APPENDIX G

Geotechnical Engineering Investigation Report
July 29, 2020

Attention: Mr. Doug Porozni
Ronmor Real Estate Fund Napa
250, 5920-1A Street SW Calgary,
AB T2H 0G3
Via email: poroznid@ronmor.ca

Subject: Geotechnical Engineering Investigation
Proposed Soscol Square Retail and Restaurant Development
333 and 407 Soscol Avenue
Napa, California

Dear Mr. Porozni:

In accordance with your request and authorization of CTE CAL Inc. (CTE) proposal dated June, 17, 2020, CTE has completed a geotechnical investigation at the above referenced project site. The attached report contains the results of our subsurface investigation, laboratory testing program, and engineering evaluation of the geotechnical and geological elements of the project site. Specifically, the report provides geotechnical engineering design parameters and construction recommendations for the design and development of the proposed project structures and site improvements.

Based on CTE’s subsurface investigations, site materials testing, and our geotechnical and geological engineering evaluation, the project is considered feasible from a geotechnical standpoint provided the recommendations contained in the attached report are incorporated into the project design and construction. If you have any questions regarding our findings or recommendations, please do not hesitate to contact this office. The opportunity to be of service is appreciated.

Respectfully Submitted

CTE CAL Inc.

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GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED SOSCOL SQUARE RETAIL AND RESTAURANT DEVELOPMENT
333 AND 407 SOSCOL AVENUE
NAPA, CALIFORNIA

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1.0 INTRODUCTION AND SCOPE OF SERVICES

1.1 Introduction
This report presents the results of the Geotechnical Engineering investigation, performed by CTE CAL, Inc. (CTE) for the proposed development consisting of a Kohl’s store and another smaller retail store and restaurant development to be constructed at 333 and 407 Soscol Avenue, in Napa, California. The report provides conclusions and recommendations regarding the geotechnical design parameters and construction recommendations for the proposed development.

The investigation contained herein included surface and subsurface field explorations, laboratory testing of site soil deposits, geologic and seismic hazard evaluation of the project site, and engineering evaluation and analysis of the proposed project site and improvements. Based on the results of the investigation and analysis performed by CTE the project is considered feasible if the recommendations contained herein are incorporated into the design and construction of the project. References utilized in the investigation and analyses cited are presented in Appendix A.

1.2 Scope of Services
The scope of services provided for this investigation included:
- Review of readily available geologic reports and documents pertinent to the site area.
- Explorations to determine subsurface conditions to the depths influenced by the proposed construction.
- Laboratory testing of representative soil samples to provide data to evaluate the geotechnical design characteristics of the site foundation soils.
- Determination of the general geology and evaluation of potential geologic seismic hazards at the site.
- Preparation of this report describing the investigations performed and providing opinions/conclusions and geotechnical engineering recommendations for design and construction.
2.0 SITE AND PROJECT DESCRIPTION

The project is proposed to be constructed at the existing Kohl’s retail store and restaurants located at 333 & 407 Soscol Avenue in Napa, California. The project site is bound by Soscol Avenue to the east, Gasser Drive to the northwest, undeveloped property to the southwest, and Tulocay Creek to the south. At the time of our field reconnaissance, the site consisted of an existing commercial structure at the north end, a commercial structure near the center, and two structures on the south end of the site with the majority of the site consisting of paved asphalt parking areas.

The project is proposed to consist of designing and constructing an approximately 55,000-sf Kohl’s retail store building, a 5,164-sf Chick-Fil-A restaurant structure, and a 9,600-sf retail structure. Figure 1, Site Index Map, at the end of this report, shows the general location of the site. Figure 2, Exploration Map, shows the configuration of the proposed project.

3.0 FIELD AND LABORATORY INVESTIGATIONS

3.1 Field Investigations

The field exploration program included performing a site reconnaissance and excavating five exploratory borings in order to determine the geometry and geotechnical characteristics of subsurface geologic deposits at the site areas proposed for new construction. Representative samples of the subsurface soil deposits were obtained from the soil borings for use in laboratory testing to determine the engineering properties and geotechnical parameters recommended for design. The borings (designated B-1 through B-5), were excavated using a truck-mounted drill rig using four-inch outer diameter solid stem flight augers to the maximum depth drilled of approximately 36.5 feet below existing ground surface (bgs).

The field subsurface exploration program included performing Standard Penetration Tests (SPT) using a standard split barrel sampler (1.4-inch inside diameter, 2-inch outside diameter) and Modified California Test using a modified split barrel sampler (2.4-inch inside diameter, 3-inch outside diameter) which were operated in accordance with ASTM D-1586. The drive samplers were utilized to obtain samples of the subsurface soils at depth intervals of 1-ft, 5-ft, 10-ft, 15-ft,
20-ft, 25-ft, 30-ft, and 35-ft by driving the sampler into the bottom of the borehole with successive blows of a 140-pound hammer free-falling 30 inches. The number of blows required to drive the sampler three, six-inch intervals (18-inches total of sampler penetration) at each sampling location was recorded and the raw results of the drive sampler testing are shown on the boring logs (contained in Appendix B) in the column "Blows/6 inches”. The standard penetration blow counts (N) were collected and used during the geotechnical engineering evaluation and analysis to correlate soil strength and structure bearing characteristics.

Soils were logged in the field by a CTE Field Geologist and were classified based on the Unified Soil Classification System (ASTM D2487), sampler drive resistance, field testing, and visual observations. Exploration logs prepared for each of the borings provide soil descriptions, and blow count data. The boring logs are included in Appendix B which also contains the Boring Log Legend and Definition of Soil Terminology as shown on Plates BL1 and BL2, respectively. The location of the test borings are shown on Figure 2 at the end of this report.

Relatively undisturbed soil samples were obtained from the drive sampler during exploration activities. The samples were collected in capped, stainless steel sample tubes or placed in zip lock plastic bags. Bulk soil samples were recovered directly from drill cuttings or were obtained from surface deposits and placed in sample bags.

Soil samples were then transported to CTE’s laboratory for further testing. Field descriptions within the boring logs have been modified, where appropriate, to reflect laboratory test results. Upon completion of drilling, the borings were backfilled from final boring depth to original ground surface. Details of the soils encountered are shown on the Boring Logs which are presented in Appendix B.

3.2 Laboratory Testing Program
Laboratory tests were conducted on representative soil samples for classification purposes and to evaluate physical properties and engineering characteristics. Laboratory tests conducted on representative soil samples collected from the borings included in situ moisture content and dry
density, relative fines content, expansion indices, Atterberg Limits, and an R-Value. Test method
descriptions and laboratory test results are presented in Appendix C.

4.0 GEOLOGY

4.1 General Geologic Setting
The site lies within the Napa Valley, which lies within the Coast Ranges Geomorphic province
of California. The site is overlying a transitional zone with Holocene stream deposits to the west
and Late Holocene stream deposits to the east. Basin and river sediments constitute the typical
depositional history. The most recent deposits consist of Holocene alluvium from present day
creeks and rivers, such as the Napa River to the west of the project site.

Based on geologic reconaissance and observations made within the test borings, alluvial
materials encountered during the investigation are considered to be consistent with Quaternary
basin deposits as shown on published geologic map of the “Geologic Map of the Napa 7.5’
Quadrangle, Napa County, California”, prepared by Clahan, K. B. et al. (2004).

The mapped area shows the site within three surficial geologic units, Stream Terrace deposits <
1,000 yrs (Qhty), Stream Terrace deposits < 10,000 yrs (Qht), and Alluvium < 30,000 yrs (Qoa).
The Qhty unit representing the west portion of the site, was deposited by stream terraces as point
bar and overbank deposits along the Napa River, composed of moderately sorted clayey sand and
sandy clay with gravel.

The Qht unit, underlying the north section of the site, was deposited by stream terraces as point
bar and overbank deposits, composed of moderately to well-sorted and bedded sand, gravel, silt,
and minor clay. The east section of the site is underlain by the Qoa unit, which is composed of
consolidated sand, silt, clay, and gravel. Topography is moderately rolling with little or no
original alluvial surfaces preserved, deeply dissected. Please refer to Figure 3 for more details.
4.2 Generalized Soil Conditions

The near surface deposits encountered during our investigation generally consisted of very artificial loose to medium dense clayey gravel (GC) and stiff moderately plastic clays with gravel (CL). The artificial fill extends to a depth of approximately 7 to 10 feet. Directly underlying the undocumented fills are native deposits generally consisting of stiff to hard moderately plastic clays (CL/CH); loose to medium dense clayey gravels (GC); and soft to very stiff gravelly clays (CL) to the maximum explored depth of approximately 37 feet. A medium dense silty sand layer (SM) was detected in boring B-3 at a depth of 28 to 33 feet bgs and in boring B-4-O a loose to medium dense layer was detected at a depth of 14 to 17 ft bgs. A soft, moderately to highly plastic, clay layer (CL-CH) was detected in boring B-4 between a depth of 16-18.5 feet; in boring B-3 at a depths between 19-21 feet; and in boring B-4-O at a depth of 19-21 feet bgs.

Since the earth material profile described above is generalized, the reader is advised to consult the Test Boring Logs contained in Appendix B, if determination of the earth material conditions at a specific depth and location are desired. The boring logs contain a more detailed earth material description regarding color, earth material type, and Unified Soil Classification System (USCS) symbol. It should be noted that earth material conditions cannot be fully determined by test borings and earth material sampling and testing. Hence, unexpected earth material conditions might be encountered during construction. If soil deposits encountered during construction vary substantially from materials encountered during the investigation, appropriate recommendations will be made during construction.

4.3 Groundwater Conditions

Observations of groundwater conditions were made in the test borings at the time of field exploration. Groundwater was observed in the borings at approximately 13 feet bgs. Based on information from the California Department of Water Resources Sustainable Groundwater Management Program website: (https://sgma.water.ca.gov/webgis/?appid=SGMADATAViewer#gwlevels), ground water levels measured in monitoring wells at nearby sites are typically deeper than about 15 feet bgs. With proper drainage groundwater is not expected to affect the proposed development. However, excavations below groundwater level will be impacted by seepage;
therefore, we recommend grading and utility excavations be performed during dry-season when ground water levels are lowest.

If construction is undertaken during wet-season/heavy-rains, saturated soils will not be expected to be acceptable for grading or compaction and could hamper progress due to limited equipment mobility and/or inability to achieve appropriate moisture content to achieve required soil compaction. Saturated soils resulting from significant precipitation events may need to be dried by aeration or an additive, such as lime, cement, or kiln dust added to stabilize the working surface and allow for proper soil compaction. Moisture conditioning (drying or wetting) of the engineered fill will likely be needed for the project. Appropriate erosion control and permanent site surface drainage elements per the latest California Building Code should be designed and implemented as per the project civil engineer.

4.4 Geologic Hazards

Based on the investigation it appears that geologic hazards at the site are primarily limited to those caused by violent shaking from earthquake generated ground motion waves. The subject site is not located within a seismic hazard zone for susceptibility to liquefaction or landslides. The subject site is not in an Alquist-Priolo special studies zone, however it is less than two miles from the West Napa Fault hazard zone. Please see Figure 4 for more detail.

The undocumented fills underlying the site are not considered adequate for support of moderately loaded structures with conventional shallow foundations in their current condition and therefore are the major geologic and geotechnical concern with regard to the potential development of the site as previously discussed in Section 4.2 “Generalized Soil Conditions” and as discussed in detail in Sections 4.10 “Compressible and Expansive Soils”. Other geologic hazards which exist and are of concern but to a lesser extent are the groundwater level, and the relatively short distances to several faults and the potential for shaking in the event of a major earthquake occurring in the site vicinity. Design and construction recommendations presented in Section 5.0 “Conclusions and Recommendations” have been developed based on the noted site conditions.
4.5 General Geologic Hazards Observation

Based on the site reconnaissance and review of the referenced literature, the site is not within a State of California-designated Alquist-Priolo Earthquake Fault Studies Zone (http://maps.conservation.ca.gov/cgs/fam/), and no known active fault traces shown on published hazard mapping underlie or project toward the site. According to the California Division of Mines and Geology, a fault is active if it displays evidence of activity in the last 11,000 years (Hart and Bryant, revised 2007). Therefore, the potential for surface rupture from displacement or fault movement directly beneath the proposed improvements is considered low.

4.6 Local and Regional Faulting

Based on the “USGS Earthquake Hazards Program, National Seismic Hazard Maps – Source Parameters, (https://earthquake.usgs.gov/cfusion/hazfaults_2008_search/query_main.cfm), the Information for principal regional faults is included in Table 4.6.

<table>
<thead>
<tr>
<th>TABLE 4.6</th>
<th>NEAR SITE FAULT PARAMETERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAULT NAME</td>
<td>DISTANCE FROM SITE (MILES)</td>
</tr>
<tr>
<td>WEST NAPA</td>
<td>1.95</td>
</tr>
<tr>
<td>GREEN VALLEY CONNECTED</td>
<td>6.45</td>
</tr>
<tr>
<td>HUNTING CREEK-BERRYESSA</td>
<td>12.18</td>
</tr>
<tr>
<td>HAYWARD-RODGERS CREEK</td>
<td>14.41</td>
</tr>
<tr>
<td>GREAT VALLEY 5, PITTSBURG KIRBY HILLS</td>
<td>16.27</td>
</tr>
<tr>
<td>GREAT VALLEY 4B, GORDON VALLEY</td>
<td>16.39</td>
</tr>
<tr>
<td>MAACAMA-GARBERVILLE</td>
<td>30.16</td>
</tr>
<tr>
<td>GREAT VALLEY 3</td>
<td>30.36</td>
</tr>
</tbody>
</table>
The site could be subjected to significant shaking in the event of a major earthquake on any of the faults listed above or other active faults within northern California.

4.7 Seismic Settlement Evaluation

Seismic surface settlements can occur when a large earthquakes occurs in the vicinity where soil deposits consist to medium dense loose gravels, sands and or silts are present. The settlements can be the result of densification / compression of soils both above the groundwater table (dry granular soil settlements) and below the groundwater as a result of liquefaction. Liquefaction occurs when saturated gravels, sands and/or silts lose their physical strength temporarily during earthquake induced shaking and behave as a liquid. This is due to loss of point-to-point grain contact and transfer of normal stress to the pore water. Liquefaction potential varies with water level, soil type, material gradation, relative density, and probable intensity and duration of ground shaking.
The California Geological Survey (CGS) has designated certain areas within California as potential liquefaction hazard zones. These mapped areas are considered at risk of liquefaction-related ground failure during a seismic event based upon mapped surficial deposits. The project site is not currently mapped for potential liquefaction hazard by the CGS (refer to CGS website: [http://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=regulatorymaps](http://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=regulatorymaps)). Based on readily available published geologic information, there is no historical record of liquefaction occurring at the site.

However the site deposits encountered consisted of loose to medium dense clayey to silty gravel (GC-GM) and silty to clayey sands (SM) which appear to be susceptible to seismic compression upon shaking and therefore a seismic settlement analyses was conducted. The analyses was conducted utilizing Boring B-3 and assuming the deposits located below the maximum depth of exploration of 36.5 ft bgs consisted of moderately plastic clays (CL). This appears reasonable based on a review of the boring logs conducted as part of this investigation and investigations performed by others.

The seismic settlement analyses, which is graphically represented in Appendix F, indicates that “dry granular soils” compression in the artificial fills of approximately 1.2” with liquefaction settlements in the native deposits of 1.43”. Based on the relative depth of the liquefiable deposits and the thickness of the capping layer in comparison to the thickness of the liquefiable layer any surface settlements should be expected to be minimal.

4.8 Earthquake Induced Landsliding

Based on information available on the California Geological Survey (CGS) website ([http://maps.conservation.ca.gov/cgs/lsi/](http://maps.conservation.ca.gov/cgs/lsi/)) the subject site is not currently mapped within a State of California Seismic Hazard Zone for seismically induced landsliding. In addition, the site and surrounding terrain within the valley is relatively gently sloping; therefore, seismically induced and/or other landslides are not considered a significant hazard at the site.
4.9 Tsunamis and Seiche Evaluation

Based on site location, elevation, and tsunami hazard mapping from the CGS website (http://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=tsunami) the site is not in a tsunami inundation hazard zone. In addition, oscillatory waves (seiches) are considered unlikely due to the absence of large confined bodies of water in the site area.

4.10 Compressible and Expansive Soils

Near surface soils encountered at the site are described as artificial fill consisting of loose to medium dense, clayey to silty gravels (GC-GM) and stiff moderately plastic clays with gravel (CL). Based on our investigation, laboratory testing, and evaluation the artificial fills are very inconsistent with regard to material type, insitu penetration resistance and in-place density. Soils with these properties are typically prone to excessive differential compression upon structure and / or seismic loading. It is CTE’s opinion that in general these artificial undocumented fill materials were not adequately compacted during original placement and therefore are not suitable for uniform support of the proposed structures in their current condition. As recommended in Section 5.3 some of these artificial fills will require removal, reprocessing and recmpaction.

Our investigation also discovered that an approximately 2 foot thick layer of moderately to highly plastic clay exists at a depth of approximately 18 ft +/- below the eastern portion of the site in the area where the Kohls building pad is to be placed. CTE performed an analyses of the potential for consolidation of this layer. The analyses indicated that due to the relatively deep depth of this clay layer the stress increase in the clay layer from the Kohl’s structure loading would be small. Therefore with only a nominal stress increase and the clay being relatively thin, consolidation of this clay layer would be expected to be small.

Laboratory testing of the near surface site deposits indicated that the materials have a moderate expansion potential. The clayey materials encountered at the site were determined to be moderately to highly plastic having liquid limits (LL) ranging from 31-46 with plasticity indices (PI) ranging from 17-27 indicating that some of these soils could be subjected to moderately
expansive / shrinkage with change in moisture.

4.11 Soil Corrosion Potential

Chemical testing was performed previously on the site soils by others to evaluate the potential effects that site soils may have on concrete foundations and various types of buried metallic utilities. Soil environments detrimental to concrete generally have elevated levels of soluble sulfates and/or have pH levels less than 5.5. According to American Concrete Institute (ACI) Table 318 4.3.1, specific guidelines have been provided for concrete where concentrations of soluble sulfate (SO$_4$) in soil exceed 0.1 percent by weight 1000 ppm. These guidelines include low water: cement ratios, increased compressive strength, and specific cement type requirements for all concrete exposed to site soils. The Caltrans Corrosion Guidelines defines a corrosive site as one where the soil and/or water has a sulfate concentration of 1,500 ppm or more, a chloride concentration of 500 ppm or more, a pH of 5.5 or less, and a minimum resistivity less than 1,100 ohm-cm.

Based on the results of the Sulfate and pH testing performed, onsite soils have a sulfate content of between 30.4 and 183 ppm and a pH of 7.6. and therefore are anticipated to generally have a low corrosion potential to Portland cement concrete improvements.

Based on the results of the Resistivity and Chloride testing preformed, onsite soils have a minimum resistivity of between 750 and 2650 ohm-cm and a chloride content of between 10.2 and 25.9 ppm and therefore are considered to have a medium corrosion potential for buried uncoated/unprotected metallic conduits.

The results of the chemical tests performed are presented in the attached Appendix C. CTE does not practice corrosion engineering. Therefore, a corrosion engineer or other qualified consultant could be contacted if site specific corrosivity issues are of concern.

4.12 Flooding Hazzard Potential

Based on FEMA flood zone maps for Napa County, California and Incorporated Areas, Map No.
06055C0517F, (2010) to assess the potential for flooding of the site. Based on a review of the noted map, the majority of the site is located in a designated zone, “Other Areas - Zone X”, areas determined to be outside the 0.2 percent chance of flooding to a depth of less than 1-foot in a given year, which corresponds to a 500-year flood plain, meaning it does not reside within a 500-year flood plain. Portions of the site near the northwest corner are located in a designated zone, “Other Areas of Flood Hazard – Zone X”, areas determined to be within the 0.2 percent chance of flooding. See Figure 5 for more information.

5.0 CONCLUSIONS AND RECOMMENDATIONS

We conclude that the proposed construction is feasible from a geotechnical standpoint, provided the recommendations in this report are incorporated into the design of the project. Based on our investigation portions of the near surface site soils (4 to 10 ft +/-) consist of artificial fills which are loose and compressible and therefore not suitable to support the proposed structures. We are recommending that portions of these soils be removed and replaced with engineered controlled fill as recommended in Sections 5.1 and 5.2. In addition the artificial fills are composed of clays and gravelly clays, which are moderately to highly plastic and therefore could be susceptible to post construction shrinkage and swelling if not remediated. To reduce the swelling and shrinkage potential CTE recommends that some of the engineered fills should be lime/cement treated. The lime/cement treatment recommendations for each building pad are presented in Section 5.2.

Continuous and isolated spread footings are considered suitable for use at this site to support the proposed structures if the site preparation and grading and earthwork are performed as described in Sections 5.1 and 5.2 respectively. All structure footings should be founded entirely in engineered fill.

5.1 Demolition and Site Preparation

Prior to building pad grading, demolition of the existing buildings and foundations, asphalt pavements, other surface improvements and underground utilities should be performed under the proposed building footprints, plus a 10 foot lateral over-build beneath the Kohls pad and 5 foot overbuild for the other retail and restaurant building pads and beneath all surface improvement areas. Recycling of the concrete and asphalt pavements and buildings may be possible.
CTE should intermittently observe the demolition operations and be notified in ample time to ensure that subsurface structures are not covered up. Excavations made by the removal of any structure in a proposed surface improvement area should be left open by the demolition contractor for backfill in accordance with the requirements for engineered fill. The removal of any underground structures or utility pipelines should be done under the observation of the Soil Engineer to assure adequacy of the removal and that subsoils are left in proper condition for placement of engineered fills.

Any soil exposed by the demolition operations, which are deemed soft or unsuitable by the Soil Engineer, shall be excavated and stockpiled. Any resulting excavations should be properly backfilled with engineered fill under the observation of the Soil Engineer as recommended in the “Grading” section below. CTE personnel shall observe and confirm that all structures, asphalt and concrete debris, vegetation, other organic material have been adequately removed in all proposed improvement areas.

5.2 Grading and Earthwork

In order to provide uniform structure foundation support and reduce the potential for post construction movement and distress of structures and improvements CTE recommends that the following grading be performed below each of the proposed buildings and improvements:

- **Kohl Building Pad Construction**
  
The Kohl building pad should be overexcavated to a depth of approximately 8 feet below current grade. The overexcavation should be performed to a distance of at least 10 feet outside the building footprint to fully comply with Kohls Design Criteria. The base of the excavation should then be evaluated by CTE to determine if addition removals are required. After the base of the excavation is approved by CTE it should be scarified, moisture conditioned to at least 2% above optimum moisture, and compacted to at least 90% relative compaction in accordance with ASTM D-1557.
Additional engineered fill shall then be placed in loose lifts of no greater than 12” in thickness, moisture conditioned to at least 2% above optimum moisture, and recompacted to at least 90% relative compaction from the bottom of the excavation to approximately 4 feet below the proposed building pad subgrade or to 1 foot below the deepest proposed footing base whichever is deeper.

The excavation shall then be refilled to top of subgrade with successive lifts of lime/cement treated engineered fill. The engineered fill in this lime/cement treated zone should consist of existing onsite materials or approved import soils, treated with 50% high-calcium quicklime meeting ASTM C977 and 50% Type II Portland cement. Based on a recommended 5% mixture (2.5% lime and 2.5% cement) by dry weight and a unit weight of 120 pcf, a spread rate of 4.5 psf of lime and 4.5 psf of cement should be used for each of the 18-inch mixing depths or a spread rate of 3 psf of lime and 3 psf of cement for a 12” mixing depth. The lime-cement treated soils should be compacted to a wet density of at least 95% of the maximum wet density per ASTM D-1557.

The lime-cement treatment must be performed by a qualified soil stabilization contractor in general conformance with Caltrans Standard Specification Section 24. The lime/cement product specifications and quality control test results must be provided to us prior to lime/cement treatment grading operations. The lime should be initially spread and mixed with equipment capable of providing relatively uniform conditions and allowed to mellow overnight. The following day, the cement should be uniformly spread followed by compaction in place. After compaction it is important to moist cure the lime-cement treated exposed soils until placement of the subsequent slab aggregate base materials.

- **Retail and Restaurant Buildings**

  The Retail and Restaurant buildings should be over excavated to a depth of 6 feet below current grade. The overexcavation should extend at least 5 feet outside of the building footprint. The base of the excavation should then be evaluated by CTE to determine if
addition removals are required. After the base of the excavation is approved by CTE it should be scarified, moisture conditioned to at least 2% above optimum moisture, and compacted to at least 90% relative compaction in accordance with ASTM D-1557.

Additional engineered fill shall then be placed in loose lifts of no greater than 12” in thickness, moisture conditioned to at least 2% above optimum moisture, and recompacted to at least 90% relative compaction from the bottom of the excavation to approximately 1.5’ below the proposed building pad subgrade. The final 18 inches of engineered fill up to the proposed building pad subgrade surface should consist of lime/treated engineered fill placed and lime cement treated as described above in the recommendations for the Kohl building pad.

- **Surface Improvement Areas**

  For general areas outside of the building pad, we recommend that the upper 12 inches of the exposed native soils be scarified, moisture conditioned and compacted to a minimum degree of relative compaction of 90% at least 3 percent above optimum moisture content as determined by ASTM D1557. After processing the lower 12 inches and compacting the native subgrade, the site may be brought to the desired finished grades by placing engineered fill in lifts of 8 inches in un-compacted thickness and compacting to a relative compaction of 90% at 3 percent over optimum. The upper 12 inches of the driveways and parking lots may also be lime treated, if desired. If unanticipated, unsuitable materials are encountered at surface improvement subgrade or structure over-excavation such that proper compaction cannot be obtained, deeper over-excavations to remove such material may be required.

Import soils if required should be placed in pavement and other surface improvement areas and should consist of materials with a liquid limit no greater than LL=40 with a plasticity index of PI < 12, have an expansion index less than 30 and consist of materials with 20 to 80 percent of materials passing the 200 sieve with no particles greater than 3” in maximum dimension.
It should be noted that the building pad subgrade and improvement subgrade soils should be maintained at a moisture content of 2% above optimum until capillary moisture break and pavement and improvement base materials placement respectively.

CTE shall inspect and approve all structure over-excavations, to confirm that adequate soil conditions have been reached; shall continuously observe and performing testing during the placement and moisture conditioning of the engineered fill; the placement and mixing of the lime/cement treatment materials; and the compaction of all engineered fill in building pad, pavement, and surface improvement subgrade areas to confirm that adequate soil conditions have been reached.

5.3 Structure Foundation Recommendations
Reinforced continuous and isolated spread footings are considered suitable for use at this site to support the proposed structures, provided the Grading is performed in accordance with the Grading and Earthwork recommendations specified in Section 5.2 existing site soils are moisture and lime-cement treated to reduce the expansive soil properties of the onsite soils as recommended in Section 5.2. CTE recommends that all conventional spread footings should be founded in properly moisture conditioned, compacted engineered fill as recommended herein.

Foundation dimensions and reinforcement should be based on allowable soil bearing values of 2000 psf for spread footings of at least 24-inches in width penetrating into and embedded below rough pad soil grade at least 18 inches. The design bearing pressure may be increased by one-third when considering total loads that include short duration wind or seismic conditions. The weight of the foundation concrete below grade may be neglected in dead load computations. The weight of the footing should be neglected in the above downward capacity calculations.

We recommend that all footings be reinforced as required by the structural engineer to provide structural continuity, to permit strong spanning of local irregularities and to be rigid enough to accommodate potential differential static movements estimated at about one-half inch over 30
linear feet. The minimum reinforcement should however consist of four #5 reinforcing bars two placed at the top and two placed at the bottom of the footings. The total structure settlement is expected to be on the order of one inch (1.0”) for static compression and one-half inch (1.6”) for dynamic settlement due to an earthquake event. Differential seismic settlements of about 0.5 inches and inches are recommended for static and dynamic settlements, respectively. The dynamic settlement is in addition to the static settlement.

Shallow footings for structures and retaining walls may be designed to resist lateral loads using a coefficient of friction of 0.30 (total frictional resistance equals the coefficient of friction times the dead load). A design passive resistance value of 250 pounds per square foot per foot of depth (with a maximum value of 1250 pounds per square foot) may be used. The allowable lateral resistance can be taken as the sum of the frictional resistance and the passive resistance, provided the passive resistance does not exceed two-thirds of the total allowable resistance.

CTE should inspect, test and approve the base of all footing excavations prior to the placement of reinforcing steel or footing / foundation concrete.

5.4 Retaining Walls
Although not anticipated to be constructed at this site free draining retaining walls backfilled using generally onsite soils, may be designed using the equivalent fluid weights given in the table below.

<table>
<thead>
<tr>
<th>WALL TYPE</th>
<th>LEVEL BACKFILL PCF</th>
<th>SLOPING BACKFILL 2:1 H:V PCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>CANTLEVERED WALL</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>RESTRAINED WALL</td>
<td>60</td>
<td>80</td>
</tr>
</tbody>
</table>

Traffic surcharges on retaining walls should generally be equal to 1/3 of the vertical load of the traffic
located within ten lateral feet of wall. Lateral pressures on cantilever retaining walls (yielding walls) due to earthquake motions may be calculated based on work by Seed and Whitman (1970). The total lateral thrust against a properly drained and backfilled cantilever retaining wall above the groundwater level can be expressed as:

\[ P_{AE} = P_A + \Delta P_{AE} \]

For non-yielding (or “restrained”) walls, the total lateral thrust may be similarly calculated based on work by Wood (1973):

\[ P_{KE} = P_K + \Delta P_{KE} \]

Where \( P_A \) = Static Active Thrust (given in previous Table)

\( P_K \) = Static Restrained Wall Thrust (given in previous Table)

\( \Delta P_{AE} \) = Dynamic Active Thrust Increment = \( \frac{3}{8} \) \( k_h \gamma H^2 \)

\( \Delta P_{KE} \) = Dynamic Restrained Thrust Increment = \( k_h \gamma H^2 \)

\( k_h = \frac{1}{2} \) Peak Ground Acceleration = \( \frac{1}{2} (S_{DS}/2.5) \)

\( H \) = Total Height of the Wall

\( \gamma \) = Total Unit Weight of Soil \( \approx 125 \) pounds per cubic foot

The increment of dynamic thrust in both cases should be based on a trapezoidal distribution (essentially an inverted triangle), with a line of action located at 0.6H above the bottom of the wall. The values above assume non-expansive backfill and free-draining conditions. Additional information for dynamic and static loading conditions for specific retaining structures can be provided on request from CTE.

Measures should be taken to prevent moisture buildup behind all retaining walls. Drainage measures should include free-draining backfill materials and sloped, perforated drains. These drains should discharge to an appropriate off-site location. Waterproofing should be as specified by the project architect.

5.5 Foundation Setback

All structure foundations should be offset horizontally from descending slopes a minimum of 10
feet from the base of the footing to the slope face. The bottoms of all utility trenches placed along the perimeter of the foundations should be above an imaginary plane that projects at a 45-degree angle down from the lowest outermost edge of the foundation. Deepening of affected foundation is considered an effective means of attaining the prescribed setbacks.

5.6 Interior Concrete Slabs-On-Grade
Lightly loaded concrete slabs-on-ground placed beneath the structures should be designed for the anticipated loadings, but measure at least 5 inches in thickness. Slab-on-grade reinforcement should consist of a minimum of #4 reinforcing bars placed on 18-inch centers, each way, at or above mid-slab height, but with proper cover. All interior slab on grade shall be underlain by a 4 inch capillary moisture break consisting of Class 2 Base or ¾ inch crushed rock.

All interior slab on grade located in moisture sensitive areas should be directly underlain by a minimum a minimum 15-mil extruded polyolefin plastic that complies with ASTM E1745 Class A10- with all laps or penetrations sealed or taped. The vapor retarder should be installed above the 4” thick capillary moisture break which in turn overlies the compacted building pad. The use of sand above the vapor retarder is not recommended. The concrete to be placed into the slab on grade shall have a water to cement ratio w/c ≤ 0.45 and shall be placed at a maximum slump of 4” +/-.

The structural engineer/architect and slab installation contractor should refer to ACI 302 and ACI 360 for procedures and cautions regarding the use and placement of a vapor barrier. In areas of exposed concrete, control joints should be saw-cut into the slab after concrete placement in accordance with ACI Design Manual, Section 302.1R-37 8.3.12 (tooled control joints are not recommended). To control the width of cracking, continuous slab reinforcement should be considered in exposed concrete slabs.

5.7 Seismic Design Criteria
Soils that underlie the site are considered to be consistent with Site Class D materials. Site ground motion with 10% probability of exceedance in 50 years is presented in Table 5.8, below.
The table is based on the United States Geological Survey’s (USGS) Probabilistic Seismic Design Maps through the third party interface ATC Hazards by Location Tool website (https://hazards.atcouncil.org/#/seismic?) for the site coordinates 37.6389° latitude and -120.9872° longitude. The referenced USGS design maps are based on the 2016 California Building Code reference document ASCE 7-10 Standard.

<table>
<thead>
<tr>
<th>SEISMIC GROUND MOTION VALUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARAMETER</td>
</tr>
<tr>
<td>Site Class¹</td>
</tr>
<tr>
<td>Mapped Spectral Response</td>
</tr>
<tr>
<td>Acceleration Parameter, Sₛ</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Mapped Spectral Response</td>
</tr>
<tr>
<td>Acceleration Parameter, S₁</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Design Spectral Response</td>
</tr>
<tr>
<td>Acceleration Parameter, Sₛ</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Design Spectral Response</td>
</tr>
<tr>
<td>Acceleration Parameter, S₁</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Seismic Design Category</td>
</tr>
</tbody>
</table>

5.8 Pavement Section Alternatives

Recommended pavement sections for auto drive/parking, truck drive/loading are presented in the table below. Two options are presented below for asphalt and concrete pavements constructed over moisture treated and / or moisture and lime treated subgrade soils respectively. Lime treatment of pavement subgrade soils substantially reduces the potential for post construction cracking of pavements, curbs, gutters, and driveways. The preliminary pavement sections presented below are based on an assumed Resistance “R”- Values of 10 which is based on our experience with clayey soils in the vicinity of the site. All Class II aggregate base should meet or exceed Caltrans Standard Specifications.
For onsite pavement design it is assumed that the upper 12 inches of subgrade and all base materials are properly compacted to 95% relative compaction at a moisture content of at least 2% above optimum moisture content. The subgrade moisture content shall be verified by CTE prior to the placement of Class 2 base or the pavement. For city streets designed based on Caltrans Standard Specifications, structural section materials (AC, AB & subgrade) should be properly compacted to 95% relative compaction within 30-inches (minimum) below finished pavement grade.

<table>
<thead>
<tr>
<th>Traffic Area</th>
<th>Assumed Traffic Index</th>
<th>Subgrade “R”-Value</th>
<th>Asphalt Pavements</th>
<th>PCC Pavements on Class 2 Base (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>AC Thickness</td>
<td>Class II AB Thickness</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(inches)</td>
<td>(inches)</td>
</tr>
<tr>
<td>Auto and Truck Parking</td>
<td>5.0</td>
<td>10</td>
<td>3.0 4.0</td>
<td>9 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6” on 4” Class 2</td>
<td></td>
</tr>
<tr>
<td>Auto Drive Isle Areas</td>
<td>6.5</td>
<td>10</td>
<td>4.0 5.0</td>
<td>13 11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6” on 4” Class 2</td>
<td></td>
</tr>
<tr>
<td>Delivery Truck Drive Areas</td>
<td>7.5</td>
<td>10</td>
<td>5.0 6</td>
<td>15 13</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.5” on 4” Class 2</td>
<td></td>
</tr>
<tr>
<td>Parking Areas On Lime Treated Subgrade</td>
<td>5.0</td>
<td>60</td>
<td>3.0</td>
<td>4</td>
</tr>
<tr>
<td>Auto Drive Isles on Lime Treated Subgrade</td>
<td>6.5</td>
<td>60</td>
<td>4.0</td>
<td>4</td>
</tr>
</tbody>
</table>
To significantly reduce concrete cracking due to shrinkage and swelling cracking and or concrete shrinkage cracking, concrete pavements should be reinforced with nominal rebar consisting of #4 bars spaced no greater than 24 inches, on center, both ways, placed at above mid-slab height, but with proper concrete cover, or as designed by your structural designer. Concrete pavements not supporting heavy traffic could be unreinforced provided they are constructed with expansion/contraction and/or construction joints spaced no greater than 24 times the pavement thickness, both ways, in nearly square patterns, and are detailed in general accordance with ACI Guidelines. Doweling of concrete pavements at critical pathways is also recommended.

Asphalt concrete paved areas should be designed, constructed, and maintained in accordance with, for example, the recommendations of the Asphalt Institute, or other widely recognized authority. Concrete paved areas should be designed and constructed in accordance with the recommendations of the American Concrete Institute or other widely recognized authority, particularly with regard to thickened edges, joints, and drainage. The Standard Specifications for Public Works construction (“Greenbook”) or CalTrans Standard Specifications may be referenced for pavement materials specifications.

5.9 Exterior Flatwork
To reduce the potential for distress to exterior flatwork caused by minor settlement or expansion of near surface soils we recommend that all exterior concrete flat work shall be a minimum of 4 inches in thickness. In addition the slabs shall be reinforced with a minimum #4 reinforcing steel bar installed on maximum 24” centers each way. Control joints should be constructed to create squares or rectangles with a maximum spacing of 15 feet on large slab areas.

All concrete flatwork should be installed with crack control joints, includes i.e. driveways,
sidewalks, and architectural features, etc. Walkways should be separated from foundations with a thick expansion joint filler. Control joints should be constructed into walkways at a maximum of 5 feet spacing. All subgrade should be prepared according to the earthwork recommendations and subgrade pre-saturation previously given before placing concrete.

Positive drainage should be established and maintained adjacent to all flatwork. The moisture content of the slab subgrade materials prior to placement shall be at least 2% above optimum moisture. The moisture content below exterior slab on grade should be verified by a geotechnical representative from CTE within 24 hours of slab concrete placement.

5.10 Drainage
Foundation and concrete-slab-on-grade performance depends greatly on how well the runoff waters drain from the site. This is true both during construction and over the entire life of the structure. The ground surface around structures should be graded so that water flows rapidly away from the structures without ponding. The surface gradient needed to do this depends on the landscaping type.

Should excessive irrigation, waterline breaks, or unusually high rainfall occur, saturated zones and groundwater may develop. Consequently, the site should be graded so that water drains away readily without saturating the foundation or landscaped areas or cascading over slope faces. A potential source of water, such as water pipes, drains, and the like should be frequently examined for signs of leakage or damage. Any such leakage or damage should be repaired promptly. The project Civil Engineers should thoroughly evaluate the on-site drainage and make provisions as necessary to keep surface waters from affecting the site.

5.11 Construction Observation
The recommendations provided in this report are based limited subsurface information observed, at locations, and within, exploratory borings performed for this project and preliminary concept design proposed construction as of the date of publication. The interpolated subsurface conditions, on which this report relies, should be checked in the field during construction to verify conditions described herein are as anticipated. Any changes which occur to preliminary
information provided to this office as of the date of this publication, this office should be notified and afforded an opportunity to update information provided in this report.

Recommendations provided in this report are based on the understanding and assumption that all earthworks should be observed and tested to verify that grading activity has been performed according to the recommendations contained within this report. The project engineer should evaluate all footing excavations before reinforcing steel placement. To assure that the recommendations contained within this report are adhered to the following minimum inspection and testing services should be performed with regard to the geotechnical design of the project.

1. Continuous observation and testing during mass grading of the project.
2. Lime/cement treatment of selected engineered fills
3. Footing excavation inspection and testing for moisture prior to reinforcing steel installation.
4. Periodic Utility trench backfill testing for moisture and relative compaction.
5. Slab subgrade inspection and testing within 24 hours of capillary moisture break material installation.
6. Pavement subgrade preparation inspection and testing for moisture and relative compaction prior to placement of Class 2 base.
7. Class 2 Base inspection and testing prior to the placement of asphalt or concrete pavement.
8. Asphalt relative compaction testing during pavement placement.

If another engineer/engineering firm is hired to perform the earthwork inspections and testing for this project the owner engineer agrees to require the engineer to prepare a letter to the City of Napa transferring all geotechnical liability for the project to that engineer/engineering firm.

5.12 Plan Review
CTE should review project grading and foundation plans before the start of earthworks to
identify potential conflicts and to verify that the recommendations contained in the report are to be implemented.

6.0 LIMITATIONS OF INVESTIGATION

As indicated, the recommendations presented herein are based on the field exploration, laboratory testing and our geologic and engineering analysis. Following completion of testing, these recommendations will be confirmed and or modified, if necessary, based on the materials exposed and re-worked during grading. The field evaluation, laboratory testing and geotechnical analysis presented in this report have been conducted according to current engineering practice and the standard of care exercised by reputable geotechnical consultants performing similar tasks in this area.

No other warranty, expressed or implied, is made regarding the conclusions, recommendations and opinions expressed in this report. Variations may exist and conditions not observed or described in this report may be encountered during construction. Our conclusions and recommendations are based on an analysis of the observed conditions. If conditions different from those described in this report are encountered, our office should be notified and additional recommendations, if required, will be provided upon request.

We appreciate the opportunity to be of service on this project. Should you have any questions or need further information please do not hesitate to contact this office.

Respectfully submitted,
CTE CAL, INC.

Rodney D. Ballard, GE 2173
Principal Geotechnical Engineer

Kristin Kohls
Geologist
APPENDIX A
REFERENCES CITED

1. ACI Design Manual, Section 318, Chapter 4.


4. ATC Hazards by Location website (https://hazards.atcouncil.org/#/seismic?) which utilizes USGS hazard data, reference 2016 ASCE 7 Standard

5. California Department of Water Recourses website: (http://wwwdwr.water.ca.gov/waterdatalibrary/index.cfm)


9. FEMA Flood Map Service Center; “Napa County California and Incorporated Areas”, Flood Zone Map No. 06055C0517F, September 2010.

10. Google Earth aerial imagery.


13. A drawing entitled “Site Plan” (sheet SP_8; dated 6/2/2020) by Ware Malcomb.

APPENDIX B

DEFINITION OF TERMS, LEGEND, BORING LOGS
AND
NAPA COUNTY PERMIT
## DEFINITION OF TERMS

<table>
<thead>
<tr>
<th>PRIMARY DIVISIONS</th>
<th>SYMBOLS</th>
<th>SECONDARY DIVISIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COARSE GRAINED SOILS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than half of material smaller than No. 200 sieve size</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GRAVELS</strong></td>
<td><strong>GW</strong></td>
<td>Well Graded Gravels, Gravel-Sand Mixtures</td>
</tr>
<tr>
<td>More than half of coarse fraction is larger than 3&quot;</td>
<td></td>
<td>Little or no fines</td>
</tr>
<tr>
<td><strong>GRAVELS WITH FINES</strong></td>
<td><strong>GP</strong></td>
<td>Poorly Graded Gravels or Gravel Sand Mixtures, Little or no fines</td>
</tr>
<tr>
<td><strong>SANDS</strong></td>
<td><strong>SW</strong></td>
<td>Silty Gravels, Gravel-Sand-Silt Mixtures, Non-plastic Fines</td>
</tr>
<tr>
<td>More than half of coarse fraction is smaller than No. 4 sieve</td>
<td></td>
<td>Clayey Gravels, Gravel-Sand-Clay Mixtures, Plastic Fines</td>
</tr>
<tr>
<td><strong>SANDS WITH FINES</strong></td>
<td><strong>SP</strong></td>
<td>Well Graded Sands, Gravelly Sands, Little or no fines</td>
</tr>
<tr>
<td><strong>SILTS AND CLAYS</strong></td>
<td><strong>ML</strong></td>
<td>Poorly Graded Sands, Gravelly Sands, Little or no fines</td>
</tr>
<tr>
<td>Liquid limit is less than 50</td>
<td></td>
<td>Silty Sands, Sand-Silt Mixtures, Non-plastic Fines</td>
</tr>
<tr>
<td><strong>HIGHLY ORGANIC SOILS</strong></td>
<td><strong>PT</strong></td>
<td>Clayey Sands, Sand-Clay Mixtures, Plastic Fines</td>
</tr>
<tr>
<td>Liquid limit is greater than 50</td>
<td></td>
<td>Inorganic Silts and Organic Clays of Low Plasticity</td>
</tr>
<tr>
<td><strong>FINE GRAINED SOILS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than half of material smaller than No. 200 sieve size</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SILTS AND CLAYS</strong></td>
<td><strong>ML</strong></td>
<td>Inorganic Silts, Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands, Slightly Plastic Clayey Silts</td>
</tr>
<tr>
<td>Liquid limit is greater than 50</td>
<td></td>
<td>Inorganic Clays of Low to Medium Plasticity, Gravelly, Sandy, Silts or Lean Clays</td>
</tr>
<tr>
<td><strong>SILTS AND CLAYS</strong></td>
<td><strong>OL</strong></td>
<td>Organic Silts and Organic Clays of Low Plasticity</td>
</tr>
<tr>
<td>Liquid limit is greater than 50</td>
<td></td>
<td>Inorganic Silts, Micaceous or Diatomaceous Fine Sandy or Silty Soils, Elastic Silts</td>
</tr>
<tr>
<td><strong>HIGHLY ORGANIC SOILS</strong></td>
<td><strong>OH</strong></td>
<td>Inorganic Clays of High Plasticity, Fat Clays</td>
</tr>
<tr>
<td>Liquid limit is greater than 50</td>
<td></td>
<td>Organic Clays of Medium to High Plasticity, Organic Silty Clays</td>
</tr>
<tr>
<td><strong>PEAT AND OTHER HIGHLY ORGANIC SOILS</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### GRAIN SIZES

<table>
<thead>
<tr>
<th>BOULDERS</th>
<th>COBBLES</th>
<th>GRAVEL</th>
<th>SAND</th>
<th>SILTS AND CLAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&quot;</td>
<td>3&quot;</td>
<td>3/4&quot;</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>CLEAR SQUARE SIEVE OPENING</td>
<td>U.S. STANDARD SIEVE SIZE</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## ADDITIONAL TESTS

(OTHER THAN TEST PIT AND BORING LOG COLUMN HEADINGS)

- MAX- Maximum Dry Density
- GS- Grain Size Distribution
- SE- Sand Equivalent
- EI- Expansion Index
- CHM- Sulfate and Chloride Content, pH, Resistivity
- COR- Corrosivity
- SD- Sample Disturbed
- PM- Permeability
- SG- Specific Gravity
- HA- Hydrometer Analysis
- AL- Atterberg Limits
- RV- R-Value
- CN- Consolidation
- CP- Collapse Potential
- HC- Hydrocollapse
- REM- Remolded
- PP- Pocket Penetrometer
- WA- Wash Analysis
- DS- Direct Shear
- UC- Unconfined Compression
- MD- Moisture/Density
- SC- Swell Compression
- OL- Organic Impurities

**FIGURE:** BL1
BORING LEGEND

DESCRIPTION

Block or Chunk Sample

Bulk Sample

Standard Penetration Test (1.4" diam)

2" diam. Modified Split-Barrel Drive Sampler (Cal Sampler)

2.5" diam. Thin Walled Army Corp. of Engineers Sample

Groundwater Table

Soil Type or Classification Change

Formation Change [(Approximate boundaries queried (?)]

"SM"

Quotes are placed around classifications where the soils exist in situ as bedrock

FIGURE: BL2
BORING: B-1

DESCRIPTION

3” Asphalt Concrete over 3” Aggregate Base

Medium dense, dark brown, damp, sandy, medium plastic clayey GRAVEL with brick fragments (Fill)

Medium dense, dark gray/black, damp-moist, sandy, medium plastic clayey GRAVEL (Fill)

Very stiff, dark brown/black, damp, sandy, medium to highly plastic organic CLAY

As Above

Loose, dark brown/black, moist-wet, clayey fine to coarse sandy fine GRAVEL

Soft, dark brown/black, moist-wet, fine sandy low plastic CLAY

Medium stiff, dark brown/black, moist, moderately plastic CLAY with sand

Total Depth = 21.5 ft

Groundwater encountered while augering at 13.0 feet, Groundwater at 13.0 ft upon completion of drilling 7/7/20.

Boring Grout Backfilled 7/7/20 (Inspected by Napa County)
BORING: B-2

DESCRIPTION

19
17
10
GM
100.6
9.3
GM
Medium dense, dark brown, damp, silty, sandy, GRAVEL with brick fragments (Fill)

Note: Concrete was encountered at 2.5 ft depth—Auger refusal, moved hole 5 feet west and continued drilling.

6
4
12
106.2
15.6
GC
Medium dense, dark gray/black, damp-moist, clayey, sandy, GRAVEL (Fill)

6
12
13
4
17
13
21
19
10.3.8
12.3
GC
As Above

12.2
GP-GC
Medium dense, dark brown, damp, poorly graded GRAVEL with CLAY

Dense, brown, moist-wet, clayey fine to coarse sandy fine GRAVEL

4
12.1
CL
Very stiff, orange brown, medium plastic CLAY

10
6
10
CL
As above with local thin layer (<2") clayey sandy fine GRAVEL

PP=2.3 tsf

2
3
4
CL
Medium stiff, brown, medium plastic CLAY

PP=1.7 tsf

Continues on Page 2
<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Blown Density (pcf)</th>
<th>Moisture (%)</th>
<th>U.S.C.S. Symbol</th>
<th>Graphic Log</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>CL</td>
<td>Medium stiff, brown, medium plastic CLAY</td>
</tr>
<tr>
<td>30</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>CL</td>
<td>As above</td>
</tr>
<tr>
<td>35</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>CL</td>
<td>Very stiff, dark brown/black, damp, medium plastic CLAY</td>
</tr>
</tbody>
</table>

Total Depth=36.5 ft

Groundwater encountered while augering at 12.5 feet, Groundwater at 12.5 ft upon completion of drilling 7/7/20.

Boring Grout Backfilled 7/7/20 (Inspected by Napa County)
### BORING: B-3

<table>
<thead>
<tr>
<th>Depth (Feet)</th>
<th>Bulk Driven Blows/6 Inches</th>
<th>Dry Density (pcf)</th>
<th>Moisture (%)</th>
<th>U.S.C.S. Symbol</th>
<th>Graphic Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>GM 7 7 100.5 19.7</td>
<td>GC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11 100.5 19.7</td>
<td>GM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>12 114.9 10.8</td>
<td>GC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>13 114.9 10.8</td>
<td>GC</td>
<td></td>
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<tr>
<td>10</td>
<td>14 114.9 10.8</td>
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<td>15 114.9 10.8</td>
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<tr>
<td>10</td>
<td>16 114.9 10.8</td>
<td>GC</td>
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<tr>
<td>10</td>
<td>17 114.9 10.8</td>
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<tr>
<td>10</td>
<td>18 114.9 10.8</td>
<td>GC</td>
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<tr>
<td>10</td>
<td>19 114.9 10.8</td>
<td>GC</td>
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<tr>
<td>10</td>
<td>20 114.9 10.8</td>
<td>GC</td>
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<tr>
<td>10</td>
<td>21 114.9 10.8</td>
<td>GC</td>
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<td>22 114.9 10.8</td>
<td>GC</td>
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<tr>
<td>10</td>
<td>23 114.9 10.8</td>
<td>GC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>24 114.9 10.8</td>
<td>GC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### DESCRIPTION

- **7**: 3" Ashalt Concrete over 3" Aggregate Base
- **12**: Medium dense, dark brown, damp, sandy, medium plastic clayey GRAVEL with brick fragments (Fill)
- **12**: Dense, dark gray/black, damp-moist, medium plastic clayey, sandy, GRAVEL (Fill)
- **7**: Medium dense, dk brown/black, damp, silty, sandy, fine GRAVEL (Fill)
- **7**: Stiff, black, damp, medium to highly plastic organic CLAY
- **2**: Stiff, fine gravelly CLAY with interbedded layers of silty sand
- **1**: Soft, black, damp, fine medium to highly plastic organic CLAY
- **3**: Loose, dark brown, wet, clayey, fine to coarse sandy, fine GRAVEL
- **3**: Stiff, bluish gray, damp, medium plastic CLAY

---

**Laboratory Tests**

- MD WA=46.3%
- MD WA=18.8%
- LL=38, PI=12
- PP=1.9 tsf
- PP=3.6 tsf
- LL=45, PI=27
- PP=0.5 tsf
- PP=2.3 tsf

---

Continues on Page 2
**BORING: B-3 Cont'd**

<table>
<thead>
<tr>
<th>Depth (Feet)</th>
<th>Bulk Blows/Foot</th>
<th>Sample Type</th>
<th>Dry Density (pcf)</th>
<th>Moisture (%)</th>
<th>U.S.C.S. Symbol Graphic Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>3 5 6</td>
<td>CL</td>
<td></td>
<td></td>
<td>Stiff, bluish gray, damp, medium plastic CLAY</td>
</tr>
<tr>
<td>30</td>
<td>2 8 8</td>
<td>SM</td>
<td></td>
<td></td>
<td>Medium dense, dark gray/black, damp-moist, silty SAND</td>
</tr>
<tr>
<td>35-40</td>
<td>6 9 11</td>
<td>CL</td>
<td></td>
<td></td>
<td>Very stiff, brown, damp, low plastic organic CLAY with trace sand</td>
</tr>
</tbody>
</table>

Total Depth=36.5 ft

Groundwater encountered while augering at 13.0 feet, Groundwater at 13.0 ft upon completion of drilling 7/7/20.

Boring Grout Backfilled 7/7/20 (Inspected by Napa County)
### BORING: B-4

#### Laboratory Tests

**Assessment:**

- **Depth (Feet):**
  - 0
- **Type:**
  - GM
- **Dry Density (pcf):**
  - 115.3
- **Moisture (%):**
  - 11.7
- **U.S.C.S. Symbol:**
  - GM
- **Graphic Log:**
  - 3" Asphalt Concrete over 3" Aggregate Base

**Description:**

- **Medium dense, dark brown, damp, sandy, silty GRAVEL with brick fragments (Fill):**
  - **MD**
  - WA = 15.8%
  - RV = 15
- **Loose, dark gray/black, damp-moist, sandy, medium plastic clayey GRAVEL (Fill):**
  - **MD**
  - WA = 43.6%
  - PP = 0.6 tsf
- **Medium dense, dark brown/black, damp, medium to highly plastic organic clayey GRAVEL:**
  - **PP = 2.0 tsf
- **Very stiff, light brown, damp, silty CLAY to CLAY:**
  - **PP = 3.7 tsf

**Total Depth:** 16.5 ft

No Free Groundwater Encountered

Boring Grout Backfilled 7/7/20 (Inspected by Napa County)
### BORING: B-5

<table>
<thead>
<tr>
<th>Depth (Feet)</th>
<th>Bulk Driven Blows/6 Inches</th>
<th>Dry Density (pcf)</th>
<th>Moisture (%)</th>
<th>U.S.C.S. Symbol</th>
<th>Graphic Log</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>3</td>
<td>102.3</td>
<td>19.8</td>
<td>GM</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>104.4</td>
<td>17.7</td>
<td>GC</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td>CL/CH</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td></td>
<td></td>
<td>GM</td>
<td></td>
</tr>
</tbody>
</table>

**DESCRIPTION**

- **0 ft**: 3" Ashalt Concrete over 9" Aggregate Base
  - WA=37.1%
  - MD
- **3 ft**: Loose, dark brown, damp, sandy, medium plastic clayey GRAVEL with brick fragments (Fill)
  - PP=0.7 tsf
  - MD
- **7 ft**: Dense, dark gray/black, damp-moist, sandy, medium plastic clayey GRAVEL (Fill)
  - PP=5.1 tsf
  - WA=45.8%
  - MD
- **17 ft**: Stiff, dark brown/black, damp, medium to highly plastic organic CLAY
  - PP=2.0 tsf
- **24 ft**: Medium dense, dark brown, moist, silty sandy fine GRAVEL

**Total Depth=16.5 ft**

No Free Groundwater Encountered

Boring Grout Backfilled 7/7/20 (Inspected by Napa County)
# LOG OF TEST BORING

**BORING NO.: 1**

**PROJECT:** Proposed Retail & Restaurant  
**CLIENT:** Ronmor Real Estate Fund Napa, LP  
**LOCATION:** 333 Soscol Avenue, Napa  
**DRILLER:** Britton Exploration Inc.  
**DRILL RIG:** CME-55  
**DEPTH TO WATER:** INITIAL \( \Phi \) : 29'  
**DATE:** 03/12/20  
**ELEVATION:** n/a  
**LOGGED BY:** DS  
**BORING DIAMETER:** 4''  
**PROJECT NO.:** VV4530A  
**BORING DURATION:** AFTER: hrs.

## Geotechnical Description and Classification

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sample No.</th>
<th>Sampler</th>
<th>Geotechnical Description</th>
<th>Soil Classification</th>
<th>Converted SPT Blow Count (blows/ft)</th>
<th>Dry Density (pcf)</th>
<th>Moisture Content (Percent)</th>
<th>Oe (l.s.f.)</th>
<th>Penetrometer</th>
<th>Additional Tests and Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td>2'' Asphalt Concrete.</td>
<td>CL</td>
<td>20</td>
<td>103.9</td>
<td>30.3</td>
<td></td>
<td></td>
<td>LL=35 Pl=16</td>
</tr>
<tr>
<td>1-1</td>
<td></td>
<td></td>
<td>3'' Aggregate Base.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Black/Brown Sandy CLAY w/ Granite Chunks; moist, very stiff.</td>
<td>CL/CL/CH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td></td>
<td></td>
<td>As Above; moist, stiff. (FILL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yellow Gray CLAY w/ Silt; moist, hard. (NATIVE)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-3</td>
<td></td>
<td></td>
<td>As Above; moist, very stiff.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-4</td>
<td></td>
<td></td>
<td>As Above; moist, very stiff.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-5</td>
<td></td>
<td></td>
<td>As Above; moist, very stiff.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-6</td>
<td></td>
<td></td>
<td>As Above; moist, very stiff.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-7</td>
<td></td>
<td></td>
<td>As Above; moist, very stiff.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-8</td>
<td></td>
<td></td>
<td>As Above; moist, very stiff.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

This information pertains only to this boring and is not necessarily indicative of the whole site.
**LOG OF TEST BORING**
**BORING NO.: 1**

**PROJECT:** Proposed Retail & Restaurant  
**CLIENT:** Ronmor Real Estate Fund Napa, LP  
**LOCATION:** 333 Soscol Avenue, Napa  
**DRILLER:** Britton Exploration Inc.  
**DRILL RIG:** CME-55  
**DEPTH TO WATER:** INITIAL : 29'  
**ELEVATION:** n/a  
**LOGGED BY:** DS  
**BORING DIAMETER:** 4"  
**DATE:** 03/12/20  
**FINAL :** AFTER: hrs.

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>SAMPLE NO.</th>
<th>GRAPHIC LOG</th>
<th>SAMPLER</th>
<th>GEOTECHNICAL DESCRIPTION AND CLASSIFICATION</th>
<th>SOIL CLASSIFICATION</th>
<th>CONVERTED SPT BLOW COUNT (BLOW/FT.)</th>
<th>DRY DENSITY (pcf)</th>
<th>MOISTURE CONTENT (PERCENT)</th>
<th>Cp (l.s.t.)</th>
<th>Penetrometer</th>
<th>ADDITIONAL TESTS AND REMARKS (L.L., P.I., U.C.C., gradation)</th>
</tr>
</thead>
</table>
| 30    | 1-7        |             |         | As Above; wet, stff. Boring Terminated @ 31.5.  
Groundwater Encountered @ 29'. |                    | 0                   | 65.5  | 38.1  | 0.5  | %<200=78% | |
| 35    |            |             |         |                                              |                    |                     |                  |                            |            |              |                                                          |
| 40    |            |             |         |                                              |                    |                     |                  |                            |            |              |                                                          |
| 45    |            |             |         |                                              |                    |                     |                  |                            |            |              |                                                          |
| 50    |            |             |         |                                              |                    |                     |                  |                            |            |              |                                                          |

This information pertains only to this boring and is not necessarily indicative of the whole site.
# LOG OF TEST BORING

**BORING NO.: 2**

**PROJECT:** Proposed Retail & Restaurant  
**CLIENT:** Ronnor Real Estate Fund Napa, LP  
**LOCATION:** 333 Soscol Avenue, Napa  
**DRILLER:** Britton Exploration Inc.  
**DRILL RIG:** CME-55  
**DEPTH TO WATER:** INITIAL: 23'  

**PROJECT NO.:** VV4530A  
**DATE:** 03/12/20  
**ELEVATION:** n/a  
**LOGGED BY:** DS  
**BORING DIAMETER:** 4"  

**FINAL:**  
**AFTER:** hrs.

## GEOTECHNICAL DESCRIPTION AND CLASSIFICATION

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>SAMPLE NO.</th>
<th>SAMPLER</th>
<th>GRAPHIC LOG</th>
<th>SOIL CLASSIFICATION</th>
<th>CONVERTED SPT BLOW COUNT (BLOW/FT.)</th>
<th>DRY DENSITY (γD)</th>
<th>MOISTURE CONTENT (%T)</th>
<th>Qp (t.s.t)</th>
<th>PENETROMETER</th>
<th>ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, &amp;c, Gradation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2-1</td>
<td></td>
<td></td>
<td>CL</td>
<td>15</td>
<td>105.3</td>
<td>4.5</td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>5</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2-2</td>
<td></td>
<td></td>
<td>CL/CH</td>
<td>15</td>
<td>105.9</td>
<td>19.9</td>
<td>3.5</td>
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<td>15</td>
<td>2-3</td>
<td></td>
<td></td>
<td>CL/CH</td>
<td>15</td>
<td>93.3</td>
<td>29.8</td>
<td>2.25</td>
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<tr>
<td>20</td>
<td>2-4</td>
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<td></td>
<td>SC</td>
<td>9</td>
<td>84.3</td>
<td>30.4</td>
<td>1.0</td>
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<td>%&lt;200=45%</td>
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<td>2-5</td>
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<td></td>
<td>12</td>
<td>87.8</td>
<td>32.4</td>
<td>2.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Boring Terminated @ 24.5', Groundwater Encountered @ 23'.

This information pertains only to this boring and is not necessarily indicative of the whole site.

**KC ENGINEERING CO.**
<table>
<thead>
<tr>
<th>DEPTH NO.</th>
<th>GRAPHIC LOG</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2' Asphalt Concrete, 3' Aggregate Base. Brown/Black Gravelly Sandy CLAY; moist, very stiff. (FILL)</td>
</tr>
<tr>
<td>3-1</td>
<td>Brown Sandy CLAY w/ Rock Chunks; moist, hard. (NATIVE)</td>
</tr>
<tr>
<td>10</td>
<td>Yellowish Brown CLAY w/ Trace Silt; moist, hard.</td>
</tr>
<tr>
<td>15</td>
<td>As Above; moist, hard.</td>
</tr>
<tr>
<td>20</td>
<td>As Above; very moist, very stiff.</td>
</tr>
</tbody>
</table>

**Geotechnical Description and Classification**

<table>
<thead>
<tr>
<th>SOIL CLASSIFICATION</th>
<th>CONTENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CL</td>
<td>Brown Sandy CLAY w/ Rock Chunks; moist, hard. (NATIVE)</td>
</tr>
<tr>
<td>CL</td>
<td>Yellowish Brown CLAY w/ Trace Silt; moist, hard.</td>
</tr>
<tr>
<td>CL</td>
<td>As Above; moist, hard.</td>
</tr>
<tr>
<td>CL</td>
<td>As Above; very moist, very stiff.</td>
</tr>
</tbody>
</table>

**Additional Tests and Remarks**

- This information pertains only to this boring and is not necessarily indicative of the whole site.
# LOG OF TEST BORING

**BORING NO.: 3**

**PROJECT:** Proposed Retail & Restaurant  
**CLIENT:** Rorunor Real Estate Fund Napa, LP  
**LOCATION:** 333 Soscol Avenue, Napa  
**DRILLER:** Britton Exploration Inc.  
**DRILL RIG:** CME-55  
**DEPTH TO WATER:** INITIAL 30'  
**FIND DIAETER:** 4"

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>SAMPLE NO.</th>
<th>SAMPLER</th>
<th>GRAPHIC LOG</th>
<th>GEOLOGICAL DESCRIPTION AND CLASSIFICATION</th>
<th>SOIL CLASSIFICATION</th>
<th>CONV SPT BLOW COUNT (BLOWS/FT)</th>
<th>DRY DENSITY (PCF)</th>
<th>MOISTURE CONTENT (PERCENT)</th>
<th>ADDITIONAL TESTS AND REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-6</td>
<td></td>
<td></td>
<td></td>
<td>Yellowish Brown Silty CLAY; wet, firm.</td>
<td>CL</td>
<td>7</td>
<td>88.1</td>
<td>34.5</td>
<td>%&lt;200=75%; P&lt;574 psf</td>
</tr>
<tr>
<td>3-7</td>
<td></td>
<td></td>
<td></td>
<td>As Above; wet, stiff.</td>
<td>CL</td>
<td>12</td>
<td>88.8</td>
<td>34.0</td>
<td>1.5</td>
</tr>
<tr>
<td>3-8</td>
<td></td>
<td></td>
<td></td>
<td>Gray Brown CLAY; moist, very stiff.</td>
<td>CL</td>
<td>25</td>
<td>88.1</td>
<td>34.3</td>
<td></td>
</tr>
</tbody>
</table>

Boring Terminated at 41.5'. Groundwater Encountered @ 30'.

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.
# LOG OF TEST BORING

**BORING NO.: 4**

**PROJECT:** Proposed Retail & Restaurant  
**CLIENT:** Ronnor Real Estate Fund Napa, LP  
**LOCATION:** 333 Soscol Avenue, Napa  
**DRILLER:** Britton Exploration Inc.  
**DRILL RIG:** CME-55  
**DEPTH TO WATER:** INITIAL \( \frac{\text{ft}}{\text{in}} \): 15'  
**DATE:** 03/12/20  
**ELEVATION:** n/a  
**LOGGED BY:** OS  
**BORING DIAMETER:** 4"

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>SAMPLE NO.</th>
<th>SAMPLE</th>
<th>GRAPHIC LOG</th>
<th>GEOTECHNICAL DESCRIPTION AND CLASSIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4-1</td>
<td></td>
<td></td>
<td>2&quot; Asphalt Concrete, 3&quot; Aggregate Base, Black CLAY; moist, stiff. (NATIVE)</td>
</tr>
<tr>
<td>4-1</td>
<td>4-2</td>
<td></td>
<td></td>
<td>Brown/ Black CLAY w/ Sand Gravels Rock Brick Chunks; moist, very stiff. (FILL)</td>
</tr>
<tr>
<td>4-2</td>
<td>4-3</td>
<td></td>
<td></td>
<td>Gray Silty SAND w/ Gravel; moist to wet, medium dense.</td>
</tr>
<tr>
<td>4-3</td>
<td>4-4</td>
<td></td>
<td></td>
<td>Brown CLAY w/ Gravels; wet, soft.</td>
</tr>
<tr>
<td>4-4</td>
<td>4-5</td>
<td></td>
<td></td>
<td>Gray Sandy CLAY; wet, very stiff.</td>
</tr>
<tr>
<td>4-5</td>
<td></td>
<td></td>
<td></td>
<td>Gray CLAY w/ Trace Fine Gravels; most, very stiff.</td>
</tr>
</tbody>
</table>

- **CONVERTED SPT BLOW COUNT (BLOWS/FT):** 22  
- **DRY DENSITY (PCF):** 109.5  
- **MOISTURE CONTENT (PERCENT):** 11.7  
- **Qp (t.s.f.):** 4.5+  
- **Penetrometer:** LL = 37, Pl = 18  
- **Groundwater Encountered:** @ 15'  
- **Boring Terminated:** @ 24.5'

**ADDITIONAL TESTS AND REMARKS (LL, PI, UCC, gradation):**

- **CL:**  
  - Po = 864 psf

---

This information pertains only to this boring and is not necessarily indicative of the whole site.

**KC ENGINEERING CO.**
**LOG OF TEST BORING**

**BORING NO.: 5**

**PROJECT:** Proposed Mechanics Bank  
**CLIENT:** Gasser Foundation  
**LOCATION:** 407 Soscal Avenue, Napa  
**DRILLER:** Ram Geotechnical Drilling Inc.  
**DRILL RIG:** Mobile B24  
**DEPTH TO WATER:** INITIAL \( \frac{1}{2} \): 16 Feet

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>SAMPLE NO.</th>
<th>SAMPLER</th>
<th>GRAPHIC LOG</th>
<th>SOIL CLASSIFICATION</th>
<th>CONVERTED SPT BLOW COUNT (BLOWS/FT.)</th>
<th>DRY DENSITY (pcf)</th>
<th>MOISTURE CONTENT (PERCENT)</th>
<th>ADDITIONAL TESTS AND REMARKS</th>
</tr>
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<td>Dark Brown Sandy Clay; moist, stiff (FILL)</td>
<td>CL</td>
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<td>21.3</td>
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<tr>
<td>15</td>
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<td>Dark Brown Sandy Clay with Organics; wet, firm (NATIVE)</td>
<td>CL</td>
<td>6</td>
<td>73.2</td>
<td>42.2</td>
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<td></td>
<td></td>
<td>As Above; No Organics, stiff to very stiff</td>
<td>CL</td>
<td>15</td>
<td>102.1</td>
<td>25.0</td>
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<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td>Bluish Grey Sandy Clay; wet, stiff</td>
<td>CL</td>
<td>15</td>
<td>102.1</td>
<td>25.0</td>
</tr>
</tbody>
</table>

This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.
LOG OF TEST BORING
BORING NO.: 5

PROJECT: Proposed Mechanics Bank
CLIENT: Gasser Foundation
LOCATION: 407 Soscal Avenue, Napa
DRILLER: Ram Geotechnical Drilling Inc.
DRILL RIG: Mobile B24

DEPTH TO WATER: INITIAL \( \frac{1}{2} \): 16 Feet

PROJECT NO.: VV2680
DATE: 11/28/07
ELEVATION:
LOGGED BY: KDL
BORING DIAMETER: 4 Inches
FINAL \( \frac{1}{2} \): AFTER: hrs.

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>SAMPLE NO.</th>
<th>GRAPHIC LOG</th>
<th>GEOTECHNICAL DESCRIPTION AND CLASSIFICATION</th>
<th>SOIL CLASSIFICATION</th>
<th>CONVERTED SPT BLOW COUNT (B/FT.)</th>
<th>DRY DENSITY (pcf)</th>
<th>MOISTURE CONTENT (PERCENT)</th>
<th>ADDITIONAL TESTS AND REMARKS</th>
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</thead>
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<tr>
<td>5-5</td>
<td></td>
<td></td>
<td>Brownish Grey Sandy Clay; wet, hard</td>
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<td>13</td>
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<td>Boring Terminated At 39.5 Feet.</td>
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<td>%&lt;200=59.3</td>
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<td>35</td>
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<td>Groundwater Encountered At 16 Feet.</td>
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This information pertains only to this boring and is not necessarily indicative of the whole site.

KC ENGINEERING CO.
# Log of Test Boring

**Boring No.: 6**

**Project:** Proposed Napa Craftsman Inn  
**Client:** Continental Real Estate Companies  
**Location:** Soscol Ave. & Gasser Dr., Napa, CA  
**Driller:** Britton Exploration  
**Drill Rig:** CME 55  
**Depth To Water:** Initial \( \text{\footnotesize \( \text{\textbullet} \)} \):  
**Logged By:** DVC  
**Date:** 06/20/18  
**Elevation:** n/a  
**Boring Diameter:** 6”  
**Final \( \text{\footnotesize \( \text{\textbullet} \)} \):** After: hrs.

## Geotechnical Description and Classification

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sampler</th>
<th>Graphic Log</th>
<th>Soil Classification</th>
<th>Converted SPT Blow Count (Blows/ft.)</th>
<th>Dry Density (pcf)</th>
<th>Moisture Content (Percent)</th>
<th>Op (t/sft) (Penetrometer)</th>
<th>Additional Tests and Remarks</th>
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<td>GP</td>
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<td>Aggregate</td>
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<td>GP</td>
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This information pertains only to this boring and is not necessarily indicative of the whole site.

**KC Engineering Co.**
**Soil Boring Permit**

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<th>Application Type:</th>
<th>Soil Borings</th>
<th>File Date:</th>
<th>6/25/2020</th>
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<tbody>
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<td>Permit Number:</td>
<td>E20-00298</td>
<td>Issued Date:</td>
<td>6/30/2020</td>
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<tr>
<td>Parcel Number:</td>
<td>046-190-054-000</td>
<td>Expiration Date:</td>
<td>6/30/2022</td>
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<tr>
<td>Site Address:</td>
<td>333 Soscol AVE, Napa 94559</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owner:</td>
<td>RONMOR REAL ESTATE FUND NAPA LP</td>
<td>Phone:</td>
<td>(916) 331-6030</td>
</tr>
<tr>
<td>Address:</td>
<td>C/O RONMOR DEVELOPERS LLC 250 5920 1 A ST SW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applicant:</td>
<td>Kristin Kohls</td>
<td>Phone:</td>
<td>(916) 331-6030</td>
</tr>
<tr>
<td>Business Name:</td>
<td>H1 DRILLING COMPANY</td>
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<td>Project Type:</td>
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<td>Type of Investigation:</td>
<td>Geotechnical</td>
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<td>LOP Site Number:</td>
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<td>Are all borings covered by this application on a single parcel and not on adjoining parcels or public or utility rights-of-way?</td>
<td>Yes  X  No</td>
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<tr>
<td>Is an Encroachment Permit Required?</td>
<td>No</td>
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<tr>
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<td>Development/Rinsate Water:</td>
<td>Left Onsite</td>
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<td>Maximum Depth:</td>
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<td>Neat Cement</td>
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<td>Method of Seal Placement:</td>
<td>Tremie Pipe/Pump</td>
<td>Other:</td>
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<tr>
<td><strong>TO PERMITEE:</strong></td>
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</table>

Any work performed or operations conducted under the auspices of this permit constitutes acceptance of all conditions, inspections and comments contained in this permit, and the incorporation of all requirements as set forth in the permit application.

Staff Signature: **Cindy Worthington**  
Date:  **6/30/2020**
CONDITIONS / INSPECTIONS / COMMENTS

Application Type: Soil Borings  File Date: 6/25/2020
Permit Number: E20-00298  Issued Date: 6/30/2020
Parcel Number: 046-190-054-000  Expiration Date: 6/30/2022
Owner: RONMOR REAL ESTATE FUND NAPA LP  Phone: (000) 000-0000
Applicant: Kristin Kohls  Phone: (916) 331-6030

CONDITIONS

Code: Condition:
STRM-02 The owner shall comply with the Napa Countywide Stormwater Pollution Prevention Program, “Erosion and Sediment Control Measures for Construction Projects”. Failure to comply with best management practices for erosion and sediment control will result in issuance of a stop-work order.

SB-1 In applying for this permit, I understand that the drilling contractor and the consultant are responsible for the following:
1) Compliance with the State of California Worker’s Compensation Laws;
2) Compliance with the State and Federal Worker Health and Safety Laws;
3) Location of all underground and aboveground utilities which might be impacted by the proposed work;
4) Compliance with the Napa County and State of California well requirements;
5) Notification to Napa County PBES at least two (2) workdays before work is initiated;
6) Notification to Napa County within two (2) workdays of discovery of contaminated soil or ground water.

INSPECTIONS

Inspection Type: Inspected By: Inspection Date:
Construction Inspection

COMMENTS

Date: Comment:
6/30/2020 Call 253-4135 at least 24 hours in advance during normal business hours to schedule inspection requests. Inspections are taken on a first-come-first-served basis so if you need a specific date and time be sure to call well in advance

If a claim is to be submitted for a refund, per County Code, a 25% processing fee will be retained. Such claims must be made within one year of the date on the receipt.
APPENDIX C

LABORATORY METHODS AND RESULTS
APPENDIX C
LABORATORY METHODS AND RESULTS

Laboratory tests were performed on representative soil samples to detect their relative engineering properties. Tests were performed following test methods of the American Society for Testing Materials or other accepted standards. The following presents a brief description of the various test methods used. The result of the laboratory tests are presented on the test boring logs or following this Appendix section.

Natural Moisture Content
The procedure of ASTM D2216 was used to measure the moisture content of representative samples.

Classification
Soils were classified visually according to the Unified Soil Classification System. Visual classifications were supplemented by laboratory testing of selected samples according to ASTM D2487.

Atterberg Limits
The procedure of ASTM D4318 was used to measure the liquid limit, plastic limit and plasticity index of representative samples.

Material Finer than No. 200 Sieve
Particle-size analyses were performed on selected representative samples according to ASTM D1140.

R-Value
The procedure of ASTM D2844 was performed to determine the potential strength of subgrade and base materials for use in road pavements.

Expansion Index
The ASTM D4829 procedure was used on selected samples to determine the expansion potential.

Sieve Analysis
The ASTM D6913 procedure was used to determine the particle size distribution of selected samples.
# MOISTURE & DENSITY TEST

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<td>5'</td>
<td>10'</td>
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<td>SAMPLE HT</td>
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<td>5.72</td>
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<td>297.9</td>
<td>296.6</td>
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<td>660.5</td>
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<td>109.7</td>
<td>100.6</td>
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<td>100.5</td>
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</table>

Reviewed By: Kristin Kohls  
Laboratory Manager
## MOISTURE & DENSITY TEST

**Project Number:** 90-1715G  
**Sample Date:** 7/7/2020

**Project Name:** Soscol Retail  
**Lab Number:** 5340

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<th>Sample No.</th>
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<td>DRY DENS</td>
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<td>115.3</td>
<td>111.9</td>
<td>102.3</td>
<td>104.4</td>
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Reviewed By: Kristin Kohls  
Laboratory Manager  
Date: ____________

**Soscol Retail**
### Material Finer than #200 Sieve

**ASTM D-1141**

**Project Name:** Soscol Retail  
**Project #:** 90-1715G  
**Depth:** 1' 11.5' 13' 1' 5' 10' 11.5' 15' 1'  
**Classification:** GC CL GC GM GM GC GP-GC CL GC  
**Wet Weight:** 542.9 846.1 N/A 554.0 581.5 1096.4 591.5 564.3 556.3  
**Dry Weight (Before Wash):** 512.4 737.2 540.3 532.2 539.2 1005.5 554.8 509.9 507.7  
**Dry Weight (After Wash):** 431.8 502.4 461.1 495.0 497.9 839.8 521.1 325.1 393.5  
**Pan Wt, g:** 260.8 297.9 262.4 296.6 268.0 265.5 255.0 261.4 260.9  
**Soil Loss, g:** 80.6 234.8 79.2 37.2 41.3 165.7 33.7 184.8 114.2  
**Moisture %:** 12.1% 24.8% N/A 9.3% 15.6% 12.3% 12.2% 21.9% 19.7%  
**Percent Passing #200 Sieve:** 32.0% 53.4% 28.5% 15.8% 15.2% 22.4% 11.2% 74.4% 46.3%  
**Lab #:** 5340  
**Sampled By:** Alan K  
**Date Sampled:** 7/7/2020
Material Finer than #200 Sieve

**ASTM D-1141**

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<td><strong>Depth:</strong></td>
<td>5'</td>
<td>15'</td>
<td>1'</td>
<td>5'</td>
<td>1'</td>
<td>5'</td>
</tr>
<tr>
<td><strong>Classification</strong></td>
<td>GC</td>
<td>CL</td>
<td>GM</td>
<td>GC</td>
<td>GC</td>
<td>GC</td>
</tr>
<tr>
<td><strong>Wet Weight:</strong></td>
<td>568.5</td>
<td>436.5</td>
<td>569.7</td>
<td>564.2</td>
<td>558.3</td>
<td>1134.0</td>
</tr>
<tr>
<td><strong>Dry Weight</strong></td>
<td>538.3</td>
<td>358.13</td>
<td>537.2</td>
<td>515.0</td>
<td>509.1</td>
<td>1002.3</td>
</tr>
<tr>
<td><strong>(Before Wash)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Dry Weight</strong></td>
<td>486.0</td>
<td>308.13</td>
<td>493.1</td>
<td>403.5</td>
<td>416.9</td>
<td>661.7</td>
</tr>
<tr>
<td><strong>(After Wash)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pan Wt, g</strong></td>
<td>259.4</td>
<td>261.7</td>
<td>258.3</td>
<td>259.2</td>
<td>260.9</td>
<td>259.0</td>
</tr>
<tr>
<td><strong>Soil Loss, g</strong></td>
<td>52.3</td>
<td>50.3</td>
<td>44.1</td>
<td>111.5</td>
<td>92.2</td>
<td>340.6</td>
</tr>
<tr>
<td><strong>Moisture %</strong></td>
<td>10.8%</td>
<td>21.8%</td>
<td>11.7%</td>
<td>19.2%</td>
<td>19.8%</td>
<td>17.7%</td>
</tr>
<tr>
<td><strong>Percent Passing #200 Sieve</strong></td>
<td>18.8%</td>
<td>52.0%</td>
<td>15.8%</td>
<td>43.6%</td>
<td>37.1%</td>
<td>45.8%</td>
</tr>
</tbody>
</table>

**Sample ID:** B3 B3 B4 B4 B5 B5

**Depth:** 5' 15' 1' 5' 1' 5'

**Classification**
- GC
- CL
- GM
- GC
- GC
- GC

**Wet Weight**
- 568.5
- 436.5
- 569.7
- 564.2
- 558.3
- 1134.0

**Dry Weight**
- 538.3
- 358.13
- 537.2
- 515.0
- 509.1
- 1002.3

**Dry Weight (After Wash)**
- 486.0
- 308.13
- 493.1
- 403.5
- 416.9
- 661.7

**Pan Wt, g**
- 259.4
- 261.7
- 258.3
- 259.2
- 260.9
- 259.0

**Soil Loss, g**
- 52.3
- 50.3
- 44.1
- 111.5
- 92.2
- 340.6

**Moisture %**
- 10.8%
- 21.8%
- 11.7%
- 19.2%
- 19.8%
- 17.7%

**Percent Passing #200 Sieve**
- 18.8%
- 52.0%
- 15.8%
- 43.6%
- 37.1%
- 45.8%
### Atterberg Limits

**ASTM D4318**

<table>
<thead>
<tr>
<th></th>
<th>Wet Soil</th>
<th>Dry Soil</th>
<th>Tare</th>
<th>Water</th>
<th>Bore Depth</th>
<th>Moisture</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Liquid Limits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WET SOIL</td>
<td>30.35</td>
<td>27.42</td>
<td>21.14</td>
<td>2.93</td>
<td>19</td>
<td>46.6%</td>
</tr>
<tr>
<td>DRY SOIL</td>
<td>30.60</td>
<td>27.62</td>
<td>20.94</td>
<td>2.98</td>
<td>35</td>
<td>44.61%</td>
</tr>
<tr>
<td>TARE</td>
<td>34.10</td>
<td>30.02</td>
<td>21.04</td>
<td>4.08</td>
<td>28</td>
<td>45.43%</td>
</tr>
<tr>
<td>WATER</td>
<td>22.45</td>
<td>22.26</td>
<td>21.28</td>
<td>0.19</td>
<td></td>
<td>19.39%</td>
</tr>
<tr>
<td><strong>% Moisture</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wet Soil</td>
<td>46.66%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry Soil</td>
<td></td>
<td>44.61%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tare</td>
<td></td>
<td></td>
<td>45.43%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LL = W(N/25)^0.121**

**PI = 0.73(LL - 20)**

**USCS**

<table>
<thead>
<tr>
<th>PI</th>
<th>LL</th>
</tr>
</thead>
<tbody>
<tr>
<td>CL</td>
<td>CH</td>
</tr>
<tr>
<td>ML&amp;OL</td>
<td>MH&amp;OH</td>
</tr>
</tbody>
</table>

**Reviewed By:** ___________________________  **Date:** _____________
WET SOIL: 29.38 29.53 29.30 23.05 23.30
DRY SOIL: 27.18 27.25 26.90 22.74 22.86
TARE: 20.97 21.02 20.57
WATER: 2.20 2.28 2.40
# BLOWS: 34 22 16
% MOIST: 35.43% 36.60% 37.91%

LIQUID LIMITS
<table>
<thead>
<tr>
<th></th>
<th>29.38</th>
<th>29.53</th>
<th>29.30</th>
<th>23.05</th>
<th>23.30</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRY SOIL</td>
<td>27.18</td>
<td>27.25</td>
<td>26.90</td>
<td>22.74</td>
<td>22.86</td>
</tr>
<tr>
<td>TARE</td>
<td>20.97</td>
<td>21.02</td>
<td>20.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WATER</td>
<td>2.20</td>
<td>2.28</td>
<td>2.40</td>
<td></td>
<td></td>
</tr>
<tr>
<td># BLOWS</td>
<td>34</td>
<td>22</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% MOIST</td>
<td>35.43%</td>
<td>36.60%</td>
<td>37.91%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PLASTIC LIMIT

LL = W(N/25)^0.121

LL\&PL\&PI

ONE POINT
<table>
<thead>
<tr>
<th></th>
<th>36.8%</th>
<th>36.0%</th>
<th>35.9%</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIQUID LIMITS</td>
<td>36%</td>
<td>19%</td>
<td>17%</td>
</tr>
</tbody>
</table>

ASTM D4318

REVIEWED BY: ________________________________ DATE: ________________
### ATTERBERG LIMITS

#### ASTM D4318

<table>
<thead>
<tr>
<th></th>
<th>WET SOIL</th>
<th>DRY SOIL</th>
<th>TARE</th>
<th>WATER</th>
<th># BLOWS</th>
<th>% MOIST</th>
<th>LL</th>
<th>PL</th>
<th>PI</th>
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</thead>
<tbody>
<tr>
<td>Liquid Limits</td>
<td>27.70</td>
<td>26.13</td>
<td>20.93</td>
<td>1.57</td>
<td>33</td>
<td>30.19</td>
<td>31.2%</td>
<td>31.0%</td>
<td>32.1%</td>
</tr>
<tr>
<td>Plastic Limit</td>
<td>27.96</td>
<td>26.18</td>
<td>20.70</td>
<td>1.78</td>
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<td>32.48</td>
<td>31.0%</td>
<td>31.0%</td>
<td>32.1%</td>
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<tr>
<td>Moisture</td>
<td>31.25</td>
<td>28.67</td>
<td>20.55</td>
<td>2.58</td>
<td>27</td>
<td>31.77</td>
<td>32.1%</td>
<td>32.1%</td>
<td>32.1%</td>
</tr>
<tr>
<td>Moisture</td>
<td>24.65</td>
<td>24.07</td>
<td>20.63</td>
<td>0.58</td>
<td></td>
<td>16.86</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Moisture</td>
<td>23.57</td>
<td>23.12</td>
<td>20.51</td>
<td>0.45</td>
<td></td>
<td>17.24</td>
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</tr>
</tbody>
</table>

#### LL vs. PI

![Graph showing LL vs. PI](image)

- LL = W(N/25)^0.121

#### USCS

![Graph showing USCS](image)

- Pl = 0.73(LL-20)

---

**Reviewed By:**

**Date:** 07/07/20

---

**Job Name:** Soscol Retail

**Job Number:** 90-1715G

**Sample No.:** 5340

**Date:** 07/07/20

**Boring:** B2

**Depth:** 10'
### ATTERBERG LIMITS

**ASTM D4318**

<table>
<thead>
<tr>
<th>LIQUID LIMITS</th>
<th>PLASTIC LIMIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>WET SOIL 24.67 26.51 26.07</td>
<td>23.52 22.69</td>
</tr>
<tr>
<td>DRY SOIL 23.66 24.85 24.68</td>
<td>23.02 22.25</td>
</tr>
<tr>
<td>TARE 20.98 20.74 20.79</td>
<td>21.07 20.57</td>
</tr>
<tr>
<td>WATER 1.01 1.66 1.39</td>
<td>0.50 0.44</td>
</tr>
<tr>
<td># BLOWS 24 15 34</td>
<td></td>
</tr>
<tr>
<td>% MOIST 37.69% 40.39% 35.73%</td>
<td>25.64% 26.19%</td>
</tr>
</tbody>
</table>

**ONE POINT**

<table>
<thead>
<tr>
<th>LL</th>
<th>PL</th>
<th>PI</th>
</tr>
</thead>
<tbody>
<tr>
<td>37.5%</td>
<td>38.0%</td>
<td>37.1%</td>
</tr>
</tbody>
</table>

\[ LL = W(N/25)^{0.121} \]

**USCS**

\[ PI = 0.73(LL-20) \]

---

**Reviewed By:** ___________________________  **Date:** 07/07/20
# BORE LOGS

**Job Name:** Soscol Retail  
**Job Number:** 90-1715G  
**Sample No.:** 5340  
**Date:** 07/07/20  
**Boring:** B3  
**Depth:** 15'

**WET SOIL**
- 24.59  
- 26.94  
- 27.69  
- 22.49  
- 22.63

**DRY SOIL**
- 23.60  
- 25.20  
- 25.18  
- 22.17  
- 22.35

**TARE**
- 20.92  
- 20.95  
- 20.93  
- 20.56  
- 20.73

**WATER**
- 0.99  
- 1.74  
- 2.51  
- 0.00  
- 0.32  
- 0.28

**# BLOWS**
- 35  
- 25  
- 16

**% MOIST**
- 36.94%  
- 40.94%  
- 59.06%  
- 19.88%  
- 17.28%

**LL**
- 38.5%  
- 40.9%  
- 56.0%  
- 45%  
- 19%  
- 27%

**PI**
- 0.73(LL - 20)

---

**LIQUID LIMITS**

<table>
<thead>
<tr>
<th>WET SOIL</th>
<th>24.59</th>
<th>26.94</th>
<th>27.69</th>
<th>22.49</th>
<th>22.63</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRY SOIL</td>
<td>23.60</td>
<td>25.20</td>
<td>25.18</td>
<td>22.17</td>
<td>22.35</td>
</tr>
<tr>
<td>TARE</td>
<td>20.92</td>
<td>20.95</td>
<td>20.93</td>
<td>20.56</td>
<td>20.73</td>
</tr>
<tr>
<td>WATER</td>
<td>0.99</td>
<td>1.74</td>
<td>2.51</td>
<td>0.00</td>
<td>0.32</td>
</tr>
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</table>

**PLASTIC LIMIT**

<table>
<thead>
<tr>
<th># BLOWS</th>
<th>35</th>
<th>25</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>% MOIST</td>
<td>36.94%</td>
<td>40.94%</td>
<td>59.06%</td>
</tr>
</tbody>
</table>

**ONE POINT**

<table>
<thead>
<tr>
<th>LL</th>
<th>PL</th>
<th>PI</th>
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</thead>
<tbody>
<tr>
<td>38.5%</td>
<td>40.9%</td>
<td>56.0%</td>
</tr>
<tr>
<td>45%</td>
<td>19%</td>
<td>27%</td>
</tr>
</tbody>
</table>

**ATTERBERG LIMITS**

ASTM D4318

**USCS**

<table>
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<tr>
<th>PI</th>
<th>CH</th>
<th>CL</th>
<th>ML&amp;OL</th>
<th>MH&amp;OH</th>
</tr>
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</table>

**LL= W(N/25)^0.121**

---

**REVIEWED BY:** _______________________________  
**DATE:** _______________________________
**EXPANSION INDEX TEST**

ASTM D-4829 -11

<table>
<thead>
<tr>
<th></th>
<th>Initial</th>
<th>Saturated</th>
</tr>
</thead>
<tbody>
<tr>
<td>WET WEIGHT (g)</td>
<td>468.6</td>
<td>363.4</td>
</tr>
<tr>
<td>DRY WEIGHT (g)</td>
<td>396.2</td>
<td>275.0</td>
</tr>
<tr>
<td>% MOISTURE (%)</td>
<td>18.3%</td>
<td>32.2%</td>
</tr>
<tr>
<td>WEIGHT OF RING &amp; SOIL (g)</td>
<td>526.1</td>
<td>564.2</td>
</tr>
<tr>
<td>WEIGHT OF RING (g)</td>
<td>200.8</td>
<td>200.8</td>
</tr>
<tr>
<td>WEIGHT OF SOIL (g)</td>
<td>325.3</td>
<td>363.4</td>
</tr>
<tr>
<td>WEIGHT OF SOIL (lbs.)</td>
<td>0.7172</td>
<td>0.8011</td>
</tr>
<tr>
<td>VOLUME OF SOIL (cf)</td>
<td>0.00730</td>
<td>0.00756</td>
</tr>
<tr>
<td>WET DENSITY (pcf)</td>
<td>98.2</td>
<td>106.0</td>
</tr>
<tr>
<td>DRY DENSITY (pcf)</td>
<td>83.1</td>
<td>80.2</td>
</tr>
<tr>
<td>% SATURATION (%)</td>
<td>48.5%</td>
<td>78.9%</td>
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**EXPANSION READING**

<table>
<thead>
<tr>
<th>DATE</th>
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<th>FINAL READING</th>
<th>EXPANSION INDEX =</th>
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<tr>
<td></td>
<td>0.000</td>
<td>0.036</td>
<td>36</td>
</tr>
</tbody>
</table>

**EXPANSION INDEX =** 36

**NOTES:**
1. 2.67 SP. GR. = 1/2.7= 0.3704
2. % SATURATION MUST BE BETWEEN 48% AND 52%
## EXPANSION INDEX TEST

**ASTM D-4829 -11**

**Project Name:** Soscol Retail  
**Project Number:** 90-1715G  
**Sample Date:** 7/7/2020  
**Lab Number:** 5340  
**Sample ID:** B3 @ 10'

<table>
<thead>
<tr>
<th></th>
<th>Initial</th>
<th>Saturated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WET WEIGHT (g)</strong></td>
<td>476.1</td>
<td>380.9</td>
</tr>
<tr>
<td><strong>DRY WEIGHT (g)</strong></td>
<td>409.7</td>
<td>300.9</td>
</tr>
<tr>
<td><strong>% MOISTURE (%)</strong></td>
<td>16.2%</td>
<td>26.6%</td>
</tr>
<tr>
<td><strong>WEIGHT OF RING &amp; SOIL (g)</strong></td>
<td>550.5</td>
<td>581.7</td>
</tr>
<tr>
<td><strong>WEIGHT OF RING (g)</strong></td>
<td>200.8</td>
<td>200.8</td>
</tr>
<tr>
<td><strong>WEIGHT OF SOIL (g)</strong></td>
<td>349.7</td>
<td>380.9</td>
</tr>
<tr>
<td><strong>WEIGHT OF SOIL (lbs.)</strong></td>
<td>0.7709</td>
<td>0.8397</td>
</tr>
<tr>
<td><strong>VOLUME OF SOIL (cf)</strong></td>
<td>0.00730</td>
<td>0.00744</td>
</tr>
<tr>
<td><strong>WET DENSITY (pcf)</strong></td>
<td>105.6</td>
<td>112.9</td>
</tr>
<tr>
<td><strong>DRY DENSITY (pcf)</strong></td>
<td>90.9</td>
<td>89.2</td>
</tr>
<tr>
<td><strong>% SATURATION (%)</strong></td>
<td>51.9%</td>
<td>80.8%</td>
</tr>
</tbody>
</table>

### EXPANSION READING

<table>
<thead>
<tr>
<th>DATE</th>
<th>TIME:</th>
<th>INITIAL READING</th>
<th>FINAL READING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>0.000</td>
<td>0.019</td>
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</table>

**EXPANSION INDEX = 19**

**EXPANSION INDEX TEST**  
**ASTM D-4829 -11**  
**Soscol Retail**  
**Project Number:** 90-1715G  
**Sample Date:** 7/7/2020  
**Sample ID:** B3 @ 10'

### NOTES:

1. - 2.67 SP. GR. = 1/2.7 = 0.3704  
2. - % SATURATION MUST BE BETWEEN 48% AND 52%
## REPORT OF RESISTANCE 'R' VALUE-EXPANSION PRESSURE

**Job Name:** Soscol Retail  
**Job No.:** 90-1715G  
**Lab No.:** 5340  
**Sample No.:** B4 @ 1-3'  
**Date:** 7/7/2020  
**Submitted By:** AK  
**Tested/Calc. By:** AO/KK  
**Type of Material:** Silty Clay with Gravel

### Test Procedure: ASTM D2844

<table>
<thead>
<tr>
<th>Specimen/ Mold No.</th>
<th>T</th>
<th>LL</th>
<th>ZZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compactor Air Pressure, - ft.lbs.</td>
<td>50</td>
<td>100</td>
<td>250</td>
</tr>
<tr>
<td>Initial Moisture, - %</td>
<td>9.4%</td>
<td>9.4%</td>
<td>9.4%</td>
</tr>
<tr>
<td>Sample Size - g</td>
<td>1200</td>
<td>1200</td>
<td>1200</td>
</tr>
<tr>
<td>Water Added, - ml</td>
<td>50</td>
<td>30</td>
<td>0</td>
</tr>
<tr>
<td>Moisture at Compaction, - %</td>
<td>13.6%</td>
<td>11.9%</td>
<td>9.4%</td>
</tr>
<tr>
<td>Wt. Of Briquette and Mold, - g</td>
<td>3146.7</td>
<td>3272.5</td>
<td>3264.3</td>
</tr>
<tr>
<td>Wt. Of Mold, - g</td>
<td>2075.2</td>
<td>2166</td>
<td>2081.2</td>
</tr>
<tr>
<td>Wt. Of Briquette, - g</td>
<td>1071.5</td>
<td>1106.5</td>
<td>1183.1</td>
</tr>
<tr>
<td>Height of Briquette, - in</td>
<td>2.46</td>
<td>2.56</td>
<td>2.55</td>
</tr>
<tr>
<td>Dry Density, - pcf</td>
<td>116.1</td>
<td>117.0</td>
<td>128.4</td>
</tr>
<tr>
<td>Stabilometer Ph @ 2000 lbs</td>
<td>126</td>
<td>107</td>
<td>40</td>
</tr>
<tr>
<td>Displacement</td>
<td>6.25</td>
<td>5.30</td>
<td>4.24</td>
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<tr>
<td>R' Value</td>
<td>9</td>
<td>18</td>
<td>63</td>
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<tr>
<td>Corrected 'R' Value</td>
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<td>18</td>
<td>63</td>
</tr>
<tr>
<td>Exudation Pressure, - psi</td>
<td>141</td>
<td>342</td>
<td>682</td>
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<tr>
<td>Exudation Pressure, - lbs</td>
<td>1760</td>
<td>4270</td>
<td>8521</td>
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<tr>
<td>Stabilometer Thickness - ft</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Expansion - in</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Expansion Pressure - Pascals</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Expansion Press, Thick-ft</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### R-value

| TI | R-value | N/A |

### Diagrams

- **R VALUE @ 300 LBS/IN2**
- **EXUDATION PRESSURE, LBS/IN2**
- **COVER THICKNESS BY EXPANSION PRESSURE-FEET**

**Cover Thickness by Expansion Pressure-Feet**

- **Expansion From Graph:** N/A
APPENDIX D

STANDARD SPECIFICATIONS FOR GRADING
Section 1 - General

CTE, Cal, Inc. (CTE) presents the following standard recommendations for grading and other associated operations on construction projects. These guidelines should be considered a portion of the project specifications. Recommendations contained in the body of the previously presented soils report shall supersede the recommendations and/or requirements as specified herein. The project geotechnical consultant shall interpret disputes arising out of interpretation of the recommendations contained in the soils report or specifications contained herein.

Section 2 - Responsibilities of Project Personnel

The geotechnical consultant should provide observation and testing services sufficient to general conformance with project specifications and standard grading practices. The geotechnical consultant should report any deviations to the client or his authorized representative.

The Client should be chiefly responsible for all aspects of the project. He or his authorized representative has the responsibility of reviewing the findings and recommendations of the geotechnical consultant. He shall authorize or cause to have authorized the Contractor and/or other consultants to perform work and/or provide services. During grading the Client or his authorized representative should remain on-site or should remain reasonably accessible to all concerned parties in order to make decisions necessary to maintain the flow of the project.

The Contractor is responsible for the safety of the project and satisfactory completion of all grading and other associated operations on construction projects, including, but not limited to, earth work in accordance with the project plans, specifications and controlling agency requirements.

Section 3 - Preconstruction Meeting

A preconstruction site meeting should be arranged by the owner and/or client and should include the grading contractor, design engineer, geotechnical consultant, owner’s representative and representatives of the appropriate governing authorities.

Section 4 - Site Preparation

The client or contractor should obtain the required approvals from the controlling authorities for the project prior, during and/or after demolition, site preparation and removals, etc. The appropriate approvals should be obtained prior to proceeding with grading operations.
Clearing and grubbing should consist of the removal of vegetation such as brush, grass, woods, stumps, trees, root of trees and otherwise deleterious natural materials from the areas to be graded. Clearing and grubbing should extend to the outside of all proposed excavation and fill areas.

Demolition should include removal of buildings, structures, foundations, reservoirs, utilities (including underground pipelines, septic tanks, leach fields, seepage pits, cisterns, mining shafts, tunnels, etc.) and other man-made surface and subsurface improvements from the areas to be graded. Demolition of utilities should include proper capping and/or rerouting pipelines at the project perimeter and cutoff and capping of wells in accordance with the requirements of the governing authorities and the recommendations of the geotechnical consultant at the time of demolition.

Trees, plants or man-made improvements not planned to be removed or demolished should be protected by the contractor from damage or injury.

Debris generated during clearing, grubbing and/or demolition operations should be wasted from areas to be graded and disposed off-site. Clearing, grubbing and demolition operations should be performed under the observation of the geotechnical consultant.

Section 5 - Site Protection

Protection of the site during the period of grading should be the responsibility of the contractor. Unless other provisions are made in writing and agreed upon among the concerned parties, completion of a portion of the project should not be considered to preclude that portion or adjacent areas from the requirements for site protection until such time as the entire project is complete as identified by the geotechnical consultant, the client and the regulating agencies.

Precautions should be taken during the performance of site clearing, excavations and grading to protect the work site from flooding, ponding or inundation by poor or improper surface drainage. Temporary provisions should be made during the rainy season to adequately direct surface drainage away from and off the work site. Where low areas cannot be avoided, pumps should be kept on hand to continually remove water during periods of rainfall.

Rain related damage should be considered to include, but may not be limited to, erosion, silting, saturation, swelling, structural distress and other adverse conditions as determined by the geotechnical consultant. Soil adversely affected should be classified as unsuitable materials and should be subject to overexcavation and replacement with compacted fill or other remedial grading as recommended by the geotechnical consultant.
The contractor should be responsible for the stability of all temporary excavations. Recommendations by the geotechnical consultant pertaining to temporary excavations (e.g., backcuts) are made in consideration of stability of the completed project and, therefore, should not be considered to preclude the responsibilities of the contractor. Recommendations by the geotechnical consultant should not be considered to preclude requirements that are more restrictive by the regulating agencies. The contractor should provide during periods of extensive rainfall plastic sheeting to prevent unprotected slopes from becoming saturated and unstable. When deemed appropriate by the geotechnical consultant or governing agencies the contractor shall install checkdams, desilting basins, sand bags or other drainage control measures.

In relatively level areas and/or slope areas, where saturated soil and/or erosion gullies exist to depths of greater than 1.0 foot; they should be overexcavated and replaced as compacted fill in accordance with the applicable specifications. Where affected materials exist to depths of 1.0 foot or less below proposed finished grade, remedial grading by moisture conditioning in-place, followed by thorough recompaction in accordance with the applicable grading guidelines herein may be attempted. If the desired results are not achieved, all affected materials should be overexcavated and replaced as compacted fill in accordance with the slope repair recommendations herein. If field conditions dictate, the geotechnical consultant may recommend other slope repair procedures.

Section 6 - Excavations

6.1 Unsuitable Materials
Materials that are unsuitable should be excavated under observation and recommendations of the geotechnical consultant. Unsuitable materials include, but may not be limited to, dry, loose, soft, wet, organic compressible natural soils and fractured, weathered, soft bedrock and nonengineered or otherwise deleterious fill materials.

Material identified by the geotechnical consultant as unsatisfactory due to its moisture conditions should be overexcavated; moisture conditioned as needed, to a uniform at or above optimum moisture condition before placement as compacted fill.

If during the course of grading adverse geotechnical conditions are exposed which were not anticipated in the preliminary soil report as determined by the geotechnical consultant additional exploration, analysis, and treatment of these problems may be recommended.
6.2 Cut Slopes
Unless otherwise recommended by the geotechnical consultant and approved by the regulating agencies, permanent cut slopes should not be steeper than 2:1 (horizontal: vertical).

The geotechnical consultant should observe cut slope excavation and if these excavations expose loose cohesionless, significantly fractured or otherwise unsuitable material, the materials should be overexcavated and replaced with a compacted stabilization fill. If encountered specific cross section details should be obtained from the Geotechnical Consultant.

When extensive cut slopes are excavated or these cut slopes are made in the direction of the prevailing drainage, a non-erodible diversion swale (brow ditch) should be provided at the top of the slope.

6.3 Pad Areas
All lot pad areas, including side yard terrace containing both cut and fill materials, transitions, located less than 3 feet deep should be overexcavated to a depth of 3 feet and replaced with a uniform compacted fill blanket of 3 feet. Actual depth of overexcavation may vary and should be delineated by the geotechnical consultant during grading, especially where deep or drastic transitions are present.

For pad areas created above cut or natural slopes, positive drainage should be established away from the top-of-slope. This may be accomplished utilizing a berm drainage swale and/or an appropriate pad gradient. A gradient in soil areas away from the top-of-slopes of 2 percent or greater is recommended.

Section 7 - Compacted Fill
All fill materials should have fill quality, placement, conditioning and compaction as specified below or as approved by the geotechnical consultant.

7.1 Fill Material Quality
Excavated on-site or import materials which are acceptable to the geotechnical consultant may be utilized as compacted fill, provided trash, vegetation and other deleterious materials are removed prior to placement. All import materials anticipated for use on-site should be sampled tested and approved prior to and placement is in conformance with the requirements outlined.
Rocks 12 inches in maximum and smaller may be utilized within compacted fill provided sufficient fill material is placed and thoroughly compacted over and around all rock to effectively fill rock voids. The amount of rock should not exceed 40 percent by dry weight passing the 3/4-inch sieve. The geotechnical consultant may vary those requirements as field conditions dictate.

Where rocks greater than 12 inches but less than four feet of maximum dimension are generated during grading, or otherwise desired to be placed within an engineered fill, special handling in accordance with the recommendations below. Rocks greater than four feet should be broken down or disposed off-site.

7.2 Placement of Fill
Prior to placement of fill material, the geotechnical consultant should observe and approve the area to receive fill. After observation and approval, the exposed ground surface should be scarified to a depth of 6 to 8 inches. The scarified material should be conditioned (i.e. moisture added or air dried by continued discing) to achieve a moisture content at or slightly above optimum moisture conditions and compacted to a minimum of 90 percent of the maximum density or as otherwise recommended in the soils report or by appropriate government agencies.

Compacted fill should then be placed in thin horizontal lifts not exceeding eight inches in loose thickness prior to compaction. Each lift should be moisture conditioned as needed, thoroughly blended to achieve a consistent moisture content at or slightly above optimum and thoroughly compacted by mechanical methods to a minimum of 90 percent of laboratory maximum dry density. Each lift should be treated in a like manner until the desired finished grades are achieved.

The contractor should have suitable and sufficient mechanical compaction equipment and watering apparatus on the job site to handle the amount of fill being placed in consideration of moisture retention properties of the materials and weather conditions.

When placing fill in horizontal lifts adjacent to areas sloping steeper than 5:1 (horizontal: vertical), horizontal keys and vertical benches should be excavated into the adjacent slope area. Keying and benching should be sufficient to provide at least six-foot wide benches and a minimum of four feet of vertical bench height within the firm natural ground, firm bedrock or engineered compacted fill. No compacted fill should be placed in an area after keying and benching until the geotechnical consultant has reviewed the area. Material generated by the benching operation should be moved sufficiently away from
the bench area to allow for the recommended review of the horizontal bench prior to placement of fill.

Within a single fill area where grading procedures dictate two or more separate fills, temporary slopes (false slopes) may be created. When placing fill adjacent to a false slope, benching should be conducted in the same manner as above described. At least a 3-foot vertical bench should be established within the firm core of adjacent approved compacted fill prior to placement of additional fill. Benching should proceed in at least 3-foot vertical increments until the desired finished grades are achieved.

Prior to placement of additional compacted fill following an overnight or other grading delay, the exposed surface or previously compacted fill should be processed by scarification, moisture conditioning as needed to at or slightly above optimum moisture content, thoroughly blended and recompressed to a minimum of 90 percent of laboratory maximum dry density. Where unsuitable materials exist to depths of greater than one foot, the unsuitable materials should be over-excavated.

Following a period of flooding, rainfall or overwatering by other means, no additional fill should be placed until damage assessments have been made and remedial grading performed as described herein.

Rocks 12 inch in maximum dimension and smaller may be utilized in the compacted fill provided the fill is placed and thoroughly compacted over and around all rock. No oversize material should be used within 3 feet of finished pad grade and within 1 foot of other compacted fill areas. Rocks 12 inches up to four feet maximum dimension should be placed below the upper 10 feet of any fill and should not be closer than 15 feet to any slope face. These recommendations could vary as locations of improvements dictate. Where practical, oversized material should not be placed below areas where structures or deep utilities are proposed. Oversized material should be placed in windrows on a clean, overexcavated or unyielding compacted fill or firm natural ground surface. Select native or imported granular soil (S.E. 30 or higher) should be placed and thoroughly flooded over and around all windrowed rock, such that voids are filled. Windrows of oversized material should be staggered so those successive strata of oversized material are not in the same vertical plane.

It may be possible to dispose of individual larger rock as field conditions dictate and as recommended by the geotechnical consultant at the time of placement.
The contractor should assist the geotechnical consultant and/or his representative by digging test pits for removal determinations and/or for testing compacted fill. The contractor should provide this work at no additional cost to the owner or contractor's client.

Fill should be tested by the geotechnical consultant for compliance with the recommended relative compaction and moisture conditions. Field density testing should conform to ASTM Method of Test D 1556-00, D 2922-04. Tests should be conducted at a minimum of approximately two vertical feet or approximately 1,000 to 2,000 cubic yards of fill placed. Actual test intervals may vary as field conditions dictate. Fill found not to be in conformance with the grading recommendations should be removed or otherwise handled as recommended by the geotechnical consultant.

7.3 Fill Slopes
Unless otherwise recommended by the geotechnical consultant and approved by the regulating agencies, permanent fill slopes should not be steeper than 2:1 (horizontal: vertical).

Except as specifically recommended in these grading guidelines compacted fill slopes should be over-built two to five feet and cut back to grade, exposing the firm, compacted fill inner core. The actual amount of overbuilding may vary as field conditions dictate. If the desired results are not achieved, the existing slopes should be overexcavated and reconstructed under the guidelines of the geotechnical consultant. The degree of overbuilding shall be increased until the desired compacted slope surface condition is achieved. Care should be taken by the contractor to provide thorough mechanical compaction to the outer edge of the overbuilt slope surface.

At the discretion of the geotechnical consultant, slope face compaction may be attempted by conventional construction procedures including backrolling. The procedure must create a firmly compacted material throughout the entire depth of the slope face to the surface of the previously compacted firm fill intercore.

During grading operations, care should be taken to extend compactive effort to the outer edge of the slope. Each lift should extend horizontally to the desired finished slope surface or more as needed to ultimately established desired grades. Grade during construction should not be allowed to roll off at the edge of the slope. It may be helpful to elevate slightly the outer edge of the slope. Slough resulting from the placement of individual lifts should not be allowed to drift down over previous lifts. At intervals not
exceeding four feet in vertical slope height or the capability of available equipment, whichever is less, fill slopes should be thoroughly dozer trackrolled.

For pad areas above fill slopes, positive drainage should be established away from the top-of-slope. This may be accomplished using a berm and pad gradient of at least two percent.

Section 8 - Trench Backfill

Utility and/or other excavation of trench backfill should, unless otherwise recommended, be compacted by mechanical means. Unless otherwise recommended, the degree of compaction should be a minimum of 90 percent of the laboratory maximum density.

Within slab areas, but outside the influence of foundations, trenches up to one foot wide and two feet deep may be backfilled with sand and consolidated by jetting, flooding or by mechanical means. If on-site materials are utilized, they should be wheel-rolled, tamped or otherwise compacted to a firm condition. For minor interior trenches, density testing may be deleted or spot testing may be elected if deemed necessary, based on review of backfill operations during construction.

If utility contractors indicate that it is undesirable to use compaction equipment in close proximity to a buried conduit, the contractor may elect the utilization of light weight mechanical compaction equipment and/or shading of the conduit with clean, granular material, which should be thoroughly jetted in-place above the conduit, prior to initiating mechanical compaction procedures. Other methods of utility trench compaction may also be appropriate, upon review of the geotechnical consultant at the time of construction.

In cases where clean granular materials are proposed for use in lieu of native materials or where flooding or jetting is proposed, the procedures should be considered subject to review by the geotechnical consultant. Clean granular backfill and/or bedding are not recommended in slope areas.

Section 9 - Drainage

Where deemed appropriate by the geotechnical consultant, canyon subdrain systems should be installed in accordance with CTE’s recommendations during grading.

Typical subdrains for compacted fill buttresses, slope stabilization or sidehill masses, should be installed in accordance with the specifications.
Roof, pad and slope drainage should be directed away from slopes and areas of structures to suitable disposal areas via non-erodible devices (i.e., gutters, downspouts, and concrete swales).

For drainage in extensively landscaped areas near structures, (i.e., within four feet) a minimum of 5 percent gradient away from the structure should be maintained. Pad drainage of at least 2 percent should be maintained over the remainder of the site.

Drainage patterns established at the time of fine grading should be maintained throughout the life of the project. Property owners should be made aware that altering drainage patterns could be detrimental to slope stability and foundation performance.

**Section 10 - Slope Maintenance**

10.1 - Landscape Plants  
To enhance surficial slope stability, slope planting should be accomplished at the completion of grading. Slope planting should consist of deep-rooting vegetation requiring little watering. Plants native to the southern California area and plants relative to native plants are generally desirable. Plants native to other semi-arid and arid areas may also be appropriate. A Landscape Architect should be the best party to consult regarding actual types of plants and planting configuration.

10.2 - Irrigation  
Irrigation pipes should be anchored to slope faces, not placed in trenches excavated into slope faces.

Slope irrigation should be minimized. If automatic timing devices are utilized on irrigation systems, provisions should be made for interrupting normal irrigation during periods of rainfall.

10.3 - Repair  
As a precautionary measure, plastic sheeting should be readily available, or kept on hand, to protect all slope areas from saturation by periods of heavy or prolonged rainfall. This measure is strongly recommended, beginning with the period prior to landscape planting.

If slope failures occur, the geotechnical consultant should be contacted for a field review of site conditions and development of recommendations for evaluation and repair.

If slope failures occur as a result of exposure to period of heavy rainfall, the failure areas and currently unaffected areas should be covered with plastic sheeting to protect against additional saturation.
In the accompanying Standard Details, appropriate repair procedures are illustrated for superficial slope failures (i.e., occurring typically within the outer one foot to three feet of a slope face).
WHERE NATURAL SLOPE GRADIENT IS 5:1 OR LESS, BENCHING IS NOT NECESSARY. FILL IS NOT TO BE PLACED ON COMPRESSIBLE OR UNSUITABLE MATERIAL.

NOT TO SCALE
REMOVE ALL TOPSOIL, COLLUVIUM, AND CREEP MATERIAL FROM TRANSITION

CUT/FILL CONTACT SHOWN ON GRADING PLAN

CUT/FILL CONTACT SHOWN ON "AS-BUILT"

NATURAL TOPOGRAPHY

CUT SLOPE*

TOPSOIL, COLLUVIUM AND CREEP REMOVE

FILL

BEDROCK OR APPROVED FOUNDATION MATERIAL

4' TYPICAL

10' TYPICAL

15' MINIMUM

2% MIN

*NOTE: CUT SLOPE PORTION SHOULD BE MADE PRIOR TO PLACEMENT OF FILL

FILL SLOPE ABOVE CUT SLOPE DETAIL

NOT TO SCALE
**TYPICAL CANYON SUBDRAIN DETAIL**

**FILTER MATERIAL TO MEET FOLLOWING**
**SPECIFICATION OR APPROVED EQUAL:**

<table>
<thead>
<tr>
<th>SIEVE SIZE</th>
<th>PERCENTAGE PASSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot;</td>
<td>100</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>90-100</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>40-100</td>
</tr>
<tr>
<td>NO. 4</td>
<td>25-40</td>
</tr>
<tr>
<td>NO. 30</td>
<td>18-33</td>
</tr>
<tr>
<td>NO. 8</td>
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<td>0-7</td>
</tr>
<tr>
<td>NO. 200</td>
<td>0-3</td>
</tr>
</tbody>
</table>

**APPROVED PIPE TO BE SCHEDULE 40**
**POLY-VINYL-CHLORIDE (P.V.C.) OR**
**APPROVED EQUAL. MINIMUM CRUSH**
**STRENGTH 1000 psi**

**PIPE DIAMETER TO MEET THE**
**FOLLOWING CRITERIA, SUBJECT TO**
**FIELD REVIEW BASED ON ACTUAL**
**GEOTECHNICAL CONDITIONS**
**ENCOUNTERED DURING GRADING**

<table>
<thead>
<tr>
<th>LENGTH OF RUN</th>
<th>PIPE DIAMETER</th>
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</thead>
<tbody>
<tr>
<td>INITIAL 500'</td>
<td>4&quot;</td>
</tr>
<tr>
<td>500' TO 1500'</td>
<td>6&quot;</td>
</tr>
<tr>
<td>&gt; 1500'</td>
<td>8&quot;</td>
</tr>
</tbody>
</table>

**NOT TO SCALE**
CANYON SUBDRAIN DETAILS

SURFACE OF COMPETENT MATERIAL

COMPACTED FILL

REMOVE UNSUITABLE MATERIAL

INCLINE TOWARD DRAIN AT 2% GRADIENT MINIMUM

TYPICAL BENCHING

SEE DETAILS BELOW

TRENCH DETAILS

6" MINIMUM OVERLAP

MINIMUM 9 FT³ PER LINEAR FOOT OF APPROVED DRAIN MATERIAL

MIRAFI 140N FABRIC OR APPROVED EQUAL

MINIMUM 9 FT³ PER LINEAR FOOT OF APPROVED DRAIN MATERIAL

MIRAFI 140N FABRIC OR APPROVED EQUAL

APPROVED PIPE TO BE SCHEDULE 40 POLYVINYLCHLORIDE (P.V.C.) OR APPROVED EQUAL. MINIMUM CRUSH STRENGTH 1000 PSI.

OPTIONAL V-DITCH DETAIL

6" MINIMUM OVERLAP

24" MINIMUM

MINIMUM 9 FT³ PER LINEAR FOOT OF APPROVED DRAIN MATERIAL

60° TO 90°

DRAIN MATERIAL TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUAL:

<table>
<thead>
<tr>
<th>SIEVE SIZE</th>
<th>PERCENTAGE PASSING</th>
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</thead>
<tbody>
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<td>1 ½&quot;</td>
<td>88-100</td>
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<tr>
<td>1&quot;</td>
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</tr>
<tr>
<td>¾&quot;</td>
<td>0-17</td>
</tr>
<tr>
<td>⅞&quot;</td>
<td>0-7</td>
</tr>
<tr>
<td>NO. 200</td>
<td>0-3</td>
</tr>
</tbody>
</table>

PIPE DIAMETER TO MEET THE FOLLOWING CRITERIA, SUBJECT TO FIELD REVIEW BASED ON ACTUAL GEOTECHNICAL CONDITIONS ENCOUNTERED DURING GRADING:

LENGTH OF RUN | PIPE DIAMETER
---------------|----------------
INITIAL 500'   | 4"
500' TO 1500'  | 6"
> 1500'        | 8"

NOT TO SCALE

GEOFABRIC SUBDRAIN

STANDARD SPECIFICATIONS FOR GRADING
Page 15 of 26
SUBDRAIN OUTLET PIPE (MINIMUM 4" DIAMETER)

ALL BACKFILL SHOULD BE COMPACTED IN CONFORMANCE WITH PROJECT SPECIFICATIONS. COMPACTION EFFORT SHOULD NOT DAMAGE STRUCTURE

CONCRETE HEADWALL

NOTE: HEADWALL SHOULD OUTLET AT TOE OF SLOPE OR INTO CONTROLLED SURFACE DRAINAGE DEVICE. ALL DISCHARGE SHOULD BE CONTROLLED.

THIS DETAIL IS A MINIMUM DESIGN AND MAY BE MODIFIED DEPENDING UPON ENCOUNTERED CONDITIONS AND LOCAL REQUIREMENTS.

NOT TO SCALE
TYPICAL SLOPE STABILIZATION FILL DETAIL

STANDARD SPECIFICATIONS FOR GRADING
Page 18 of 26

AN ADDITIONAL BACKDRAIN AT MID-SLOPE WILL BE REQUIRED FOR SLOPE IN EXCESS OF 40 FEET HIGH.

KEY-DIMENSION PER SOILS ENGINEER (GENERALLY 1/2 SLOPE HEIGHT, 15’ MINIMUM)

DIMENSIONS ARE MINIMUM RECOMMENDED

NOT TO SCALE
4" DIAMETER PERFORATED PIPE BACKDRAIN

4" DIAMETER NON-PERFORATED PIPE LATERAL DRAIN

SLOPE PER PLAN

FILTER MATERIAL

15' MINIMUM

BENCHING

H/2

ADDITIONAL BACKDRAIN AT MID-SLOPE WILL BE REQUIRED FOR SLOPE IN EXCESS OF 40 FEET HIGH.

15'

2' MIN

2% MIN

KEY-DIMENSION PER SOILS ENGINEER

DIMENSIONS ARE MINIMUM RECOMMENDED

NOT TO SCALE

TYPICAL BUTTRESS FILL DETAIL

STANDARD SPECIFICATIONS FOR GRADING
Page 19 of 26
NOT TO SCALE

DLYTHLT SHEAR KEY DETAIL

STANDARD SPECIFICATIONS FOR GRADING
Page 20 of 26
Provide Backdrain, per Backdrain detail. An additional Backdrain at mid-slope will be required for back slopes in excess of 40 feet high. Locations of Backdrains and outlets per Soils Engineer and/or Engineering Geologist during grading. Minimum 2% flow gradient to discharge location.

Base width "W" determined by Soils Engineer.

Natural Ground

Proposed Grading

Compacted Fill

"W"

Not to Scale
**APPROVED PIPE TYPE:**  
SCHEDULE 40 POLYVINYL CHLORIDE (P.V.C.) OR APPROVED EQUAL. 
MINIMUM CRUSH STRENGTH 1000 PSI

*SIEVE SIZE*  |  *PERCENTAGE PASSING*  
---|---  
1"*  |  100  
\(\frac{3}{4}\)"  |  90-100  
\(\frac{1}{2}\)"  |  40-100  
NO. 4  |  25-40  
NO. 30  |  5-15  
NO. 50  |  0-7  
NO. 200  |  0-3

**NOT TO SCALE**

**TYPICAL BACKDRAIN DETAIL**

**STANDARD SPECIFICATIONS FOR GRADING**

Page 22 of 26
FINISH SURFACE SLOPE

MINIMUM 3 FT³ PER LINEAR FOOT OPEN GRADED AGGREGATE*

TAPE AND SEAL AT COVER

CONCRETE COLLAR PLACED NEAT

COMPACTED FILL

MINIMUM 4" DIAMETER SOLID OUTLET PIPE SPACED PER SOIL ENGINEER REQUIREMENTS

2.0% MINIMUM GRADIENT

TYPICAL BENCHING

BENCH INCLINED TOWARD DRAIN

MIRAFI 140N FABRIC OR APPROVED EQUAL

4" MINIMUM APPROVED PERFORATED PIPE (PERFORATIONS DOWN) MINIMUM 2% GRADIENT TO OUTLET

DETAIL A-A

TEMPORARY FILL LEVEL

MINIMUM 12" COVER

COMPACTED BACKFILL

MINIMUM 4" DIAMETER APPROVED SOLID OUTLET PIPE

12"

MINIMUM

*NOTE: AGGREGATE TO MEET FOLLOWING SPECIFICATIONS OR APPROVED EQUAL:

<table>
<thead>
<tr>
<th>SIEVE SIZE</th>
<th>PERCENTAGE PASSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ½&quot;</td>
<td>100</td>
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<tr>
<td>1&quot;</td>
<td>5-40</td>
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<tr>
<td>¾&quot;</td>
<td>0-17</td>
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<tr>
<td>½&quot;</td>
<td>0-7</td>
</tr>
<tr>
<td>NO. 200</td>
<td>0-3</td>
</tr>
</tbody>
</table>

NOT TO SCALE

BACKDRAIN DETAIL (GEOFRABIC)

STANDARD SPECIFICATIONS FOR GRADING
Page 23 of 26
SOIL SHALL BE PUSHED OVER ROCKS AND FLOODED INTO VOIDS. COMPACT AROUND AND OVER EACH WINDROW.

STACK BOULDERS END TO END. DO NOT PILE UPON EACH OTHER.

FILL SLOPE

10' MIN

10' MIN

STAGGER ROWS

COMPETENT MATERIAL

NOT TO SCALE

ROCK DISPOSAL DETAIL
STANDARD SPECIFICATIONS FOR GRADING
Page 24 of 26
FINISHED GRADE

BUILDING

NO OVERSIZE, AREA FOR
FOUNDATION, UTILITIES,
AND SWIMMING POOLS

10'

WINDROW

SLOPE FACE

STREET

15'

5' MINIMUM OR BELOW
DEPTH OF DEEPEST
UTILITY TRENCH
(WHICHEVER GREATER)

TYPICAL WINDROW DETAIL (EDGE VIEW)

GRANULAR SOIL FLOODED
TO FILL VOIDS

HORIZONTALLY PLACED
COMPACION FILL

PROFILE VIEW

NOT TO SCALE

ROCK DISPOSAL DETAIL

STANDARD SPECIFICATIONS FOR GRADING
Page 25 of 26
APPENDIX E

US SEISMIC DESIGN VALUES
Hazards by Location

Search Information

Address: 333 Soscol Ave, Napa, CA 94559, USA
Coordinates: 38.2874, -122.27585
Elevation: 22 ft
Timestamp: 2020-07-10T16:13:32.765Z
Hazard Type: Seismic
Reference Document: ASCE7-16
Risk Category: III
Site Class: D

Basic Parameters

<table>
<thead>
<tr>
<th>Name</th>
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<th>Description</th>
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</thead>
<tbody>
<tr>
<td>S_S</td>
<td>1.932</td>
<td>MCE_R ground motion (period=0.2s)</td>
</tr>
<tr>
<td>S_1</td>
<td>0.676</td>
<td>MCE_R ground motion (period=1.0s)</td>
</tr>
<tr>
<td>S_MS</td>
<td>1.932</td>
<td>Site-modified spectral acceleration value</td>
</tr>
<tr>
<td>S_M1</td>
<td>* null</td>
<td>Site-modified spectral acceleration value</td>
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<tr>
<td>S_DS</td>
<td>1.288</td>
<td>Numeric seismic design value at 0.2s SA</td>
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<tr>
<td>S_D1</td>
<td>* null</td>
<td>Numeric seismic design value at 1.0s SA</td>
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* See Section 11.4.8

Additional Information

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<tr>
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<td>Seismic design category</td>
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<tr>
<td>F_a</td>
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<td>Site amplification factor at 0.2s</td>
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<tr>
<td>F_v</td>
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<td>Site amplification factor at 1.0s</td>
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<tr>
<td>CR_S</td>
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<td>Coefficient of risk (0.2s)</td>
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<tr>
<td>CR_1</td>
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<td>Coefficient of risk (1.0s)</td>
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<tr>
<td>PGA</td>
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<td>MCE_G peak ground acceleration</td>
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<tr>
<td>F_PGA</td>
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<td>Site amplification factor at PGA</td>
</tr>
<tr>
<td>PGA_M</td>
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<td>Site modified peak ground acceleration</td>
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https://hazards.atcouncil.org/#/seismic?lat=38.2874&lng=-122.27585&address=333 Soscol Ave%2C Napa%2C CA 94559%2C USA
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td>$T_L$</td>
<td>8</td>
<td>Long-period transition period (s)</td>
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<tr>
<td>SsRT</td>
<td>2.066</td>
<td>Probabilistic risk-targeted ground motion (0.2s)</td>
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<tr>
<td>SsUH</td>
<td>2.261</td>
<td>Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)</td>
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<td>SsD</td>
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<td>PGAd</td>
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<td>Factored deterministic acceleration value (PGA)</td>
</tr>
</tbody>
</table>

* See Section 11.4.8

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

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APPENDIX F

SEISMIC SETTLEMENT
LIQUEFACTION ANALYSIS
Soscol Retail - Code Based

Hole No.=B-3 Water Depth=12.5 ft Surface Elev.=EGS

Magnitude=6.7
Acceleration=0.878g

Asphalt Concrete
Medium Dense Clayey Gravel (GC)
Medium Dense Silty Gravel (GM)
Stiff Plastic Clay (CH)
Stiff Gravelly Clay (CL)
Soft Plastic Clay (CH)
Loose Clayey Gravel (GC)
Stiff Lean Clay (CL)
Medium Dense Silty Sand (SM)
Very Stiff Lean Clay (CL)

Shaded Zone has Liquefaction Potential

Soil Description

<table>
<thead>
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<th>Unit Weight</th>
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<th>Shear Stress Ratio</th>
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Factor of Safety

Saturated
Unsaturated

Settlement

S = 2.63 in.

fs1=1.30

CivilTech Corporation
90-1715G Plate A-1