R G H

CONSULTANTS, INC.

PRELIMINARY GEOTECHNICAL STUDY REPORT

PALISADES WINERY CALISTOGA, CALIFORNIA

Project Number:
6439.01.01.2

Prepared For:

Denis Sutro
3106 Palisades Road
Calistoga, California 94515

Prepared By:

RGH Consultants, Inc.
Santa Rosa Office
1305 North Dutton Avenue
Santa Rosa, California 95401
(707) 544-1072

Ryan Padgett
Staff Geologist

Gary W. Russey
Professional Geologist – 5283

PROFESSIONAL GEOLOGIST GARY W. RUSSEY No. 5283 Exp. 3/31/10 STATE OF CALIFORNIA

Juan B. Hidalgo
Geotechnical Engineer – 398

REGISTERED PROFESSIONAL ENGINEER JUAN B. HIDALGO GE 398 Exp. 3/31/09 GEOTECHNICAL STATE OF CALIFORNIA

December 29, 2008

TABLE OF CONTENTS

INTRODUCTION

This report presents the results of our preliminary geotechnical study for the proposed winery and cave to be constructed at 3106 Palisades Road in Calistoga, California. The property is located at the base of the Mayacamas Mountains along the northeastern edge of Napa Valley. Topography at the site ranges from relatively level at the southern lower elevations (developed as a vineyard) to moderately sloping (wooded) at the northern upper elevations. The site location is shown on Plate 1, Appendix A.

We understand that the intended development includes a 3,600 square foot single-story, wood framed winery building with either slab-on-grade or structurally supported wood floors and a wine cave to the northwest of the existing structures at the site. Additionally, developments include a proposed paved driveway that traverses the base of a hillside and leads to a planned parking area in the northern portion of the site.

The purpose of our study as outlined in our proposal dated December 3, 2008, 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, a review of selected published geologic data and stereo-paired aerial photographs pertinent to the site, and preparation of this report. A site-specific subsurface exploration was not requested, authorized or performed for this phase of our services.

SERVICES PROVIDED

We reviewed stereo-paired aerial photographs of the site and select published geologic information pertinent to the site. A list of the geologic references reviewed is presented at the end of this report. On December 10, 2008, our Field Geologist conducted a surficial reconnaissance of the property to observe exposed topographic features, surface soils, rock outcroppings and cut banks. A topographic map of the property that also shows the location/alignment of proposed improvements is presented on Plate 2.

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

1. A brief description of geologic, surface soil, and spring or other conditions observed during our reconnaissance;

2. Distance to nearby active faults and a discussion of geologic hazards, including liquefaction per 2007 California Building Code (CBC), that may affect the proposed project;

3. Our opinions regarding the geotechnical feasibility of the project; and

4. Preliminary conclusions and recommendations concerning:

    a. Primary geotechnical engineering concerns and possible mitigation measures, as applicable;

    b. Seismic design criteria per 2007 CBC;

c. Suitable foundation systems for new structures;

d. Stability and feasibility of stable building envelopes and access routes; and

e. Supplemental geotechnical engineering services including recommendations for site specific subsurface exploration.

SITE CONDITIONS

General

Napa 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. The site is located in the northern portion of the alluvial Napa Valley. The Napa Valley is a long, narrow northwest trending alluvial plain flanked by northwest trending mountain ridges.

Geology and Soils

Published geologic maps (Graymer et al., 2007) indicate the site is underlain by Holocene age fan deposits along the flat lower elevations of the property Tertiary age andesite and basalt flows of the Sonoma Volcanics group are mapped along the moderately sloping upper elevations of the property. Holocene fan deposits consist of moderately to poorly sorted and moderately to poorly bedded sand, gravel, silt and clay.

Landslides

Published landslide maps (Dwyer, 1976) indicate a queried landslide is located in a south facing swale situated northeast of the site. No evidence of large-scale active or dormant landslide features were observed in this swale. However, small active surficial failures were observed at the upper portion of the swale. We also observed shallow active and dormant landslides adjacent to and uphill of the planned building site. These include an active translational landslide that is approximately 10 feet long, 15 feet wide and less than 5 feet deep which is located uphill of the proposed parking area in the vicinity of the western portal to the planned cave. A dormant translational landslide approximately 25 feet long, 20 feet wide and less than 5 feet deep is located approximately 20 feet west, laterally from the eastern portal to the planned cave. Additionally, a ravelling scree field (slope wash) is located upslope of the building site. These landslides are presented on Plate 2, Appendix A.

Landslides and slope failures were mapped and categorized using a numeric classification system. Each number within the classification system defines a landslide characteristic, including the type of landslide movement, certainty of landslide identification, estimated thickness of landslide deposits and state of landslide activity. The landslide identification nomenclature chart is presented on Plate 3.

Faulting

The site is not within a current Alquist-Priolo Earthquake Fault Zone (Bryant and Hart, 2007) for active faults as defined by the California Geologic Survey (CGS). CGS defines active faults as those exhibiting evidence of surface displacement during Holocene time (last 11,000 years). However, the site is within an area affected by strong seismic activity. Several northwest-trending Earthquake Fault Zones exist in close proximity to, and within several miles of, the site (Bortugno, 1982). The shortest distances from the site to the mapped surface expression of these faults are presented below in Table 1.

TABLE 1
ACTIVE FAULT PROXIMITY

Fault	Direction	Distance-Miles
San Andreas	SW	31
Healdsburg-Rodgers Creek	SW	11
Concord-Green Valley	SE	27
Cordelia	SE	34
West Napa	S	7
Maacama	W	6½

Surface

The developed portion of the property extends primarily over relatively level to gently sloping alluvial fan terrain. The vegetation in this area consists primarily of grapevines with some landscaped shrubs and trees. The undeveloped portion of the property is moderately to steeply sloping and contains dense native trees and brush. The proposed building and parking lot site are located at the base of the slope to the northwest of the developed portion of the site in an area presently occupied by grapevines.

In general, the ground surface is soft and spongy. This is a condition generally associated with weak, porous surface soils and areas that have been scarified for agriculture.

Natural drainage consists of flow over the ground surface that concentrates in natural drainage elements such as swales and ravines. A dry creek bed traverses the site just south of the existing structures. The drainage trends west towards the Napa River.

Soils

Mapping by the U.S. Soil Conservation Service (Lambert and Kashiwagi, 1978) has classified soil over the sloping portion of this property proposed for development as belonging to the Hambright (152) series. The series is shown to comprise rock outcrops and steep and very steep soils on uplands. The topsoil is shown to be a very stony loam (CL-ML) that exhibits low to medium plasticity (LL = 15-30; PI = 5-15) and low shrink-swell potential and extends from a depth of zero to 12 inches, and is underlain by unweathered bedrock. Runoff over these soils is rapid. The hazard of erosion is high.

The soils on the relatively level portion of the property proposed for development are classified as belonging to the Bale (103) series. The series is shown to comprise somewhat poorly drained soils on alluvial fans, flood plains and low terraces. The series is shown to comprise two soil horizons. The topsoil is shown to be a clay loam (CL) that exhibits medium to high plasticity (LL = 30-50; PI = 10-25) and moderate shrink-swell potential, and extends from a depth of zero to 24 inches. The subsoil is shown to be a stratified loam to gravelly sandy loam (SM) that exhibits low plasticity (LL = 15-20; PI = NP-5) and low shrink-swell potential, and extends from a depth of 24 to 60 inches. Runoff over these soils is slow. The hazard of erosion is slight.

Corrosion Potential

Mapping by the Natural Resources Conservation Service (2008) indicates that the corrosion potential of the near surface soil at the proposed development area, including the sloping portion of the site, is moderate to high for uncoated steel and moderate to low for concrete. Performing corrosivity tests to verify these values was not part of our requested and/or proposed scope of work. Should the need arise, we would be pleased to provide a proposal to evaluate these characteristics.

DISCUSSION AND CONCLUSIONS

Geologic Hazards

Landslides

As previously discussed, landslide features were observed at the project site. The observed landslide features are mapped on Plate 2. Proposed grading, structures and utilities should avoid or be set back from these areas unless remedial work is performed to stabilize the slopes. Remedial work could include removing the landslide debris and constructing a buttress. The final geotechnical study should address these issues in detail. Published landslide maps show queried large scale slope instability located to the northeast of the site, however our field observations did not identify this feature as a landslide.

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. Therefore, we believe the risk of fault rupture at the site is low.

Strong Ground Shaking

Data presented by the Working Group on California Earthquake Probabilities (2007) estimates the chance of one or more large earthquakes (Magnitude 6.7 or greater) in the San Francisco Bay region within the next 30 years to be approximately 63 percent. Therefore, future seismic shaking should be anticipated at the site. It will be necessary to design and construct the proposed winery project in strict adherence with current standards for earthquake-resistant construction.

Liquefaction

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. The site is located within an area delineated by the United States Geological Survey (USGS) as having moderate susceptibility to liquefaction. Furthermore, we have encountered soils potentially susceptible to liquefaction at other sites in the vicinity. Therefore, we judge, on a preliminary basis, that there is a moderate potential for liquefaction at the site. The final geotechnical study should address liquefaction in detail.

Densification

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. Provided foundations are installed as discussed herein, we judge the potential for densification to impact structures at the site is low.

Lurching

Seismic slope failure or lurching is a phenomenon that occurs during earthquakes when slopes or man-made embankments yield and displace in the unsupported direction. We judge, on a preliminary basis, that the potential for impact to the proposed improvements from the occurrence of these phenomena at the site is low provided improvements are set back from areas of identified slope stability and/or remedial grading and foundation installation are performed as recommended herein. However, some of these secondary earthquake effects are unpredictable as to location and extent, as evidenced by the 1989 Loma Prieta Earthquake.

Geotechnical Issues

Based upon the results of our geologic data review and reconnaissance, we judge that it is geotechnically feasible to construct the proposed winery, cave, driveway and parking areas. The primary geotechnical considerations and potential mitigating measures recommended for building site development and roadway construction 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.

Structure Locations

The proposed building envelopes must be located outside unstable areas and steep slopes in order to reduce the risks associated with slope instability. The location of the building envelop in relation to such areas is shown on Plate 2. Initially, a structural setback of approximately 50-feet from unrepaired, unstable areas and breaks in slope of 2:1 or steeper should be established. A site-specific study should finalize recommended structural setbacks.

Weak, Porous Surface Soils

Weak, porous surface soils with medium to high plasticity and moderate shrink-swell potential are mapped by the U.S. Soil Conservation Service (SCS) within the proposed development area. These soils are typically found in the vicinity and, on a preliminary basis to be present, at the proposed improvement site. Such soils appear hard and strong when dry but will lose strength rapidly and settle under the load of fills, foundations, slabs and pavements as their moisture content increases and approaches saturation. The moisture content of these soils can increase as the result of rainfall, periodic irrigation or when the natural upward migration of water vapor through the soils is impeded by and condenses under fills, foundations, pavements and slabs. The detrimental effects of such movements can be remediated by strengthening the soils during grading. This is typically achieved by excavating the weak soils and replacing them as properly compacted (engineered) fill.

Expansive Soil - In addition, the surface soils are shown by SCS to have moderate expansion potential. Expansive surface soils shrink and swell as they lose and gain moisture during the local weather cycle. The resulting volumetric changes can heave and crack lightly loaded foundations, slabs and pavement. The detrimental effects of these movements can be remediated by pre-swelling the expansive soils during recompaction (strengthening), as previously discussed, and covering them with a moisture fixing and confining blanket of properly compacted select fill, as subsequently defined. In building areas, the blanket thickness required depends on the expansion potential of the soils and the anticipated performance of the foundations and slabs. In order to effectively reduce foundation and slab heave given the expansion potential of the site's soils, a blanket thickness of 30 inches will be needed. In exterior slab and paved areas, the select fill blanket need only be 12 inches thick.

Foundation Slab and Pavement Support

After remedial grading, satisfactory foundation support for the winery building can be obtained from spread footings that bottom on the engineered fill. Slab-on-grade floors and pavements can also be satisfactorily supported on the engineered fill.

As an alternative to remedial grading or to reduce structure setbacks, satisfactory foundation support can be obtained from a system of grade beams supported on drilled piers that gain support below the weak surface soils. Structurally supported wood floors must be used in conjunction with the piers and grade beams.

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.

Paved Areas

The proposed roadway alignment and parking areas do not traverse across or extend over mapped or observed unstable areas. However, we observed areas of instability directly upslope from the planned paved areas (Plate 2). We judge, on a preliminary basis that, it is geotechnically feasible to construct the driveway and parking areas as shown. Final roadway and parking area design should include a site-specific study of the alignment, particularly areas of inherent weakness such as steep slopes, swales, ravines, and the instability observed directly upslope of the planned paved areas. In general, new paved areas should be sited to avoid steep slopes and areas of potential instability in order to reduce construction costs and future maintenance.

Erosion and Site Drainage

The long-term satisfactory performance of projects constructed on or adjacent to hillsides results primarily from strict control of surface runoff and subsurface seepage. On sloping areas, SCS shows the site's surface soils have a high erosion potential. Within the relatively level areas proposed for development, SCS literature indicates erosion potential to be slight. Uncontrolled erosion could induce sloughing or landsliding. Discharge areas for roadway culverts and ditches and downspout points need to be protected against erosion and sloughing by energy dissipators such as rip-rap and gabions, or equivalent protective and energy dissipation measures, as appropriate

Groundwater

Free groundwater seeps or springs were not observed during our reconnaissance. On hillsides, rainwater typically percolates through the porous topsoil and migrates downslope in the form of seepage at the interface of the topsoil and bedrock, and through fractures in the bedrock. Fluctuations in the seepage rates typically occur due to variations in rainfall and other factors such as periodic irrigation.

Flooding

Our review of the Federal Emergency Management Agency (FEMA) Flood Zone Map for Napa County, California, Unincorporated Areas (Map Number 06055C0230E) dated September 26, 2008, indicates that the site is located within Zone "X," an area determined to be outside the 0.2 percent annual chance floodplain.

Provided 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 winery, cave and roadway. The study should include test borings or backhoe pits, laboratory testing and engineering analyses. The geotechnical study should address specific design and locating aspects of each planned structure, caves and the access road, and the data generated should be incorporated into project plans. The plans should then be reviewed by the geotechnical engineer and/or engineering geologist prior to receiving bids for planned work.

LIMITATIONS

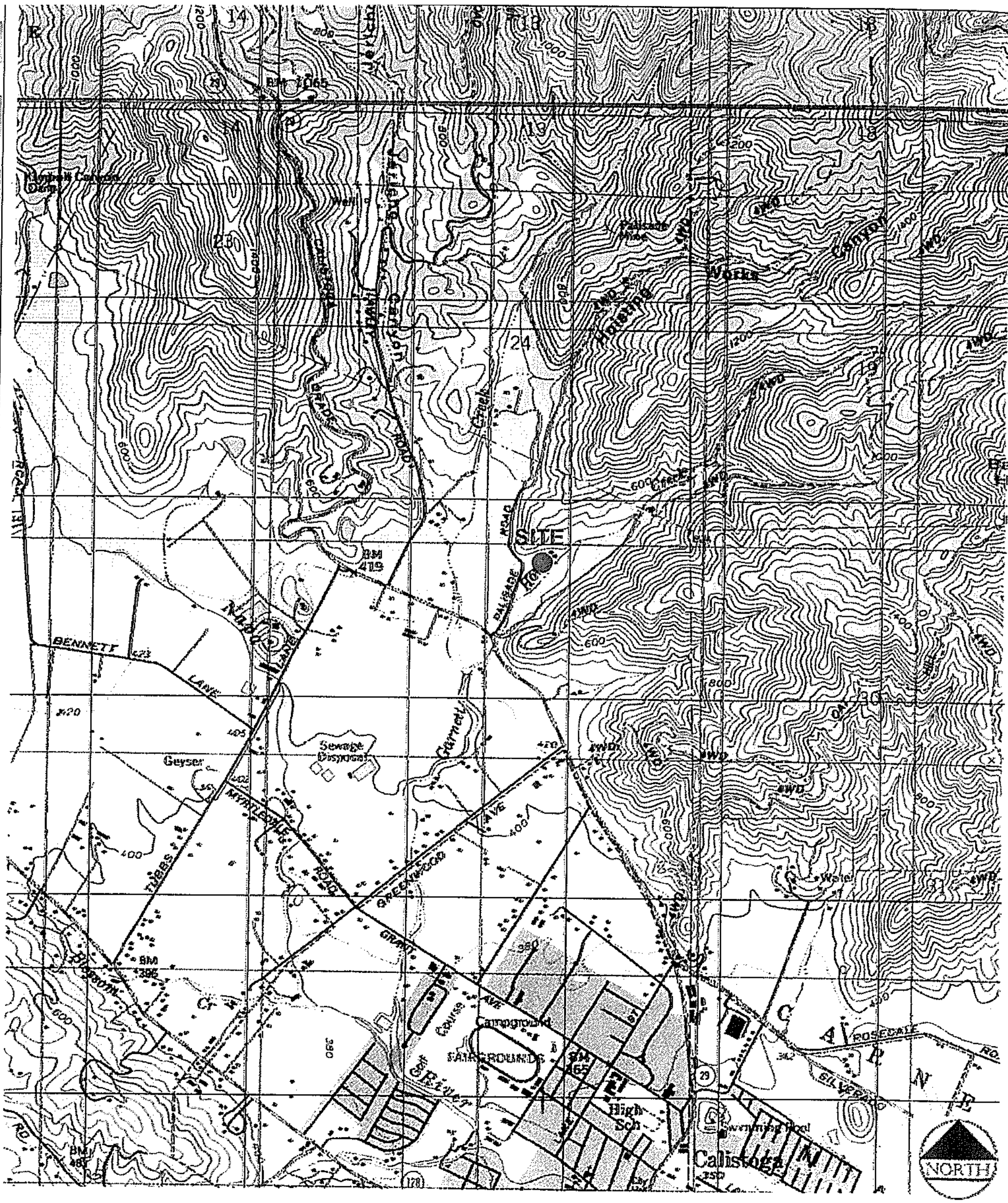
This report has been prepared by RGH for the exclusive use of Denis Sutro and his consultants to evaluate the geotechnical feasibility of the proposed winery, wine cave and roadway.

Our services consist of professional opinions and conclusions developed in accordance with generally accepted geotechnical engineering principles and practices. We provide no other warranty, either expressed or implied. Our conclusions and recommendations are based on the information provided to us regarding the proposed construction, the results of our field reconnaissance, 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 field exploration on December 10, 2008, and may not necessarily be the same or comparable at other times.

It should be understood that slope failures including landslides, debris flows and erosion are on-going natural processes which gradually wear away the landscape. Residual soils and weathered bedrock can be susceptible to downslope movement, even on apparently stable sites. Such inherent hillside and slope risks are generally more prevalent during periods of intense and prolonged rainfall, which occasionally occur in northern California and/or during earthquakes. Therefore, it must be accepted that occasional slope failure and erosion and deposition of the residual soils and weathered bedrock materials are irreducible risks and hazards of building upon or near the base of any hillside or steep slope throughout northern California. By accepting this report, the client and other recipients acknowledge their understanding and acceptance of these risks and hazards.

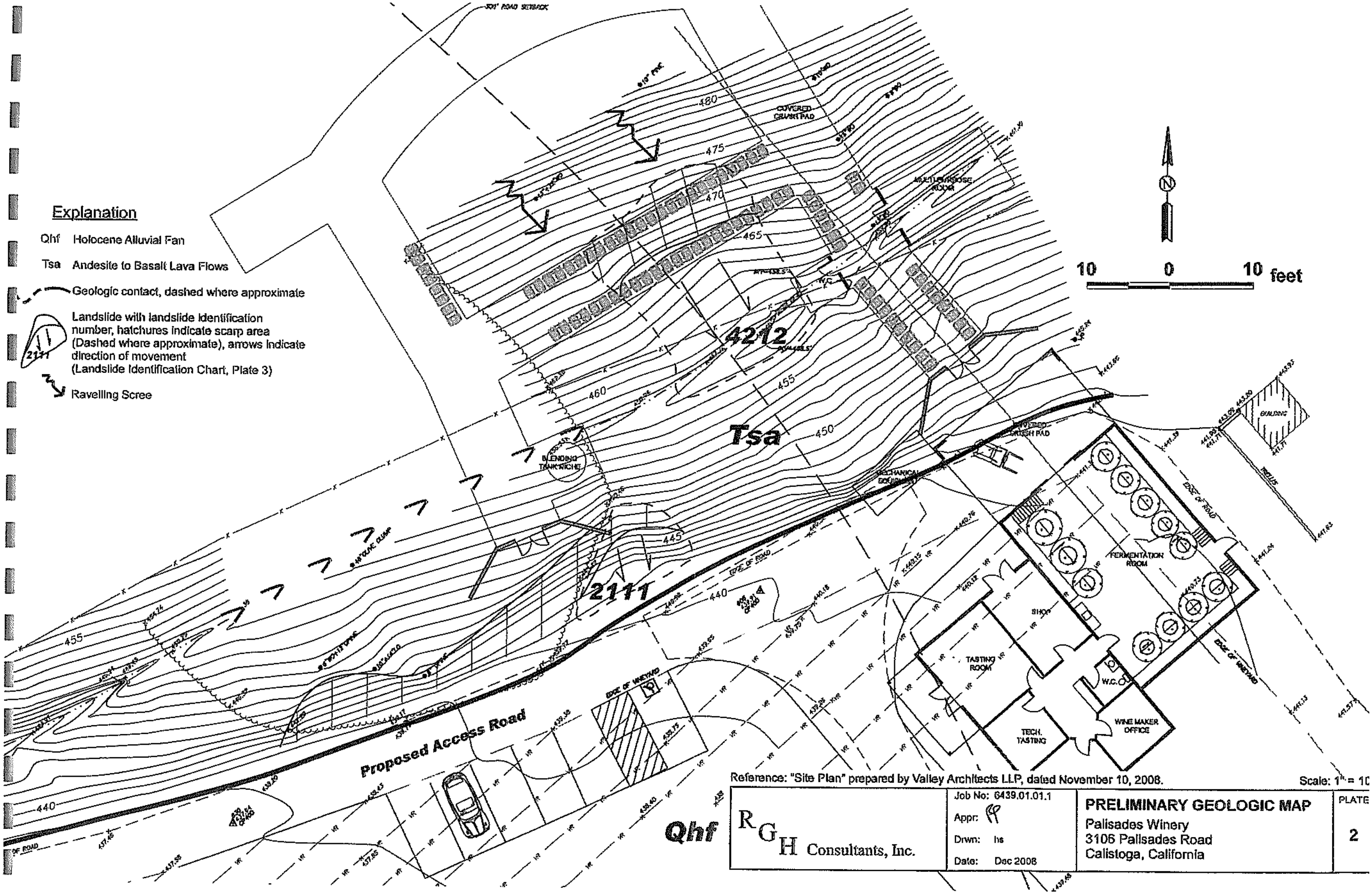
The scope of our services did not include an environmental assessment or a study of the presence (or absence) of hazardous, toxic or corrosive materials in the soil, surface water, groundwater or air on, below, or around this site, nor did it include an evaluation or study for the presence (or absence)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



Reference: Maptech TopoQuad, Calistoga , California Quadrangle

Scale: 1" = 2000'

RGH Consultants, Inc.	Job No: 6439.01.01.1 Appr: Drwn: hs Date: DEC 2008	**SITE LOCATION MAP** Palisades Winery 3106 Palisades Road Calistoga, California	PLATE 1



Reference: "Site Plan" prepared by Valley Architects LLP, dated November 10, 2008.

Scale: 1" = 10

RGH Consultants, Inc.	Job No: 6439.01.01.1 Appr: Drwn: hs Date: Dec 2008	**PRELIMINARY GEOLOGIC MAP** Palisades Winery 3106 Palisades Road Calistoga, California	PLATE 2

Landslide Identification Nomenclature *

Type of Landslide Movement

1	Rotational (Earth Slump)	Movement due to forces that cause a turning moment about a point above the center of gravity of the unit.
2	Translational	Movement predominantly along more or less planar or gently undulatory surfaces.
3	Debris Flow	Rapid movement (50 to 80 kph) within displaced mass such that the form taken by moving material or the apparent distribution of velocities and displacements resemble those of viscous fluids.
4	Earth Flow	Downslope viscous flow of fine grained materials that have been saturated and moves under the pull of gravity. Typically slow moving (a few meters per day or less).
5	Debris Slide	Unconsolidated rock and soil moved downslope along a relatively shallow failure plane
6	Rock Fall	Fragments of rock detached by toppling or falling that falls along a vertical or sub-vertical cliff.
C	Many landslides consist of one or more type of movement. The listed type of movement is modified with a "C" to indicate a Complex of landslides.	

Certainty of Landslide Identification

1	Definite
2	Probable
3	Questionable

Estimated Thickness of Landslide Deposits

1	Less than 5 feet
2	5 to 20 feet
3	20 to 50 feet
4	Greater than 50 feet

State of Landslide Activity

1	Recently Active	Currently moving or estimated movement within recent years.
2	Dormant	Marginally stable with mature and subdued expression of the landslide. Mostly re-vegetated.
3	Ancient	Most landslide features are eroded. Heavily vegetated.

* The landslide identification mapping is designed for planning purposes only and should not be used in lieu of a detailed site specific investigation. Our mapping should be considered preliminary and for feasibility and planning purposes only. A subsurface study may reveal conditions different from those inferred by surface observations and data review only. Such subsurface study may warrant a revision to our preliminary mapping.

RGH Consultants, Inc.	Job No: 6439..01.01.1 Appr: [signature] Drwn: hs Date: Dec 2008	**LANDSLIDE IDENTIFICATION CHART** Palisades Winery 3106 Palisades Road Calistoga, California	PLATE 3

APPENDIX B - REFERENCES

Bortugno, E.J., 1982, Map Showing Recency of Faulting, Santa Rosa Quadrangle in Wagner and Bortugno, Geologic Map of the Santa Rosa Quadrangle: California Division of Mines and Geology, Regional Geologic Map Series, Map No. 2A, Santa Rosa Quadrangle, Scale 1:250,000.

Dwyer, M.J., Noguchi, N., and O'Rourke, J., 1976, Reconnaissance Photo-Interpretation Map of Landslides in 24 Selected 7.5-Minute Quadrangles in Lake, Napa, Solano, and Sonoma Counties, California: U.S. Geological Survey OFR 76-74, 25 Plates, Scale 1:24,000.

Graymer, R.W., Brabb, E.E., Jones, D.L., Barnes, J., Nicholson, R.S., and Stamski, R.E., 2007, Geologic Map and Map Database of Eastern Sonoma and Western Napa Counties, California, U.S. Department of the Interior, U.S. Geological Survey, Scientific Investigations Map 2956.

Helley, E.J., and Herd, D. G., 1977, Map Showing Faults with Quaternary Displacement, Northeastern San Francisco Bay Region: U.S. Geological Survey Miscellaneous Field

Herd, D.G, and Helley E.J., 1977, Faults with Quaternary Displacement, Northwestern San Francisco Bay Region, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-818, 1 plate, Scale 1:125,000.

Lambert, G. and Kashiwagi, J., 1978, Soil Survey of Napa County, California: U.S. Department of Agriculture, Soil Conservation Service, 47 Sheets, Scale 1:24,000.

Natural Resources Conservation Service, United States Department of Agriculture, accessed December 16, 2008. Web Soil Survey, available online at http://websoilsurvey.nrcs.usda.gov/.

WAC Corporation, Sonoma County, 1996, Black and White Aerial Photographs, Roll 96CA, Frames 17-49 & 17-50, Approximate Scale 1" = 2000'.

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

Denis Sutro (2,1)
3106 Palisades Road
Calistoga, CA 94515

Valley Architects (3,1)
1560 Railroad Avenue
St. Helena, CA 94574

REP:GWR:JBH:TLJ:lw

s:\project files\6251-6500\6439.01.01.2 carver sutro winery\gs report prelim.doc

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 a light 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 Geotechncial 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 you ASFE-member geotechnical engineer for more information.

ASFE

The Best People on Earth

[illegible] Road/Suite G106, S[illegible] Spring, MD 20910
[illegible] 301/589-2017
[illegible]