE/SEI 7-16:

2022 CBC Seismic Design Parameters	Value
Site Latitude (decimal degrees)	33.7695
Site Longitude (decimal degrees)	-117.9136
Site Class Definition	D
Mapped Spectral Response Acceleration at 0.2s Period, S_s	1.347
Mapped Spectral Response Acceleration at 1s Period, S_I	0.478
Short Period Site Coefficient at 0.2s Period, F_a	1.2
Long Period Site Coefficient at 1s Period, F_v	1.822
Adjusted Spectral Response Acceleration at 0.2s Period, S_{MS}	1.616
Adjusted Spectral Response Acceleration at 1s Period, S_{MI}	0.871
Design Spectral Response Acceleration at 0.2s Period, S_{DS}	1.078
Design Spectral Response Acceleration at 1s Period, S_{DI}	0.581

6.0 LIQUEFACTION POTENTIAL

For liquefaction to occur, all of three key ingredients are required: liquefaction-susceptible soils, groundwater within a depth of 50 feet or less, and strong earthquake shaking. Soils susceptible to liquefaction are generally saturated loose to medium dense sands and non-plastic silt deposits below the water table.

The site is located within a liquefaction hazard zone. Historic high groundwater is at 15 feet. The existing house is supported on shallow foundation system. The proposed ADU building will be one-story and is exempt for liquefaction hazard evaluation. Liquefaction mitigation measures are not warranted. It is the opinion of this firm, liquefaction and the associated hazards will not adversely impact the proposed ADU building. We recommend that the Proposed Accessory Dwelling Unit be supported on shallow foundation system.

7.0 DESIGN RECOMMENDATIONS

Based upon the results of our investigation, the proposed Residential Building is considered geotechnically feasible provided the recommendations presented herein are incorporated into the design and construction. If changes in the design of the structure are made or variations or changed conditions are encountered during construction, Geoboden should be contacted to evaluate their effects on these recommendations. The following geotechnical engineering

recommendations for the proposed building are based on observations from the field investigation program and the physical test results.

7.1 EARTHWORK

All earthworks, including excavation, backfill and preparation of subgrade, should be performed in accordance with the geotechnical recommendations presented in this report and applicable portions of the grading code of local regulatory agencies. All earthwork should be performed under the observation and testing of a qualified geotechnical engineer.

7.2 SITE AND FOUNDATION PREPARATION

The construction area should be cleared of any vegetation and stripped of miscellaneous debris and other deleterious material. Organic matter and all other material that may interfere with the completion of the work should be removed from the limits of the construction area. Vegetation, construction debris, and organic matter should not be incorporated into engineered fill.

All active or inactive utilities within the construction limits should be identified for relocation, abandonment, or protection prior to grading. Any subsurface piping encountered should be abandoned in-place by being filled with sand/cement slurry. The adequacy of existing backfill around utilities to remain in place under new structures should be evaluated; loose or dumped trench backfill should be removed and replaced with properly compacted backfill.

In general, all fill soils within the proposed building footprints should be overexcavated and replaced with engineered fill. As a minimum, removals should extend to competent native soils. At least 2 feet of compacted fill should be provided underneath all spread footings and floor slabs. The compacted fill should extend laterally a minimum of 5 feet beyond the foundation footprints, where possible. Where grading is limited due to the property constraints, extending laterally a minimum of 5 feet beyond the foundation footprints is not possible. For this case, we recommend that the offsite soils be probe tested. If loose soils are encountered, deepening of the new footings is recommended. Prior to placing structural fill, exposed bottom surfaces in each removal area approved for fill should first be scarified to a depth of at least 6 inches, water or air dried as necessary to achieve near optimum moisture conditions, and then recompacted in place to a minimum relative compaction of 90 percent.

Based on the observations made in our boring and the results of pertinent laboratory tests, anticipated depths of removal of unsuitable soils will be about 4 feet. However, actual removal depths will have to be determined during grading on the basis of in-grading observations and testing performed by a representative of geotechnical consultants.

Where grading is interrupted by rain, fill operations should not be resumed until the moisture content and dry density of the placed fill are satisfactory. Also, clay soils should not be allowed to dry out and crack; if they do, they should be excavated down to the depth of drying, moisture conditioned, and compacted.

7.3 FILL PLACEMENT AND COMPACTION REQUIREMENTS

Material for engineered fill should be select free of organic material, debris, and other deleterious substances, and should not contain fragments greater than 3 inches in maximum dimension. On-site excavated soils that meet these requirements may be used to backfill the excavated building pad area.

All fill should be placed in 6-inch-thick maximum lifts, watered or air dried as necessary to achieve near optimum moisture content, and then compacted in place to a maximum relative compaction of 90 percent. The laboratory maximum dry density and optimum moisture content for each change in soil type should be determined in accordance with Test Method ASTM D 1557. A representative of the project consultant should be present on-site during grading operations to verify proper placement and compaction of all fill, as well as to verify compliance with the other geotechnical recommendations presented herein.

Imported soils, if any, should consist of clean materials exhibiting a VERY LOW expansion potential (Expansion Index less than 20). Soils to be imported should be approved by the project geotechnical consultant prior to importation.

7.4 GEOTECHNICAL OBSERVATIONS

Exposed bottom surfaces in each removal area should be observed and approved by the project geotechnical consultant prior to placing fill. No fill should be placed without prior approval from the geotechnical consultant.

The project geotechnical consultant should be present on site during grading operations to verify proper placement and compaction of fill, as well as to verify compliance with the recommendations presented herein.

7.5 UTILITY TRENCH BACKFIL

All utility trench backfill should be compacted to a minimum relative compaction of 90 percent. Trench backfill materials should be placed in lifts no greater than approximately 6 inches in thickness, watered or air-dried as necessary to three (3) percent above optimum moisture content, and then mechanically compacted in place to a minimum relative compaction of 90 percent. A representative of the project geotechnical consultant should probe and test the backfills to verify adequate compaction.

As an alternative for shallow trenches where pipe or utility lines may be damaged by mechanical compaction equipment, such as under floor slabs, imported clean sand exhibiting a sand equivalent (SE) value of 30 or greater may be utilized. The sand backfill materials should be watered to achieve near optimum moisture conditions and then tamped into place. No specific relative compaction will be required; however, observation, probing, and if deemed necessary, testing should be performed by a representative of the project geotechnical consultant to verify an adequate degree of compaction and that the backfill will not be subject to settlement.

Where utility trenches enter the footprint of the floor slabs, they should be backfilled through their entire depths with on-site fill materials, sand-cement slurry, or concrete rather than with any sand or gravel shading. This “Plug” of less- or non-permeable materials will mitigate the potential for water to migrate through the backfilled trenches from outside to the areas beneath the foundations and floor slabs.

7.6 SHALLOW FOUNDATIONS

Following the site and foundation preparation recommended above, foundation for load bearing walls and interior columns may be designed as discussed below.

7.6.1 Bearing Capacity and Settlement

Load bearing walls and interior columns may be supported on continuous spread footings and isolated spread footings, respectively, and should bear entirely upon undisturbed native or properly engineered fill. Continuous and isolated footings should have a minimum width of 14 inches and 24 inches, respectively. All footings should be embedded a minimum depth of 24 inches measured from the lowest adjacent finish grade. Continuous and isolated footings placed on such materials may be designed using an allowable (net) bearing capacity of 2,000 pounds per square foot (psf) respectively. Allowable increases of 250 psf for each additional 1 foot in width and 250 psf for each additional 6 inches in depth may be utilized, if desired. The maximum allowable bearing pressure should be 3,000 psf. The maximum bearing value applies to combined dead and sustained live loads. The allowable bearing pressure may be increased by one-third when considering transient live loads, including seismic and wind forces.

Based on the allowable bearing value recommended above, total settlement of the shallow footings are anticipated to be less than one inch, provided foundation preparations conform to the recommendations described in this report. Differential settlement is anticipated to be approximately half the total settlement for similarly loaded footings spaced up to approximately 30 feet apart.

7.6.2 Lateral Load Resistance

Lateral load resistance for the spread footings will be developed by passive soil pressure against sides of footings below grade and by friction acting at the base of the concrete footings bearing on compacted fill. An allowable passive pressure of 250 psf per foot of depth may be used for design purposes. An allowable coefficient of friction 0.30 may be used for dead and sustained live load forces to compute the frictional resistance of the footings constructed directly on compacted fill. Safety factors of 2.0 and 1.5 have been incorporated in development of allowable passive and frictional resistance values, respectively. Under seismic and wind loading conditions, the passive pressure and frictional resistance may be increased by one-third.

7.6.3 Footing Reinforcement

Reinforcement for footings should be designed by the structural engineer based on the anticipated loading conditions. Footings for structures that are supported in medium expansive soils should have No. 4 bars, two top and two bottom.

7.7 CONCRETE SLAB ON-GRADE

Concrete slabs will be placed on undisturbed natural soils or properly compacted fill. Moisture content of subgrade soils should be maintained a few percent above the optimum moisture content. This moisture content should penetrate to a depth of approximately 18 inches into the subgrade.

At the time of the concrete pour, subgrade soils should be firm and relatively unyielding. Any disturbed soils should be excavated and then replaced and compacted to a minimum of 90 percent relative compaction. Slabs should be designed to accommodate low to medium expansive fill soils. The structural engineer should determine the minimum slab thickness and reinforcing depending upon the expansive soil condition intended use. Slabs placed on low to medium expansive soils should be at least 4 inches thick and have minimum reinforcement of No. 4 bars placed at mid-height of the slabs and spaced 18 inches on centers, in both directions. The structural engineer may require thicker slabs with more reinforcement depending on the anticipated slab loading conditions.

If moisture-sensitive floor covering is planned, a layer of open-graded gravel, at least 4 inches thick, should be placed below the concrete slab to form a capillary break. Alternately, moisture-proof membrane (such as 10-mil) may be utilized. The vapor barrier should be placed between sand layers (2 inches above and below) to protect the membrane from damage during construction. Gravel for use under a concrete floor slab should be clean, crushed rock that meets the gradation requirements presented next

<u>Sieve Size</u>	<u>Percentage</u>
1 inch	100
¾ inch	90-100

7.8 SOLUBLE SULFATES AND SOIL CORROSIVITY

The soluble sulfate, pH, and chloride concentration tests were performed on a sample of the on-site soils. Corrosion test results are presented in Appendix B. Results of the minimum resistivity tests indicate that on-site soils have corrosive potential when in contact with ferrous materials. Typical recommendations for mitigation of the corrosive potential of the soil in contact with building materials are the following:

- Below grade ferrous metals should be given a high quality protective coating, such as an 18 mil plastic tape, extruded polyethylene, coal tar enamel, or Portland cement mortar.
- Below grade ferrous metals should be electrically insulated (isolated) from above grade ferrous metals and other dissimilar metals, by means of dielectric fittings in utilities and exposed metal structures breaking grade.
- Steel and wire reinforcement within concrete in contact with the site soils should have at least two inches of concrete cover.

If ferrous building materials are expected to be placed in contact with site soils, it may be desirable to consult a corrosion specialist regarding chosen construction materials, and/or protection design for the proposed facility.

Corrosion test results also indicate that the surficial soils at the site have negligible sulfate attack potential on concrete. No sulfate-resistant cement will be necessary for concrete placed in contact with the on-site soils.

8.0 CONSTRUCTION CONSIDERATIONS

Based on our field exploration program, earthwork can be performed with conventional construction equipment.

8.1 TEMPORARY DEWATERING

Groundwater was encountered in our boring at 15 feet. Based on the anticipated excavation depths, the need for temporary dewatering is considered low.

8.2 CONSTRUCTION SLOPES

Excavations during construction should be conducted so that slope failure and excessive ground movement will not occur. The short-term stability of excavation depends on many factors, including slope angle, engineering characteristics of the subsoils, height of the excavation and length of time the excavation remains unsupported and exposed to equipment vibrations, rainfall and desiccation.

Where space permits, and providing that adjacent facilities are adequately supported, open excavations may be considered. In general, unsupported slopes for temporary construction excavations should not be expected to stand at an inclination steeper than 1:1 (horizontal:vertical). The temporary excavation side walls may be cut vertically to a height of 3 feet and then laid back at a 1:1 slope ratio above a height of 3 feet.

Surcharge loads should be kept away from the top of temporary excavations a horizontal distance equal to at least one-half the depth of excavation. Surface drainage should be controlled along the top of temporary excavations to preclude wetting of the soils and erosion of the excavation faces. Even with the implementation of the above recommendations, sloughing of the surface of the temporary excavations may still occur, and workmen should be adequately protected from such sloughing.

9.0 EXTERIOR CONCRETE FLATWORK

9.1 THICKNESS AND JOINT SPACING

Concrete sidewalks should be at least 4 inches thick and provided with construction joints or expansion joints every 10 feet or less. Concrete subslabs to be covered with decorative pavers should also be at least 4 inches thick and provided with construction joints or expansion joints every 10 feet or less. Concrete driveway slabs should be at least 6 inches thick and provided with construction joints or expansion joints every 10 feet or less.

9.2 REINFORCEMENT

Consideration should be given to reinforcing all concrete patio-type slabs, driveways and sidewalks greater than 5 feet in width with No. 4 bars spaced 18 inches on centers, both ways. The reinforcement should be positioned near the middle of the slabs by means of concrete chairs or brick.

9.3 SUBGRADE PREPARATION

The subgrade soils below concrete flatwork areas should first be compacted to a minimum relative compaction of 90 percent and then thoroughly moistened to achieve a moisture content that is a few percent above optimum moisture content. Pre-wetting of the soils will promote uniform curing of the concrete and minimize the development of shrinkage cracks. A representative of the project geotechnical consultant should observe and verify the density and moisture content of the soils, and the depth of moisture penetration prior to pouring concrete.

10.0 POST INVESTIGATION SERVICES

Final project plans and specifications should be reviewed prior to construction to confirm that the full intent of the recommendations presented herein have been applied to design and construction. Following review of plans and specifications, observation should be performed by the geotechnical engineer during construction to document that foundation elements are founded on/or penetrate onto the recommended soils, and that suitable backfill soils are placed upon competent materials and properly compacted at the recommended moisture content.

11.0 CLOSURE

The conclusions, recommendations, and opinions presented herein are: (1) based upon our evaluation and interpretation of the limited data obtained from our field and laboratory programs; (2) based upon an interpolation of soil conditions between and beyond the boring; (3) are subject to confirmation of the actual conditions encountered during construction; and, (4) are based upon the assumption that sufficient observation and testing will be provided during construction.

If parties other than Geoboden are engaged to provide construction geotechnical services, they must be notified that they will be required to assume complete responsibility for the

geotechnical phase of the project by concurring with the findings and recommendations in this report or providing alternate recommendations.

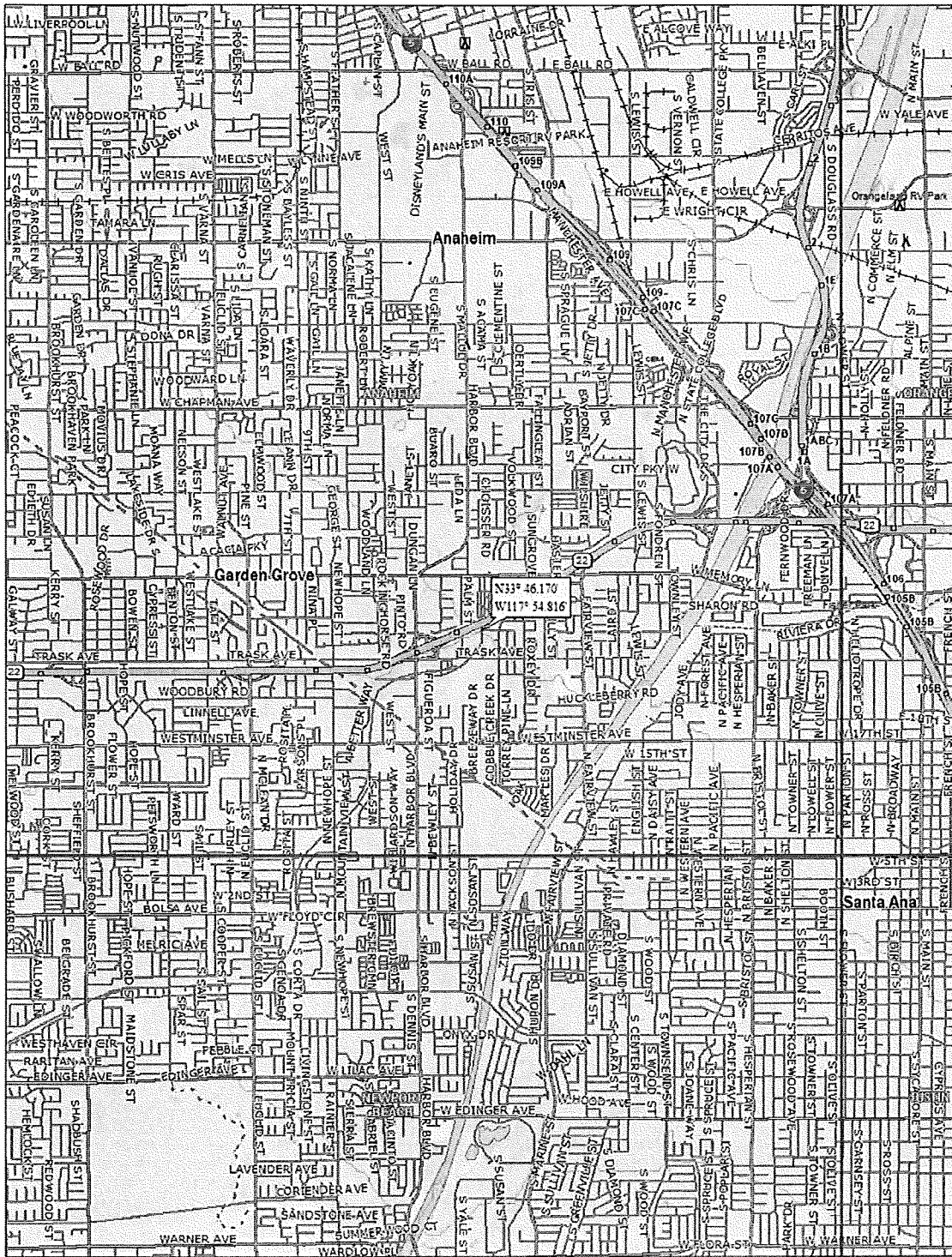
If pertinent changes are made in the project plans or conditions are encountered during construction that appear to be different than indicated by this report, please contact this office. Significant variations may necessitate a re-evaluation of the recommendations presented in this report.

12.0 REFERENCES

California Building Code, 2022 Volume 2.

Department of Conservation, Division of Mines and Geology. 1997. "Seismic Hazard Zone Report for the Anaheim and Newport Beach 7.5-Minute Quadrangles, Orange County, California, Seismic Hazard Zone Report 03, Open File No. 97-08.

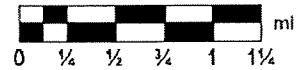
FIGURES



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Data Zoom 12-0

GEOBODEN INC.



Geotechnical Consultants

SITE VICINITY MAP
Proposed Residential Building
Street
Garden Grove, California

Figure By
C.R.

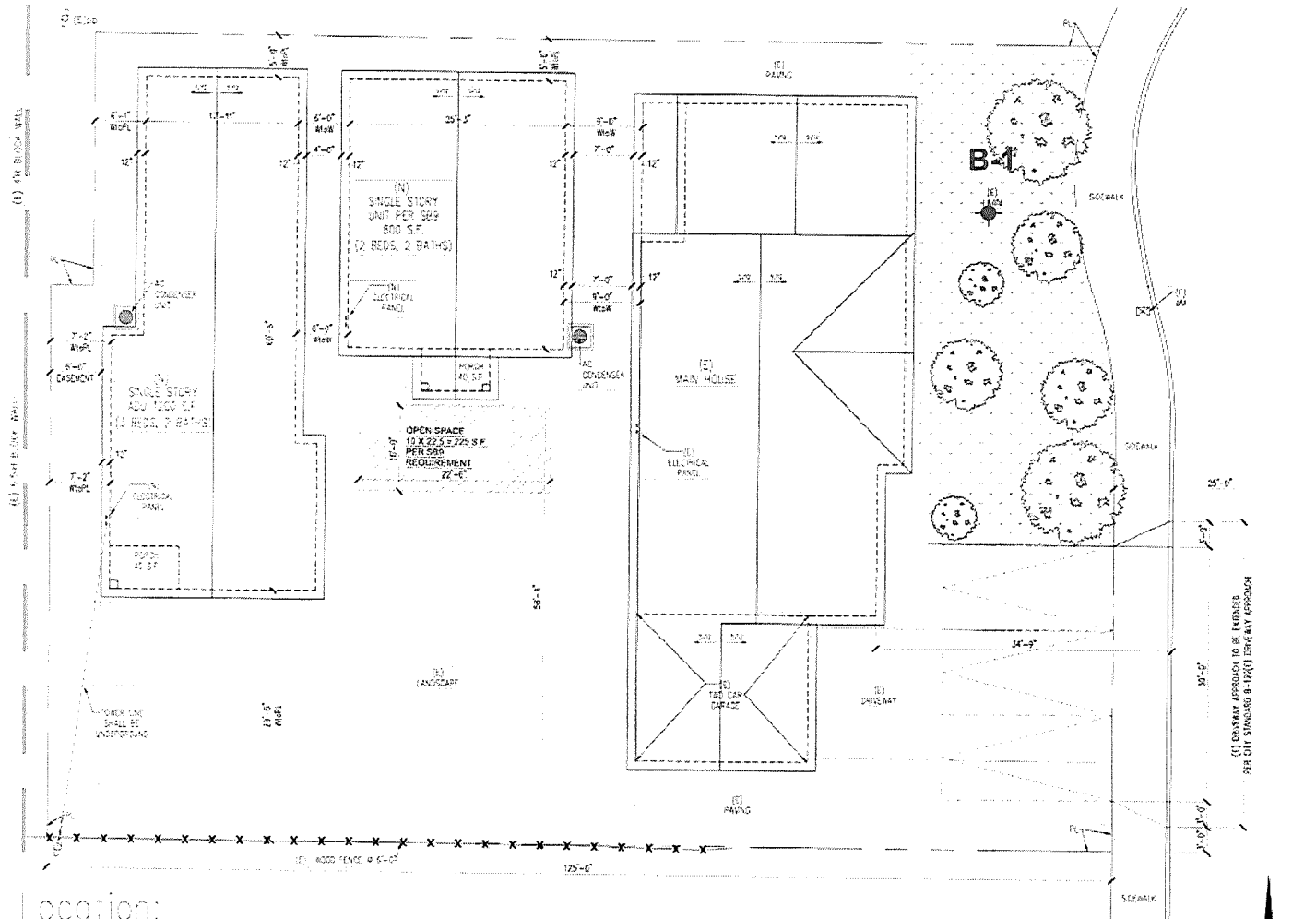
Map No.
XX

Date
12-09-24


Project No.
1

Figure No.

1



Location:
 Garden Grove, CA 92843

B-1  **LEGEND**

NUMBER AND APPROXIMATE LOCATION OF BORING

BORING LOCATION MAP
 Proposed Residential Building
 I Street
 Garden Grove, California

Figure By C.R.	Project No.
Map No. XX	Figure No.
Date 12-09-24	2

APPENDIX A

BORING LOG

CLIENT Construction PROJECT NAME Proposed Residential Building
 PROJECT NUMBER _____ PROJECT LOCATION _____
 DATE STARTED 12/2/24 COMPLETED 12/2/24 GROUND ELEVATION _____ HOLE SIZE 4 inches
 DRILLING CONTRACTOR GeoBoden, Inc. GROUND WATER LEVELS:
 DRILLING METHOD Hand Auger Boring ▽ AT TIME OF DRILLING 15.00 ft
 LOGGED BY C.R. CHECKED BY _____ AT END OF DRILLING ---
 NOTES _____ AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0		SILTY SAND (SM): light brown, moist, fine sand [FILL]										
5		SANDY CLAY (CL): light olive brown, moist [NATIVE]	MC R-1				103	18				
5			MC R-2				109	16	47	14	33	69
10												
15												

Groundwater at 15 feet below ground surface. Boring was backfilled with cuttings.
 Bottom of borehole at 15.0 feet.

GEOTECH BH COLUMNS - GINT STD US LAB.GDT - 12/9/24 18:10 - C:\PASSPORT\G8113321 BLACKBIRD STREET, GARDEN GROVE, CA, DAVID NGUYEN\LOGS.GPJ

APPENDIX B
LABORATORY TESTING

**APPENDIX B
LABORATORY TESTING**

***PROPOSED RESIDENTIAL BUILDING
Street
GARDEN GROVE, CALIFORNIA***

Laboratory tests were performed on selected samples to assess the engineering properties and physical characteristics of soils at the site. The following tests were performed:

- moisture content and dry density
- expansion
- Atterberg
- No. 200 wash sieve
- direct shear
- corrosion potential

Test results are summarized on laboratory data sheets or presented in tabular form in this appendix.

Moisture Density Tests

The field moisture contents, as a percentage of the dry weight of the soils, were determined by weighing samples before and after oven drying. The dry density, in pounds per cubic foot, was also determined for all relatively undisturbed ring samples collected. These analyses were performed in accordance with ASTM D 2937. The results of these determinations are shown on the boring log in Appendix A. Representative samples were dried, weighed, soaked in water until individual soil particles.

Expansion Potential

Expansion index test was performed on a representative bulk sample of the on-site soils in accordance with ASTM D4829. The result of expansion test is summarized in Table B-1.

TABLE B-1 (Expansion Index Test Data)

Boring Designation	Depth (ft)	Expansion Index (EI)
B-1	0-2	46

No. 200 Wash Sieve

A quantitative determination of the percentage of soil finer than 0.075 mm was performed on selected soil samples by washing the soil through the No. 200 sieve. Test procedures were performed in accordance with ASTM Method D1140. The results of the tests are shown on boring log.

Atterberg Limits

Liquid limit, plastic limit, and plasticity index were determined for selected soil samples in accordance with ASTM D 4318. The soil sample was air-dried and passed through a No. 40 sieve and moisturized. The liquid and plastic limit tests were performed on the fraction passing the No. 40 sieve. Results of the Atterberg limits tests are shown graphically and presented in this Appendix.

Direct Shear

Direct shear tests were performed on undisturbed samples of on-site soils. A different normal stress was applied vertically to each soil sample ring which was then sheared in a horizontal direction. The resulting shear strength for the corresponding normal stress was measured at a maximum constant rate of strain of 0.005 inches per minute. The direct shear results are shown graphically on a laboratory data sheet included in this appendix.

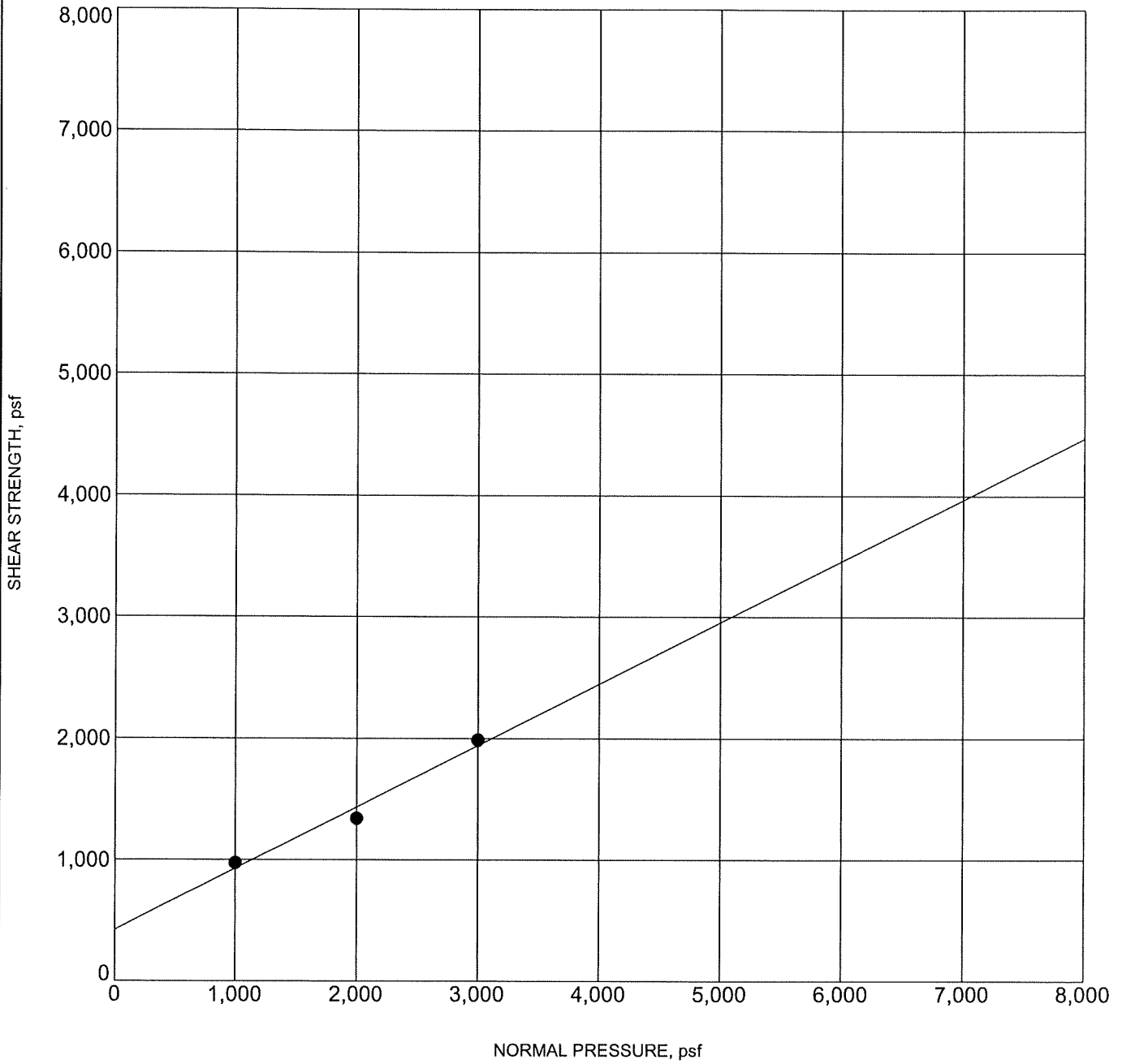
Corrosion Potential

The selected soil sample in the near surface was tested to determine the corrosivity of the site soil to steel and concrete. The soil samples were tested for soluble sulfate (Caltrans 417), soluble chloride (Caltrans 422), and pH and minimum resistivity (Caltrans 643). The results of corrosion tests are summarized in Table B-2.

TABLE B-2 (Corrosion Test Results)

Boring No.	Depth (ft)	Chloride Content (Calif. 422) ppm	Sulfate Content (Calif. 417) % by Weight	pH (Calif. 643)	Resistivity (Calif. 643) Ohm*cm
B-1	0-3	149	0.0193	7.7	1,078

CLIENT Construction PROJECT NAME Proposed Residential Building
 PROJECT NUMBER Blackbird-1-01 PROJECT LOCATION Garden Grove



DIRECT SHEAR - GINT STD US LAB.GDT - 12/9/24 18:11 - C:\PASSPORT\GINT\3321 BLACKBIRD STREET, GARDEN GROVE, CA, DAVID NGUYEN\LOGS.GPJ

Specimen Identification	Classification	γ_d	MC%	c	ϕ
● B-1 5.0	SANDY LEAN CLAY(CL)	109	16	421.3	27

