Experience is the difference

PRELIMINARY GEOTECHNICAL STUDY REPORT

MARINWOOD LOW INCOME HOUSING
121, 155, 175, AND 197 MARINWOOD AVENUE
SAN RAFAEL, CALIFORNIA

Project Number:

7799.001.01.1

Prepared For:

Impact Residential Development, LLC
c/o Alex Waterbury
400 Galleria Parkway, Suite 1450
Atlanta, Georgia

Prepared By:

RGH Consultants

Santa Rosa Office
3501 Industrial Drive, Suite A
Santa Rosa, CA 95403
707-544-1072

Napa Office
1041 Jefferson Street, Suite 4
Napa, CA 94559
707-252-8105

Jared J. Pratt
Principal Engineering Geologist

Eric G. Chase
Principal Geotechnical Engineer
Project Manager

CERTIFIED ENGINEERING GEOLOGIST
JARED JACKSON PRATT
No. 2453
STATE OF CALIFORNIA

December 29, 2023

REGISTERED PROFESSIONAL ENGINEER
ERIC G. CHASE
No. 2628
GEOTECHNICAL
STATE OF CALIFORNIA

TABLE OF CONTENTS

INTRODUCTION

This report presents the results of our preliminary geotechnical study for the proposed residential community to be constructed at 121, 155, 175, and 197 Marinwood Avenue in San Rafael, California. The combined properties are approximately 5 acres total in size and include Assessor Parcel Numbers 164-471-64, 164-471-65, 164-471-69, and 164-471-70. These parcels extend over predominantly level terrain that is formerly a shopping center of which only the market remains. A gas station that was located north of the shopping center within the project area has also been removed. The site location is shown on Plate 1.

We understand that it is planned to construct four 3-story apartment buildings and a new retail building with associated new parking and landscape improvements. The existing marketplace will remain.

The purpose of our study as outlined in our proposal dated October 31, 2023, was to evaluate the geologic hazards within the property and comment on the geotechnical feasibility of the project. In addition, we were to recommend the geotechnical services needed for actual development, design, and construction of the project.

SCOPE

Our scope of work was limited to a brief site reconnaissance, geotechnical laboratory testing of near surface soil samples obtained from borings performed by the environmental consultant, a review of selected published geologic data and satellite imagery pertinent to the site, and preparation of this report. Site-specific subsurface exploration was not requested, authorized, or performed for this phase of our services.

SERVICES PROVIDED

We reviewed satellite imagery of the site and published geologic information pertinent to the site. A list of the geologic references reviewed is presented at the end of this report. On December 12, 2023, our engineer conducted a surficial reconnaissance of the property to observe the current site conditions, observe the locations of planned environmental borings, and collected samples of near surface soils from borings performed by the environmental consultant. A site plan of the property showing the location of proposed improvements and sample collection locations is presented on Plate 2.

Based on the geologic literature review, site reconnaissance, and laboratory testing, we were to develop the following information:

- A brief description of geologic, anticipated surface soil, and other conditions observed during our reconnaissance and from laboratory testing;
- A discussion of geologic hazards that may affect the proposed project;
- Our opinions regarding the geotechnical feasibility of the project; and
- Preliminary conclusions and recommendations concerning;
    - Primary geotechnical engineering concerns and possible mitigation measures, as applicable;
    - Suitable foundation systems for new structures; and
    - Supplemental geotechnical engineering services.

SITE CONDITIONS

General

Marin County is located within the California Coast Range geomorphic province. This province is a geologically complex and seismically active region characterized by sub-parallel northwest-trending faults, mountain ranges and valleys. The oldest bedrock units are the Jurassic-Cretaceous Franciscan Complex and Great Valley sequence sediments originally deposited in a marine environment. Subsequently, younger rocks such as the Tertiary-age Sonoma Volcanics group, the Plio-Pleistocene-age Clear Lake Volcanics and sedimentary rocks such as the Guinda, Domengine, Petaluma, Wilson Grove, Cache, Huichica and Glen Ellen formations were deposited throughout the province. Extensive folding and thrust faulting during late Cretaceous through early Tertiary geologic time created complex geologic conditions that underlie the highly varied topography of today. In valleys, the bedrock is covered by thick alluvial soils.

Geology

Published geologic maps (Rice et al., 2002) indicate the project site is within an alluvial valley between hillsides underlain by Franciscan Complex bedrock. The property is underlain by Holocene aged alluvium (Qha). The alluvium generally consists of poorly to moderately sorted gravels, sands, and silts. Miller Creek passes south of the project site within the mapped stream channel deposits (Qhc) and consist of loose alluvial sand, gravel, and silt.

Landslides

The site is essentially flat and not located near hillsides. The nearest sloping conditions are approximately 700 feet to the south.

Faulting

The site is not within a current Alquist-Priolo Earthquake Fault Zone for active faults as defined by the California Geological Survey (Bryant and Hart, 2007).

Surface Conditions and Near Surface Soil Conditions

The property extends primarily over relatively level terrain that is formerly a shopping center of which only the market remains. The site surfaces around the market are generally paved for parking with landscape areas or consist of exposed soil where the shopping center structures have been removed. A gas station that was located north of the shopping center within the project area has also been removed resulting in exposed soil. The property is bordered by mature trees with trees scattered throughout the landscaped parking areas.

The near surface soil conditions where the gas station was located and within areas where the shopping center has been removed consists of a few to several feet of heterogeneous fill. Some of this fill was placed as part of remediation efforts for the gas station and a dry cleaner in the shopping center. There may be some documentation of the compaction of the fill placed for remediation. Undocumented heterogeneous fill is generally a material with varying density, strength, compressibility, and shrink-swell characteristics that often has an unknown origin and placement history. Outside of fill areas, a native clay material with varying amounts of sand was observed. Laboratory test results indicate the fill and native soils have low plasticity (LL = 27.0, 28.6; PI = 9.3, 9.0) and low expansion potential (EI = 35, 43). These laboratory test results are presented on Plates 3 and 4.

Natural drainage consists of overland flow over the ground surface that concentrates in man-made drainage elements, such as directed surface drainage, street gutters, and storm drains and natural drainage elements such as Miller Creek located south of the project site.

DISCUSSION AND CONCLUSIONS

Geologic Hazards

Landslides

As discussed previously, the site is essentially flat and not located near hillsides.

Fault Rupture

We did not observe landforms within the area that would indicate the presence of active faults and the site is not within a current Alquist-Priolo Earthquake Fault Zone (Bryant and Hart, 2007). Therefore, we believe the risk of fault rupture at the site is low.

Strong Ground Shaking

The site is within an area affected by strong seismic activity. The USGS Unified Hazard Tool (https://earthquake.usgs.gov/hazards/interactive/) 10 percent chance of exceedance in the next 50 years is 0.478g indicates that the peak ground acceleration (PGA)at the site for an earthquake with a while the PGA for an earthquake with a 2% chance of exceedance in 50 years is 0.786g. Therefore, future seismic shaking should be anticipated at the site. It will be necessary to design and construct the proposed structures in strict adherence with current standards for earthquake-resistant construction and in accordance with the current building code at the time of design and construction.

Liquefaction and Densification

Liquefaction is a rapid loss of shear strength experienced in saturated, predominantly granular soils below the groundwater level during strong earthquake ground shaking due to an increase in pore water pressure. The occurrence of this phenomenon is dependent on many complex factors including the intensity and duration of ground shaking, particle size distribution and density of the soil. Per the “Geology” section of this report, the site is underlain by Holocene aged alluvium that is shown to consist of gravels, sands, and silts, which are soils that can be susceptible to liquefaction and densification. A

review of published liquefaction hazard maps [Marin Map GIS System for Marin County (https://marinmap.org) and Knudsen et al., 2000) found that the project site is located within a zone of moderate liquefaction potential.

Densification is the settlement of loose, granular soils above the groundwater level due to earthquake shaking. Densification typically occurs in old fills and in soils that if saturated would be susceptible to liquefaction. As discussed previously, old fills are present at the site and the site has a moderate potential for liquefaction. Therefore, the subsurface soil at the site has a moderate potential for densification. The final geotechnical study should address liquefaction and densification potential in detail.

Geotechnical Issues

Based upon the results of our geologic data review, reconnaissance, and laboratory testing, we judge that it is geotechnically feasible to construct the proposed project at the site. The primary geotechnical considerations and potential mitigating measures recommended for building site development are discussed in the following sections of the report. These conclusions are preliminary and will need to be verified or modified during final design following detailed site-specific subsurface exploration, laboratory testing and geotechnical engineering evaluations, as recommended herein.

Old Fill

As discussed previously, old fill is present at the site. Some of this fill was placed as part of remediation operations for environmental cleanups. The documentation of this fill placement needs to be reviewed to confirm the quality of the fill. Old fills of unknown quality and unknown method of placement, such as those anticipated to be found at the site outside of remediation areas, can settle and/or heave erratically under the load of new fills, structures, slabs, and pavements. Footings, slabs, and pavements supported on old fill could also crack as a result of such erratic movements. Thus, where not removed by planned grading, the old fill must be excavated and replaced as an engineered fill if it is to be used for structural support. Alternatively, the structures can be supported on mat slabs designed for the anticipated settlement and differential movement associated with old fills of varying thicknesses. The final geotechnical study should address the impacts of the old fill in detail.

Weak, Porous Surface Soils

Weak, porous surface soil, such as that anticipated to be found at the site outside of old fill areas, appears hard and strong when dry but will lose strength rapidly and settle under the load of fills, foundations, slabs, and pavements as its moisture content increases and approaches saturation. The moisture content of this soil can increase as the result of rainfall, periodic irrigation or when the natural upward migration of water vapor through the soil is impeded by, and condenses under fills, foundations, slabs, and pavements. The detrimental effects of such movements can be reduced by strengthening the soil during grading. This can be achieved by excavating the weak soil and replacing it as properly compacted (engineered) fill.

Soils with Moderate Potential for Liquefaction/Densification

As discussed previously, hazard mapping indicates that the subsurface soil at the site has moderate potential for liquefaction and densification. The potential consequences of liquefaction are bearing capacity failure, which is extreme settlement when foundations are located close to the liquefiable layer, lateral spreading towards a free face such as Miller Creek, and settlement related to the densification of the liquefied soil. It has been our experience that subsurface soil with a moderate potential for liquefaction generally has discontinuous layers with the typical consequence being settlement. The final geotechnical study should address liquefaction and densification potential in detail.

Foundation Slab and Pavement Support

After remedial grading of old fill and weak, porous surface soil, satisfactory foundation support for the strictures can likely be obtained from spread footings that bottom on the engineered fill. With this option, interior slab-on-grade floors can also be satisfactorily supported on the engineered fill. However, if the variable quality and thickness of the old fill and/or liquefaction/densification results in excessive settlement and differential settlement, the structures can be supported on mat slabs supported on the engineered fill. Criteria for the design of the above foundation systems should be developed by a site-specific geotechnical study as recommended in the supplemental services section of this report.

Flooding

Our review of the Federal Emergency Management Agency (FEMA) Flood Zone Map for Marin County, California, Unincorporated Areas (No. 06041C0291D) dated May 4, 2009, indicates that the site is located within Zone “X”, an area of minimal flood hazard. If the building sites are located as shown on Plate 2, we judge the risk of flooding will be low. However, evaluation of flooding potential is typically the responsibility of the project civil engineer.

Supplemental Services

We should perform a detailed geotechnical study prior to the construction of the residential community. The study should include test borings, Cone Penetration Tests, laboratory testing, and engineering analyses. The geotechnical study should address specific design aspects of the project, and the data generated should be incorporated into project plans. The plans should then be reviewed by the geotechnical engineer as part of the project approval process.

LIMITATIONS

This report has been prepared by RGH for the exclusive use of Impact Residential Development and their consultants to evaluate the geotechnical feasibility of residential community at the site.

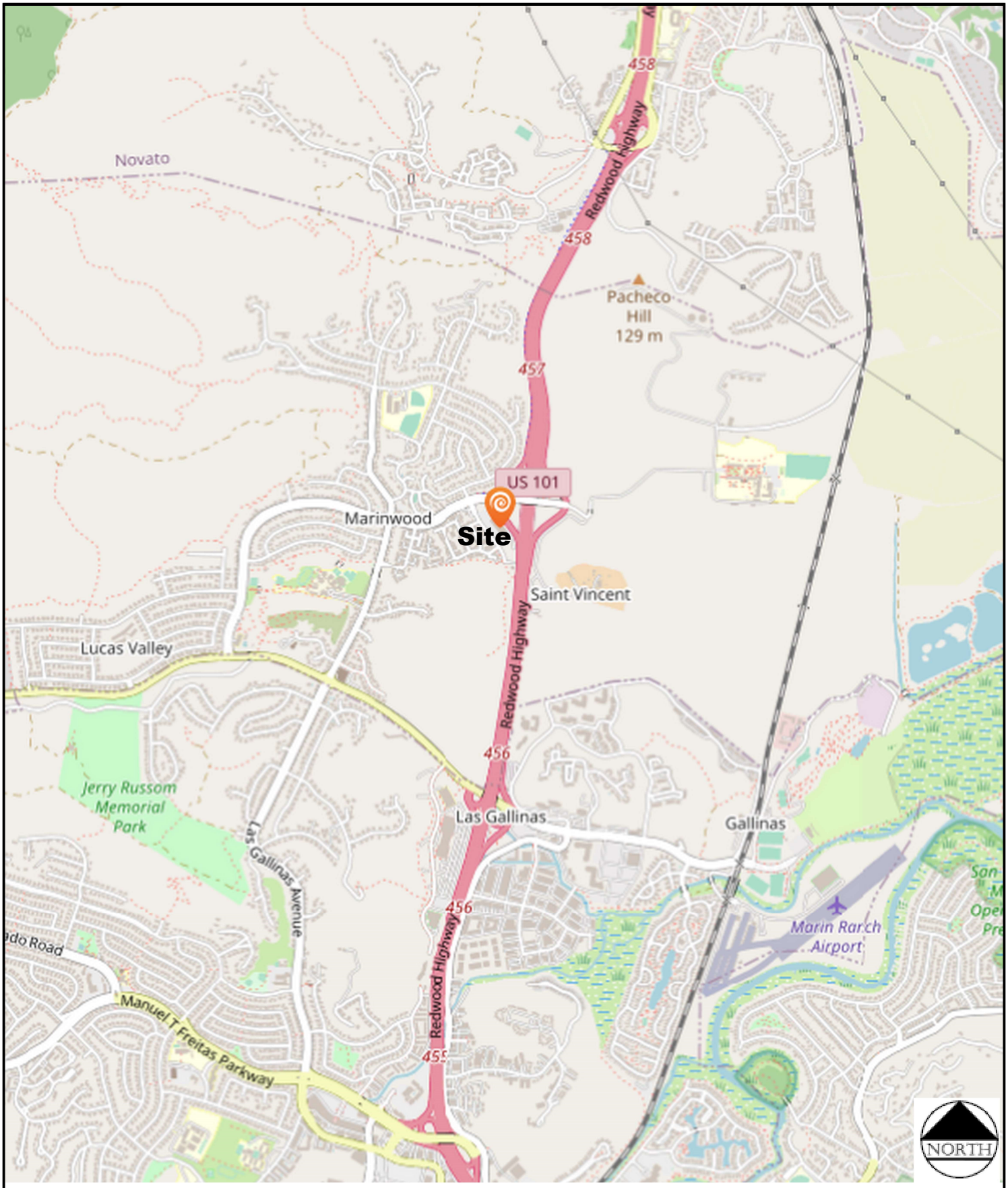
Our services consist of professional opinions and conclusions developed in accordance with generally accepted geotechnical engineering principles and practices. We provide no warranty, either expressed or implied. Our conclusions and recommendations are based on the information provided to us regarding the proposed project; the results of our field reconnaissance, laboratory testing, and data review; and professional judgment. As such, our conclusions and recommendations should be considered preliminary and for feasibility and planning purposes only. A subsurface study, such as recommended herein, may reveal conditions different from those inferred by surface observation and data review only. Such subsurface study may warrant a revision to our preliminary conclusions.

Site conditions and cultural features described in the text of this report are those existing at the time of our site reconnaissance on December 12, 2023, and may not necessarily be the same or comparable at other times.

The scope of our services did not include an environmental assessment or a study of the presence (or absence) of hazardous, toxic or corrosive materials in the soil, surface water, groundwater or air on, below, or around this site, nor did it include an evaluation or study for the presence (or absence) of wetlands.

APPENDIX A - PLATES

LIST OF PLATES



Reference: Mapline

Scale: 1" = 2000'

RGH CONSULTANTS

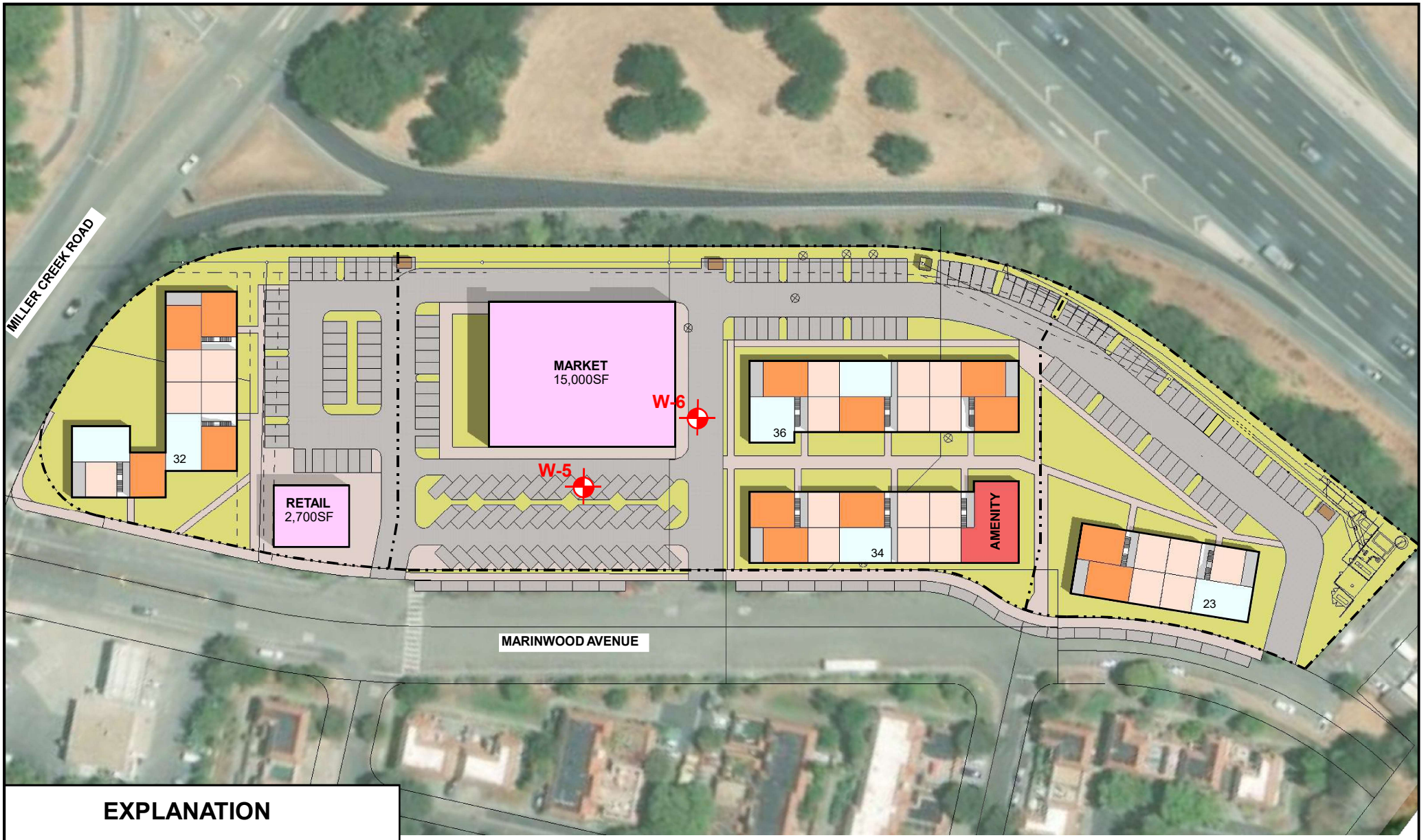
Job No: 7799.001.01.01 | Date: DEC 2023

SITE LOCATION MAP

Marinwood Low Income Housing
121, 155, 175, and 197 Marinwood Avenue
San Rafael, California

PLATE

1



EXPLANATION

W-3 Boring Location and Number

100 0 100 feet

Reference: "Conceptual Site Plan" by LPAS Architecture + Design (10/30/23)

Scale: 1" = 100'

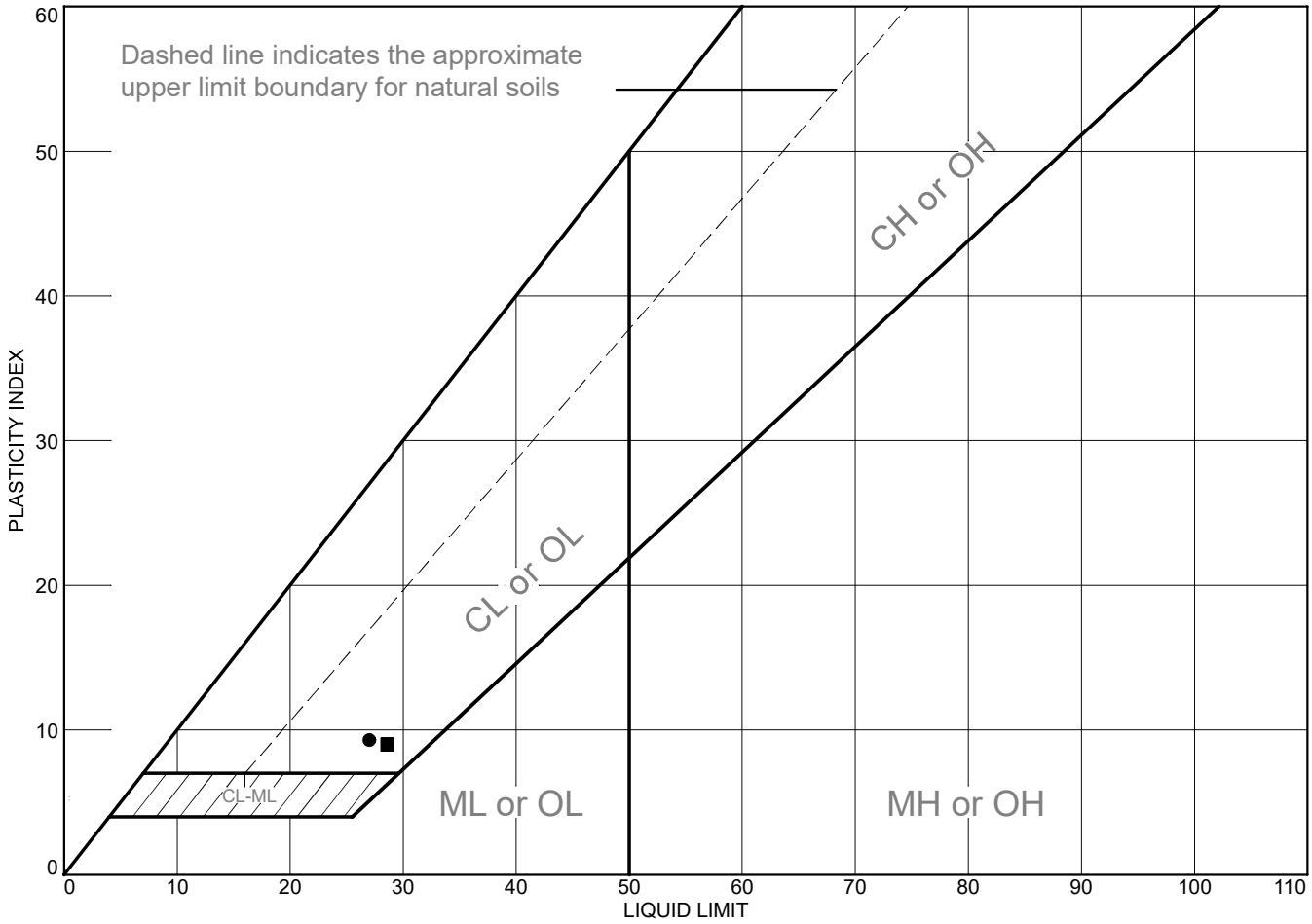
RGH CONSULTANTS

Job No: 7799.001.01.1 | Date: DEC 2023

SITE PLAN
Marinwood Low Income Housing
121, 155, 175, and 197 Marinwood Avenue
San Rafael, California

PLATE
2

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark Brown Sandy Clay (CL)	27.0	17.7	9.3		57.4	CL
■	Dark Brown Clay W/ Sand (CL)	28.6	19.6	9.0		73.2	CL

Project No. 7799.001.01.1

Project: Marinwood Low Income Housing

● Source of Sample: W-5 Depth: 1.5'-5.5'

■ Source of Sample: W-6 Depth: 1.0'-5.5'

Remarks:

● Expansion Index= 35 (Low)

■ Expansion Index= 43 (Low)

RGH CONSULTANTS

Figure

Tested By: ○ SAM □ SCW Checked By: SEF

RGH CONSULTANTS

Job No: 7799.001.01.01 | Date: DEC 2023

CLASSIFICATION TEST DATA

Marinwood Low Income Housing
121, 155, 175, and 197 Marinwood Avenue
San Rafael, California

PLATE

3

APPENDIX B - REFERENCES

Bryant, W.A., and Hart, E.W., Interim Revision 2007, Fault-Rupture Zones in California; California Geological Survey, Special Publication 42, p. 21 with Appendices A through F.

Federal Emergency Management Agency, May 4, 2009, Flood Insurance Rate Map, Marin County, California, Community Panel Number 06041C0291D.

Knudsen, K.L., Sowers, J.M., Witter, R.C., Wentworth, C.M., and Helley, E.J., 2000, Preliminary Maps of Quaternary Deposits and Liquefaction Susceptibility, Nine-County San Francisco Bay Region, California, U.S. Geological Survey, Open File Report 00-444.

Rice, S.R., et al., 2002, Geologic Map of the Novato 7.5' Quadrangle, Marin and Sonoma Counties, California: A Digital Database: California Geological Survey.

Working Group on California Earthquake Probabilities, 2007, Uniform California Earthquake Rupture Forecast (UCERF): Notes on Southern California Earthquake Center (SCEC) Web Site (http://www.scec.org/ucerf/).

APPENDIX C - DISTRIBUTION

Tableau Development (e)
Attention: Jack Robertson
Jack@tableaudev.com

EGC:JJP:plb:brw

https://rghgeo.sharepoint.com/sites/shared/shared documents/project files/7501-7999/7799/7799.001.01.1 marinwood low income housing/.01 - pgs/7799.001.01.1 gs report prelim.docx

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one - not even you* - should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from alight industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes - even minor ones - and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ-sometimes significantly from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the express purpose of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in-this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely on Your ASFE-Member Geotechnical Engineer For Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone:' 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

IIGER06045.0M