GEOTEK

PRELIMINARY GEOTECHNICAL EVALUATION
PROPOSED MULTI-FAMILY RESIDENCES
3328 ROOSEVELT STREET
OCEANSIDE, CALIFORNIA 920

PREPARED FOR

PROTEUS HOMES
793 NORTH AVENUE, SUITE C
VISTA, CALIFORNIA 92083

PREPARED BY

GEOTEK, INC.
1384 POINSETTIA AVENUE
VISTA, CALIFORNIA 92081

PROJECT NO. 4044-SD **APRIL 30, 2025**

GeoTek, Inc.
1384 Poinsettia Avenue, Suite A Vista, CA 92081-8505
(760) 599-0509 Office (760) 599-0593 Fax www.geotekusa.com

April 30, 2025
Project No. 4044-SD

Proteus Homes
793 North Avenue, Suite C
Vista, California 92083

Attention: JD Ower

Subject: **Preliminary Geotechnical Evaluation**
Proposed Multi-Family Residences
3328 Roosevelt St
Carlsbad, California 92008

Dear Mr. Ower,

GeoTek, Inc. (GeoTek) is pleased to provide the results of this Preliminary Geotechnical Evaluation for the subject improvements. Based upon review, site construction appears feasible from a geotechnical viewpoint, provided that the recommendations included herein are incorporated into the design and construction phases of site improvements.

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to call GeoTek.

Respectfully submitted,
GeoTek, Inc.

CERTIFIED ENGINEERING GEOLOGIST
Christopher D. Livesey
2733
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
EDWIN R. CUNNINGHAM
No. C 81687
Exp. Date
CIVIL
STATE OF CALIFORNIA

Christopher D. Livesey
CEG 2733, Exp. 05/31/2025
Vice President

Edwin R. Cunningham
RCE 81687, Exp. 03/31/2026
Project Engineer

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1. PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to assess the site geotechnical conditions with regards to the proposed improvements. Services provided for this study included the following:

- Research and review of readily available geologic data and general information pertinent to the site.
- Excavation of four manual auger borings and collection of bulk and relatively undisturbed in-situ samples for subsequent laboratory testing.
- Laboratory testing of soil samples collected during field exploration.
- Review and analysis of geologic and geotechnical engineering data.
- Compilation of this geotechnical report which presents GeoTek's findings of pertinent site geotechnical conditions and geotechnical recommendations for site development.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 SITE DESCRIPTION

The subject property is located at 3328 Roosevelt Street, Carlsbad, California 92008. (See Figure 1). The property is currently undeveloped and relatively flat with a change of elevation of approximately 1 foot across the lot. The property is bounded to the north and south by residential property, to the east by an alley, and to the west by Roosevelt Street.

This report is limited to the subject property, see Geotechnical Map, Figure 2.

2.2 PROPOSED DEVELOPMENT

Based on correspondence with you and a preliminary site plan, the proposed construction consists of two multi-family structures, each with three units, for a total of six units. The buildings are planned to be two-story and assumed to be wood framed, stucco sided, supported by continuous/spread footings with slab on grade flooring and associated utility improvements. No additional site grading (cuts and fills to change grades) other than remedial grading is proposed at this time.

3. FIELD STUDY AND LABORATORY TESTING

3.1 FIELD EXPLORATION

The field exploration for this study was conducted on November 6, 2024, and consisted of a site reconnaissance, excavation of four manual auger borings (HA-1 through HA-4), and collection of relatively undisturbed and bulk soil samples for subsequent laboratory testing. A representative from GeoTek visually logged the excavations as depicted on the Logs of Exploration, presented in Appendix A. The approximate locations of the test borings are presented on the Geotechnical Map, Figure 2.

3.2 LABORATORY TESTING

Laboratory tests were performed on the soil samples collected during the field exploration. The purpose of the laboratory testing was to evaluate their physical and chemical soil properties for use in engineering design and analysis. Results of the laboratory testing program, along with a brief description and relevant information regarding testing procedures, are included in Appendix B. Tests Performed consisted of the following:

- Dry Density/Moisture Content (ASTM D 2216)
- Direct Shear (ASTM D 4038)
- Expansion Index (ASTM D 4829)
- Maximum Dry Density/Optimum Moisture Content (ASTM D 1557)
- Soluble Sulfate (Cal Test 417)

4. GEOLOGIC AND SOILS CONDITIONS

4.1 REGIONAL SETTING

The subject property is located in the Peninsular Ranges geomorphic province. The Peninsular Ranges province is one of the largest geomorphic units in western North America. It extends from the north and northeast, adjacent the Transverse Ranges geomorphic province to the top of Baja California. This province varies in width from about 30 to 100 miles. It is bounded on the west by the Pacific Ocean, on the south by the Gulf of California, and on the east by the Colorado Desert Province.

The Peninsular Ranges are essentially a series of northwest-southeast oriented fault blocks. Several major fault zones are found in this province. The Elsinore Fault zone and the San Jacinto

Fault zones trend northwest-southeast and are found in the near the middle of the province. The San Andreas Fault zone borders the northeasterly margin of the province. The Newport-Inglewood-Rose Canyon Fault zone borders the southwest margin of the province. No faults are shown in the immediate site vicinity on the map reviewed for the area (Kennedy, 2007).

4.2 EARTH MATERIALS

A brief description of the earth materials encountered during both subsurface explorations is presented in the following sections. Based on review of published geologic maps and our site evaluation, the site is locally underlain by artificial fill and over Old Paralic Deposits.

4.2.1 Artificial Fill (Map Symbol Af)

Artificial fill was encountered during the subsurface explorations in all borings to approximately 0.5 to 1 foot below the existing ground surface (Artificial Fill encountered consisted of silty fine to medium sand, light brown in color, dry, and loose. The artificial fill in its current state is not suitable to support the proposed development.

4.2.2 Old Paralic Deposits (Map Symbol Qop)

The regional geologic map showing the overall site geology (Kennedy, 2007) indicates Old Paralic Deposits underlie the near surface topography. All borings encountered Old Paralic Deposits underlying the artificial fill at approximately 0.5 to 1 foot below ground surface, and consisted of silty fine to medium sand, light brown to reddish brown in color, dry, loose to dense. All borings encountered refusal due to very dense Old Paralic Deposits.

4.3 SURFACE AND GROUND WATER

4.3.1 Surface Water

Surface water was not observed during the site visit and exploration. If encountered during earthwork construction, surface water on this site will likely be the result of precipitation or possibly minor surface runoff.

4.3.2 Groundwater

Groundwater or localized perched water was not encountered in the exploration and is not anticipated to be a factor in the proposed construction.

4.4 EARTHQUAKE AND SEISMIC HAZARDS

No active or potentially active fault is known to exist at this site nor is the site situated within an *"Alquist-Priolo"* Earthquake Fault Zone or a Special Studies Zone (Bryant and Hart, 2007). No faults are identified on the geologic maps reviewed for the immediate proximity of the study area.

The liquefaction potential and seismic settlement potential on this site are considered negligible due to the apparent dense underlying formation material and absence of a shallow groundwater table.

Evidence of ancient landslides or gross slope instabilities at this site was not observed during this study or indicated on regional geologic maps. Thus, the potential for landslides is considered negligible.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 GENERAL

The proposed improvements appear feasible from a geotechnical viewpoint provided that the project design and construction comply with ordinances of the 2022 California Building Code (CBC), City of Carlsbad guidelines and recommendations contained in this report.

5.2 EARTHWORK CONSIDERATIONS

5.2.1 Site Clearing and Building Pad Preparation

Initial site preparation should commence with removal of existing structures, debris, abandoned utilities, deleterious materials, and vegetation within the limits of the planned improvements. These materials should be properly disposed of off-site. Voids resulting from removing any materials should be replaced with engineered fill materials with expansion characteristics similar to the onsite materials. If encountered, any existing underground improvements, e.g., footings, utilities and trench backfill, should also be removed, rerouted as appropriate, or be further evaluated as part of site development operations.

5.2.2 Remedial Grading

Remedial grading should include all areas of improvements with foundations for the building and consist of removing existing artificial fill and weathered material down to competent Old Paralic Deposits replacing with engineered fill in order to achieve finished design grades. Based on our evaluation we anticipate removal depths on the order of 3 feet. Some localized areas of deeper removals may be necessary.

The bottom of the removals should be observed by a GeoTek representative prior to processing the bottom for receiving placement of compacted fills. Once approved, the exposed soils should

be scarified, moisture conditioned to slightly above the soil's optimum moisture content to a depth of six inches, and then compacted to at least 90% of the soil maximum dry density as determined by ASTM D1557 test procedures.

The resultant voids from remedial grading/over-excavation should be filled with materials placed in general accordance with Section 5.2.4 Engineered Fill of this report.

5.2.3 Horizontal Extent of Remedial Grading

As a minimum, the lateral extent of removals should extend down and away from foundation elements at a 1:1 (h:v) projection to the recommended removal depth, or a minimum of three feet laterally, whichever is greater. Where the horizontal extent conflicts with property lines or existing foundations, a temporary excavation from the existing grades at a 1:1 into the remedial grading is recommended. The top of temporary excavation should begin one foot away from the constraint. As engineered fill is placed to achieve design grades, the temporary excavation should be benched and replaced with engineered fill. Benching is recommended to be limited to the thickness layer of engineered fill placed.

5.2.4 Engineered Fill

Onsite materials are generally considered suitable for reuse as engineered fill, provided they are free from vegetation, roots, debris, and rock/concrete or hard lumps greater than six inches in maximum dimension.

Engineered fill materials should be moisture conditioned to or slightly above optimum moisture content and compacted in horizontal lifts not exceeding 8 inch in loose thickness to a minimum relative compaction of 90% as determined by ASTM D 1557 test procedures.

5.2.5 Trench Excavations and Backfill

Temporary excavations within the onsite materials should be stable at 1½:1 (horizontal to vertical) gradient for short durations during construction, and where cuts do not exceed 20 feet in height. Temporary cuts to a maximum height of 4 feet can be excavated vertically. Trench excavations should conform to Cal-OSHA regulations. The contractor should have a competent person, per OSHA requirements, on site during construction to observe conditions and to make the appropriate recommendations.

Utility trench backfill should be compacted to at least 90% relative compaction of the maximum dry density as determined by ASTM D1557 test procedures. Under-slab trench excavation backfill should also be compacted to project specifications.

Compaction should be achieved with a mechanical compaction device. Ponding or jetting of trench backfill is not recommended. If backfill soils have dried out, they should be properly moisture conditioned prior to placement in trenches.

5.3 DESIGN RECOMMENDATIONS

5.3.1 Foundations

The structural engineer should design the slab and beam reinforcement based on actual loading conditions. It is GeoTek's recommendation that foundations are to be embedded into engineered fill, and the slab is recommended to be designed as a structural slab. As verified by laboratory testing, the near surface subgrade soils are considered to have a "very low" (EI≤20) expansion index based upon ASTM D4829 test procedures. The following criteria is for the design of the project's building foundation system.

MINIMUM DESIGN REQUIREMENTS FOR CONVENTIONALLY REINFORCED FOUNDATIONS	
DESIGN PARAMETER	**"Very Low" Expansion Index (EI≤20) Two-Story**
Perimeter Foundation Embedment Depth (Inches below lowest adjacent finished grade)	18 inches
Minimum Perimeter Foundation Width	15 inches
Minimum Isolated Square Foundation Width	30 inches
Minimum Isolated Square Foundation Embedment Depth into Engineered Fill (inches below lowest adjacent finished grade)	18 inches
Minimum Slab Thickness	4 inches
Minimum Slab Reinforcement	No. 4 bars at 18-inch centers, each way, placed within the middle-third of the slab
Minimum Footing Reinforcement	Four No. 4 Reinforcing Bars, two top and two bottom
Pre-Saturation of Subgrade Soil (percent of optimum moisture content)	Minimum 100% to a depth of 12 inches

It should be noted that the above recommendations are based on soil support characteristics only. Foundation footings deeper than those presented as minimum depths should be anticipated and are recommended to be determined in the field by the geotechnical engineer of record. The structural engineer should design the slab and beam reinforcement based on actual loading conditions.

- For footings supported within suitable bearing materials (engineered fill), as observed, and documented by a GeoTek representative, these footings may be dimensioned based on an allowable soil bearing pressure of 2,000 psf. The allowable soil bearing pressure may be increased by one-third for short term wind and/or seismic loads.

- The passive earth pressure for footings within the engineered fill may be computed as an equivalent fluid having a density of 200 psf per foot of depth, to a maximum earth pressure of 2,000 psf. A coefficient of friction between soil and concrete of 0.35 may be used with dead load forces. When combining passive and frictional resistance, the passive pressure component should be reduced by one-third.

5.3.2 Miscellaneous Foundation Recommendations

To minimize moisture penetration beneath the slab-on-grade areas, utility trenches should be backfilled with engineered fill, lean concrete, or concrete slurry where they intercept the perimeter footing or thickened slab edge. Spoils from the footing excavations should not be placed in the slab-on-grade areas unless properly compacted and tested. The excavations should be free of loose/sloughed materials and be neatly trimmed at the time of concrete placement.

5.3.3 Moisture and Vapor Retarding System

A moisture and vapor retarding system should be placed below slabs-on-grade where moisture migration through the slab is undesirable. Guidelines for these are provided in the 2022 California Green Building Standards Code (CALGreen) Section 4.505.2, the 2022 CBC Section 1907.1 and ACI 360R-10. The vapor retarder design and construction should also meet the requirements of ASTM E 1643. A portion of the vapor retarder design should be the implementation of a moisture vapor retardant membrane.

It should be realized that the effectiveness of the vapor retarding membrane can be adversely impacted as a result of construction related punctures (e.g., stake penetrations, tears, punctures from walking on the vapor retarder placed atop the underlying aggregate layer, etc.). These occurrences should be limited as much as possible during construction. Thicker membranes are generally more resistant to accidental puncture than thinner ones. Products specifically designed for use as moisture/vapor retarders may also be more puncture resistant. Although the CBC specifies a 6 mil vapor retarder membrane, it is GeoTek's opinion that a minimum 10 mil thick

membrane with joints properly overlapped and sealed should be considered, unless otherwise specified by the slab design professional.

Moisture and vapor retarding systems are intended to provide a certain level of resistance to vapor and moisture transmission through the concrete, but do not eliminate it. The acceptable level of moisture transmission through the slab is to a considerable extent based on the type of flooring used and environmental conditions. Ultimately, the vapor retarding system should be comprised of suitable elements to limit migration of water and reduce transmission of water vapor through the slab to acceptable levels. The selected elements should have suitable properties (i.e., thickness, composition, strength, and permeability) to achieve the desired performance level.

Moisture retarders can reduce, but not eliminate, moisture vapor rise from the underlying soils up through the slab. Moisture retarder systems should be designed and constructed in accordance with applicable American Concrete Institute, Portland Cement Association, Post-Tensioning Concrete Institute, ASTM and California Building Code requirements and guidelines.

GeoTek recommends that a qualified person, such as the flooring contractor, structural engineer, architect, and/or other experts specializing in moisture control within the building be consulted to evaluate the general and specific moisture and vapor transmission paths and associated potential impact on the proposed construction. That person (or persons) should provide recommendations relative to the slab moisture and vapor retarder systems and for migration of potential adverse impact of moisture vapor transmission on various components of the structures, as deemed appropriate.

In addition, the recommendations in this report and GeoTek's services in general are not intended to address mold prevention; since GeoTek, along with geotechnical consultants in general, do not practice in the area of mold prevention. If specific recommendations addressing potential mold issues are desired, then a professional mold prevention consultant should be contacted.

5.3.4 Seismic Design Parameters

The site is located at approximately 33.15670 Latitude and -117.34439 Longitude. Site spectral accelerations (Ss and S1), for 0.2 and 1.0 second periods for a risk targeted two (2) percent probability of exceedance in 50 years (MCER) were determined using the web interface provided by ASCE 7 Hazard Tool (https://asce7hazardtool.online/) to access the USGS Seismic Design Parameters. A Site Class "C" is deemed appropriate for this site based on the apparent density of the formation underlying the project site.

SITE SEISMIC PARAMETERS	
Mapped 0.2 sec Period Spectral Acceleration, S_s	1.078g
Mapped 1.0 sec Period Spectral Acceleration, S_1	0.39g
Site Coefficient for Site Class "C," F_a	1.2
Site Coefficient for Site Class "C," F_v	1.5
Maximum Considered Earthquake Spectral Response Acceleration for 0.2 Second, S_{MS}	1.294g
Maximum Considered Earthquake Spectral Response Acceleration for 1.0 Second, S_{M1}	0.585g
5% Damped Design Spectral Response Acceleration Parameter at 0.2 Second, S_{DS}	0.863g
5% Damped Design Spectral Response Acceleration Parameter at 1 second, S_{D1}	0.39g
Peak Ground Acceleration adjusted for site class effects, PGA_M	0.571g
Seismic Design Category	D

5.3.5 Soil Sulfate Content and Corrosivity

Sulfate content test results indicate water soluble sulfate is less than 0.1 percent by weight, which is considered "S0" as per Table 19.3.1.1 of ACI 318-14. Based upon the test results, no special recommendations for concrete are required for this project due to soil sulfate exposure.

5.4 CONSTRUCTION OBSERVATIONS

GeoTek representatives should be present during site grading and foundation construction to check for proper implementation of the geotechnical recommendations. These representatives should perform at least the following duties:

- Observe site clearing and grubbing operations for proper removal of unsuitable materials.
- Observe and test bottom of removals prior to fill placement/subgrade recompaction.
- Evaluate the suitability of onsite and import materials for fill placement, if needed, and collect soil samples for laboratory testing where necessary.
- Observe the fill for uniformity during placement.
- Perform field density testing of the fill and backfill materials.
- Observe and probe foundation and slab subgrade excavations to confirm suitability of bearing materials. This observation should be performed prior to placement of reinforcement.

6. INTENT

It is the intent of this report to aid in the design and construction of the proposed development. Implementation of the advice presented in this report is intended to reduce risk associated with construction projects. The professional opinions and geotechnical advice contained in this report are not intended to imply total performance of the project or guarantee that unusual or variable conditions will not be discovered during or after construction.

The scope of this evaluation is limited to the area explored that is shown on Figure 2. This evaluation does not and should in no way be construed to encompass any areas beyond the specific area of the proposed construction as indicated to us by the client. Further, no evaluation of any existing site improvements is included. The scope is based on GeoTek's understanding of the project and the client's needs, and geotechnical engineering standards normally used on similar projects in this region.

7. LIMITATIONS

GeoTek's findings are based on site conditions observed and the stated sources. Thus, GeoTek's comments are professional opinions that are limited to the extent of the available data.

GeoTek has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report.

Since GeoTek's recommendations are based on the site conditions observed and encountered and laboratory testing, the conclusions and recommendations provided in this report are professional opinions that are limited to the extent of the available data. Observations during construction are important to allow for any change in recommendations found to be warranted. These opinions have been derived in accordance with current standards of practice and no warranty of any kind is expressed or implied. Standards of care/practice are subject to change with time.

8. SELECTED REFERENCES

American Society of Civil Engineers (ASCE), 2016, "Minimum Design Loads for Buildings and Other Structures," ASCE/SEI 7-16.

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GeoTek, Inc., In-house proprietary information.

Kennedy, M.P., et al., 2007, "Geologic Map of the Oceanside 30x60-minute Quadrangle and Adjacent Areas, California," California Geological Survey, Regional Geologic Map No. 2, map scale 1:100,000.

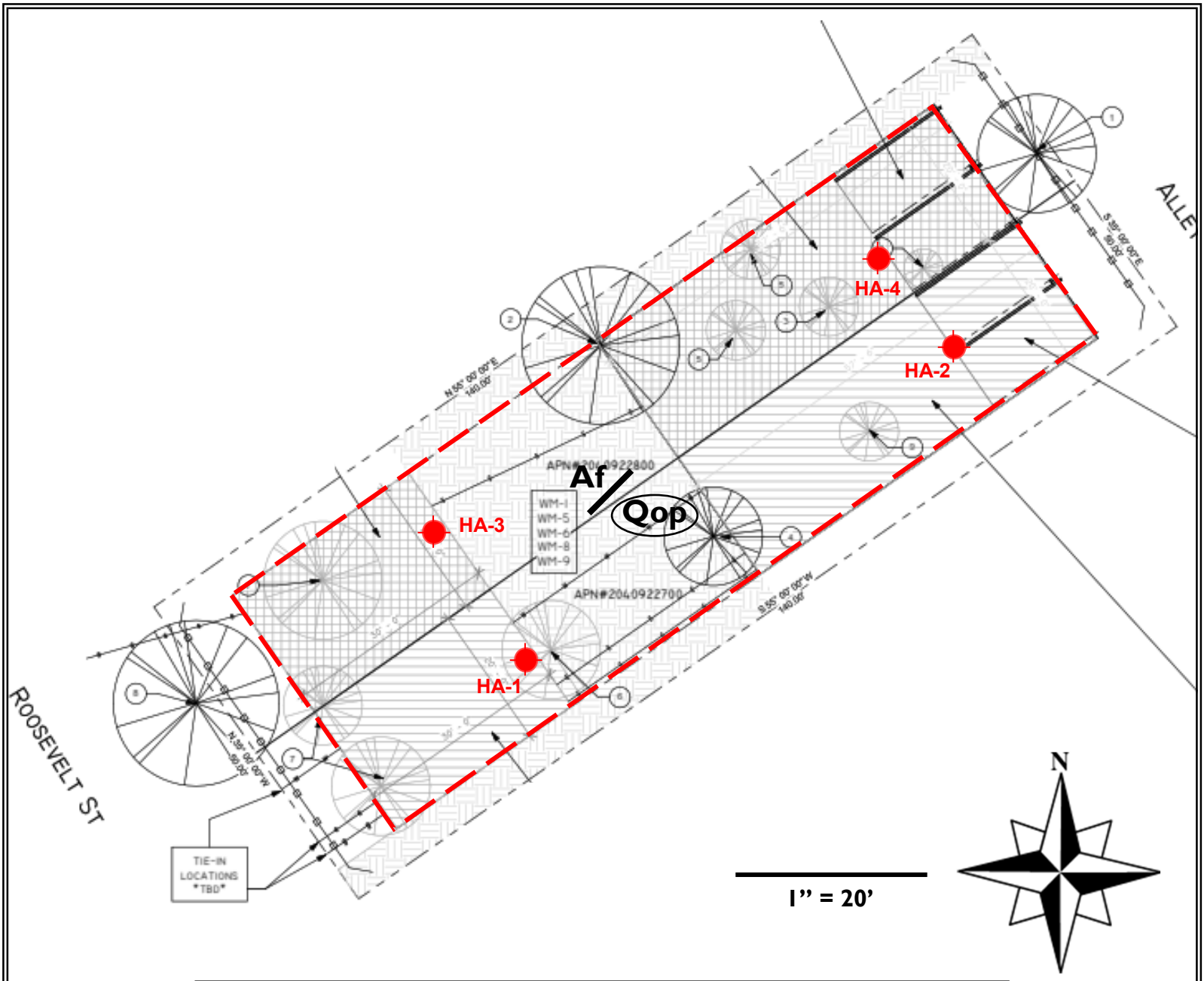
Proteus Homes, 2024, 3328 Roosevelt Street, Site Plan, dated September 11th, 2024 1 Sheet.

Terzaghi, K. and Peck, R.B., 1967, "Soil Mechanics in Engineering Practice, Second Edition.

Image from USGS The National Map (2025)

Not to Scale

GEOTEK 1384 Poinsettia Avenue, Suite A Vista, California 92081-8505		**Figure 1** Site Location Map	**Proteus Homes** 3328 Roosevelt Street Carlsbad, CA
PN: 4044-SD	*April 2025*		



LEGEND

HA-1	Approximate Location of Manual Auger Boring
Af	Artificial Fill
Qop	Quaternary Old Paralics, Circled Where Buried
– – – –	Approximate Limits of Study, This Report

Image adapted from *Site Plan*, Proteus Homes 2024

GEOTEK
1384 Poinsettia Avenue, Suite A
Vista, California 92081-8505

Figure 2

Geotechnical Map

Proteus Homes
3328 Roosevelt Street
Carlsbad, CA

PN: 4044-SD | *April 2025*

APPENDIX A

LOGS OF EXPLORATION

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Proteus Homes	**DRILLER:**	GeoTek Inc.	**LOGGED BY:**	BJ
PROJECT NAME:	3328 Roosevelt Street	**DRILL METHOD:**	Boring	**OPERATOR:**	BJ
PROJECT NO.:	4044-SD	**HAMMER:**	35 lbs	**RIG TYPE:**	Manual Auger
LOCATION:	Carlsbad, CA	**ELEVATION:**	51 feet msl	**DATE:**	11/6/2024

BORING NO. HA-1

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
			BB-1	SM	**Artificial Fill (Af)** Topsoil, dry grass, leaves, silty fine to medium SAND, light brown, dry, loose			SH, EI, MD
1		30 20	R-1	SM	**Old Paralic Deposits (Qop)** Silty fine to medium SAND, light brown with some reddish brown, dry, medium dense, dense at 1 foot, friable	3.6	98.4	
2		50/1	R-2		Material becomes very dense, auger does not advance, practical refusal No recovery of ring sample			
3					**HOLE TERMINATED AT 2 FEET** Practical refusal No groundwater encountered Backfilled with adjacent soil			
4								
5								
6								
7								
8								
9								
10								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resistivity Test; SH = Shear Test; CO = Consolidation test; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Proteus Homes	**DRILLER:**	GeoTek Inc.	**LOGGED BY:**	BJ
PROJECT NAME:	3328 Roosevelt Street	**DRILL METHOD:**	Boring	**OPERATOR:**	BJ
PROJECT NO.:	4044-SD	**HAMMER:**	35 lbs	**RIG TYPE:**	Manual Auger
LOCATION:	Carlsbad, CA	**ELEVATION:**	50 feet msl	**DATE:**	11/6/2024

BORING NO. HA-2

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
			BB-1	SM	**Artificial Fill (Af)** Topsoil, dry grass, leaves, silty fine to medium SAND, light brown, loose, dry			
1		25	R-1	SM	**Old Paralic Deposits (Qop)** Silty fine to medium SAND, reddish brown, loose, uniform, friable At 1 foot, material becomes medium dense, sample not recovered			
2		65			Material becomes more cemented			
3		50/1	R-2		Material becomes very dense, auger not advancing. No sample recovery			
					HOLE TERMINATED 3 FEET Practical refusal No groundwater encountered Backfilled with adjacent soil			

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resistivity Test; SH = Shear Test; CO = Consolidation test; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Proteus Homes	**DRILLER:**	GeoTek Inc.	**LOGGED BY:**	BJ
PROJECT NAME:	3328 Roosevelt Street	**DRILL METHOD:**	Boring	**OPERATOR:**	BJ
PROJECT NO.:	4044-SD	**HAMMER:**	35 lbs	**RIG TYPE:**	Manual Auger
LOCATION:	Carlsbad, CA	**ELEVATION:**	51 feet msl	**DATE:**	11/6/2024

BORING NO. HA-3

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0			BB-1	SM	**Artificial Fill (Af)** Topsoil, dry grass, leaves, silty fine to medium SAND, light brown, very dry, loose			
1				SM	**Very Old Paralics (Qop)** Silty fine to medium SAND, light brown, very dry, medium dense, friable Material becomes very dense, auger nearing refusal			
2					**HOLE TERMINATED AT 2 FEET** Practical refusal No groundwater encountered Backfilled with adjacent soil			
3								
4								
5								
6								
7								
8								
9								
10								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resistivity Test; SH = Shear Test; CO = Consolidation test; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	Proteus Homes	**DRILLER:**	GeoTek Inc.	**LOGGED BY:**	BJ
PROJECT NAME:	3328 Roosevelt Street	**DRILL METHOD:**	Boring	**OPERATOR:**	BJ
PROJECT NO.:	4044-SD	**HAMMER:**	35 lbs	**RIG TYPE:**	Manual Auger
LOCATION:	Carlsbad, CA	**ELEVATION:**	50 feet msl	**DATE:**	11/6/2024

BORING NO. HA-4

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
				SM	**Artificial Fill (Af)** Topsoil, dry grass, leaves, silty fine to medium SAND, light brown, dry, loose,			
1		12 20	R-1	SM	**Old Paralic Deposits** Silty fine to medium SAND, reddish brown, dry, loose, friable	3.9	96.1	
2					Material becomes medium dense, dry			
3					Material becomes damp			
					HOLE TERMINATED AT 3 FEET			
4					Practical refusal No groundwater encountered Backfilled with adjacent soil			
5								
6								
7								
8								
9								
10								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resistivity Test; SH = Shear Test; CO = Consolidation test; MD = Maximum Density

APPENDIX B

RESULTS OF LABORATORY TESTING

SUMMARY OF LABORATORY TESTING

Identification and Classification

Soils were identified visually in general accordance with the procedures of the Standard Practice for Description and Identification of Soils (ASTM D2488). The soil identifications and classifications are shown on the exploration logs in Appendix A.

Direct Shear - Remolded

Direct shear testing was performed on a representative remolded site soil sample obtained from the subsurface exploration. Testing was performed in general accordance with ASTM D 3080 test procedures. The results of the testing are presented in Appendix B.

Maximum Density

Laboratory testing was performed on one sample collected during the subsurface exploration for compaction characteristics. The laboratory maximum dry density and optimum moisture content for the soil was determined in general accordance with ASTM Test Method D 1557 procedures. The test results are graphically presented in Appendix B.

Expansion Index

Expansion Index testing was performed on a representative site soil sample obtained from the subsurface exploration. Testing was performed in general accordance with ASTM D 4829 test procedures. The results of the testing are presented in Appendix B.

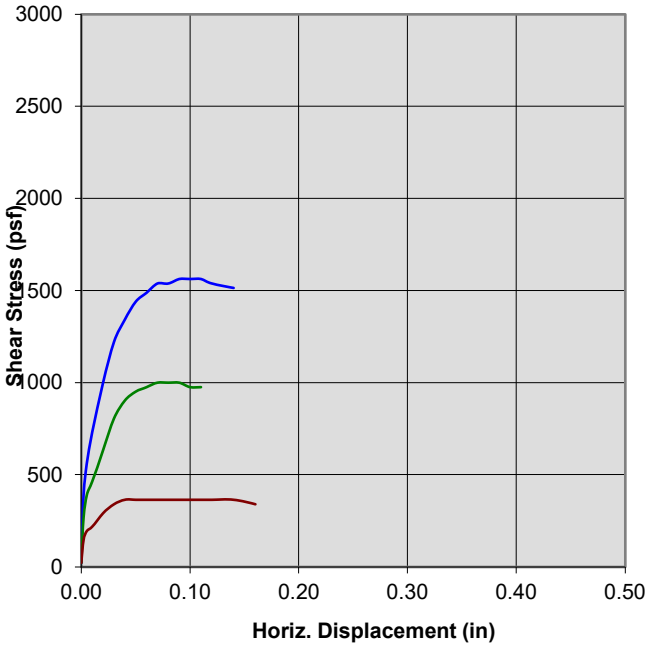
In-Situ Moisture and Density

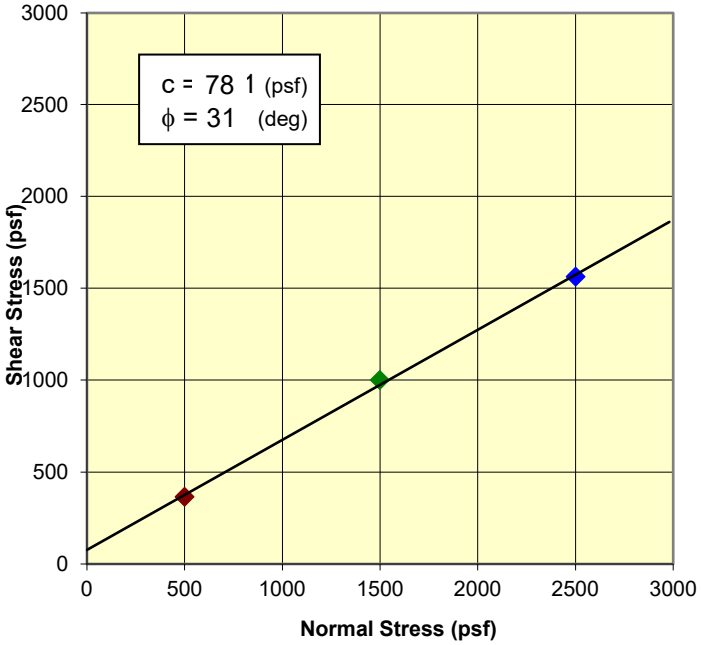
The natural water content was determined (ASTM D 2216) on samples of the materials recovered during the subsurface exploration. In addition, in-place dry density determinations (ASTM D 2937) were performed on relatively undisturbed samples to measure the unit weight of the subsurface soils. Results of these tests are shown on the boring logs at the appropriate sample depths in Appendix A.

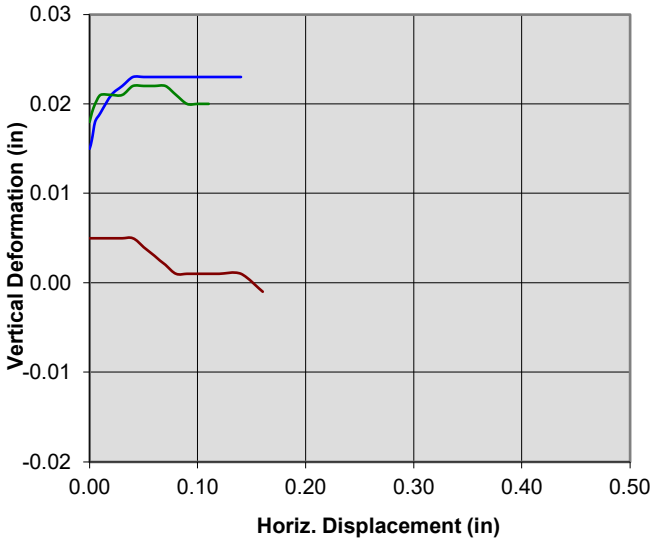
Sulfate and Chloride Content

The soluble sulfate and chloride content of a representative site soil sample was determined by GeoTek's subconsultant, Project X, in general accordance with ASTM D 4327 test procedures. The results of the testing are provided in Appendix B.

DIRECT SHEAR TEST REPORT







Shear Strength: Φ = 31 ° C = 78 psf

Sample No.		1	2	3
Initial	Water Content, %	8.0	8.0	8.0
	Dry Density, pcf	116.3	115.8	116.2
	Saturation, %	49.0	48.2	48.8
	Void Ratio	0.44	0.44	0.44
	Diameter, in.	2.375	2.375	2.375
	Height, in.	1.0	1.0	1.0
At Test	Water Content, %	13.8	15.0	14.7
	Dry Density, pcf	116.9	117.9	117.9
	Saturation, %	85.7	96.4	94.0
	Void Ratio	0.43	0.42	0.42
	Height, in.	0.995	0.982	0.985
Normal Stress, psf		500	1500	2500
Failure Stress, psf		365	1000	1563
Displacement, in.		0.000	0.004	0.008
Ultimate Stress, psf		0	0	0
Displacement, in.		0.000	0.000	0.000
Strain rate, in./min.		0.0100	0.0100	0.0100

Description: Reddish brown sandy silt

Remarks: Soaked, consolidated, drained. 2.375-in. remolded ring sample

Condition: ☐ In-situ ■ Remolded

Project Name:	**3328 Roosevelt**	**Technician:**	**MB**
Project Number:	**4044-SD**	**Location:**	
Sample ID:	**HA-1 BB-1**	**Apparatus:**	
Sample Depth:	**0-2'**	**Date:**	**11/18/2024**

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EXPANSION INDEX TEST

(ASTM D4829)

Project Name:	3328 Roosevelt	***Tested/ Checked By:***	***MB/ERC*** Lab No 244
Project Number:	4044-SD	***Date Tested:***	11/14/2024
Project Location:	Carlsbad, CA	***Sample Source:***	HA-1 & 3 BB-1
		Sample Description:	Brown Silty Sand

Ring Id 12 Ring Dia. " 4" Ring H 1"

Loading weight: 5516. grams

DENSITY DETERMINATION

A	Weight of compacted sample & ring	**785.6**
B	Weight of ring	370.5
C	Net weight of sample	415.1
D	Wet Density, lb / ft3 (C*0.3016)	125.2
E	Dry Density, lb / ft3 (D/1.F)	**115.5**

SATURATION DETERMINATION

	Wet Weight of sample & tare	**103.7**
	Dry Weight of sample & tare	**96.2**
	Tare	**7**
F	Initial Moisture Content, %	**8.4**
G	(E*F)	971.0
H	(E/167.232)	0.69
I	(1.-H)	0.31
J	(62.4*I)	19.3
K	(G/J)= **L** % Saturation	**50.3**

READINGS

DATE	TIME	READING	
11/14/2024	12:20	150	Initial
11/14/2024	12:30	147	10 min/Dry
11/14/2024	12:31	144	1 min/Wet
11/14/2024	12:35	143	5 min/Wet
11/14/2024	2:00	139	Random
11/14/2024	2:00	139	Final

FINAL MOISTURE

Weight of wet sample & tare	Wt. of dry sample & tare	Tare	% Moisture
120.8	106.7	4.7	13.8%

EXPANSION INDEX = 0

GeoTek - Vista
1384 Poinsettia Ave Suite A
Vista, CA 83642
Phone: (760) 599-0509
Fax: (760) 599-0593

Proctor Report

Report No: PTR:24-00243-S01

Client: Proteus Homes
Attn: JD Ower
Vista CA 92083

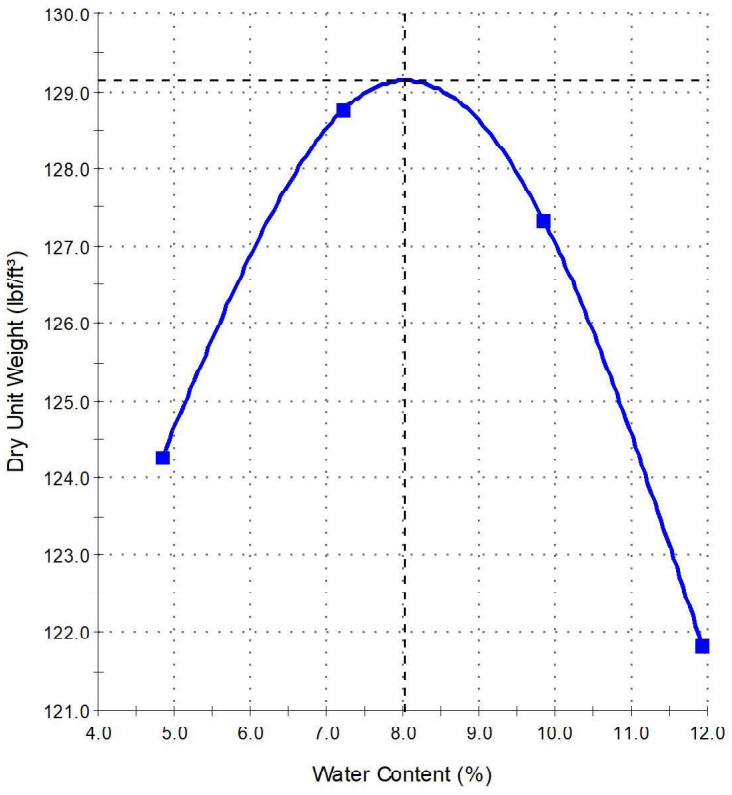
CC:

Project: 4044-SD
3328 Roosevelt Street

Sample Details

Sample ID: 24-00243-S01
Date Sampled: 11/6/2024
Sampled By:
Material: Brown Silty Sand
Location: HA-1 & HA-4 BB-1

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D 1557

Maximum Dry Unit Weight (lbf/ft³):	**129.1**
Optimum Water Content (%):	**8.0**
Method:	A
Preparation Method:	Moist
Tested By:	Melea Bailey
Date Tested:	11/13/2024

Comments

Results Only Soil Testing for 3328 Roosevelt Street

November 12, 2024

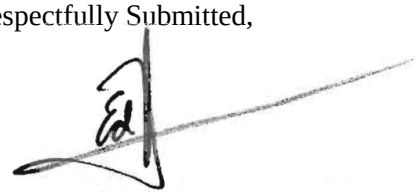
Prepared for:

Ray Cunningham
GeoTek, Inc.
1384 Poinsettia Ave, Suite A
Vista, CA 92081
ecunningham@geotekusa.com

Project X Job#: S241111F
Client Job or PO#: X

Prepared by:
N. Rabatin

Respectfully Submitted,



Eduardo Hernandez, M.Sc., P.E.
Sr. Corrosion Consultant
NACE Corrosion Technologist #16592
Professional Engineer
California No. M37102
ehernandez@projectxcorrosion.com

Soil Analysis Lab Results

Client: GeoTek, Inc.
Job Name: 3328 Roosevelt Street
Client Job Number: X
Project X Job Number: S241111F
November 12, 2024

	Method	ASTM D4327		ASTM D4327	
Bore# / Description	**Depth**	**Sulfates** SO_4^{2-}		**Chlorides** Cl^-	
	(ft)	**(mg/kg)**	**(wt%)**	**(mg/kg)**	**(wt%)**
HA-1 BB-1	0-2	45.8	0.0046	46.3	0.0046

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
Chemical Analysis performed on 1:3 Soil-To-Water extract
PPM = mg/kg (soil) = mg/L (Liquid)

Note: Sometimes a bad sulfate hit is a contaminated spot. Typical fertilizers are Potassium chloride, ammonium sulfate or ammonium sulfate nitrate (ASN). So this is another reason why testing full corrosion series is good because we then have the data to see if those other ingredients are present meaning the soil sample is just fertilizer-contaminated soil. This can happen often when the soil samples collected are simply surface scoops. This is why it's best to dig in a foot, throw away the top and test the deeper stuff. Dairy farms are also notorious for these items.

If one sample pops up much more corrosive than all others, we would recommend collecting more samples surrounding the problem sample location to determine if the peak is isolated to it. This allows us to conclude it was a contaminated sample and able to declare it an outlier.

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