AREAS MORE LIKELY TO CONTAIN NATURALLY OCCURRING ASBESTOS

APPROXIMATE SITE LOCATION

DISCLAIMER: THIS MAP REPRESENTS FEATURES FOR ILLUSTRATION PURPOSES ONLY. IT IS NOT A LEGAL SURVEY AND IS NOT INTENDED FOR USE IN DETERMINING BOUNDARIES. ANY USE OF THIS MAP FOR PURPOSES OTHER THAN FOR APPROXIMATE LOCATION OF FEATURES IS DONE SO AT THE USER’S RISK AND WITHOUT THE CONSENT OF CONDOR EARTH TECHNOLOGIES, INC.
Consult the EPA map of radon zones document (EPA-402-R-93-071) before using this map. This document contains information on radon potential variations within counties. EPA recommends that this map be supplemented with any available local data in order to further understand and predict the radon potential of a specific area.

**Figure 7**

Radon Hazard Map

- **Zone 1** = Highest Potential (>4 pCi/L)
- **Zone 2** = Moderate Potential (2–4 pCi/L)
- **Zone 3** = Low Potential (<2 pCi/L)

pCi/L = Picocuries per liter
APPENDIX A
Log Legend and Soil Classification, Rock Properties, Boring Logs, and Core Photographs
WEATHERING
Severely Weathered – minerals decomposed to soil, but rock fabric and structure are preserved.
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 decomposition.
Fresh – unaffected by weathering agents; no appreciable change with depth.

<table>
<thead>
<tr>
<th>FRACTURE, JOINT, OR SHEAR SPACING</th>
<th>THICKNESS OF SEDIMENTARY ROCK BEDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Spacing in Inches)</td>
<td>(Thickness in Inches)</td>
</tr>
<tr>
<td>Very little fractured</td>
<td>Greater than 48</td>
</tr>
<tr>
<td>Occasionally fractured</td>
<td>12 to 48</td>
</tr>
<tr>
<td>Moderately fractured</td>
<td>6 to 12</td>
</tr>
<tr>
<td>Closely fractured</td>
<td>1.25 to 6</td>
</tr>
<tr>
<td>Intensely fractured</td>
<td>0.5 to 1.25</td>
</tr>
<tr>
<td>Crushed</td>
<td>Less than 0.5</td>
</tr>
<tr>
<td></td>
<td>Very thickly bedded</td>
</tr>
<tr>
<td></td>
<td>Greater than 72</td>
</tr>
<tr>
<td></td>
<td>Thickly bedded</td>
</tr>
<tr>
<td></td>
<td>24 to 72</td>
</tr>
<tr>
<td></td>
<td>Medium bedded</td>
</tr>
<tr>
<td></td>
<td>8 to 24</td>
</tr>
<tr>
<td></td>
<td>Thinly bedded</td>
</tr>
<tr>
<td></td>
<td>2.5 to 8</td>
</tr>
<tr>
<td></td>
<td>Very thinly bedded</td>
</tr>
<tr>
<td></td>
<td>0.75 to 2.5</td>
</tr>
<tr>
<td></td>
<td>Laminated</td>
</tr>
<tr>
<td></td>
<td>0.25 to 0.75</td>
</tr>
<tr>
<td></td>
<td>Thinly laminated</td>
</tr>
<tr>
<td></td>
<td>Less than 0.25</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FRACTURE OR LAYER SEPARATION</th>
<th>FRACTURE OR LAYER ROUGHNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Thickness of Separations in Millimeters)</td>
<td></td>
</tr>
<tr>
<td>Very tight</td>
<td>Very Rough - Non-continuous, Hard joint rock wall</td>
</tr>
<tr>
<td>Tight</td>
<td>Slightly Rough - Hard joint rock wall</td>
</tr>
<tr>
<td>Moderately open</td>
<td>Slightly Rough and Soft - Soft joint rock wall</td>
</tr>
<tr>
<td>Open</td>
<td>Slickensided - Open and continuous with gouge</td>
</tr>
<tr>
<td>Very wide</td>
<td>Soft Gouge - Open and continuous with soft gouge</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STRUCTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intact/Massive – intact rock specimens with few widely spaced discontinuities.</td>
</tr>
<tr>
<td>Blocky – well interlocked, undisturbed rock mass, consisting of cubical blocks formed by three intersecting joint sets.</td>
</tr>
<tr>
<td>Very blocky – interlocked, partially disturbed, with multi-faceted angular blocks formed by 4 or more joint sets.</td>
</tr>
<tr>
<td>Disturbed/Seamy – folded with angular blocks, formed by many intersecting joint sets, persistence of bedding planes or schistosity.</td>
</tr>
<tr>
<td>Disintegrated – poorly interlocked, heavily broken, mix of angular and rounded rock pieces.</td>
</tr>
<tr>
<td>Laminated/Sheared – lack of blockiness due to close spacing of shear planes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STRENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic or very low strength.</td>
</tr>
<tr>
<td>Friable – crumbles easily by rubbing with fingers.</td>
</tr>
<tr>
<td>Weak – an unfractured specimen of such material</td>
</tr>
<tr>
<td>Moderately strong – specimen will withstand a few heavy hammer blows before breaking.</td>
</tr>
<tr>
<td>Strong – specimen will withstand a few heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments.</td>
</tr>
<tr>
<td>Very strong – specimen will resist heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HARDNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft – reserved for plastic material alone.</td>
</tr>
<tr>
<td>Low hardness – can be gouged deeply or carved easily with a knife blade.</td>
</tr>
<tr>
<td>Moderately hard – can be readily scratched by a knife blade; scratch leaves a heavy trace of dust and is readily visibly after the powder has been blown away.</td>
</tr>
<tr>
<td>Hard – can be scratched with difficulty; scratch produced a little powder and is often faintly visible.</td>
</tr>
<tr>
<td>Very hard – cannot be scratched with knife blade; leaves a metallic streak.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GROUND WATER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry</td>
</tr>
<tr>
<td>Damp</td>
</tr>
<tr>
<td>Wet</td>
</tr>
<tr>
<td>Dripping</td>
</tr>
<tr>
<td>Flowing</td>
</tr>
</tbody>
</table>
## UNIFIED SOIL CLASSIFICATION SYSTEM

<table>
<thead>
<tr>
<th>Division</th>
<th>Group Symbol</th>
<th>Group Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coarse-Grained Soils</td>
<td>GW</td>
<td>Well-graded Gravel (with Sand)</td>
</tr>
<tr>
<td></td>
<td>GW-GM</td>
<td>Well-graded Gravel with Silt (and Sand)</td>
</tr>
<tr>
<td></td>
<td>GW-GC</td>
<td>Well-graded Gravel with Clay (and Sand)</td>
</tr>
<tr>
<td></td>
<td>GP</td>
<td>Poorly graded Gravel (with Sand)</td>
</tr>
<tr>
<td></td>
<td>GP-GM</td>
<td>Poorly graded Gravel with Silt (and Sand)</td>
</tr>
<tr>
<td></td>
<td>GP-GC</td>
<td>Poorly graded Gravel with Clay (and Sand)</td>
</tr>
<tr>
<td></td>
<td>GM</td>
<td>Silty Gravel (with Sand)</td>
</tr>
<tr>
<td></td>
<td>GC</td>
<td>Clayey Gravel (with Sand)</td>
</tr>
<tr>
<td></td>
<td>SW</td>
<td>Well-graded Sand (with Gravel)</td>
</tr>
<tr>
<td></td>
<td>SW-SM</td>
<td>Well-graded Sand with Silt (and Gravel)</td>
</tr>
<tr>
<td></td>
<td>SW-SC</td>
<td>Well-graded Sand with Clay (and Gravel)</td>
</tr>
<tr>
<td></td>
<td>SP</td>
<td>Poorly graded Sand (with Gravel)</td>
</tr>
<tr>
<td></td>
<td>SP-SM</td>
<td>Poorly graded Sand with Silt (and Gravel)</td>
</tr>
<tr>
<td></td>
<td>SP-SC</td>
<td>Poorly graded Sand with Clay (and Gravel)</td>
</tr>
<tr>
<td></td>
<td>SM</td>
<td>Silty Sand (with Gravel)</td>
</tr>
<tr>
<td></td>
<td>SC</td>
<td>Clayey Sand (with Gravel)</td>
</tr>
<tr>
<td></td>
<td>ML</td>
<td>Silt (with Sand or Gravel), Sandy Silt (with Gravel), Gravelly Silt (with Sand)</td>
</tr>
<tr>
<td></td>
<td>CL-ML</td>
<td>Silty Clay (with Sand or Gravel), Sandy Silty Clay (with Gravel), Gravelly Silty Clay (with Sand)</td>
</tr>
<tr>
<td></td>
<td>CL</td>
<td>Lean Clay (with Sand or Gravel), Sandy lean Clay (with Gravel), Gravelly lean Clay (with Sand)</td>
</tr>
<tr>
<td></td>
<td>OL</td>
<td>Organic Clay (with Sand or Gravel), Sandy organic Clay (with Gravel), Gravelly organic Clay (with Sand)</td>
</tr>
<tr>
<td></td>
<td>MH</td>
<td>Elastic Silt (with Sand or Gravel), Sandy elastic Silt (with Gravel), Gravelly elastic Silt (with Sand)</td>
</tr>
<tr>
<td></td>
<td>CH</td>
<td>Fat Clay (with Sand or Gravel), Sandy fat Clay (with Gravel), Gravelly fat Clay (with Sand)</td>
</tr>
<tr>
<td></td>
<td>OH</td>
<td>Organic Clay (with Sand or Gravel), Sandy organic Clay (with Gravel), Gravelly organic Clay (with Sand)</td>
</tr>
<tr>
<td>Fine-Grained Soils</td>
<td>PT</td>
<td>Peat and other highly organic soils</td>
</tr>
</tbody>
</table>

**Note:** Percentages are by dry weight. Soil classifications based on some criteria that are not shown. Group Name items in parentheses may or may not apply, depending on percent of sand or gravel.

### Coarse Grained Soil Definitions

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Particle Dimension or U.S. Standard Sieve Size/No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boulders</td>
<td>Above 12&quot;</td>
</tr>
<tr>
<td>Cobbles</td>
<td>12&quot; to 3&quot;</td>
</tr>
<tr>
<td>Gravel - coarse</td>
<td>3&quot; to 3/4&quot;</td>
</tr>
<tr>
<td>Gravel - fine</td>
<td>3/4&quot; to No. 4</td>
</tr>
<tr>
<td>Sand - coarse</td>
<td>No. 4 to No. 10</td>
</tr>
<tr>
<td>Sand - medium</td>
<td>No. 10 to No. 40</td>
</tr>
<tr>
<td>Sand - fine</td>
<td>No. 40 to No. 200</td>
</tr>
</tbody>
</table>

**Split-barrel**
- 3-inch O.D., 2.43-inch I.D.
- 2.5-inch O.D., 1.93-inch I.D.

**Standard Penetration Test (SPT)**
- 2.0-inch O.D., 1.375-inch I.D.

**Shelby Tube**

**Disturbed sample**

**No recovery**

**Groundwater level during drilling**

**Subsequent groundwater level**

**Note:** O.D. = outside diameter   I.D. = inside diameter
<table>
<thead>
<tr>
<th>Depth</th>
<th>Elevation</th>
<th>Technical Log/Notes</th>
<th>Graphic Log</th>
<th>0.0-0.3' ASPHALT</th>
<th>0.3-39.9' VOLCANOCLASTIC ALUMINUM - red-brown to dark brown dense clayey sand (0) matrix with gravel to cobble-sized clasts, occasional boulders, poorly consolidated, matrix-supported clasts are mostly volcanic origin, fresh to slightly weathered sub-rounded to sub-angular, moderately strong to strong, moderately hard to hard</th>
<th>12': LL=41, PI=12, W=28.9%, D=69.7%; 18': W=31.9%, C=28.4%, C'=470 pcf, O=33°</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>296</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>296</td>
<td></td>
<td></td>
<td></td>
<td>70% return</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>296</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>291</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>291</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>271</td>
<td></td>
<td></td>
<td></td>
<td>100% return</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>264</td>
<td></td>
<td></td>
<td></td>
<td>29.5-38.4' tan-grey SANDY SILT (ML) medium dense</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>261</td>
<td></td>
<td></td>
<td></td>
<td>29.5; LL=NV, PI=NP</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>261</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Remarks:** Back-filled full depth with neat cement.
<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Elevation</th>
<th>Date</th>
<th>Technical Log Notes</th>
<th>Graphical Log</th>
<th>Note on Groundwater and Circulation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-0.75'</td>
<td>12/20/15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0-0.75' REINFORCED CONCRETE</td>
</tr>
<tr>
<td>0.75'-1.9'</td>
<td>12/20/15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.75'-1.9' VOLCANOCLASTIC ALLUVIUM-</td>
</tr>
<tr>
<td>1.9'-5</td>
<td>12/20/15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>red-brown to dark brown dense</td>
</tr>
<tr>
<td>5'-10</td>
<td>12/20/15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CLAYEY SAND (SC) matrix with</td>
</tr>
<tr>
<td>10'-15</td>
<td>12/20/15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>gravel to cobble-sized clasts,</td>
</tr>
<tr>
<td>15'-20</td>
<td>12/20/15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>occasional boulders, poorly</td>
</tr>
<tr>
<td>20'-25</td>
<td>12/20/15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>consolidated, matrix-supported</td>
</tr>
<tr>
<td>25'-30</td>
<td>12/20/15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>clasts are mostly volcanic</td>
</tr>
<tr>
<td>30'-35</td>
<td>12/20/15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>origin, fresh to slightly weathered</td>
</tr>
<tr>
<td>35'-40</td>
<td>12/20/15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sub-founded to sub-angular,</td>
</tr>
<tr>
<td>40'-45</td>
<td>12/20/15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>moderately strong to strong,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>moderately hard to hard</td>
</tr>
</tbody>
</table>

Remarks: Backfill until full depth with neat cement.
**LOG OF BOREHOLE NO. 8-1**

**PROJECT NUMBER:** 6658  
**PROJECT NAME:** Culinary Institute of America at Greystone  
**LOCATION:** 2555 Main Street, Napa, CA

**COORDINATES:** 38°51'14.4" - 122°48'55.29"  
**REFERENCE POINT FOR DEPTH MEASUREMENT:** Ground Surface

**SURFACE CONDITION:** Asphalt Driveway  
**ELEVATION OF PIEZOMETER COLLAR:** 289 ft

**DIRECTION OF BOREHOLE:** Vertical  
**INCLINATION FROM HORIZONTAL:** 0°

**TOTAL DEPTH:** 27.1 ft  
**DATE STARTED:** 5/13/10  
**DATE COMPLETED:** 5/14/10

**CONTRACTOR:** Tahef Drilling  
**DRILL RIG:** CME-5S Track-Mounted  
**LOGGED BY:** E. Kenita  
**DRAWN:** E. Kenita  
**APPROVED:**

**NUMBER OF CORE BOXES:** 5  
**STORED:** Condor - Sonora, CA

**REMARKS:** Backfilled till depth with neat cement grout.  
2.5-in. inside diameter sampler.

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Date</th>
<th>Technical Logs/Notes</th>
<th>Graphical Log</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.291</td>
<td>5/13/10</td>
<td>Approximate Return</td>
<td></td>
<td>4&quot; Asphalt</td>
</tr>
<tr>
<td>9.291</td>
<td></td>
<td></td>
<td></td>
<td>0.5'-6&quot; Artificial fill - sandy clay (C)</td>
</tr>
<tr>
<td>10.291</td>
<td></td>
<td></td>
<td></td>
<td>with gravel and rock blocks; bluish</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>stuff, fine to coarse sand, fine to</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>coarse sand, gravel, sand, gravel,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>hard rock blocks (2)</td>
</tr>
<tr>
<td>15.291</td>
<td></td>
<td></td>
<td></td>
<td>5'-27.1 Somoma Volcanics - Volcaniclastic</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Aluminous clay (C) matrix</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>red-brown, dense, fine to coarse</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>sand, with fine to coarse gravel</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>and cobble-sized clasts, matrix</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>supported; clasts are mostly</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>volcanic origin, fresh to</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>moderately weathered; angular,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>strong, hard, vesicular (3)</td>
</tr>
<tr>
<td>25.291</td>
<td></td>
<td></td>
<td></td>
<td>25.291 yellow dark brown matrix</td>
</tr>
<tr>
<td>26.291</td>
<td></td>
<td></td>
<td></td>
<td>(1) 25': W=12.7, R=113</td>
</tr>
<tr>
<td>27.1</td>
<td></td>
<td></td>
<td></td>
<td>(2) 5': LL=38, PI=14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(3) 8.5': LL=59, PI=20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Terminated at 27.1 ft.</td>
</tr>
</tbody>
</table>
Approx. Elev. (ft): 3
Approx. Depth (ft): 3
Approx. Length (ft): 5.5
Orientation: N 10° W
Equipment: shovel, slide hammer

NOTES:
SONOMA VOLCANICS - VOLCANICLASTIC ALLUVIUM: severely weathered to consistency of CLAY WITH SAND (CL), yellow-brown, moist, very stiff, fine sand
3 ft: LL=34, PI=16, w=33.3, γd=87, c'=200, ϕ'=23.7

GROUNDWATER: not encountered at time of excavation
SAMPLE: Two 2-inch diameter tubes at 3 ft., one 2-inch diameter tube at 2 ft., disturbed (bag) sample at 2 ft.

LEGEND:
PP = Pocket Penetrometer Resistance - Unconfined Compressive Strength (tons per square foot)
F = Percent Passing No. 200 Sieve by Dry Weight, LL = Liquid Limit, PI = Plasticity Index
w = Moisture Content (percent), γd = Dry Unit Weight (pounds per cubic foot)
q_u = Unconfined Compressive Strength - Laboratory (pounds per square foot)
S_u = Undrained Shear Strength (pounds per square foot)
Drained Shear Strength Parameters: c' = Cohesion (pounds per square foot), ϕ' = Internal Friction Angle (deg)
**CONDO EARTH TECHNOLOGIES, INC.**  
**LOG OF TEST PIT - 2**

**Project:** Culinary Institute of America at Greystone  
2555 Main Street  
St. Helena, CA  
**Location:** See Figure 2  
**Approx. Elev. (ft):**  
**Approx. Depth (ft):** 2.5  
**Approx. Length (ft):** 3  
**Equipment:** shovel

**NOTES:**

**GROUNDWATER:** not encountered at time of excavation  
**SAMPLE:** not sampled  
**NOTES:**

**LEGEND:**

- **PP** = Pocket Penetrometer Resistance - Unconfined Compressive Strength (tons per square foot)  
- **F** = Percent Passing No. 200 Sieve by Dry Weight, **LL** = Liquid Limit, **PI** = Plasticity Index  
- **w** = Moisture Content (percent), **γ_d** = Dry Unit Weight (pounds per cubic foot)  
- **q_u** = Unconfined Compressive Strength - Laboratory (pounds per square foot)  
- **S_u** = Undrained Shear Strength (pounds per square foot)  

Drained Shear Strength Parameters:  
- **c'** = Cohesion (pounds per square foot), **ϕ'** = Internal Friction Angle (deg)
Project: Culinary Institute of America at Greystone  
Location: See Figure 2  
Approx. Elev. (ft):  
Approx. Depth (ft): 3  
Approx. Length (ft): 2  
Equipment: shovel

**Legend:**
- \( w \) = Moisture Content (percent), \( \gamma_d \) = Dry Unit Weight (pounds per cubic foot)  
- \( q_u \) = Unconfined Compressive Strength - Laboratory (pounds per square foot)  
- \( S_u \) = Undrained Shear Strength (pounds per square foot)  
- Drained Shear Strength Parameters: \( c' \) = Cohesion (pounds per square foot), \( \phi' \) = Internal Friction Angle (deg)

**Layer** | **Description**
--- | ---
A | **ARTIFICIAL FILL - CLAY (CL):** dark brown, wet, very stiff
B | **ARTIFICIAL FILL - Poorly-Graded SAND with CLAY and GRAVEL (SP-SC):** brown, moist, dense, fine to coarse sand, coarse and subangular gravel consisting of hard rock  
| 3ft: \( F=5.8, LL=28, PI=11 \)

**Groundwater:** not encountered at time of excavation  
**Sample:** disturbed (bag) sample at 3 ft.

**Notes:**

**Diagram:**
- Depth (ft): -10, -8, -6, -4, -2, 0, +2, +4
- EAST
- WEST
- **Description:** concrete retaining wall, landscape

---

**Notes:**

---

---
Approx. Elev. (ft): 3.9
Approx. Depth (ft): 3.9
Approx. Length (ft): 4.4’ x 2.4’
Orientation: N 20° W
Equipment: shovel

Layer | Description
--- | ---
A | ARTIFICIAL FILL - SANDY CLAY (CL) with GRAVEL: red-brown to brown, dry to moist, stiff, fine to coarse sand, subangular to subrounded gravel consisting of hard rock, roots
B | ARTIFICIAL FILL - Well-Graded SAND with GRAVEL (SW): tan, moist, medium dense, fine to medium sand, minor coarse sand and subangular fine gravel, roots
C | SONOMA VOLCANICS - VOLCANICLASTIC ALLUVIUM: severely weathered to consistency of SANDY CLAY (CL), light brown, moist, stiff, fine to coarse sand, subangular to subrounded gravel consisting of hard rock

GROUNDWATER: not encountered at time of excavation
SAMPLE: not sampled
NOTES:

LEGEND:
PP = Pocket Penetrometer Resistance - Unconfined Compressive Strength (tons per square foot)
F = Percent Passing No. 200 Sieve by Dry Weight, LL = Liquid Limit, PI = Plasticity Index
w = Moisture Content (percent), \( \gamma_d \) = Dry Unit Weight (pounds per cubic foot)
\( q_u \) = Unconfined Compressive Strength - Laboratory (pounds per square foot)
\( S_u \) = Undrained Shear Strength (pounds per square foot)
Drained Shear Strength Parameters: \( c' \) = Cohesion (pounds per square foot), \( \phi' \) = Internal Friction Angle (deg)
6658 CIA Core Box Photos

Culinary Institute of America at Greystone
CET # 6658
Boring B-2
Box 2 of 7
9.9’ – 14.8’

IMG_3941.JPG

Culinary Institute of America at Greystone
CET # 6658
Boring B-2
Box 3 of 7
14.8’ – 19.9’

IMG_3942.JPG
Culinary Institute of America at Greystone
CET # 6658
Boring B-2
Box 6 of 7
29.9’ – 34.8’

Culinary Institute of America at Greystone
CET # 6658
Boring B-2
Box 7 of 7
34.8’ – 39.9’
Culinary Institute of America at Greystone
CET # 6658
Boring B-3
Box 1 of 5
5.0’ – 9.6’

05/06/2016

IMG_4701.JPG

Culinary Institute of America at Greystone
CET # 6658
Boring B-3
Box 2 of 5
9.6’ – 18.0’

05/06/2016

IMG_4702.JPG
Culinary Institute of America at Greystone
CET # 6658
Boring B-3
Box 3 of 5
15.0’ – 19.5’

05/06/2016

Culinary Institute of America at Greystone
CET # 6658
Boring B-3
Box 4 of 5
19.5’ – 23.8’

05/06/2016
Culinary Institute of America at Greystone
CET # 6658
Boring B-3
Box 5 of 5
23.8’ – 27.1’

IMG_4705.JPG
APPENDIX B
Laboratory Test Reports
Particle Size Distribution Report

<table>
<thead>
<tr>
<th>% +3&quot;</th>
<th>% Gravel</th>
<th>% Sand</th>
<th>% Fines</th>
<th>Silt</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coarse</td>
<td>Fine</td>
<td>Coarse</td>
<td>Medium</td>
<td>Fine</td>
</tr>
<tr>
<td>○</td>
<td>0.0</td>
<td>12.3</td>
<td>29.9</td>
<td>14.5</td>
<td>18.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **LL**: 28
- **PL**: 17
- **D_{50}**: 16.9618
- **D_{60}**: 5.4073
- **D_{90}**: 3.0259
- **D_{16}**: 0.6458
- **D_{10}**: 0.1941
- **C_{c}**: 0.1237
- **C_{u}**: 0.62
- **C_{u}**: 43.71

**Material Description**
- Brown, poorly graded SAND with clay & gravel.

**Project No.**: 6658
- **Client**: Condor Earth Technologies, Inc.
- **Project**: Storage Caves-Culinary Institute of America
- **Location**: TP-3  Depth: 3'

**Soil Mechanics Lab**
- **Oakland, California**  Plate

**Tested By**: MA  Checked By:
Particle Size Distribution Report

<table>
<thead>
<tr>
<th>GRAIN SIZE - mm</th>
<th>PERCENT FINER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>% +3&quot;</th>
<th>% Gravel</th>
<th>% Sand</th>
<th>% Fines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coarse</td>
<td>Fine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>36.5</td>
<td>13.2</td>
<td>4.5</td>
</tr>
<tr>
<td></td>
<td>6.6</td>
<td>7.0</td>
<td>32.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LL</th>
<th>PL</th>
<th>D85</th>
<th>D60</th>
<th>D50</th>
<th>D30</th>
<th>D15</th>
<th>D10</th>
<th>Cc</th>
<th>Cu</th>
</tr>
</thead>
<tbody>
<tr>
<td>29.8859</td>
<td>16.6213</td>
<td>4.5699</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Material Description

○ Dense, dark brown clayey fine to coarse GRAVEL with sand.

Project No: 6658  Client: Condor Earth Technologies, Inc.

Project: Culinary Institute of America

○ Location: B-2  Depth: 19'

Soil Mechanics Lab

Oakland, California

Tested By: MA  Checked By:  

Remarks:
LIQUID AND PLASTIC LIMITS TEST REPORT

Dashed line indicates the approximate upper limit boundary for natural soils

<table>
<thead>
<tr>
<th>MATERIAL DESCRIPTION</th>
<th>LL</th>
<th>PL</th>
<th>PI</th>
<th>%&lt;#40</th>
<th>%&lt;#200</th>
<th>USCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dark brown CLAY with sand.</td>
<td>37</td>
<td>17</td>
<td>20</td>
<td></td>
<td></td>
<td>CL</td>
</tr>
<tr>
<td>Yellow-brown sandy CLAY.</td>
<td>34</td>
<td>18</td>
<td>16</td>
<td></td>
<td></td>
<td>CL</td>
</tr>
<tr>
<td>Brown, well graded SAND with clay &amp; gravel.</td>
<td>28</td>
<td>17</td>
<td>11</td>
<td>25.2</td>
<td>5.8</td>
<td>SP-SC</td>
</tr>
</tbody>
</table>

Project No. 6658  Client: Condor Earth Technologies, Inc.  Remarks:

Project: Storage Caves-Culinary Institute of America

Location: TP-1  Depth: 2'
Location: TP-1  Depth: 3'
Location: TP-3  Depth: 3'

Soil Mechanics Lab
Oakland, California

Tested By: MA  Checked By: _______________
LIQUID AND PLASTIC LIMITS TEST REPORT

MATERIAL DESCRIPTION | LL | PL | PI | %<#40 | %<#200 | USCS
--- | --- | --- | --- | --- | --- | ---
● Dark brown clayey SAND with gravel | 41 | 29 | 12 | | | SC
● Olive gray sandy SILT | NV | NP | NP | | | ML
▲ Dark brown clayey SAND with gravel | 49 | 32 | 17 | | | SC
◆ Dark brown clayey GRAVEL with sand | 40 | 29 | 11 | | | GC

Project No: 6658  
Client: Condor Earth Technologies, Inc.

Project: Culinary Institute of America,  
2555 Main Street, St. Helena, CA.

Location: B-1  
Depth: 12.5'

Location: B-1  
Depth: 29.5'

Location: B-2  
Depth: 5'

Location: B-2  
Depth: 19.5'

Soil Mechanics Lab  
Oakland, California

Tested By: MA  
Checked By: ____________________________
LIQUID AND PLASTIC LIMITS TEST REPORT

Dashed line indicates the approximate upper limit boundary for natural soils.

MATERIAL DESCRIPTION | LL | PL | PI | %<#40 | %<#200 | USCS
--- | --- | --- | --- | --- | --- | ---
Gray Sandy Lean Clay | 38 | 24 | 14 |

Project No. 6658  Client: Culinary Institute of America at Greystone Winery
Project: CIA Greystone Storage Caves
Location: B3 @ -5'  Sample Number: B3-5'  Depth: -5'

CONDOR EARTH TECHNOLOGIES
Jamestown, CA

Tested By: N. Garnica  Checked By: R. Long
LIQUID AND PLASTIC LIMITS TEST REPORT

Dashed line indicates the approximate upper limit boundary for natural soils

MATERIAL DESCRIPTION | LL | PL | PI | %<#40 | %<#200 | USCS
--- | --- | --- | --- | --- | --- | ---
Tan Sandy Elastic Silt with Gravel | 59 | 39 | 20 | | | MH

Project No. 6658  
Client: Culinary Institute of America at Greystone Winery  
Project: CIA Greystone Storage Caves  
Location: B3 @ -8.5'  
Sample Number: B3-8.5'  
Depth: -8.5'

CONDOR EARTH TECHNOLOGIES  
Jamestown, CA

Tested By: N. Garnica  
Checked By: R. Long

Remarks:
Type of Test: CU with Pore Pressures
Sample Type: 2" Liner
Description: CLAY with sand(CL), dark brown.

Assumed Specific Gravity = 2.70
Remarks:

Sample No. | 1 | 2 | 3
---|---|---|---
Water Content, % | 20.3 | 20.3 | 20.3
Dry Density, pcf | 89.8 | 89.8 | 89.8
Saturation, % | 62.5 | 62.5 | 62.5
Void Ratio | 0.8775 | 0.8775 | 0.8775
Diameter, in. | 1.93 | 1.93 | 1.93
Height, in. | 4.10 | 4.10 | 4.10

At Test
Water Content, % | 32.7 | 31.9 | 30.9
Dry Density, pcf | 91.6 | 92.6 | 94.0
Saturation, % | 105.0 | 105.2 | 105.3
Void Ratio | 0.8393 | 0.8202 | 0.7925
Diameter, in. | 1.91 | 1.93 | 1.94
Height, in. | 4.10 | 3.96 | 3.88

Strain rate, %/min. | 0.0030 | 0.0030 | 0.0030
Eff. Cell Pressure, psi | 3.47 | 6.94 | 13.89
Fail. Stress, ksf | 1.16 | 1.50 | 2.12
Excess Pore Pr., ksf | 0.04 | 0.27 | 0.85
Strain, % | 3.2 | 1.8 | 2.1

Ult. Stress, ksf
Excess Pore Pr., ksf
Strain, %

σf, Failure, ksf | 1.62 | 2.23 | 3.28
σf, Failure, ksf | 0.46 | 0.73 | 1.15

Client: Condor Earth Technologies, Inc.
Project: Storage Caves-Culinary Institute of America
Location: TP-1
Depth: 2'
Proj. No.: 6658
Date Sampled:

TRIAXIAL SHEAR TEST REPORT
Soil Mechanics Lab
Oakland, California

Tested By: MA
Type of Test: CU with Pore Pressures
Sample Type: 2" Liner
Description: Sandy CLAY(CL), yellow brown

Assumed Specific Gravity = 2.70
Remarks:

Client: Condor Earth Technologies, Inc.
Project: Storage Caves-Culinary Institute of America
Location: TP-1
Depth: 3'
Proj. No.: 6658

Date Sampled:
TRIAXIAL SHEAR TEST REPORT
Soil Mechanics Lab
Oakland, California

Sample No. | 1 | 2 | 3
---|---|---|---
Water Content, % | 33.3 | 33.3 | 33.3
Dry Density, pc | 86.9 | 86.9 | 86.9
Saturation, % | 95.8 | 95.8 | 95.8
Void Ratio | 0.9390 | 0.9390 | 0.9390
Diameter, in. | 1.93 | 1.93 | 1.93
Height, in. | 3.83 | 3.83 | 3.83

At Test
Water Content, % | 36.1 | 35.5 | 34.7
Dry Density, pc | 86.9 | 87.7 | 88.7
Saturation, % | 103.9 | 103.9 | 104.0
Void Ratio | 0.9390 | 0.9221 | 0.9010
Diameter, in. | 1.93 | 1.94 | 1.95
Height, in. | 3.83 | 3.76 | 3.68

Strain rate, %/min. | 0.0030 | 0.02 | 0.0030
Eff. Cell Pressure, psi | 3.47 | 6.94 | 13.89
Fail. Stress, ksf | 1.01 | 1.53 | 2.43
Excess Pore Pr., ksf | 0.20 | 0.33 | 0.64
Strain, % | 1.8 | 1.9 | 2.7

σ₁, Failure, ksf | 1.31 | 2.20 | 3.78
σ₂, Failure, ksf | 0.30 | 0.67 | 1.36

Tested By: MA
Type of Test:
CU with Pore Pressures

Sample Type: PQ Core

Description: Dense, dark brown clayey SAND with fine gravel (SC).

Assumed Specific Gravity = 2.70

Remarks:

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Initial</th>
<th>At Test</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Water Content, %</td>
<td>31.9</td>
<td>31.9</td>
<td>31.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dry Density,pcf</td>
<td>81.8</td>
<td>81.8</td>
<td>81.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Saturation, %</td>
<td>81.1</td>
<td>81.1</td>
<td>81.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Void Ratio</td>
<td>1.0611</td>
<td>1.0611</td>
<td>1.0611</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diameter, in.</td>
<td>2.80</td>
<td>2.80</td>
<td>2.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Height, in.</td>
<td>5.20</td>
<td>5.20</td>
<td>5.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Strain rate, %/min: 0.0030

Eff. Cell Pressure, psi: 3.47 10.42 17.36

Fail. Stress, ksf: 2.3 5.1 7.9

Excess Pore Pr., ksf: 0.2 0.1 -0.1

Strain, %: 1.3 2.0 3.4

Ult. Stress, ksf: 2.6 6.5 10.5

Excess Pore Pr., ksf: 0.3 1.4 2.6

Client: Condar Earth Technologies, Inc.

Project: Culinary Institute of America,
2555 Main Street, St. Helena, CA.

Location: B-1

Depth: 13'

Proj. No.: 6658

Date Sampled: TRIAXIAL SHEAR TEST REPORT

Soil Mechanics Lab
Oakland, California

Tested By: MA
Type of Test:
CU with Pore Pressures

Sample Type: PQ Core

Description: Dense, dark brown clayey fine to coarse GRAVEL with sand.

Assumed Specific Gravity = 2.70

Remarks:

Sample No. 1 2 3

Water Content, % 22.9 22.9 22.9
Dry Density,pcf 82.3 82.3 82.3
Saturation, % 59.0 59.0 59.0
Void Ratio 1.0489 1.0489 1.0489
Diameter, in. 2.90 2.90 2.90
Height, in. 5.00 5.00 5.00

Water Content, % 39.6 38.7 38.4
Dry Density,pcf 82.6 83.6 84.0
Saturation, % 102.8 102.9 102.9
Void Ratio 1.0406 1.0160 1.0073
Diameter, in. 2.89 2.91 2.93
Height, in. 5.00 4.90 4.81

Strain rate, %/min. 0.0030 0.0030 0.0030
Eff. Cell Pressure, psi 3.47 10.42 17.36
Fall. Stress, ksf 1.19 2.89 4.49
Excess Pore Pr., ksf 0.15 0.44 0.57
Strain, % 1.8 1.6 2.5
Ult. Stress, ksf
Excess Pore Pr., ksf
Strain, %

σ_f Failure, ksf 1.54 3.95 6.42
σ_3 Failure, ksf 0.35 1.06 1.93

Client: Condor Earth Technologies, Inc.

Project: Culinary Institute of America,
2555 Main Street, St. Helena, CA.

Location: B-2

Depth: 19'

Proj. No.: 6658

Date Sampled:

TRIAXIAL SHEAR TEST REPORT
Soil Mechanics Lab
Oakland, California

Tested By: MA
15 January, 2016

Job No.1601014
Cust. No.12016

Ms. Emily Kentta
Condor Earth Technologies, Inc.
P.O. Box 3905
Sonora, CA 95370

Subject: Project No.: 6658
          Project Name: Culinary Institute of America, 2555 Main St., St. Helena, CA
          Corrosivity Analysis – ASTM Test Methods

Dear Ms. Kentta:

Pursuant to your request, CERCO Analytical has analyzed the soil sample submitted on January 05, 2016. Based on the analytical results, this brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurement, this sample is classified as “moderately corrosive”. All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentration reflects none detected with a detection limit of 15 mg/kg.

The sulfate ion concentration is 15 mg/kg and is determined to be insufficient to damage reinforced concrete structures and cement mortar-coated steel at this location.

The pH of the soil is 7.36, which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

The redox potential is 410-mV, which is indicative of aerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific long-term corrosion control design recommendations or consultation, please call JDH Corrosion Consultants, Inc. at (925) 927-6630.

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,

CERCO ANALYTICAL, INC.

J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure
<table>
<thead>
<tr>
<th>Job/Sample No.</th>
<th>Sample I.D.</th>
<th>Redox (mV)</th>
<th>pH</th>
<th>Conductivity (umhos/cm)*</th>
<th>Resistivity (100% Saturation) (ohms-cm)</th>
<th>Sulfide (mg/kg)*</th>
<th>Chloride (mg/kg)*</th>
<th>Sulfate (mg/kg)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1601014-001</td>
<td>B-2 @ 5'</td>
<td>410</td>
<td>7.36</td>
<td>-</td>
<td>2,200</td>
<td>-</td>
<td>N.D.</td>
<td>17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Reporting Limit:</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>-</td>
<td>50</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

Date Analyzed: 11-Jan-2016 11-Jan-2016 - 12-Jan-2016 - 11-Jan-2016 11-Jan-2016

* Results Reported on "As Received" Basis
N.D. - None Detected

Quality Control Summary - All laboratory quality control parameters were found to be within established limits
# TABLE OF CONTENTS

INTRODUCTION .................................................................................................................. 1  
SCOPE ................................................................................................................................ 2  
STUDY ................................................................................................................................. 3  
  Site Exploration ............................................................................................................. 3  
  Laboratory Testing......................................................................................................... 5  
SITE CONDITIONS ............................................................................................................. 5  
  General ............................................................................................................................ 5  
  Geology and Soils .......................................................................................................... 6  
  Landslides ....................................................................................................................... 6  
  Surface ............................................................................................................................ 7  
  Subsurface ...................................................................................................................... 7  
  Groundwater ................................................................................................................. 8  
  Flooding .......................................................................................................................... 8  
DISCUSSION AND CONCLUSIONS .................................................................................. 8  
  Seismic Hazards ............................................................................................................ 8  
    General ......................................................................................................................... 8  
    Seismicity ..................................................................................................................... 9  
    Faulting ....................................................................................................................... 9  
    Liquefaction ............................................................................................................... 10  
    Densification ............................................................................................................ 11  
  Geotechnical Issues ...................................................................................................... 11  
    General ....................................................................................................................... 11  
    Heterogeneous Fill .................................................................................................... 12  
    Weak, Porous Surface Soils ...................................................................................... 12  
    Foundation, Slab and Pavement Support .................................................................. 12  
    On-Site Soil Quality ................................................................................................... 13  
    Select Fill ................................................................................................................... 13  
    Settlement ................................................................................................................... 13  
    Surface Drainage ....................................................................................................... 13  
    Excavation Dewatering .............................................................................................. 14  
RECOMMENDATIONS ...................................................................................................... 14  
  Seismic Design ............................................................................................................. 14  
  Grading ........................................................................................................................... 15  
    Site Preparation ........................................................................................................ 15  
    Stripping ...................................................................................................................... 16  
    Excavations ............................................................................................................... 16  
    Fill Quality ............................................................................................................... 17  
    Select Fill .................................................................................................................. 17  
    Fill Placement .......................................................................................................... 18  
    Permanent Fill Slopes .............................................................................................. 18  
    Wet Weather Grading ............................................................................................. 19  
  Foundation Support .................................................................................................... 19  
    Spread Footings ........................................................................................................ 20  
    Bearing Pressures ...................................................................................................... 20  
    Lateral Pressures ...................................................................................................... 20  
    Drilled Piers .............................................................................................................. 20  
    Skin Friction ............................................................................................................. 21
TABLE OF CONTENTS (cont’d)

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lateral Forces</td>
<td>21</td>
</tr>
<tr>
<td>Pier Drilling</td>
<td>21</td>
</tr>
<tr>
<td>Concrete</td>
<td>22</td>
</tr>
<tr>
<td>Slab-On-Grade</td>
<td>22</td>
</tr>
<tr>
<td>Utility Trenches</td>
<td>23</td>
</tr>
<tr>
<td>Pavements</td>
<td>23</td>
</tr>
<tr>
<td>Parking Lot Drainage</td>
<td>25</td>
</tr>
<tr>
<td>Wet Weather Paving</td>
<td>26</td>
</tr>
<tr>
<td>Geotechnical Drainage</td>
<td>26</td>
</tr>
<tr>
<td>Surface</td>
<td>26</td>
</tr>
<tr>
<td>Slab Underdrains</td>
<td>27</td>
</tr>
<tr>
<td>Maintenance</td>
<td>27</td>
</tr>
<tr>
<td>Supplemental Services</td>
<td>28</td>
</tr>
<tr>
<td>LIMITATIONS</td>
<td>29</td>
</tr>
</tbody>
</table>

APPENDICES

APPENDIX A - PLATES ................................................. A-1
APPENDIX B - REFERENCES ............................................. B-1
APPENDIX C - DISTRIBUTION ................................. C-1
INFORMATION ABOUT YOUR G EOTECHNICAL REPORT
INTRODUCTION

This report presents the results of our geotechnical study for the Vineyard Lodge expansion project to be constructed at the Culinary Institute of America’s facilities located at 830 Pratt Avenue in St. Helena, California. The triangular-shaped property extends over relatively level terrain and contains a vineyard lodge building in the southwest corner (based on true north) of the property along Pratt Avenue and a small triangular-shaped building just northwest of the vineyard lodge building. A paved parking lot lies in front of the building to the northeast and is accessed by Pratt Avenue. The site is bounded on the southwestern side by railroad tracks and on the northeastern side by a vineyard. Wastewater treatment ponds lie to the north of the property. The site location is shown on Plate 1, Appendix A.

We understand it is proposed to remove the triangular-shaped building and construct a new building northwest of the main building and parking area. The new building is to have a concrete slab-on-grade floor. New parking that extends off the existing lot is also planned adjacent to the proposed building. Smaller proposed improvements include two new trellis areas, a new dumpster enclosure, and new walkways.

Actual foundation loads are not known at this time. We anticipate the loads will be typical for the light to moderately heavy type of construction planned and that wall and isolated column loads will range from about 1 to 3 kips per lineal foot and 30 to 40 kips, respectively.

Grading plans are not available, but we anticipate that the planned grading will be the minimum amount needed to construct a level building pad and provide the building site and paved areas with positive drainage, and could include cuts and fills on the order of 1 to 4 feet.

Utility plans are not available, but we have assumed for this study that the project utilities will extend no deeper than 8 feet below the existing ground surface. If project
utilities extend deeper, supplemental exploration may be required to evaluate the soil conditions within and below the utility excavations.

SCOPe

The purpose of our study, as outlined in our Professional Service Agreement dated February 25, 2008, was to generate geotechnical information for the design and construction of the project. Our scope of services included reviewing selected published geologic data pertinent to the site; evaluating subsurface conditions with test borings and laboratory tests; analyzing the field and laboratory data; and presenting this report with the following geotechnical information:

1. A brief description of soil and groundwater conditions observed during our study;

2. A discussion of seismic hazards that may affect the proposed improvements; and

3. Conclusions and recommendations regarding:
   a. Primary geotechnical engineering concerns and mitigating measures, as applicable;
   b. Site preparation and grading including remedial grading of weak, porous, compressible surface soils;
   c. Foundation types, design criteria, and estimated settlement behavior;
d. Support of concrete slabs-on-grade;

e. Preliminary pavement thickness based on our experience with similar soils and projects and the results of one R-value test on the anticipated subgrade soils;

f. Utility trench backfill;

g. Geotechnical engineering drainage improvements; and

h. Supplemental geotechnical engineering services.

STUDY

Site Exploration

We reviewed our previous geotechnical studies in the vicinity and selected geologic references pertinent to the site. The geologic literature reviewed is listed in Appendix B.

On April 28, 2008, we performed a geotechnical reconnaissance of the site and explored the subsurface conditions by drilling six test borings to depths ranging from about 5½ to 18½ feet. The borings were drilled with a truck-mounted drill rig equipped with 8-inch diameter, hollow stem augers at the approximate locations shown on the Exploration Plan, Plate 2. The test boring locations were determined approximately by pacing their distance from features shown on the Exploration Plan and should be considered accurate only to the degree implied by the method used. Our geologist located
and logged the borings and obtained samples of the materials encountered for visual examination, classification and laboratory testing.

Relatively undisturbed samples were obtained from the borings 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 test boring logs. A disturbed “bulk” sample was also obtained from the test borings and placed in a plastic bucket.

The logs of the test borings showing the materials encountered, groundwater conditions, converted blow counts, and sample depths are presented on Plates 3 through 8. The soils are described in accordance with the Unified Soil Classification System, outlined on Plate 9.

The test boring logs show our interpretation of subsurface soil 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 samples, laboratory test results, and interpretation of drilling and sampling resistance. The location of the soil boundaries should be considered approximate. The transition between soil types may be gradual.
Laboratory Testing

The samples obtained from the borings were transported to our office and re-examined by the project engineer to verify soil classifications, evaluate characteristics, and assign tests pertinent to our analysis. Selected samples were laboratory tested to determine their water content, dry density, classification (Atterberg Limits, grain size distribution), shear strength, expansion potential (Expansion Index - EI) and R-value. Some test results are presented on the test boring logs. Results of the classification, shear strength, and R-value tests are presented on Plates 10 through 14.

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 near the center of the Napa Valley floor. The Napa Valley is a long, narrow northwest-trending alluvial plain flanked by northwest-trending mountain ridges.
Geology and Soils

The United States Geological Survey (USGS) geologic maps (R.W. Graymer, et al., 2007) indicate the property is underlain by Holocene Epoch alluvial fan deposits. The alluvial fan deposits are shown to comprise moderately to poorly sorted and moderately to poorly bedded sand, gravel, silt, and clay, which were deposited where streams emanate from upland regions onto valley floors or plains.

Mapping by the U.S. Soil Conservation Service (Soil Survey Staff, 2008) has classified soil over the portions of the property proposed for development as belonging to the Bale clay loam series. The Bale clay loam series comprises two soil horizons. The topsoil is shown to be a clay loam that exhibits medium plasticity (LL = 30-50; PI = 10-25) and moderate shrink-swell potential, and extends from a depth of 0 to 24 inches. The subsoil is shown to be a stratified loam to gravelly sandy loam 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. The risk of corrosion is given as high (topsoil) and low (subsoil) for uncoated steel, and moderate (topsoil and subsoil) 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.

Landslides

The USGS maps of landslides (Dwyer, 1976) do not indicate large-scale slope instability at the planned Vineyard Lodge Expansion site, and we did not observe active landslides at the site during our study.
**Surface**

The property extends primarily over relatively level alluvial terrain outside of the Napa River flood plain. The proposed building site is covered with seasonal grass and weeds and is located adjacent to the existing facility. Natural drainage consists of sheet flow over the ground surface that concentrates in man made surface drainage elements such as roadside ditches, and natural drainage elements such as swales and creeks.

In general, the ground surface is moderately hard. However, soils in the area that appear hard and strong when dry will typically lose strength rapidly and settle under the loads of fills, foundations and slabs as their moisture content increases and approaches saturation. This typically occurs because the surface soils are weak, porous and compressible.

**Subsurface**

Our borings and laboratory tests indicate that the portion of the site we studied is blanketed to depths of 6 to 8 feet with clayey soils that are weak, porous and compressible to a depth of 2 to 3 feet. As mentioned, porous soils appear hard and strong when dry but become weak and compressible as their moisture content increases towards saturation. These soils exhibit low plasticity (LL = 35; PI = 15) and low expansion potential (EI = 52). The surface soils are locally covered by 1 to 2 feet of heterogeneous fill. Heterogeneous fill is a material with varying density, strength, compressibility and shrink-swell characteristics that often has an unknown origin and placement history. The Liquid Limit (LL) and Plasticity Index (PI) for the fill soils matched the underlying natural soils (described above), while the Expansion Index was 46. These surface materials are underlain by interbedded sand and gravel with varying amounts of clay and cobbles. A detailed description of subsurface conditions found in our borings is given on Plates 3 through 8, Appendix A.
Groundwater

Free groundwater was first detected in our borings at depths ranging from 7 to 11 feet below the ground surface at the time of drilling. When the holes were backfilled 1½ hours after drilling was completed, the water level had risen a depth of about 7 feet. Fluctuation in the groundwater level typically occurs because of a variation in rainfall intensity, duration and other factors such as flooding and periodic irrigation.

Flooding

Our review of the Federal Emergency Management Agency (FEMA) Flood Zone Map for Napa County, California, Unincorporated (NO. 060205) dated February 1, 1980, indicates that the proposed building site is located within Zone “C,” an area of minimal or no flooding. Evaluation of flooding potential is typically the responsibility of the project civil engineer.

DISCUSSION AND CONCLUSIONS

Seismic Hazards

General

We did not observe subsurface conditions within the portion of the property we studied that would suggest the presence of materials that may be susceptible to seismically induced lurching. Therefore, we judge the potential for the occurrence of this phenomenon at the site to be low.
Seismicity

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 Vineyard Lodge expansion project in strict adherence with current standards for earthquake-resistant construction.

Faulting

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. 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; Bryant, 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**

<table>
<thead>
<tr>
<th>Fault</th>
<th>Direction</th>
<th>Distance-Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Andreas</td>
<td>SW</td>
<td>32</td>
</tr>
<tr>
<td>Healdsburg-Rodgers Creek</td>
<td>SW</td>
<td>12</td>
</tr>
<tr>
<td>Concord-Green Valley</td>
<td>SE</td>
<td>19</td>
</tr>
<tr>
<td>Cordelia</td>
<td>SE</td>
<td>21</td>
</tr>
<tr>
<td>West Napa</td>
<td>S</td>
<td>9.1</td>
</tr>
<tr>
<td>Maacama</td>
<td>NW</td>
<td>14</td>
</tr>
<tr>
<td>Konociti</td>
<td>NW</td>
<td>25</td>
</tr>
<tr>
<td>Hunting Creek</td>
<td>N</td>
<td>18</td>
</tr>
</tbody>
</table>
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.

Granular soils were encountered at the site below the groundwater table. Therefore, we performed an analysis of the blow count data from our borings using the methods of Seed and Idriss (1982), Seed and others (1985), and Youd and Idriss (2001). These procedures normalize the blow counts to account for overburden pressure, rod length, hammer energy, and fines (percent of silt and clay) content. Once the blow counts are normalized and adjusted to a clean sand blow count, the critical blow count is then determined. The critical blow count is calculated using the same procedures referenced above and requires a peak ground acceleration and design earthquake magnitude.

Peak ground acceleration (PGA) was determined using the methods in the 2007 California Building Code (CBC) and Chapter 11 of the American Society of Civil Engineers (ASCE) Standard 7-05, titled “Minimum Design Loads for Buildings and Other Structures” (2006). Section 11.8.3 of ASCE Standard 7-05 states that the PGA for liquefaction evaluation can be defined as the design spectral response acceleration at short periods with 5 percent damping ($S_{DS}$) divided by 2.5. The $S_{DS}$ value is determined using the United States Geological Survey's Earthquake Ground Motion Parameter Java Application (2007). Based on the site's latitude and longitude of 38.514°N and −122.476°W, respectively, the $S_{DS}$ value Site Class D is 0.818g. Therefore, the PGA used for our evaluation is 0.33g.

The West Napa fault is most likely controlling the ground motions at the site. According to Petersen (1996), the West Napa fault is capable of a $M_M$ 6.5 earthquake. Using this information and the scaling factors presented in Youd and Idriss (2001), the critical blow count at the site ranges from 15 to 20 blows per foot depending on depth.
The normalized and adjusted blow counts at the site exceed this value. Therefore, we judge that the potential for liquefaction at the site is low.

Densification

Densification is the settlement of loose, granular soils above the groundwater level due to earthquake shaking. Typically, granular soils that would be susceptible to liquefaction, if saturated, are susceptible to densification. As discussed in the "Liquefaction" section, the soils at the site have a low potential for liquefaction. Therefore, we judge that there is a low potential for densification to impact structures at the site.

Geotechnical Issues

General

Based on our study, we judge the proposed Vineyard Lodge Expansion can be built as planned, provided the recommendations presented in this report are incorporated into its design and construction. The primary geotechnical concerns during design and construction of the project are:

1. The presence of 2 to 3 feet of weak, porous, compressible, clayey surface soils and heterogeneous fill;

2. The detrimental effects of uncontrolled surface runoff and groundwater seepage on the long-term satisfactory performance of projects of this type, especially those constructed on alluvial fans, given the erosion potential and porous nature of the surface soils; and
3. The strong ground shaking predicted to impact the site during the life of the project.

**Heterogeneous Fill**

Heterogeneous fills of unknown quality and unknown method of placement, such as those found at the project site, can settle and/or heave erratically under the load of new fills, structures, slabs, and pavements. Footings, slabs, and pavements supported on heterogeneous fill could also crack as a result of such erratic movements. Thus, where not removed by planned grading, the heterogeneous fill must be excavated and replaced as an engineered fill if it is to be used for structural support.

**Weak, Porous Surface Soils**

Weak, porous surface soils, such as those found at the improvement area, 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, slabs, and pavements. The detrimental effects of such movements can be remediated by strengthening the soils during grading. This can be achieved by excavating the weak soils and replacing them as properly compacted (engineered) fill. Alternatively, satisfactory foundation support could be obtained below the weak surface soils.

**Foundation, Slab and Pavement Support** - After remedial grading, satisfactory foundation support for the planned lodge expansion can be obtained from spread footings bottomed on the engineered fill. Interior slab-on-grade floors, exterior slabs and pavements can also be satisfactorily supported on the engineered fill. For exterior slabs
and pavements the engineered fill below subgrade need only be 12 inches thick. The trellis structures can be supported on drilled piers.

**On-Site Soil Quality**

All fill materials used in the building area and exterior slab and pavement subgrade must be select, as subsequently described in “Recommendations.” We anticipate that, with the exception of organic matter and of rocks or lumps larger than 6 inches in diameter, the excavated material will be suitable for re-use as general and select fill.

**Select Fill**

The select fill can consist of approved on-site soils or import materials with a low expansion potential. The geotechnical engineer must approve the use of on-site soils as select fill during grading.

**Settlement**

Provided remedial grading is performed and the spread footings are installed in accordance with the recommendations presented herein, we estimate that post-construction differential settlements across the building will be about 1 inch.

**Surface Drainage**

Because of topography and location, the site will be impacted by surface runoff from the alluvial fan surface. In addition, the site soils are susceptible to erosion. Surface runoff typically sheet flows over the ground surface but can be concentrated by the planned site grading, landscaping, and drainage. The surface runoff can pond against
structures and seep into the slab rock. Therefore, strict control of surface runoff is necessary to provide long-term satisfactory performance of projects constructed on or near alluvial fans. It will be necessary to divert surface runoff around improvements and provide positive drainage away from structures. This can be achieved by constructing the building pad several inches above the surrounding area and conveying the runoff into man made drainage elements or natural swales that lead downgradient of the site.

**Excavation Dewatering**

Depending on the time of year of construction, groundwater may be encountered near the planned excavation depth, including utility trenches. Therefore, in order to accomplish the planned excavation, it may be necessary to dewater excavations. The dewatering system can consist of a perforated plastic pipe (in a grid array) embedded in free draining rock. The system should discharge to a sump area that is pumped continuously during construction. The general contractor is responsible for the design, operation and maintenance of the temporary dewatering system. If this system is to be incorporated into the final dewatering system of the structure, we should evaluate its performance during excavation.

**RECOMMENDATIONS**

**Seismic Design**

Seismic design parameters presented below are based on Section 1613 titled "Earthquake Loads" of the 2007 California Building Code (CBC). Based on CBC Table 1613.5.2, we have determined a Site Class D should be used for the subject site. Using a site latitude and longitude of 38.514°N and -122.475°W, respectively, and the United
States Geological Survey’s Earthquake Ground Motion Parameter Java Application (USGS, 2007) we recommend that the following seismic design criteria be used for structures at the site.

Mapped Maximum Considered Earthquake Spectral Response Acceleration:

\[
\begin{align*}
S_S (0.2 \text{ second period}) & = 1.205 \text{ g} \\
S_I (1 \text{ second period}) & = 0.501 \text{ g}
\end{align*}
\]

Maximum Considered Earthquake Spectral Response Acceleration for Site Class D:

\[
\begin{align*}
S_{MS} (0.2 \text{ second period}) & = 1.226 \text{ g} \\
S_{MI} (1 \text{ second period}) & = 0.752 \text{ g}
\end{align*}
\]

Design Spectral Response Acceleration (5% damped) for Site Class D:

\[
\begin{align*}
S_{DS} (0.2 \text{ second period}) & = 0.818 \text{ g} \\
S_{DI} (1 \text{ second period}) & = 0.501 \text{ g}
\end{align*}
\]

Grading

Site Preparation

Areas to be developed should be cleared of vegetation and debris, including that left by the removal of obsolete structures. Trees and shrubs that will not be part of the proposed development should be removed and their primary root systems grubbed. Cleared and grubbed material should be removed from the site and disposed of in accordance with County Health Department guidelines. We did not observe septic tanks, leach lines or underground fuel tanks during our study. Any such appurtenances found during grading should be capped and sealed and/or excavated and removed from the site, respectively, in accordance with established guidelines and requirements of the County Health Department. Voids created during clearing should be backfilled with engineered fill as recommended herein.
Stripping

Areas to be graded should be stripped of the upper few inches of soil containing organic matter. Soil containing more than two percent by weight of organic matter should be considered organic. Actual stripping depth should be determined by a representative of the geotechnical engineer in the field at the time of stripping. The strippings should be removed from the site, or if suitable, stockpiled for re-use as topsoil in landscaping.

Excavations

Following initial site preparation, excavation should be performed as planned or recommended herein. Excavations extending below the proposed finished grade should be backfilled with suitable materials compacted to the requirements given below.

Within building areas and fill areas, including areas outside of the building footprint, the old fill and weak, porous, compressible surface soils should be excavated to a minimum depth of 3 feet below the surface exposed by stripping. The excavation of weak, compressible soils and old fill should also extend at least 12 inches below exterior slab and pavement subgrade where those improvements are not supported on new fill.

The excavation of weak, porous, compressible surface materials should extend at least 5 feet beyond the outside edge of the exterior footings of the proposed buildings and 3 feet beyond the edge of exterior slabs and pavements and the toe of fills outside of building areas. The excavated materials should be stockpiled for later use as compacted fill, or removed from the site, as applicable.

At all times, temporary construction excavations should conform to the regulations of the State of California, Department of Industrial Relations, Division of Industrial Safety or other stricter governing regulations. The stability of temporary cut slopes, such as those constructed during the installation of underground utilities, should be the responsibility of the contractor. Depending on the time of year when grading is performed, and the surface conditions exposed, temporary cut slopes may need to be
excavated to 1½:1, or flatter. The tops of the temporary cut slopes should be rounded back to 2:1 in weak soil zones.

**Fill Quality**

All fill materials should be free of perishable matter and rocks or lumps over 6 inches in diameter and must be approved by the geotechnical engineer prior to use. We judge the on-site soils are generally suitable for use as general and select fill. The suitability of the on-site soils for use as select fill should be verified during grading.

**Select Fill**

Select fill should be free of organic matter, have a low expansion potential, and conform in general to the following requirements:

<table>
<thead>
<tr>
<th>SIEVE SIZE</th>
<th>PERCENT PASSING (By Dry Weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 inch</td>
<td>100</td>
</tr>
<tr>
<td>4 inch</td>
<td>90 - 100</td>
</tr>
<tr>
<td>No. 200</td>
<td>10 - 60</td>
</tr>
</tbody>
</table>

Liquid Limit - 40 Percent Maximum  
Plasticity Index - 15 Percent Maximum

In general, imported fill, if needed, should be select. Material not conforming to these requirements may be suitable for use as import fill; however, it shall be the contractor's responsibility to demonstrate that the proposed material will perform in an equivalent manner. The geotechnical engineer should approve imported materials prior to use as compacted fill. The grading contractor is responsible for submitting, at least 72 hours (3 days) in advance of its intended use, samples of the proposed import materials for laboratory testing and approval by the soils engineer.
Fill Placement

The surface exposed by stripping and removal of heterogeneous fill and weak, compressible surface soils should be scarified to a depth of at least 6 inches, uniformly moisture-conditioned to near optimum and compacted to at least 90 percent of the maximum dry density of the materials as determined by ASTM Test Method D-1557. Approved fill material should then be spread in thin lifts, uniformly moisture-conditioned to near optimum, and properly compacted. All structural fills, including those placed to establish site surface drainage, should be compacted to at least 90 percent relative compaction. Only approved select materials should be used for fill within the building areas and within the upper 12 inches of exterior slabs and pavement subgrades.

Permanent Fill Slopes

In general, fill slopes should be designed and constructed at slope gradients of 2:1 (horizontal to vertical) or flatter, unless otherwise approved by the geotechnical engineer in specified areas. Where steeper slopes are required, retaining walls should be used, and the geotechnical engineer should be consulted regarding the retaining wall design criteria. Fill slopes should be constructed by overfilling and cutting the slope to final grade. "Track walking" of a slope to achieve slope compaction is not an acceptable procedure for slope construction. The geotechnical engineer is not responsible for measuring the angles of these slopes. Denuded slopes should be planted with fast-growing, deep-rooted groundcover to reduce sloughing or erosion. The fill slope inclinations recommended herein address only the stability of the slopes. It should not be inferred that they address the feasibility of landscaping and weed control. Where these are concerns, the slopes should be flattened accordingly.
Wet Weather Grading

Generally, grading is performed more economically during the summer months when on-site soils are usually dry of optimum moisture content. Delays should be anticipated in site grading performed during the rainy season or early spring due to excessive moisture in on-site soils. Special and relatively expensive construction procedures, including dewatering of excavations and importing granular soils, should be anticipated if grading must be completed during the winter and early spring or if localized areas of soft saturated soils are found during grading in the summer and fall.

Open excavations also tend to be more unstable during wet weather as groundwater seeps towards the exposed cut slope. Severe sloughing and occasional slope failures should be anticipated. The occurrence of these events will require extensive clean up and the installation of slope protection measures, thus delaying projects. The general contractor is responsible for the performance, maintenance and repair of temporary cut slopes.

Foundation Support

Provided the weak surface soils are removed by or strengthened by remedial grading as recommended herein, the proposed lodge expansion building can be supported on continuous and isolated spread footings that bottom on engineered fill. The planned trellis structures can be supported on drilled, cast-in-place concrete piers as detailed herein.
Spread Footings

Spread footings should be at least 12 inches wide and should bottom on engineered fill at least 18 inches below pad subgrade. Additional embedment or width may be needed to satisfy code and/or structural requirements.

The bottoms of all footing excavations should be thoroughly cleaned out or wetted and compacted using hand-operated tamping equipment prior to placing steel and concrete. This will remove the soils disturbed during footing excavations, or restore their adequate bearing capacity, and reduce post-construction settlements. Footing excavations should not be allowed to dry before placing concrete. If shrinkage cracks appear in soils exposed in the footing excavations, the soil should be thoroughly moistened to close all cracks prior to concrete placement. The moisture condition of the foundation excavations should be checked by the geotechnical engineer no more than 24 hours prior to placing concrete.

Bearing Pressures - Footings installed in accordance with these recommendations may be designed using allowable bearing pressures of 1800, 2700 and 3600 pounds per square foot (psf), for dead loads, dead plus code live loads, and total loads (including wind and seismic), respectively.

Lateral Pressures - The portion of spread footing foundations extending into select engineered fill may impose a passive equivalent fluid pressure and a friction factor of 350 pcf and 0.35, respectively, to resist sliding. Passive pressure should be neglected within the upper 6 inches, unless the soils are confined by concrete slabs or pavements.

Drilled Piers

Drilled, cast-in-place, reinforced concrete piers can be used for foundation support for the planned trellis structures. Drilled piers should be at least 12 inches in diameter and
should extend at least 6 feet below planned pad elevation. Where fill is placed to create a pad and the weak, compressible surface soils are not strengthened by grading, the piers should be deepened in direct proportion to the thickness of fill. Larger piers and deeper embedment may be needed to resist the lateral forces imposed by earthquakes per the 2007 California Building Code. Piers should be spaced no closer than 3 pier diameters, center to center.

Skin Friction - The portion of the piers extending below the weak surface soils may be designed using an allowable skin friction of 500 psf for dead load plus long term live loads. This value can be increased by 1/2 for total loads, including downward vertical wind or seismic forces. A skin friction value of 350 psf should be used to resist uplift forces due to wind or seismic. 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. An equivalent fluid pressure of 350 pcf acting on two pier diameters should be used. Confinement for passive pressure may be assumed from 3 feet below existing grade. Where fill is placed to create a pad and the weak compressible soils are not strengthened by grading, the confinement depth should increase in direct proportion to the thickness of fill.

Pier Drilling - We encountered groundwater and/or caving-prone soils 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 soils are encountered, it may be necessary to case the holes. Difficult drilling may be required to achieve the required penetration. The drilling subcontractor should review this report, become familiar with site conditions as they pertain to his operation and draw
his own conclusions regarding drilling difficulty, suitable drill rigs and the need for casing and dewatering prior to bidding.

**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.

**Slab-On-Grade**

Provided grading is performed in accordance with the recommendations presented herein, slabs should be underlain by engineered fill. Slab-on-grade subgrade should be rolled to produce a dense, uniform surface. The slabs should be underlain with a capillary moisture break consisting of at least 4 inches of clean, free-draining crushed rock or gravel (excluding pea gravel) at least ¼-inch and no larger than ¾-inch in size. Class 2 aggregate base can be used for slab rock under exterior slabs. Interior area slabs should be provided with an underdrain system. The installation of this subdrain system is discussed in the "Geotechnical Drainage" section. Slabs should be designed by the project civil or structural engineer to support the anticipated loads, reduce cracking and provide protection against the infiltration of moisture vapor.

A vapor barrier should be placed under all slabs-on-grade that are likely to receive an impermeable floor finish or be used for any purpose where the passage of water vapor through the floor is undesirable. RGH does not practice in the field of moisture vapor transmission evaluation or mitigation; therefore, we recommend that a qualified person be consulted to evaluate the general and specific moisture vapor transmission paths and any impact on the proposed construction. This person should provide recommendations for mitigation of the potential adverse impact of moisture vapor transmission on various components of the structure as deemed appropriate.
Utility Trenches

The shoring and safety of trench excavations is solely the responsibility of the contractor. Attention is drawn to the State of California Safety Orders dealing with “Excavations and Trenches.”

Unless otherwise specified by the County of Napa, on-site, inorganic soil may be used as general utility trench backfill. Where utility trenches support pavements, slabs and foundations, trench backfill should consist of aggregate baserock. The baserock should comply with the minimum requirements in Caltrans Standard Specifications, Section 26 for Class 2 Aggregate Base. Trench backfill should be moisture-conditioned as necessary, and placed in horizontal layers not exceeding 8 inches in thickness, before compaction. Each layer should be compacted to at least 90 percent relative compaction as determined by ASTM Test Method D-1557. The top 6 inches of trench backfill below vehicle pavement subgrades should be moisture-conditioned as necessary and compacted to at least 95 percent relative compaction. Jetting or ponding of trench backfill to aid in achieving the recommended degree of compaction should not be attempted.

Pavements

Based on our study, we believe the near-surface clayey soils will have a low to moderate supporting capacity, after proper compaction, when used as a pavement subgrade. As shown on Plate 12, an R-value of 12 was measured on a bulk sample of near-surface soil obtained near the planned parking area. Because of potential variation in the on-site soils, we selected an R-value of 10 for use in pavement design calculations.

Based on the selected R-value, we have computed pavement sections for Traffic Indices (TI) ranging from 5.0 to 7.0 on Table 2, page 24. The project engineer, in consultation with City/County officials, should choose the pertinent (TI) for this project.
TABLE 2
PAVEMENT SECTIONS

<table>
<thead>
<tr>
<th>TI</th>
<th>ASPHALT CONCRETE</th>
<th>CLASS 2 AGGREGATE BASE</th>
<th>MINIMUM ENGINEERED FILL</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.0</td>
<td>0.30</td>
<td>1.25</td>
<td>1.0</td>
</tr>
<tr>
<td>6.5</td>
<td>0.30</td>
<td>1.10</td>
<td>1.0</td>
</tr>
<tr>
<td>6.0</td>
<td>0.25</td>
<td>1.05</td>
<td>1.0</td>
</tr>
<tr>
<td>5.5</td>
<td>0.25</td>
<td>0.90</td>
<td>1.0</td>
</tr>
<tr>
<td>5.0</td>
<td>0.20</td>
<td>0.85</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Pavement thicknesses were computed using Method 301 F of the Caltrans Highway Design Manual and are based on a pavement life of 20 years. These recommendations are intended to provide support for the auto and light truck traffic represented by the indicated Traffic Indices. They are not intended to provide pavement sections for heavy concentrated construction storage or wheel loads such as forklifts, parked truck-trailers and concrete trucks or for post-construction concentrated wheel loads such as self-loading dumpster trucks.

In areas where heavy construction storage and wheel loads are anticipated, the pavements should be designed to support these loads. Support could be provided by increasing pavement sections or by providing reinforced concrete slabs. Alternatively, paving can be deferred until heavy construction storage and wheel loads are no longer present. Loading areas for self-loading dumpster trucks should be provided with reinforced concrete slabs at least 6 inches thick, and reinforced with No. 4 bars at 12-inch centers each way. Alternatively, the asphalt concrete section should be increased to at least 8 inches in these areas.

Prior to placement of aggregate base and subbase materials, the upper 6 inches of the pavement subgrade soils should be scarified, uniformly moisture-conditioned to near optimum, and compacted to at least 95 percent relative compaction to form a firm, non-
yielding surface. Aggregate subbase and aggregate base materials should be spread in thin layers, uniformly moisture-conditioned, and compacted to at least 95 percent relative compaction to form a firm, non-yielding surface. The materials and methods used should conform to the requirements of the County of Napa and the current edition of the Caltrans Standard Specifications, except that compaction requirements should be based on ASTM Test Method D-1557. Aggregate used for the base course should comply with the minimum requirements specified in Caltrans Standard Specifications, Section 26 for Class 2 Aggregate Base. Aggregate used for the subbase course should be non-expansive and should comply with the minimum requirements specified in Section 25 for Class 2 Aggregate Subbase.

Parking Lot Drainage

Water tends to migrate under pavements and collect in the aggregate courses at low areas on parking lot subgrade soils, such as around storm drain inlets and the thread of paved swales leading to inlets. The ponded water will soften subgrade soils and, under repetitive heavy-wheel loads, will induce inordinately high stresses on the subgrade and pavement components that could result in untimely maintenance. Under-pavement drainage can be improved and maintenance reduced by replacing a 12-inch wide strip (extending at least 15 feet on either side of the inlet) of the select subbase layer or subgrade soils with a subdrain consisting of ¾-inch or 1½-inch free-draining Class 1 Permeable Material. The drain rock should be outletted into the storm drain inlet. Storm drain trenches can be made to serve as pavement subdrains. We should be consulted to verify the suitability of storm drain trenches as pavement subdrains in a case-specific basis.

Where pavements will abut landscaped areas, the pavement baserock layer and subgrade soils should be protected against saturation from irrigation and rainwater with a subdrain, similar to that previously discussed. The subdrain should extend to a depth of at least 12 inches below the bottom of the baserock layer. Alternatively, a grouted moisture
cut-off extending at least 12 inches below subgrade should be provided behind or below the curb and gutter.

**Wet Weather Paving**

In general, the pavements should be constructed during the dry season to avoid the saturation of the subgrade and base materials, which often occurs during the wet winter months. If pavements are constructed during the winter, a cost increase relative to drier weather construction should be anticipated. Unstable areas may have to be overexcavated to remove soft soils. The excavations will probably require backfilling with imported crushed (ballast) rock. The geotechnical engineer should be consulted for recommendations at the time of construction.

**Geotechnical Drainage**

**Surface**

Surface water should be diverted away from slopes, foundations, and edges of pavements. Surface drainage gradients within 5 feet of building foundations should be constructed with a minimum slope of 2 percent for paved areas and 4 percent for unpaved areas. Where a flatter gradient is required to satisfy design constraints, area drains should be installed with a spacing no greater than about 20 feet. Roofs should be provided with gutters and the downspouts should be connected to closed (glued Schedule 40 PVC or better) conduits discharging well away from foundations, onto paved areas, onto erosion resistant natural drainages, or into the site’s surface drainage system. Roof downspouts and surface drains must be maintained entirely separate from the slab underdrains recommended hereinafter.
Water seepage or the spread of extensive root systems into the soil subgrade of footings, slabs or pavements could cause differential movements and consequent distress in these structural elements. Landscaping should be planned with consideration for these potential problems.

**Slab Underdrains**

Where interior slab subgrades are less than 6 inches above adjacent exterior grade and where migration of moisture through the slab would be detrimental, slab underdrains should be installed to dispose of surface and/or groundwater that may seep and collect in the slab rock. Slab underdrains should consist of trenches that extend at least 6 inches below the bottom of the slab rock and slope to drain by gravity. The slab underdrain trenches should be at least 6 inches wide and spaced no further than 15 feet, both ways. Additional drain trenches should be installed, as necessary, to drain all isolated under slab areas. Four-inch diameter perforated pipe (SDR 35 or better) sloped to drain to outlets by gravity should be placed in the bottom of the trenches. Slab underdrain trenches should be backfilled to subgrade level with clean, free draining slab rock. An illustration of this system is shown on Plate 15. If slab underdrains are not used, it should be anticipated that water will enter the slab rock, permeate through the concrete slab and ruin floor coverings.

**Maintenance**

Periodic land maintenance will be required. Surface and subsurface drainage facilities should be checked frequently, and cleaned and maintained as necessary or at least annually. A dense growth of deep-rooted ground cover must be maintained on all slopes to reduce sloughing and erosion. Sloughing and erosion that occurs must be repaired promptly before it can enlarge.
Supplemental Services

RGH Consultants, Inc. (RGH) recommends that we be retained to review the project plans and specifications to determine if they are consistent with our recommendations. In addition, we should be retained to observe construction, particularly site excavations, compaction of fills and backfills, foundation and subdrain installations, and perform field and laboratory testing. As part of these services, we recommend that prior to construction a meeting be held at the site that includes, but is not limited to, the owner or owner’s representative, the general contractor, the grading contractor, the foundation contractor, the underground contractor, any specialty contractors, the project civil engineer, other members of the project design team and RGH. This meeting should serve as a time to discuss and answer questions regarding the recommendations presented herein and to establish the coordination procedure between the contractors and RGH.

If, during construction, we observe subsurface conditions different from those encountered during the explorations, we should be allowed to amend our recommendations accordingly. If different conditions are observed by others, or appear to be present beneath excavations, RGH should be advised at once so that these conditions may be evaluated and our recommendations reviewed and updated, if warranted. The validity of recommendations made in this report is contingent upon our being notified and retained to review the changed conditions.

If more than 18 months have elapsed between the submission of this report and the start of work at the site, or if conditions have changed because of natural causes or construction operations at, or adjacent to, the site, the recommendations made in this report may no longer be valid or appropriate. In such case, we recommend that we be retained to review this report and verify the applicability of the conclusions and recommendations or modify the same considering the time lapsed or changed conditions. The validity of recommendations made in this report is contingent upon such review.
These supplemental services are performed on an as-requested basis and are in addition to this geotechnical study. We cannot accept responsibility for items that we are not notified to observe or for changed conditions we are not allowed to review.

**LIMITATIONS**

This report has been prepared by RGH for the exclusive use of the Culinary Institute of America and its consultants as an aid in the design and construction of the proposed Vineyard Lodge expansion project described in this report.

The validity of the recommendations contained in this report depends upon an adequate testing and monitoring program during the construction phase. Unless the construction monitoring and testing program is provided by our firm, we will not be held responsible for compliance with design recommendations presented in this report and other addendum submitted as part of this report.

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 construction, the results of our field exploration, laboratory testing program, and professional judgment. Verification of our conclusions and recommendations is subject to our review of the project plans and specifications, and our observation of construction.

The test borings represent subsurface conditions at the locations and on the date indicated. It is not warranted that they are representative of such conditions elsewhere or at other times. Site conditions and cultural features described in the text of this report are those existing at the time of our field exploration on April 28, 2008, 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 toxic mold and/or 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. These studies should be conducted under separate cover, scope and fee and should be provided by a qualified expert in those fields.
APPENDIX A - PLATES

LIST OF PLATES

Plate 1       Site Location Map
Plate 2       Exploration Plan
Plates 3 through 8 Logs of Borings 1 through 6
Plate 9       Soil Classification Chart and Key to Test Data
Plate 10      Classification Test Data
Plate 11      Particle Size Analysis
Plates 12 and 13 Strength Test Data
Plate 14      Resistance (R) Value Data
Plate 15      Typical Subdrain Details Illustration
**LOG OF BORING B-1**

**EQUIPMENT:** Mobile B-53  
**LOGGED BY:** BDM  
**DATE:** 4-28-08  
**DRILLER:** Pearson Drilling  
**ELEVATION:** **

**Other Laboratory Tests**

<table>
<thead>
<tr>
<th>Dry Density (pcf)</th>
<th>Moisture Content (%)</th>
<th>% Passing #200 Screen</th>
<th>Blows/foot*</th>
</tr>
</thead>
</table>
| LL=35; PI=15  
El=52 |

**Depth (FEET)**

- **0**
- **1**
- **2**
- **3**
- **4**
- **5**
- **6**
- **7**
- **8**
- **9**
- **10**
- **11**

**Dark Brown Sandy Clay with Gravel (CL), stiff, dry; porous with fine roots in upper 1 foot.**

**Brown Clayey Sand with Gravel (SC), medium dense, moist.**

**Gray-Brown Sandy Cobbles with Clay.**

Bottom of boring at 11.2 feet.

Notes:
1. Severe caving at 8 feet.
2. Free water encountered at 7 feet.

* Converted to equivalent standard penetration blow counts.
** Existing ground surface.
**LOG OF BORING B-2**

**Vineyard Lodge Expansion**
830 Pratt Avenue
St. Helena, California

---

**Other Laboratory Tests**

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Sample</th>
<th>Dry Density (g/cc)</th>
<th>Moisture Content (%)</th>
<th>% Passing #200 Mesh</th>
<th>Blows/foot*</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>1</td>
<td>59.7</td>
<td></td>
<td></td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>8/6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>45/11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>51</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Equipment:** Mobile B-53

**Logged by:** BDM

**Date:** 4-28-08

**Driller:** Pearson Drilling

**Elevation:** **

**Notes:**
1. Severe caving at 12 feet.
2. Free groundwater encountered at 11½ feet and equilibrated at 7 feet after 3½ hours.

---

* Converted to equivalent standard penetration blow counts.
** Existing ground surface.
**Other Laboratory Tests**

<table>
<thead>
<tr>
<th>Dry Density (pcf)</th>
<th>Moisture Content (%)</th>
<th>% Passing #200 Sieve</th>
</tr>
</thead>
<tbody>
<tr>
<td>91.2</td>
<td>15.1</td>
<td>9</td>
</tr>
<tr>
<td>101.9</td>
<td>19.5</td>
<td>10</td>
</tr>
</tbody>
</table>

**DEPTH (FEET)**

- **0**
- **1**
- **2**
- **3**
- **4**
- **5**
- **6**
- **7**
- **8**
- **9**
- **10**
- **11**
- **12**
- **13**
- **14**
- **15**
- **16**
- **17**
- **18**
- **19**

**EQUIPMENT:** Mobile B-53

**LOGGED BY:** BDM

**DATE:** 4-28-08

**DRILLER:** Pearson Drilling

**ELEVATION:** **

**DARK BROWN SANDY CLAY WITH GRAVEL (CL), stiff, dry, porous, with some bark and gravel throughout and with fine roots in upper 1 foot (Fill).**

**DARK BROWN SANDY CLAY WITH GRAVEL (CL), stiff, dry; porous to 3 feet.**

**DARK BROWN SANDY CLAY (CL-CH), stiff, moist.**

**BROWN CLAYEY SAND WITH GRAVEL (SC), medium dense, moist.**

**MOTTLED YELLOW-BROWN AND OLIVE-GREY CLAYEY SAND WITH GRAVEL (SM), medium dense, wet.**

**YELLOW-BROWN SANDY GRAVEL (GP), dense to very dense, moist to wet; with occasional cobbles.**

**GRAY-BROWN SANDY COBBLES WITH CLAY.**

Bottom of boring at 18½ feet.

**Notes:**

1. Severe caving at 8 feet.
2. Free groundwater encountered at 7 feet.

---

R G H Consultants, Inc.

Job No: 5310.02.04.2

Appr: EC

Dwn: tI

LOG OF BORING B-3

Vineyard Lodge Expansion
830 Pratt Avenue
St. Helena, California

PLATE 5
**EQUIPMENT:** Mobile B-53  
**LOGGED BY:** BDM  
**DATE:** 4-28-08  
**DRILLER:** Pearson Drilling  
**ELEVATION:** **

<table>
<thead>
<tr>
<th>DEPTH (FEET)</th>
<th>DRY DENSITY (pcf)</th>
<th>MOISTURE CONTENT (%)</th>
<th>% PASSING #200 SIEVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DARK BROWN SANDY CLAY WITH GRAVEL (CL),**  
stiff, dry, porous, with some bark and gravel throughout and with fine roots in upper 1 foot (Fili).

**DARK BROWN SANDY CLAY WITH GRAVEL (CL),**  
stiff, dry.

**BROWN CLAYEY GRAVEL (GC),** dense, moist.

**MOTTLED YELLOW-BROWN AND OLIVE-GRAY**  
**CLAYEY SAND WITH GRAVEL (SC),** medium dense, moist, with abundant fine-grained-sand.

**YELLOW-BROWN SANDY GRAVEL (GP),** dense to very dense, moist to wet; with occasional cobbles.

**GRAY-BROWN SANDY COBBLES WITH CLAY.**

Bottom of boring at 14½ feet.  
**Notes:**  
(1) Severe caving at 8 feet.  
(2) Free groundwater encountered at 8 feet, equilibrated to 7 feet after 70 minutes.

---

* Converted to equivalent standard penetration blow counts.  
** Existing ground surface.
DARK BROWN SANDY CLAY WITH GRAVEL (CL), stiff, dry, porous, with some bark and gravel throughout and with fine roots (Fill).
DARK BROWN SANDY CLAY WITH GRAVEL (CL), medium stiff to stiff, dry; porous to 2 to 3 feet.

Bottom of boring at 5½ feet.

Notes:
1. No caving.
2. No free groundwater encountered.
Dark Brown Sandy Clay with Gravel (CL), medium stiff, dry; porous with fine roots in upper 1 foot.

Brown Clayey Sand with Gravel (SC), medium dense, moist.

Gray-Brown Sandy Cobbles with Clay.

Bottom of boring at 11 feet.

Notes:
(1) Severe caving at 8 feet.
(2) Free groundwater encountered at 7½ feet.

* Converted to equivalent standard penetration blow counts.
** Existing ground surface.
## Unified Soil Classification System

### Major Divisions

<table>
<thead>
<tr>
<th>Major Divisions</th>
<th>Symbols</th>
<th>Typical Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coarse Grained Soils</td>
<td>GW</td>
<td>Well-graded gravel, gravel-sand mixtures, little or no fines</td>
</tr>
<tr>
<td></td>
<td>GP</td>
<td>Poorly-graded gravel, gravel-sand mixtures, little or no fines</td>
</tr>
<tr>
<td></td>
<td>GM</td>
<td>Silty gravel, poorly graded gravel-sand-silt mixtures</td>
</tr>
<tr>
<td></td>
<td>GC</td>
<td>Clayey gravel, poorly graded gravel-sand-clay mixtures</td>
</tr>
<tr>
<td>Sand and Sandy Soils</td>
<td>SW</td>
<td>Well-graded sand, gravelly sand, little or no fines</td>
</tr>
<tr>
<td></td>
<td>SP</td>
<td>Poorly-graded sand, gravelly sand, little or no fines</td>
</tr>
<tr>
<td></td>
<td>SM</td>
<td>Silty sands, poorly graded sand-silt mixtures</td>
</tr>
<tr>
<td></td>
<td>SC</td>
<td>Clayey sands, poorly graded sand-clay mixtures</td>
</tr>
<tr>
<td>Fine Grained Soils</td>
<td>ML</td>
<td>Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity</td>
</tr>
<tr>
<td></td>
<td>CL</td>
<td>Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays</td>
</tr>
<tr>
<td></td>
<td>OL</td>
<td>Organic clays and organic silty clays of low plasticity</td>
</tr>
<tr>
<td>Silts and Clays</td>
<td>MH</td>
<td>Organic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts</td>
</tr>
<tr>
<td></td>
<td>CH</td>
<td>Inorganic clays of high plasticity, fat clays</td>
</tr>
<tr>
<td></td>
<td>OH</td>
<td>Organic clays of medium to high plasticity, organic silts</td>
</tr>
<tr>
<td>Highly Organic Soils</td>
<td>PT</td>
<td>Peat, humus, swamp soils and other soils with high organic contents</td>
</tr>
</tbody>
</table>

### Key to Test Data

<table>
<thead>
<tr>
<th>Test Type</th>
<th>Shear Strength, psf</th>
<th>Confining Pressure, psf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tx</td>
<td>320 (2600)</td>
<td>- Unconsolidated Undrained Triaxial</td>
</tr>
<tr>
<td>TxCu</td>
<td>320 (2600)</td>
<td>- Consolidated Undrained Triaxial</td>
</tr>
<tr>
<td>DS</td>
<td>2750 (2600)</td>
<td>- Consolidated Drained Direct Shear</td>
</tr>
<tr>
<td>UC</td>
<td>2000</td>
<td>- Unconfined Compression</td>
</tr>
<tr>
<td>FVS</td>
<td>470</td>
<td>- Field Vane Shear</td>
</tr>
<tr>
<td>LVS</td>
<td>700</td>
<td>- Laboratory Vane Shear</td>
</tr>
<tr>
<td>SS</td>
<td>- Shrink Swell</td>
<td></td>
</tr>
<tr>
<td>EXP</td>
<td>- Expansion</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>- Permeability</td>
<td></td>
</tr>
</tbody>
</table>

*Note: All strength tests on 2.8-in. or 2.4-in. diameter sample, unless otherwise indicated.*

---

R G H Consultants, Inc.

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

Vineyard Lodge Expansion
830 Pratt Avenue
St. Helena, California

Job No: 5310.02.04.2
Appr: EC
Drwn: II
Date: May 2008

PLATE 9
Dashed line indicates the approximate upper limit boundary for natural soils.

<table>
<thead>
<tr>
<th>MATERIAL DESCRIPTION</th>
<th>LL</th>
<th>PL</th>
<th>PI</th>
<th>%&lt;#40</th>
<th>%&lt;#200</th>
<th>USCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown Sandy Lean Clay (CL)</td>
<td>35</td>
<td>20</td>
<td>15</td>
<td>83.8</td>
<td>60.9</td>
<td>CL</td>
</tr>
<tr>
<td>Brown Sandy Lean Clay (CL)</td>
<td>35</td>
<td>20</td>
<td>15</td>
<td>80.9</td>
<td>59.7</td>
<td>CL</td>
</tr>
<tr>
<td>Dark Brown Sandy Lean Clay (CL)</td>
<td>36</td>
<td>18</td>
<td>18</td>
<td></td>
<td></td>
<td>CL</td>
</tr>
</tbody>
</table>

Project No. 5310.2.4.2  Client: RGH Consultants
Project: Vineyard Lodge Expansion, St. Helena

- Source of Sample: B-1  Depth: 1.0-1.5'
- Source of Sample: B-2  Depth: 1.5-2.0'
- Source of Sample: B-2  Depth: 4.0'

Remarks:
- Expansion Index= 52 (Medium)
- Expansion Index= 46 (Low)
Particle Size Distribution Report

<table>
<thead>
<tr>
<th>GRAIN SIZE - mm.</th>
<th>% +3&quot;</th>
<th>% Gravel</th>
<th>% Sand</th>
<th>% Fines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coarse</td>
<td>Fine</td>
<td>Coarse</td>
<td>Medium</td>
</tr>
<tr>
<td>0.9</td>
<td>0.0</td>
<td>4.0</td>
<td>4.4</td>
<td>7.8</td>
</tr>
<tr>
<td>0.0</td>
<td>0.0</td>
<td>4.3</td>
<td>5.2</td>
<td>9.6</td>
</tr>
</tbody>
</table>

SOIL DATA

<table>
<thead>
<tr>
<th>SYMBOL</th>
<th>SOURCE</th>
<th>SAMPLE NO.</th>
<th>DEPTH (FT)</th>
<th>Material Description</th>
<th>USCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>B-1</td>
<td>1.0-1.5'</td>
<td>Brown Sandy Lean Clay (CL)</td>
<td>CL</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>B-2</td>
<td>1.5-2.0'</td>
<td>Brown Sandy Lean Clay (CL)</td>
<td>CL</td>
<td></td>
</tr>
</tbody>
</table>

Client: RGH Consultants
Project: Vineyard Lodge Expansion, St. Helena
Project No.: 5310.24.2
Plate: 11

RG H CONSULTANTS, INC.
RG H Consultants, Inc.

Job No: 5310.02.04.2
Appr: EC
Drwn: H
Date: May 2008

PARTICLE SIZE ANALYSIS
Vineyard Lodge Expansion
830 Pratt Avenue
St. Helena, California
Type of Test: Unconsolidated Undrained
Sample Type: Undisturbed
Description: Dark Brown Fat Clay W/Sand And Gravel (CH)
Assumed Specific Gravity= 2.70
Remarks:

R G H Consultants, Inc.

TRIAXIAL TEST DATA
Vineyard Lodge Expansion
830 Pratt Avenue
St. Helena, California
Type of Test:
Unconsolidated Undrained

Sample Type: Undisturbed
Description: Dark Brown Fat Clay W/Sand (CH)

Assumed Specific Gravity = 2.70

Remarks:

Sample No. 1

<table>
<thead>
<tr>
<th>Initial</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Content, %</td>
<td>19.5</td>
</tr>
<tr>
<td>Dry Density,pcf</td>
<td>101.9</td>
</tr>
<tr>
<td>Saturation, %</td>
<td>80.4</td>
</tr>
<tr>
<td>Void Ratio</td>
<td>0.6538</td>
</tr>
<tr>
<td>Diameter, in.</td>
<td>2.430</td>
</tr>
<tr>
<td>Height, in.</td>
<td>5.800</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>At Test</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Content, %</td>
<td>19.5</td>
</tr>
<tr>
<td>Dry Density,pcf</td>
<td>101.9</td>
</tr>
<tr>
<td>Saturation, %</td>
<td>80.4</td>
</tr>
<tr>
<td>Void Ratio</td>
<td>0.6538</td>
</tr>
<tr>
<td>Diameter, in.</td>
<td>2.430</td>
</tr>
<tr>
<td>Height, in.</td>
<td>5.800</td>
</tr>
</tbody>
</table>

Strain rate, in./min. | 0.060 |
Back Pressure, psf | 0.9 |
Cell Pressure, psf | 720.0 |
Fall. Stress, psf | 1925.3 |
Strain, % | 7.9 |
Ult. Stress, psf | 1925.3 |
Strain, % |  |

σ1, Failure, psf | 2645.3 |
σ3, Failure, psf | 720.0 |

Client: RGH Consultants

Project: Vineyard Lodge Expansion, St. Helena

Source of Sample: B-3 Depth: 5.0'

Proj. No.: 5310.24.2 Date Sampled: 5-2-08

RGH CONSULTANTS, INC.
R-VALUE TEST REPORT

Resistance R-Value and Expansion Pressure - Cal Test 301

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>75</td>
<td>105.7</td>
<td>19.8</td>
<td>0</td>
<td>142</td>
<td>2.42</td>
<td>228</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>125</td>
<td>109.7</td>
<td>18.5</td>
<td>0</td>
<td>130</td>
<td>2.60</td>
<td>336</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>130</td>
<td>113.2</td>
<td>17.1</td>
<td>0</td>
<td>124</td>
<td>2.48</td>
<td>410</td>
<td>17</td>
<td>17</td>
</tr>
</tbody>
</table>

Test Results

R-value at 300 psi exudation pressure = 12

Material Description

Brown Sandy Lean Clay W/Gravel (CL)

Project No.: 5310.2.4.2
Project: Vineyard Lodge Expansion, St. Helena
Source of Sample: B-5  Depth: 0.0'
Sample Number: Bulk A
Date: 5/7/2008

R-VALUE TEST REPORT
RGH CONSULTANTS, INC.

RESISTANCE (R) VALUE DATA
Vineyard Lodge Expansion
830 Pratt Avenue
St. Helena, California

RGH Consultants, Inc.

Job No: 5310.02.04.2
Appr: EL
Drwn: II
Date: May 2008
TYPICAL UNDERSLAB DRAIN PLAN

Perforated Underslab Drain Pipe
Lateral @ 15-foot intervals (both ways) and to drain all isolated underslab areas

TYPICAL SUBDRAIN DETAILS
ILLUSTRATION
Vineyard Lodge Expansion
830 Pratt Avenue
St. Helena, California

RGH Consultants, Inc.
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.


Seed, H.B. and Idriss, I.M., 1982, Ground Motion and Soil Liquefaction During Earthquakes: Earthquake Engineering Research Institute, Berkeley, California.


APPENDIX C - DISTRIBUTION

Culinary Institute of America
 c/o Healthy Buildings USA
 Attn: Bob Massaro
 100A Coombs Street
 Napa, CA 94559
 (2,0)

ZFA Structural Engineers
 Attn: Dennis Fagent
 1212 Fourth Street, Suite Z
 Santa Rosa, CA 95404
 (1,0)

Valley Architects
 Attn: Rob Anglin
 1560 Railroad Avenue
 St. Helena, CA 94574
 (4[wet-signed],0)

Summit Engineering, Inc
 Attn: Richard Dinges
 463 Aviation Boulevard, Suite 200
 Santa Rosa, CA 95403
 (1,0)

ZAC Landscape Architect
 Attn: Sandy Reed
 1574 Skillman Lane
 Petaluma, CA 94952
 (1,0)

BDM:EGC:bdm:iw
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 overly rely on the construction recommendations included in your report. These 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 buildings 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 you ASFE-member geotechnical engineer for more information.
THE CULINARY INSTITUTE OF AMERICA
AT GREYSTONE
2555 MAIN STREET
ST. HELENA, CALIFORNIA
USE PERMIT AND DESIGN REVIEW SUBMITTAL

INDEX OF DRAWINGS

TITLE SHEET

COVER SHEET

CULINARY INSTITUTE OF AMERICA AT GREYSTONE
2555 MAIN STREET
ST. HELENA, CALIFORNIA

USE PERMIT AND DESIGN REVIEW SUBMITTAL

PERMIT SUB 9/2/2016
NO. DESCRIPTION DATE

06/21/2016

PROJECT LOCATION

PLOT PLAN

PROJECT TEAM

CLIENT
CULINARY INSTITUTE OF AMERICA
2555 MAIN STREET
ST. HELENA, CA 94574

ARCHITECT
ARCHITECTURAL RESOURCES GROUP, INC.
900 PINE, 10TH FLOOR
ZERO STREET
SACRAMENTO, CA 95814

MECHANICAL/HVAC ENGINEER
THE ENGR CORP.
1200 WASHINGTON, SUITE 204
SANTA ROSA, CA 95404

G.I.T. ENGINEER
G & T ENGINEERING, INC.
485 VIA LAURA, STE 200
SANTA ROSA, CA 95403

ARCHITECTURAL

A-1 SITE PLAN
A-2 SITE PLAN - EXISTING
A-3 THIRD FLOOR PLAN - EXISTING
A-4 SECOND FLOOR PLAN - PROPOSED
A-5 THIRD FLOOR PLAN - PROPOSED
A-6 ROOF PLAN
A-7 ELEVATIONS - EXISTING
A-8 ELEVATIONS - PROPOSED
A-9 SECTIONS

ARCHITECTURAL RESOURCES GROUP
THE CULINARY INSTITUTE OF AMERICA
2555 MAIN STREET
ST. HELENA, CALIFORNIA

ARCHITECTURAL RESOURCES GROUP
THE CULINARY INSTITUTE OF AMERICA
2555 MAIN STREET
ST. HELENA, CALIFORNIA

DRAWN BY
CHECKED BY
DRAWING NO.
SHEET NO.

SCALE: 1" = 40' LINEAR

ARCHITECTURE: 4F8 - 2016

ARCHITECTURAL RESOURCES GROUP
CULINARY INSTITUTE OF AMERICA
MAP OF EASEMENTS
DRAWING NOTES
SITE INFORMATION
REVISIONS & ADDITIONS
ALBION REFERENCES

EXHIBIT "A"
FLAT OF EASEMENTS AS SERIES NUMBER 1994 D17853