RGH CONSULTANTS
Experience is the difference

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

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

September 11, 2023

Sonoma Cutrer Vineyards
Attention: Ken Larson and Steve Peterson
ken_larson@b-f.com
steve_peterson@b-f.com

Geotechnical Engineering Report Update
Shade Structure
Sonoma Cutrer Vineyards
4401 Slusser Road
Windsor, California

Project Number: 1099.18.12.1

The purpose of this letter is to update our previous geotechnical work at Sonoma Cutrer Vineyards to current design standards and to apply to the proposed shade structure. The results of our previous supplemental geotechnical study for the property were presented in our report dated March 21, 2012. That report addressed a project that included construction of the Bodega II Expansion project. The current project includes construction of a shade structure in the hospitality patio area. The shade structure will be supported on drilled piers.

## Site Exploration

We reviewed our previous geotechnical studies at the facility. On August 9, 2023, we performed a geotechnical reconnaissance of the site and explored the subsurface conditions by drilling one boring to a depth of about 15½ feet. The boring was drilled with a portable drill rig equipped with 4-inch diameter, solid stem augers at the approximate location shown below. The boring location was determined approximately by pacing its distance from features shown below and should be considered accurate only to the degree implied by the method used. Our project engineer located and logged the boring and obtained samples of the materials encountered for visual examination, classification, and laboratory testing.


Relatively undisturbed samples were obtained from the boring at selected intervals by driving a 2.43-inch inside diameter, split spoon sampler, containing 6-inch-long brass liners, using a 140-pound hammer dropping approximately 30 inches. The sampler was driven 12 to 18 inches. The blows required to drive each 6-inch increment were recorded and the blows required to drive the last 12 inches, or portion thereof, were converted to equivalent Standard Penetration Test (SPT) blow counts for correlation with empirical data. Disturbed samples were also obtained at selected depths by driving a 1.375-inch inside diameter (2-inch outside diameter) SPT sampler, without liners or rings, using a 140-pound hammer dropping approximately 30 inches. The sampler was driven 12 to 18 inches, the blows to drive each 6-inch increment were recorded, and the blows required to drive the final 12 inches, or portion thereof, are provided on the boring log.

The log of the boring showing the materials encountered, groundwater conditions, converted blow counts, and sample depths is presented on Plate 1. The soil is described in accordance with the Unified Soil Classification System, outlined on Plate 2. Bedrock is described in accordance with Engineering Geology Rock Terms, shown on Plate 3.

The boring log shows our interpretation of the subsurface soil, bedrock, and groundwater conditions on the date and at the locations indicated. Subsurface conditions may vary at other locations and times. Our interpretation is based on visual inspection of soil and bedrock samples, laboratory test results, and

interpretation of drilling and sampling resistance. The location of the soil and bedrock boundaries should be considered approximate. The transition between soil and bedrock types may be gradual.

**Laboratory Testing**

The samples obtained from the boring were transported to our office and re-examined to verify soil classifications, evaluate characteristics, and assign tests pertinent to our analysis. Selected samples were laboratory tested to determine their classification (Atterberg Limits, percent of silt and clay), expansion potential (Expansion Index - EI), water content, dry density, and shear strength. The test results are presented on the boring log.

**Subsurface**

Our boring and laboratory tests indicate that the portion of the site we studied is blanketed by about 1 foot of weak, porous, compressible, silty soil. Porous soil appears hard and strong when dry but becomes weak and compressible as its moisture content increases towards saturation. Under this silty soil, there was about 1½ feet of heterogenous fill. Heterogeneous fill is a material with varying density, strength, compressibility, and shrink-swell characteristics that often has an unknown origin and placement history. Underneath these soils, there is sandy clay to a depth of about 8 feet. This sandy clay soil exhibits medium plasticity (LL = 45.7; PI = 22.7) and medium expansion potential (EI = 70). These surface materials are underlain by siltstone.

Siltstone bedrock extends from beneath the surface materials to the maximum depths explored (15½ feet). The bedrock is generally firm, friable, and highly weathered. A detailed description of the subsurface conditions found in our boring is given on Plate 1. Based on Table 20.3-1 of American Society of Civil Engineers (ASCE) Standard 7-16, titled “Minimum Design Loads and Associated Criteria for Buildings and Other Structures,” we have determined a Site Class of C should be used for the site.

**Conclusions and Recommendations**

Based on the subsurface conditions encountered in our boring, it is our opinion that the recommendations in our referenced report, with the updated and supplemental criteria presented below, are valid for design and construction of the improvements.

Seismic Design

Seismic design parameters presented below are based on Section 1613 titled “Earthquake Loads” of the 2022 California Building Code (CBC). Based on Table 20.3-1 of ASCE Standard 7-16, we have determined a Site Class of C should be used for the site. Using a site latitude and longitude of 38.4987°N and 122.8325°W, respectively, and the OSHPD Seismic Design Maps website (https://seismicmaps.org), we recommend that the following seismic design criteria be used for applicable structures at the site.

| 2022 CBC Seismic Criteria | |
|---|---|
| **Spectral Response Parameter** | **Acceleration (g)** |
| $S_S$ (0.2 second period) | 1.569 |
| $S_1$ (1 second period) | 0.600 |
| $S_{MS}$ (0.2 second period) | 1.883 |
| $S_{M1}$ (1 second period) | 0.840 |
| $S_{DS}$ (0.2 second period) | 1.255 |
| $S_{D1}$ (1 second period) | 0.560 |

Drilled Piers

Drilled, cast-in-place, reinforced concrete piers should be used for foundation support. Drilled piers should be at least 12 inches in diameter and should gain support below a depth of 5 feet from the hospitality patio area surface. Larger piers may be needed to resist the lateral forces imposed by earthquakes per the California Building Code. Piers should be spaced no closer than 3 pier diameters, center to center.

Skin Friction - The portion of the piers extending between 5 and 10 feet below the patio surface may be designed using an allowable skin friction of 400 pounds per square foot (psf) for dead load plus long term live loads. The portion of the piers extending below 10 feet may be designed using an allowable skin friction of 750 psf for dead load plus long term live loads. These values can be increased by ⅓ for total loads, including downward vertical wind or seismic forces. A skin friction value of 267 psf should be used to resist uplift forces from 5 to 10 feet. A skin friction value of 500 psf should be used to resist uplift forces below 10 feet. End bearing should be neglected because of the difficulty of cleaning out small diameter pier holes, and the uncertainty of mobilizing end bearing and skin friction simultaneously.

Lateral Forces - Lateral loads on piers will be resisted by passive pressure on the soil and bedrock. An equivalent fluid pressure of 350 pounds per cubic foot (pcf) acting on two pier diameters should be used. Confinement for passive pressure may be assumed from 5 feet below the existing patio surface.

Pier Drilling - We did not encounter groundwater and/or caving-prone soil within the planned pier depth during our study. If groundwater is encountered during drilling, it may be necessary to de-water the holes and/or place the concrete by the tremie method. If caving soil is encountered, it may be necessary to case the holes.

Concrete - Concrete mix design and placement should be done in accordance with the current ADSC and/or ACI specifications. Concrete should not be allowed to mushroom at the top of the piers or below the bottom of grade beams.

The recommendations presented herein are subject to the limitations set forth in our referenced report. We trust this provides the information you require at this time. If you have questions, please contact the undersigned.

Very truly yours,
RGH Consultants


Eric G. Chase
Principal Geotechnical Engineer
Project Manager

cc: Michael Holber
mthdrafting@gmail.com

EGC:TAW:aku:brw
Electronically submitted

https://rghgeo.sharepoint.com/sites/shared/shared documents/project files/1000-1250/1099/1099.18.12.1 sonoma cutrer vineyard shade structure/.01 - rup/1099.18.12.1 report update.docx

Attachments: Plate 1 – Log of Boring B-1
Plate 2 – Soil Classification Chart and Key to Test Data
Plate 3 – Engineering Geology Rock Terms

| | | |
|---|---|---|
| Date Drilled **8/9/2023** | Logged By **AKU** | Project Manager **EGC** |
| Drilling Method **Solid-Stem Auger** | Drill Bit Size/Type **4 inch** | Total Depth of Borehole **15 1/2 feet** |
| Drill Rig Type **Portable Drill Rig** | Drilling Contractor **Benevent** | Approximate Surface Elevation **Existing Ground Surface** |
| Groundwater Level **No Groundwater Encountered** | Sampling Method(s) **Modified California, SPT** | Hammer Data **140 lb., 30" drop** |

| Depth (feet) | Sample Type | Sampling Resistance, blows/ft | Graphic Log | MATERIAL DESCRIPTION | Dry Density (pcf) | Water Content (%) | % <#200 Sieve | PI, % | LL, % | Expansion Index (EI) | UC, ksf | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | DARK BROWN SANDY SILT (ML), medium stiff, moist, rootlets (Topsoil) | | | | | | | | |
| | | 8 | | DARK BROWN CLAYEY SAND WITH GRAVEL (SC), loose, moist (Fill) | | | | | | | | |
| | | 7 | | GRAY SANDY CLAY (CL), stiff, moist | | | 56.3 | 22.7 | 45.7 | 70 | | |
| 5 | | 8 | | | 89.1 | 31.1 | | | | | | Su = 429.5 psf |
| | | | | LIGHT GRAY BROWN SILTSTONE, firm, friable, highly weathered, cobbles between 8 - 9 feet | | | | | | | | |
| 10 | | 22 | | | | | | | | | | |
| 15 | | 50 | | | | | | | | | | |
| | | | | Boring terminated at 15 1/2 feet<br>No groundwater encountered | | | | | | | | |

RGH CONSULTANTS

Job No: 1099.18.12.1 | Date: SEPT 2023

# LOG OF BORING B-1

Sonoma Cutrer Shade Structure
4401 Slusser Road
Windsor, California

PLATE
**1**

| Depth (feet) | Sample Type | Sampling Resistance, blows/ft | Graphic Log | MATERIAL DESCRIPTION | Dry Density (pcf) | Water Content (%) | % <#200 Sieve | PI, % | LL, % | Expansion Index (EI) | UC, ksf | REMARKS AND OTHER TESTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |

## COLUMN DESCRIPTIONS

**1** Depth (feet): Depth in feet below the ground surface.
**2** Sample Type: Type of soil sample collected at the depth interval shown.
**3** Sampling Resistance, blows/ft: Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the hammer identified on the boring log.
**4** Graphic Log: Graphic depiction of the subsurface material encountered.
**5** MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
**6** Dry Density (pcf): Dry density, in pcf.
**7** Water Content (%): Water content, percent.
**8** % <#200 Sieve: % <#200 Sieve
**9** PI, %: Plasticity Index, expressed as a water content.
**10** LL, %: Liquid Limit, expressed as a water content.
**11** Expansion Index (EI): Expansion Index (EI)
**12** UC, ksf: Unconfined compressive strength, in kips per square foot.
**13** REMARKS AND OTHER TESTS: Comments and observations regarding drilling or sampling made by driller or field personnel. Su, psf: Undrained Shear Strength, in pounds per square foot (psf)

## FIELD AND LABORATORY TEST ABBREVIATIONS

LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
Su: Undrained Shear Strength, in pounds per square foot (psf)

## MATERIAL GRAPHIC SYMBOLS

Lean CLAY, CLAY w/SAND, SANDY CLAY (CL)
SILT, SILT w/SAND, SANDY SILT (ML)
Clayey SAND (SC)
Siltstone

## TYPICAL SAMPLER GRAPHIC SYMBOLS

2.5-inch-OD Modified California w/ brass liners
2-inch-OD unlined split spoon (SPT)

## OTHER GRAPHIC SYMBOLS

Water level (at time of drilling, ATD)
Water level (after waiting, AW)
Minor change in material properties within a stratum
Inferred/gradational contact between strata
Queried contact between strata

## GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

RGH CONSULTANTS

Job No: 1099.18.12.1 | Date: SEPT 2023

**SOIL CLASSIFICATION AND KEY TO TEST DATA**
Sonoma Cutrer Shade Structure
4401 Slusser Road
Windsor, California

PLATE
**2**

## LAYERING

| | |
|---|---|
| MASSIVE | Greater than 6 feet |
| THICKLY BEDDED | 2 to 6 feet |
| MEDIUM BEDDED | 8 to 24 inches |
| THINLY BEDDED | 2½ to 8 inches |
| VERY THINLY BEDDED | ¾ to 2½ inches |
| CLOSELY LAMINATED | ¼ to ¾ inches |
| VERY CLOSELY LAMINATED | Less than ¼ inch |

## JOINT, FRACTURE, OR SHEAR SPACING

| | |
|---|---|
| VERY WIDELY SPACED | Greater than 6 feet |
| WIDELY SPACED | 2 to 6 feet |
| MODERATELY SPACED | 8 to 24 inches |
| CLOSELY SPACED | 2½ to 8 inches |
| VERY CLOSELY SPACED | ¾ to 2½ inches |
| EXTREMELY CLOSELY SPACED | Less than ¼ inch |

## HARDNESS

Soft - pliable; can be dug by hand

Firm - can be gouged deeply or carved with a pocket knife

Moderately Hard - can be readily scratched by a knife blade; scratch leaves heavy trace of dust and is readily visible after the powder has been blown away

Hard - can be scratched with difficulty; scratch produces little powder and is often faintly visible

Very Hard - cannot be scratched with pocket knife, leaves a metallic streak

## STRENGTH

Plastic - capable of being molded by hand

Friable - crumbles by rubbing with fingers

Weak - an unfractured specimen of such material will crumble under light hammer blows

Moderately Strong - specimen will withstand a few heavy hammer blows before breaking

Strong - specimen will withstand a few heavy ringing hammer blows and usually yields large fragments

Very Strong - rock will resist heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments

## DEGREE OF WEATHERING

Highly Weathered - abundant fractures coated with oxides, carbonates, sulphates, mud, etc., thorough discoloration, rock disintegration, mineral decomposition

Moderately Weathered - some fracture coating, moderate or localized discoloration, little to no effect on cementation, slight mineral decomposition

Slightly Weathered - a few stained fractures, slight discoloration, little or no effect on cementation, no mineral composition

Fresh - unaffected by weathering agents; no appreciable change with depth

RGH CONSULTANTS

Job No: 1099.18.12.1 | Date: SEPT 2023

**ENGINEERING GEOLOGY ROCK TERMS**

Sonoma Cutrer Shade Structure
4401 Slusser Road
Windsor, California

PLATE
**3**