GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED WILDAVEN YOSEMITE PROJECT
4808 CA-140
MARIPOSA, CALIFORNIA

KA PROJECT NO. 012-21100
MAY 21, 2021

Prepared For:

MR. BRIAN LAWRENCE
WILDAVEN
% ENVIRONMENTAL SCIENCE ASSOCIATES
550 KEARNY STREET, SUITE 800
SAN FRANCISCO, CALIFORNIA 94108

ATTENTION: MS. MARY LAX

Prepared By:

KRAZAN & ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING DIVISION
215 W. DAKOTA AVENUE
CLOVIS, CALIFORNIA 93612
(559) 348-2200
May 21, 2021

Mr. Brian Lawrence
Wildhaven
c/o Environmental Science Associates
550 Kearny Street, Suite 800
San Francisco, California 94108
Attention: Ms. Mary Laux

RE: Geotechnical Engineering Investigation
Proposed Wildhaven Yosemite Project
4808 CA-140
Mariposa, California

Dear Ms. Laux:

In accordance with your request, we have completed a Geotechnical Engineering Investigation for the above-referenced site. The results of our investigation are presented in the attached report.

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (559) 348-2200.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

George P. Hattrup
Senior Geotechnical Engineer
RCE No. 43979/RGE No. 2353

GPH:ht
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May 21, 2021

GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED WILDHAVEN YOSEMITE PROJECT
4808 CA-140
MARIPOSA, CALIFORNIA

INTRODUCTION

This report presents the results of our Geotechnical Engineering Investigation for the proposed Wildhaven Yosemite Project at 4808 CA-140 near Mariposa, California. Discussions regarding site conditions are presented herein, together with conclusions and recommendations pertaining to site preparation, Engineered Fill, utility trench backfill, drainage and landscaping, foundations, concrete floor slabs and exterior flatwork, retaining walls, pavement design and soil cement reactivity.

A site plan showing the approximate boring locations is presented following the text of this report. A description of the field investigation, boring logs, and the boring log legend are presented in Appendix A. Appendix A also contains a description of the laboratory testing phase of this study; along with the laboratory test results. Appendices B and C contain guides to earthwork and pavement specifications. When conflicts in the text of the report occur with the general specifications in the appendices, the recommendations in the text of the report have precedence.

PURPOSE AND SCOPE

This investigation was conducted to evaluate the soil and groundwater conditions at the site, to make geotechnical engineering recommendations for use in design of specific construction elements, and to provide criteria for site preparation and Engineered Fill construction.

Our scope of services was outlined in our revised proposal dated April 1, 2021 (KA Proposal No. P223-21) and included the following:

- A site reconnaissance by a member of our engineering staff to evaluate the surface conditions at the project site.
- A field investigation consisting of drilling 7 borings to depths ranging from 7 to 16 feet and performing 3 percolation tests at depths of 4 to 5 feet to evaluate the subsurface conditions at the project site.
- Performing laboratory tests on representative soil samples obtained from the borings to evaluate the physical and index properties of the subsurface soils.
• Evaluation of the data obtained from the investigation and an engineering analysis to provide recommendations for use in the project design and preparation of construction specifications.

• Preparation of this report summarizing the results, conclusions, recommendations, and findings of our investigation.

PROPOSED CONSTRUCTION

Based on the information that was provided, which included a project description and a conceptual site plan, it is understood the planned development will be constructed on a 36.3-acre parcel, which will include the following improvements:

• A communal bathhouse consisting of an approximately 20’ by 60’ rustic post & beam structure that will house men’s and women’s bathrooms and be located in the area of the existing horse barn. Each bathroom will have approximately 10 shower stalls and 8 toilets. It is anticipated that the bathhouse will have a concrete slab-on grade floor and shallow foundations.

• An onsite wastewater disposal system associated with the communal bathhouse, which is expected to consist of a septic tank and leach field that will be sized to meet the requirements of both Phase 1 and Phase 2 improvements (e.g. 250 people).

• Miscellaneous underground utilities and minor roadway improvements.

Although the terrain is gently to moderately sloping at the project site, it is anticipated that minor grading will be performed to achieve the finished subgrade elevation in the area of the planned improvements.

In the event that these structural or grading details are inconsistent with the final design criteria, the Krazan & Associates should be notified so that we may update this writing as applicable.

SITE LOCATION AND SITE DESCRIPTION

The project site is located along the south side of Highway 140, approximately one mile south of Mariposa, in Mariposa County, California. The site lies within a rural area that is partially developed with a covered animal shelter, corrals, a manager’s residence, a ropes course, ziplines, and both paved and unpaved roadways, which are part of the “Yosemite Zip Lines and Adventure Ranch”. The ground surface is covered with a light to heavy growth of native grass, some brush, and varying amounts of trees as indicated by the pictures provided below. The project site lies in an area with gently to moderately sloping terrain with ground surface elevations ranging from less than 2,200 to approximately 2,300 feet in the northeastern and southern parts of the site, respectively.
Photo 1: Covered Animal Shelter, looking north.

Photo 2: View of Ropes Course and Property to the North.
GEOLOGIC SETTING

The subject site lies on the western flank and within the central part of the Sierra Nevada Geomorphic Province of California. The Sierra Nevada is a great block composed of primarily plutonic igneous and metamorphic rock of Paleozoic and Mesozoic Age. It is 50 to 80 miles wide and runs northwest through eastern California for approximately 400 miles from the Mojave Desert on the south to the Cascade Range and the Modoc Plateau on the north. It can be compared to a tilted plateau uplifted along a series of faults on its eastern margin and depressed along its western flank. It is overlapped on the west by sedimentary rock of the great valley, and on the north by volcanic sheets extending south from the Cascade Range. Most of the southern and northeastern sectors of the Sierras are underlain by Plutonic (chiefly granitic) rocks of Mesozoic Age, which comprise the Sierra Nevada Batholith. The Batholith is a great composite body made up of hundreds of individual plutons which have been intruded into strongly deformed Paleozoic and Mesozoic metasedimentary and metavolcanic rocks. In the northern Sierras, the Batholith is flanked to the west by the western metamorphic belt which extends continuously for about 200 miles in the northwest/southeast direction. In the southern Sierras, metamorphic rocks have been largely eroded leaving only scattered roof pendants engulfed by the granitic rocks. The Geologic Map of California, Mariposa Sheet, indicates the project site lies in an area underlain by Upper Jurassic marine sedimentary rock and Jurassic/Triassic metavolcanic rocks.
There are no active fault traces in the project vicinity. Accordingly, the project area is not within an Earthquake Fault Zone (Special Studies Zone). However, it is anticipated that the project site will be subject to some ground shaking during a design seismic event. The nearest active or potentially active earthquake fault zones to the project site are the Hartley Springs Fault (approximately 50 miles east-northeast), the Hilton Creek Fault (approximately 59 miles east), the San Joaquin Fault (approximately 62 miles southwest), the O’Neill Fault (approximately 63 miles southwest), the Ortigalita Fault (approximately 70 miles to the southwest), and the Owens Valley Fault (approximately 85 miles east-southeast). The San Andreas Fault is possibly the best-known fault and is located about 91 miles to the southwest.

Secondary hazards from earthquakes include rupture, seiche, landslides, liquefaction, and seismic settlement. Since there are no known faults within the immediate area, ground rupture from surface faulting should not be a potential problem. Seiche and landslides are not hazards in the area either. Taking into account the seismic setting and the relatively shallow depth to bedrock at the project site, the risk of liquefaction (sudden loss of shear strength in a saturated cohesionless soil) or seismic settlement occurring during a design seismic event is considered negligible.

FIELD AND LABORATORY INVESTIGATIONS

Subsurface soil conditions were explored by drilling 7 borings to depths ranging from 7 to 16 feet below existing site grade using a truck-mounted drill rig. At two of the boring locations (B2 and B3), drilling operations were terminated due to the presence of slightly weathered rock that resulted in practical drilling refusal. In addition to the borings, three percolation tests were performed to evaluate the absorption characteristics of the soils. The approximate boring and percolation test locations are shown on the site plan, Figure 1. During drilling operations, penetration tests were performed at regular intervals to evaluate the soil consistency and to obtain information regarding the engineering properties of the subsoils. Soil samples were retained for laboratory testing. The soils encountered were continuously examined and visually classified in accordance with the Unified Soil Classification System. A more detailed description of the field investigation is presented in Appendix A.

Laboratory tests were performed on selected soil samples to evaluate their physical characteristics and engineering properties. The laboratory testing program was formulated with emphasis on the evaluation of natural moisture, density, gradation, shear strength, consolidation potential, expansion potential, and Atterberg Limits of the materials encountered. In addition, chemical tests were performed to evaluate the soil cement reactivity. Details of the laboratory test program and results of the laboratory tests are summarized in Appendix A. This information, along with the field observations, was used to prepare the final boring logs in Appendix A.

SOIL PROFILE AND SUBSURFACE CONDITIONS

Based on our findings, the subsurface conditions encountered appear typical of those found in the geologic region of the site. Our borings indicate the near-surface soils consist primarily of firm to very stiff silty and sandy clay to depths ranging from less than one foot to approximately 14 feet. These soils appear to be derived from heavily to completely weathered-in-place claystone. Based on our
observations and laboratory testing, these soils are moderately strong and have a medium expansion potential. The penetration resistance ranged from 19 blows per foot to over 50 blows per 6 inches. The dry densities of relatively undisturbed samples of these soils ranged from approximately 97 to 118 pcf. A representative soil sample expanded approximately 0.6 percent under a 500 psf load when saturated, but had an overall consolidation of approximately 1.1 percent under a 2,000 psf load when saturated. In addition, another representative soil sample had an angle of internal friction of 20 degrees with a cohesion of approximately 500 psf. Our testing also indicated that the clayey soils have an Expansion Index of 49, a Liquid Limit of 28, and a Plasticity Index of 13, which are indicative of a moderate shrink/swell potential.

Below the surface layer described above, moderately to heavily weathered claystone was encountered in the test borings. This material appeared to have similar characteristics to a very hard silty or sandy clay to the maximum depth explored of 16 feet. Drilling was relatively difficult in the weathered rock and practical drilling refusal was experienced in two of our borings, as noted in the following table.

<table>
<thead>
<tr>
<th>Boring No.</th>
<th>Approximate Depth to Weathered Rock (feet)</th>
<th>Approximate Depth to Practical Drilling Refusal (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>8</td>
<td>&gt;15</td>
</tr>
<tr>
<td>B2</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>B3</td>
<td>&lt;1</td>
<td>9</td>
</tr>
<tr>
<td>B4</td>
<td>14</td>
<td>&gt;15</td>
</tr>
<tr>
<td>B5</td>
<td>13</td>
<td>&gt;15</td>
</tr>
<tr>
<td>B6</td>
<td>5</td>
<td>&gt;15</td>
</tr>
<tr>
<td>B7</td>
<td>5</td>
<td>&gt;15</td>
</tr>
</tbody>
</table>

Field and laboratory tests suggest that the weathered rock is very strong and slightly compressible. Penetration resistance ranged from 50 blows per 2 inches to 50 blows per 5 inches. The dry density of relatively undisturbed samples of this material ranged from approximately 101 to 113 pcf.

For additional information about the soils encountered in the test borings at the project site, please refer to the boring logs and laboratory test data in Appendix A.

**PERCOLATION TESTING**

Three percolation tests were performed within the site to evaluate the soils absorption characteristics. The percolation tests were performed inside test holes drilled near the exploratory test boring. The percolation tests were performed at depths 4 and 5 feet below the existing ground surface. The tests were conducted in general accordance with the criteria set in the “Manual of Septic Tank Practice” published by the Department of Health, Education, and Welfare. Results of the tests are as follows:
<table>
<thead>
<tr>
<th>Test No.</th>
<th>Depth (feet)</th>
<th>Percolation Rate (min/in)</th>
<th>Soil Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>4</td>
<td>171</td>
<td>Sandy Clay (CL)</td>
</tr>
<tr>
<td>P2</td>
<td>5</td>
<td>600</td>
<td>Silty Clay (CL)</td>
</tr>
<tr>
<td>P3</td>
<td>5</td>
<td>100</td>
<td>Sandy Clay (CL)</td>
</tr>
</tbody>
</table>

The test results indicate that the native soils at the project site have poor absorption characteristics. The test results do not include a factor of safety. The percolation rates given are based on 1 inch of fall within a 4½-inch diameter hole with a 12- to 18-inch head of water.

**GROUNDWATER**

Test boring locations were checked for the presence of groundwater during and immediately following the drilling operations. Free groundwater was not encountered within the maximum depth explored of 16 feet below the existing ground surface at the project site. It should be recognized that water table elevations may fluctuate with time, being dependent upon seasonal precipitation, irrigation, land use, and climatic conditions, as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered during the construction phase of the project. The evaluation of such factors is beyond the scope of this report.

**CONCLUSIONS AND RECOMMENDATIONS**

Based on the findings of our field and laboratory investigations, along with previous geotechnical experience in the project area, the following is a summary of our evaluations, conclusions, and recommendations.

**Administrative Summary**

In brief, the subject site and soil conditions, with the exception of the surface soils that have a variable density, moderate shrink/swell potential and poor absorption characteristics, appear to be conducive to the development of the project. Based on our field exploration, the upper 1 to 2 feet of surface soils at the site consist primarily of silty or sandy clay with a highly variable density and a medium Expansion Index. Surface improvements, especially concrete slabs-on-grade, may experience significant amounts of differential movement in response to the swelling of these soils if they become wet or the shrinkage of these soils if they dry out. In addition, due to the variable density of the near surface soils, intolerable amounts of total or differential settlement may occur under the building foundation loads. Accordingly, it is recommended that these surface soils be removed and replaced with lime-treated clayey soils or a non-expansive fill material within the area of planned building and concrete flatwork improvements.

Fill material was not apparent within our test borings. However, fill material may be encountered between or beyond the boring locations. If similar to the shallow onsite soils, it is anticipated the fill material would consist of silty or sandy clay that has a moderate shrink/swell potential. Verification of the extent of fill, if any, should be determined during site grading. It is recommended that fill material that has not been properly compacted and certified be excavated and stockpiled so that the native soils
can be properly prepared. These soils will not be suitable for reuse as non-expansive Engineered Fill, unless they are lime-treated. However, they should be suitable to reuse as General Engineered Fill, provided this material is cleansed of excessive organics and debris and moisture-conditioned to a minimum of 2 percent above optimum moisture content.

The site currently has building and other improvements, and may contain subsurface improvements, such as underground utility lines and foundations, within the areas of where new improvements are planned. Demolition activities should include the proper removal of any buried structures encountered, including underground utilities, irrigation lines, and/or septic systems within the area of the planned improvements. It is anticipated demolition activities will disturb the upper soils. Disturbed areas caused by demolition activities should be excavated to firm native ground and backfilled with Engineered Fill.

The near-surface on-site clayey soils have a moderate shrink/swell potential. To reduce potential soil movement related to shrink/swell of the clayey soils, it is recommended that slab-on-grade and exterior flatwork areas be supported by at least 1.5 feet of non-expansive Engineered Fill. The non-expansive fill material should be a well-graded silty sand or sandy silt soil. A clean sand or very sandy soil is not acceptable for this purpose. A clean sandy soil will allow the surface water to drain into the expansive soils below, which may result in soil swelling. The replacement soils and/or upper 1.5 feet of Imported Fill soils should meet the specifications as described under the subheading Engineered Fill. The replacement soils should extend at least 5 feet beyond building perimeters. The non-expansive replacement soils should be compacted to at least 90 percent of relative compaction based on ASTM Test Method D1557. The exposed native soils in the excavation should not be allowed to dry out and should be kept continually moist, prior to backfilling. In addition, it is recommended that slab-on-grade, continuous footings and slabs be reinforced to reduce cracking and vertical off-set.

As an alternative to the use of non-expansive soils, the upper 1.5 feet of soil supporting slab-on-grade and exterior flatwork areas can consist of lime-treated clayey soils. The lime-treated soils should be recompacted to a minimum of 90 percent of maximum density. Preliminary application rate of lime should be 5 percent by dry weight; however, additional sampling and testing should be done prior to construction to verify this. The lime material should be calcium oxide, commonly known as quick-lime. The clayey soils should be at least 2 percent above optimum moisture during the mixing operations.

After completion of the site preparation as recommended below, the site should be suitable for shallow footing support. The proposed structure footings may be design utilizing an allowable bearing pressure of 2,500 psf for dead-plus-live loads. Isolated spread or continuous footings should have a minimum embedment of 24 inches. An allowable modulus of subgrade reaction of 60 pci may be used to design structural concrete slabs-on-grade or mat foundations that are supported on at least 1.5 feet of non-expansive engineered fill or lime-treated clayey soils.

**Groundwater Influence on Structures/Construction**

Based on our findings and historical records, it is not anticipated that groundwater will rise within the zone of structural influence or affect the construction of foundations and pavements for the project. However, if earthwork is performed during or soon after periods of precipitation, the subgrade soils may
become saturated, "pump," or not respond to densification techniques. Typical remedial measures include: discing and aerating the soil during dry weather; mixing the soil with dryer materials; removing and replacing the soil with an approved fill material; or mixing the soil with an approved lime or cement product. Our firm should be consulted prior to implementing remedial measures to observe the unstable subgrade conditions and provide appropriate recommendations.

**Site Preparation**

General site clearing within the area of the planning structural and civil improvements should include the removal of vegetation; debris; existing utilities; structures including foundations; basement walls and floors; stockpiled soil; trees and associated root systems; rubble; rubbish; and any loose and/or saturated materials. Site stripping should extend to a minimum depth of 2 to 4 inches, or until all organics in excess of 3 percent by volume are removed. Deeper stripping may be required in localized areas. These materials will not be suitable for use as Engineered Fill. However, stripped topsoil may be stockpiled and reused in landscape or non-structural areas.

Fill material was not apparent within our test borings. However, fill material may be encountered between or beyond the boring locations. If similar to the shallow onsite soils, it is anticipated the fill material would consist of silty or sandy clay. Verification of the extent of fill should be determined during site grading. It is recommended that fill material that has not been properly compacted and certified be excavated and stockpiled so that the native soils can be properly prepared. The fill soils will be suitable for reuse as General Engineered Fill, provided they are cleansed of excessive organics, debris, and fragments greater than 4 inches in maximum dimension. However, as recommended below, the Expansion Index of the upper 1.5 feet of fill must be no greater than 15 when placed within the areas of the planned building and concrete flatwork.

The site preparation must include the proper removal of any buried structures, including irrigation lines, underground utilities that will not be utilized as part of the new development, and any related loose backfill material that is present at the site. The resulting excavations should be backfilled with Engineered Fill. It is suspected that demolition activities will disturb the upper soils. After demolition activities, it is recommended that these disturbed soils be removed and/or recompacted. Excavations, depressions, or soft and pliant areas extending below planned finished subgrade levels should be cleaned to firm, undisturbed soil and backfilled with Engineered Fill. In general, any substructures, septic tanks, debris pits, cesspools, or similar structures should be entirely removed. Concrete footings should be removed to an equivalent depth of at least 3 feet below proposed footing elevations or as recommended by the Geotechnical Engineer. Water wells, if present, should be abandoned in accordance with County standards. Any other buried structures should be removed in accordance with the recommendations of the Geotechnical Engineer. Resulting excavations should be backfilled with Engineered Fill.

Following stripping, demolition activities, and the removal of any existing fill material, the site preparation within building and exterior concrete flatwork areas will require the removal of the moderately expansive subgrade to a depth of at least 1.5 feet below the existing ground surface or at least 1.5 feet below the finished subgrade surface, whichever is deeper. This over-excavation should extend at least 5 feet outside of the planned building area. Prior to fill placement, the exposed subgrade...
soils should be scarified to a minimum depth of 6 inches, moisture-conditioned to at least 2 percent over optimum, and compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. Subsequently, the excavation should be backfilled with Engineered Fill, moisture-conditioned as necessary and compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

Weathered claystone was encountered at relatively shallow depths within the project site. In order to reduce post-construction differential settlement, it is recommended that native soil and rock that are in cuts extending into weathered rock, and/or in a soil/rock transition zone, be cut a minimum of 24 inches below the proposed bottoms of footings. The excavation should be extended a minimum of 5 feet beyond structural elements. In lieu of over-excavation, the footings of all connected structures may be embedded a minimum of 12 inches into the native weathered rock.

Following stripping, fill removal operations and demolition activities, the exposed subgrade in pavement areas should be excavated to a depth of at least 12 inches. This over-excavation should extend at least 2 feet outside of the planned paved area or up to the property line, if applicable. Prior to fill placement, the exposed subgrade soils should be scarified to a minimum depth of 6 inches, moisture-conditioned to at least 2 percent over optimum, and compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. This compaction effort should stabilize the exposed subgrade and locate any unsuitable or pliant areas not found during our field investigation. Subsequently, any fill required to achieve the required finished subgrade surface should consist of an Engineered Fill that is moisture-conditioned as necessary and compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

The near-surface clayey soils at the project site have a medium expansion potential. Therefore, it is recommended that the upper 1.5 feet of soil within proposed conventional slab-on-grade and exterior flatwork areas consist of non-expansive Engineered Fill or lime treated clayey soils. This select fill placement serves two functions: 1) it provides a uniform amount of soil which will more evenly distribute the soil pressures and 2) it reduces moisture content fluctuation in the clayey material beneath the new structural improvements. The non-expansive fill material should be a well-graded silty sand or sandy silt soil with between 20 and 60 percent passing the #200 sieve. A clean sand or very sandy soil is not acceptable for this purpose. A clean sandy soil will allow the surface water to drain into the expansive clayey soil below, which may result in soil swelling. Imported Fill should be approved by Krazan prior to placement. The fill should be placed as specified for Engineered Fill. The exposed native soils in the excavation should not be allowed to dry out and should be kept moist prior to backfilling. In addition, it is recommended that slab-on-grade, continuous footings and slabs be properly reinforced to reduce cracking and vertical off-set.

During periods of wet weather, the upper soils will become very moist due to the absorptive characteristics of the soil. Earthwork operations performed during winter or early spring months may encounter very moist unstable soils, which may require removal to grade a stable building foundation. Project site winterization consisting of placement of aggregate base and protecting exposed soils during the construction phase should be performed.

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01221100 Report (Widhoven Yosemite Project)
A representative of our firm should be present during all site clearing and grading operations to test and observe earthwork construction. This testing and observation is an integral part of our service as acceptance of earthwork construction is dependent upon compaction of the material and the stability of the material. The Geotechnical Engineer may reject any material that does not meet compaction and stability requirements. Further recommendations of this report are predicated upon the assumption that earthwork construction will conform to recommendations set forth in this section and the Engineered Fill section.

**Engineered Fill**

Based on our test borings, the upper, on-site soils consist predominately of silty and sandy clay. These soils will not be suitable to use as non-expansive fill material. However, these clayey soils, and any existing fill material that is expansive, will be suitable for reuse as General Engineered Fill, within roadway areas and below 1.5 feet from the finished subgrade surface in slab-on-grade areas, provided they are cleansed of excessive organics, debris, fragments larger than 4 inches in maximum dimension and moisture-conditioned to at least two (2) percent above optimum moisture.

As an alternative to using onsite or imported fill materials that are non-expansive, the onsite clayey soils can be used as Engineered Fill within the upper 1.5 feet below slab-on-grade and exterior flatwork areas provided they are lime-treated. The Expansion Index (ASTM D4829) of lime treated clayey soil must not be greater than 15. On a preliminary basis, the application rate of lime to meet this requirement is estimated to be 5 percent by dry weight. The clayey soils should be at least 2 percent above optimum moisture content during mixing operations. Additional testing is recommended to determine the appropriate application rate of lime prior to placement.

The preferred materials specified for Engineered Fill are suitable for most applications with the exception of exposure to erosion. Project site winterization and protection of exposed soils during the construction phase should be the sole responsibility of the Contractor, since he has complete control of the project site at that time.

Imported Fill should consist of a well-graded, slightly cohesive, silty sand or sandy silt soil with relatively impervious characteristics when compacted. This material should be approved by Krazan prior to use and should typically possess the following characteristics:

<table>
<thead>
<tr>
<th>Percent Passing No. 200 Sieve</th>
<th>20 to 60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasticity Index (ASTM D4318)</td>
<td>10 maximum</td>
</tr>
<tr>
<td>Expansion Index (ASTM D4829)</td>
<td>15 maximum</td>
</tr>
</tbody>
</table>

Fill soils should be placed in lifts approximately 6 inches thick, moisture-conditioned as necessary, and compacted to achieve at least 90 percent maximum density based on ASTM Test Method D1557. Additional lifts should not be placed if the previous lift did not meet the required dry density or if soil conditions are not stable.
Drainage and Landscaping

The ground surface should slope away from building pad and pavement areas toward appropriate drop inlets or other surface drainage devices. In accordance with Section 1804 of the 2019 California Building Code, it is recommended that the ground surface adjacent to foundations be sloped a minimum of 5 percent for a minimum distance of 10 feet away from structures, or to an approved alternative means of drainage conveyance. Swales used for conveyance of drainage and located within 10 feet of foundations should be sloped a minimum of 2 percent. Impervious surfaces, such as pavement and exterior concrete flatwork, within 10 feet of building foundations should be sloped a minimum of 1 percent away from the structure. Drainage gradients should be maintained to carry all surface water to collection facilities and off-site. These grades should be maintained for the life of the project.

Utility Trench Backfill

Utility trenches should be excavated according to accepted engineering practice following OSHA (Occupational Safety and Health Administration) standards by a Contractor experienced in such work. The responsibility for the safety of open trenches should be borne by the Contractor. Traffic and vibration adjacent to trench walls should be reduced and cyclic wetting and drying of excavation side slopes should be avoided. Depending upon the location and depth of some utility trenches, groundwater flow into open excavations could be experienced, especially during or shortly following periods of precipitation.

Utility trench backfill placed in or adjacent to buildings and exterior slabs should be compacted to at least 90 percent of maximum density based on ASTM Test Method D1557. The utility trench backfill placed in pavement areas should be compacted to at least 90 percent of maximum density based on ASTM Test Method D1557. Pipe bedding should be in accordance with pipe manufacturer’s recommendations.

The Contractor is responsible for removing all water sensitive soils from the trench regardless of the backfill location and compaction requirements. The Contractor should use appropriate equipment and methods to avoid damage to the utilities and/or structures during fill placement and compaction.

Foundations

After completion of the recommended site preparation, the site should be suitable for shallow footing support. The proposed structures may be supported on a shallow foundation system bearing on Engineered Fill or undisturbed weathered rock. Isolated spread and continuous footings can be designed for the following maximum allowable soil bearing pressures:

<table>
<thead>
<tr>
<th>Load</th>
<th>Allowable Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dead Load Only</td>
<td>1,800 psf</td>
</tr>
<tr>
<td>Dead-Plus-Live Load</td>
<td>2,500 psf</td>
</tr>
<tr>
<td>Total Load, including wind or seismic loads</td>
<td>3,350 psf</td>
</tr>
</tbody>
</table>
The footings should have a minimum embedment depth of 24 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower. Continuous footings should have a minimum width of 12 inches and isolated spread footings should have a minimum width of 24 inches, regardless of load.

Footing excavations must not be allowed to dry out any time prior to pouring concrete. Due to the presence of clayey subgrade with a medium expansion potential, it is recommended that continuous footings be reinforced with at least two No. 4 reinforcing bars at both the top and bottom of the footings.

The total movement of the planned building is not expected to exceed 1 inch. Differential movement should be less than ½ inch between similarly loaded and sized footings or less than ½ inch over 30 feet for continuous footings. Most of the settlement is expected to occur during construction as the loads are applied. However, additional post-construction movement may occur if the foundation soils are flooded or saturated.

Resistance to lateral footing displacement can be computed using an allowable friction factor of 0.3 acting between the base of foundations and the supporting subgrade. Lateral resistance for footings can alternatively be developed using an allowable equivalent fluid passive pressure of 240 pounds per cubic foot acting against the appropriate vertical footing faces. The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance. A ¼ increase in the above value may be used for short duration, wind, or seismic loads.

**Pole-Type Foundations**

It is anticipated that canopy structures, light poles, or signs may be supported on drilled piers or cast-in-drilled-hole (CIDH) piles. This type of foundation may be designed using an average allowable sidewall friction of 250 psf. This value is applicable for dead-plus-live loads and may be increased ½ for short duration loads, such as wind or seismic. In unpaved areas, the upper 18 inches should be neglected from friction calculations. Uplift loads can be resisted by CIDH piles using an allowable sidewall friction of 170 psf for the surface area plus the weight of the pier. CIDH piles should have a minimum embedment depth of 5 feet. The total settlement of the drilled piers is not expected to exceed 1 inch and the differential settlement between two adjacent CIDH piles should be less than ½ inch. Most of the settlement is expected to occur during construction as the loads are applied.

The lateral capacity of CIDH piles may be determined in accordance with Section 1807.3 of the 2019 CBC. However, it is recommended that an allowable lateral soil bearing pressure of 160 psf per foot of embedment be used to develop parameters S1 and S3 rather than one of the values given in Table 1806.2. This value includes a factor of safety of 2 and may be increased as indicated in Section 1806.3.4. In unpaved landscape areas, the upper 12 inches of soil should be ignored when calculating the minimum depth of embedment.

As indicated above, weathered claystone was encountered at a relatively shallow depth at the project site, which may be difficult to drill into. Prior to placing the reinforcing steel and concrete, loose or disturbed soils should be removed from CIDH pile excavations. A representative of the Geotechnical Engineer should observe the drilling and clean-out associated with the construction of pier foundations in order to assess whether the actual bearing conditions are compatible with the conditions anticipated.
during the preparation of this report. Drilled holes should be left open for as briefly as possible and should be protected from run-off. The contractor must take responsibility for staging the installation of CIDH piles so that significant amounts of sloughing or caving do not occur prior to installing the reinforcing steel and concrete.

**Floor Slabs and Exterior Flatwork**

To reduce post-construction soil movement beneath floor slabs and exterior flatwork, it is recommended that mitigation measures be performed as recommended above. For conventional slabs-on-grade, it is recommended that the upper 1.5 feet of soil consist of non-expansive Engineered Fill or lime-treated clay soils.

In areas where moisture-sensitive floor coverings will be used, concrete slab-on-grade floors should be underlain by a water vapor retarder. The water vapor retarder should be installed in accordance with accepted engineering practice. The water vapor retarder should consist of a vapor retarder sheeting underlain by a minimum of 3 inches of compacted, clean, gravel of ¾-inch maximum size, which will act as a capillary break. To aid in concrete curing an optional 2 to 4 inches of granular fill may be placed on top of the vapor retarder. The granular fill should consist of damp clean sand with at least 10 to 30 percent of the sand passing the 100 sieve. The sand should be free of clay, silt, or organic material. Rock dust which is manufactured sand from rock crushing operations is typically suitable for the granular fill. This granular fill material should be compacted.

It is recommended that the concrete slabs be reinforced with at least No. 4 reinforcing bars, placed at 24 inches on center in each direction within the slabs middle third, to reduce crack separation and possible vertical offset at the cracks. Thicker floor slabs with increased concrete strength and reinforcement should be designed wherever heavy concentrated loads, heavy equipment, or machinery is anticipated.

The exterior floors should be poured separately in order to act independently of the walls and foundation system. Exterior finish grades should be sloped a minimum of 1 to 1½ percent away from all interior slab areas to preclude ponding of water adjacent to the structures. All fills required to bring the building pads to grade should be Engineered Fills.

Moisture within the structure may be derived from water vapors, which were transformed from the moisture within the soils. This moisture vapor can travel through the capillary break and penetrate the slab-on-grade. This moisture vapor penetration can affect floor coverings and produce mold and mildew in the structure. To reduce moisture vapor intrusion, it is recommended that a vapor retarder be installed. It is recommended that the utility trenches within the structure be compacted, as specified in our report, to reduce the transmission of moisture through the utility trench backfill. Special attention to the immediate drainage and irrigation around the buildings is recommended. Positive drainage should be established away from the structure and should be maintained throughout the life of the structure. Ponding of water should not be allowed adjacent to the structure. Over-irrigation within landscaped areas adjacent to the structure should not be performed. In addition, ventilation of the structures (i.e. ventilation fans) is recommended to reduce the accumulation of interior moisture.
Lateral Earth Pressures and Retaining Walls

Walls retaining horizontal backfill and capable of deflecting a minimum of 0.1 percent of its height at the top may be designed using an equivalent fluid active pressure of 45 pounds per square foot per foot of depth. Walls that are incapable of this deflection or walls that are fully constrained against deflection may be designed for an equivalent fluid at-rest pressure of 65 pounds per square foot per foot per depth. Expansive soils should not be used for backfill against walls. The wedge of non-expansive backfill material should extend from the bottom of each retaining wall outward and upward at a slope of 2:1 (horizontal to vertical) or flatter. The stated lateral earth pressures do not include the effects of hydrostatic water pressures generated by infiltrating surface water that may accumulate behind the retaining walls; or loads imposed by construction equipment, foundations, or roadways. All of the above earth pressures are unfactored and are, therefore, not inclusive of factors of safety.

Retaining and/or below grade walls should be drained with either perforated pipe encased in free-draining gravel or a prefabricated drainage system. The gravel zone should have a minimum width of 12 inches wide and should extend upward to within 12 inches of the top of the wall. The upper 12 inches of backfill should consist of native soils, concrete, asphaltic concrete, or other suitable backfill to reduce surface drainage into the wall drain system. The aggregate should conform to Class 2 permeable materials graded in accordance with CalTrans Standard Specifications (2018). Prefabricated drainage systems, such as Miradrain®, Enkadrain®, or an equivalent substitute, are acceptable alternatives in lieu of gravel provided they are installed in accordance with the manufacturer’s recommendations. If a prefabricated drainage system is proposed, our firm should review the system for final acceptance prior to installation.

Drainage pipes should be placed with perforations down and should discharge in a non-erosive manner away from foundations and other improvements. The pipes should be placed no higher than 6 inches above the heel of the wall, in the center line of the drainage blanket and should have a minimum diameter of four inches. Collector pipes may be either slotted or perforated. Slots should be no wider than ¼ inch in diameter, while perforations should be no more than ¼ inch in diameter. If retaining walls are less than 6 feet in height, the perforated pipe may be omitted in lieu of weep holes on 4 feet maximum spacing. The weep holes should consist of 4-inch diameter holes (concrete walls) or unmortared head joints (masonry walls) and not be higher than 18 inches above the lowest adjacent grade. Two 8-inch square overlapping patches of geotextile fabric (conforming to CalTrans Standard Specifications for “edge drains”) should be affixed to the rear wall opening of each weep hole to retard soil piping.

During grading and backfilling operations adjacent to any walls, heavy equipment should not be allowed to operate within a lateral distance of 5 feet from the wall or within a lateral distance equal to the wall height, whichever is greater, to avoid developing excessive lateral pressures. Within this zone, only hand operated equipment ("whackers," vibratory plates, or pneumatic compactors) should be used to compact the backfill soils. ("whackerson, vibratory plates, or pneumatic compactors) should be used to compact the backfill soils.
Seismic Parameters – 2019 California Building Code

The Site Class per Section 1613 of the 2019 California Building Code (2019 CBC) and ASCE 7-16, Chapter 20 is based upon the site soil conditions. It is our opinion that a Site Class C is most consistent with the subject site soil conditions. For seismic design of the structures based on the seismic provisions of the 2019 CBC, we recommend the following parameters:

<table>
<thead>
<tr>
<th>Seismic Item</th>
<th>Value*</th>
<th>CBC Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Class</td>
<td>C</td>
<td>Section 1613.2.2</td>
</tr>
<tr>
<td>Site Coefficient F_a</td>
<td>1.30</td>
<td>Table 1613.2.3 (1)</td>
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<td>S_a</td>
<td>0.453</td>
<td>Section 1613.2.1</td>
</tr>
<tr>
<td>S_MS</td>
<td>0.589</td>
<td>Section 1613.2.3</td>
</tr>
<tr>
<td>S_DS</td>
<td>0.393</td>
<td>Section 1613.2.4</td>
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<tr>
<td>Site Coefficient F_c</td>
<td>1.50</td>
<td>Table 1613.2.3 (2)</td>
</tr>
<tr>
<td>S_I</td>
<td>0.193</td>
<td>Section 1613.2.1</td>
</tr>
<tr>
<td>S_MI</td>
<td>0.290</td>
<td>Section 1613.2.3</td>
</tr>
<tr>
<td>S_DI</td>
<td>0.225</td>
<td>Section 1613.2.4</td>
</tr>
<tr>
<td>T_S</td>
<td>0.193</td>
<td>Section 1613.2</td>
</tr>
</tbody>
</table>

* Based on Equivalent Lateral Force (ELF) Design Procedure being used

Soil Cement Reactivity

Excessive sulfate in either the soil or native water may result in an adverse reaction between the cement in concrete (or stucco) and the soil. HUD/FHA and CBC have developed criteria for evaluation of sulfate levels and how they relate to cement reactivity with soil and/or water.

A representative soil samples was obtained from the site (Boring B6 at 2 to 3 feet) and tested in accordance with State of California Materials Manual Test Designation 417. The sulfate concentration detected in the soil sample was 0.00071 percent (7.1 ppm), which is well below the maximum allowable values established by HUD/FHA and CBC. Therefore, no special design requirements are necessary to compensate for sulfate reactivity with the cement.

The soil sample referenced above was also tested to evaluate the soluble chloride content, which was less than 1.0 ppm, indicating that there is a negligible amount of soluble chloride content in the onsite soils. In addition, a soil reactivity (pH) of 6.25 was determined for the soil sample that was tested.

Compacted Material Acceptance

Compaction specifications are not the only criteria for acceptance of the site grading or other such activities. However, the compaction test is the most universally recognized test method for assessing the performance of the Grading Contractor. The numerical test results from the compaction test cannot be used to predict the engineering performance of the compacted material. Therefore, the acceptance of compacted materials will also be dependent on the stability of that material. The Geotechnical Engineer
has the option of rejecting any compacted material regardless of the degree of compaction if that material is considered to be unstable or if future instability is suspected. A specific example of rejection of fill material passing the required percent compaction is a fill which has been compacted with an in situ moisture content significantly less than optimum moisture. This type of dry fill (brittle fill) is susceptible to future settlement if it becomes saturated or flooded.

**Testing and Inspection**

A representative of Krazan & Associates, Inc., should be present at the site during the earthwork activities to confirm that actual subsurface conditions are consistent with the exploratory fieldwork. This activity is an integral part of our service, as acceptance of earthwork construction is dependent upon compaction testing and stability of the material. This representative can also verify that the intent of these recommendations is incorporated into the project design and construction. Krazan & Associates, Inc., will not be responsible for grades or staking, since this is the responsibility of the Prime Contractor.

**LIMITATIONS**

Geotechnical Engineering is one of the newest divisions of Civil Engineering. This branch of Civil Engineering is constantly improving as new technologies and understanding of earth sciences advance. Although your site was analyzed in accordance with the current standard of practice, undoubtedly there will be substantial future improvements in this branch of engineering. In addition to advancements in the field of Geotechnical Engineering, physical changes in the site, either due to excavation or fill placement, new agency regulations, or possible changes in the proposed structure after the soils report is completed may require the soils report to be professionally reviewed. In light of this, the Owner should be aware that there is a practical limit to the usefulness of this report without critical review. Although the time limit for this review is strictly arbitrary, it is suggested that 2 years be considered a reasonable time for the usefulness of this report.

Foundation and earthwork construction is characterized by the presence of a calculated risk that soil and groundwater conditions have been fully revealed by the original foundation investigation. This risk is derived from the practical necessity of basing interpretations and design conclusions on limited sampling of the earth. The recommendations made in this report are based on the assumption that soil conditions do not vary significantly from those disclosed during our field investigation. If any variations or undesirable conditions are encountered during construction, the Geotechnical Engineer should be notified so that supplemental recommendations may be made.

The conclusions of this report are based on the information provided regarding the proposed construction. If the proposed improvements are relocated or redesigned, the conclusions in this report may not be valid. The Geotechnical Engineer should be notified of any changes so the recommendations may be reviewed and re-evaluated.

This report is a Geotechnical Engineering Investigation with the purpose of evaluating the soil conditions in terms of foundation design. The scope of our services did not include any Environmental Site Assessment for the presence or absence of hazardous and/or toxic materials in the soil, groundwater, or atmosphere; or the presence of wetlands. Any statements, or absence of statements, in this report or
on any boring log regarding odors, unusual or suspicious items, or conditions observed, are strictly for descriptive purposes and are not intended to convey engineering judgment regarding potential hazardous and/or toxic assessment.

The geotechnical engineering information presented herein is based upon professional interpretation utilizing standard engineering practices and a degree of conservatism deemed proper for this project. It is not warranted that such information and interpretation cannot be superseded by future geotechnical engineering developments. We emphasize that this report is valid for the project outlined above and should not be used for any other sites.

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (559) 348-2200.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

George P. Hattrup
Senior Geotechnical Engineer
RCE No. 43979/RGE No. 2353

David R. Jarosz, II
Managing Engineer
RGE No. 2698/RCE No. 60185

GPH/DRJ:ht
Wildhaven® Yosemite Site Plan

LEGEND
- Phase 1 Walking trail (lighted with solar/hardwired)
- Phase 1 Dirt road (to fire code)
- Phase 1 parking spots
- Phase 2 Walking trail
- Phase 2 Dirt road (to fire code)
- APN 012-140-0580

Existing well
Existing parking lot

Approx. 550 sq. tents total in Phase 1

Proposed bathhouse

Approx. 350 sq. septic area with
3-4 ADA tents and parking along road

Portable restroom trailer
with pump out station in Phase 2

APN 012-180-0130
Agriculture/ranch land

Existing mobile office units
(may keep or replace with event tent)

APN 012-180-0420
Agriculture/ranch land

Existing access road

Proposed storage yard
(fenced area possibly with a temporary plastic/canvas airport structure)
and/or staff RV site (TBD)

Phase 2 proposed
clubhouse
(Tents will be removed 2022)

1100 sq.

Gate

SITE MAP

Wildhaven Yosemite Project
4808 CA-140
Mariposa, California

Scale: NTS
Drawing by: HT

Date: May 2021
Approved by: DJ

Project No. 012-21100
Figure No. 1
APPENDIX A

FIELD AND LABORATORY INVESTIGATIONS

Field Investigation

The field investigation consisted of a surface reconnaissance and a subsurface exploratory program. Seven 4½-inch diameter exploratory borings were advanced. In addition, three percolation tests were performed at depths of 4 to 5 feet below the existing ground surface. The boring and percolation test locations are shown on the Site Map, Figure 1.

The soils encountered were logged in the field during the exploration and, with supplementary laboratory test data, are described in accordance with the Unified Soil Classification System.

Modified standard penetration tests were performed at selected depths. This test represents the resistance to driving a 2½-inch inside diameter split barrel sampler. The driving energy was provided by a hammer weighing 140 pounds falling 30 inches. Relatively undisturbed soil samples were obtained while performing this test. Bag samples of the disturbed soil were obtained from the auger cuttings. All samples were returned to our Clovis laboratory for evaluation.

Laboratory Investigation

The laboratory investigation was programmed to determine the physical and mechanical properties of the foundation soil underlying the site. Test results were used as criteria for determining the engineering suitability of the surface and subsurface materials encountered.

In-situ moisture content, dry density, consolidation, direct shear, sieve analysis, and Atterberg Limits tests were completed on relatively undisturbed samples representative of the subsurface material. In addition, an Expansion Index test was performed on a bag sample obtained from the auger cuttings. These tests, supplemented by visual observation, comprised the basis for our evaluation of the site material.

The logs of the exploratory borings and laboratory test results are presented in this Appendix.
**UNIFIED SOIL CLASSIFICATION SYSTEM**

**UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART**

<table>
<thead>
<tr>
<th>GRADE</th>
<th>DESCRIPTION</th>
<th>SYMBOL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COARSE-GRAINED SOILS</strong></td>
<td>Clean Gravels (Less than 5% fines)</td>
<td>GW</td>
</tr>
<tr>
<td>GRAVELS</td>
<td>More than 50% of coarse fraction larger than No. 4 sieve size</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gravels with fines (More than 12% fines)</td>
<td>GM</td>
</tr>
<tr>
<td></td>
<td>Sands with fines (More than 12% fines)</td>
<td>SM</td>
</tr>
<tr>
<td></td>
<td>Sands</td>
<td>SP</td>
</tr>
<tr>
<td></td>
<td>Clean Sands (Less than 5% fines)</td>
<td>SW</td>
</tr>
<tr>
<td><strong>SANDS</strong></td>
<td>50% or more of coarse fraction smaller than No. 4 sieve size</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fine-grained soils</td>
<td>OL</td>
</tr>
<tr>
<td></td>
<td>Silts and clays</td>
<td>ML</td>
</tr>
<tr>
<td></td>
<td>Organic silts and organic silty clays of low plasticity</td>
<td>CL</td>
</tr>
<tr>
<td></td>
<td>Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays</td>
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</tr>
<tr>
<td></td>
<td>Inorganic clays of high plasticity, fat clays</td>
<td>CH</td>
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<tr>
<td></td>
<td>Organic clays of medium to high plasticity, organic silts</td>
<td>OH</td>
</tr>
<tr>
<td></td>
<td>Highly organic soils</td>
<td>PT</td>
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</tbody>
</table>

**CONSISTENCY CLASSIFICATION**

<table>
<thead>
<tr>
<th>Grain Type</th>
<th>Standard Sieve Size</th>
<th>Grain Size in Millimeters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boulders</td>
<td>Above 12 inches</td>
<td>Above 305</td>
</tr>
<tr>
<td>Cobble</td>
<td>12 to 13 inches</td>
<td>305 to 76.2</td>
</tr>
<tr>
<td>Gravel</td>
<td>3 inches to No. 4</td>
<td>76.2 to 4.76</td>
</tr>
<tr>
<td>Coarse-grained</td>
<td>3 to ¾ inches</td>
<td>76.2 to 19.1</td>
</tr>
<tr>
<td>Fine-grained</td>
<td>¾ inches to No. 4</td>
<td>19.1 to 4.76</td>
</tr>
<tr>
<td>Sand</td>
<td>No. 4 to No. 200</td>
<td>4.76 to 0.074</td>
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<tr>
<td>Coarse-grained</td>
<td>No. 4 to No. 10</td>
<td>4.76 to 2.00</td>
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<td>Medium-grained</td>
<td>No. 10 to No. 40</td>
<td>2.00 to 0.042</td>
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<tr>
<td>Fine-grained</td>
<td>No. 40 to No. 200</td>
<td>0.042 to 0.074</td>
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<tr>
<td>Silt and Clay</td>
<td>Below No. 200</td>
<td>Below 0.074</td>
</tr>
</tbody>
</table>

**GRAIN SIZE CLASSIFICATION**

**PLASTICITY CHART**

- **CH**
- **CL**
- **ML & OL**
- **A LINE:** $\text{Pi} = 0.73(\text{LL} - 20)$
## Log of Boring B1

**Project:** Wildhaven Yosemite Project  
**Client:** Wildhaven  
**Location:** 4808 CA-140, Mariposa, California  
**Depth to Water:**  
**Initial:** None  
**Project No:** 012-21100  
**Figure No:** A-1  
**Logged By:** Dave Adams  
**At Completion:** None

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Symbol</th>
<th>Description</th>
<th>Dry Density (pcf)</th>
<th>Moisture (%)</th>
<th>Type</th>
<th>Blows/ft</th>
<th>Penetration Test (blows/ft)</th>
<th>Water Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Ground Surface</td>
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<td>13.4</td>
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<td>19</td>
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<td>10 20 30 40</td>
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<tr>
<td>2</td>
<td></td>
<td>SANDY SILTY CLAY (CL)</td>
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<td>110.3</td>
<td>18.3</td>
<td>32</td>
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</tr>
<tr>
<td>4</td>
<td></td>
<td>Very stiff below 5 feet</td>
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<td>8</td>
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<td>13.0</td>
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**Drill Method:** Solid Flight  
**Drill Rig:** CME 45C-1  
**Driller:** Chris Wyneken  
**Drill Date:** 4-26-21  
**Hole Size:** 4½ inches  
**Elevation:** 16 Feet  
**Krazan and Associates**
# Log of Boring B2

**Project:** Wildhaven Yosemite Project  
**Client:** Wildhaven  
**Location:** 4808 CA-140, Mariposa, California  
**Depth to Water:** None

<table>
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<th>Symbol</th>
<th>Subsurface Profile</th>
<th>Description</th>
<th>Dry Density (pcf)</th>
<th>Moisture (%)</th>
<th>Type</th>
<th>Blows/ft</th>
<th>Penetration Test blows/ft</th>
<th>Water Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ground Surface</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>SANDY SILTY CLAY (CL)</td>
<td>Soft, fine- to medium-grained; brown, moist, drills easily</td>
<td>100.0</td>
<td>12.2</td>
<td>Gray</td>
<td>50+</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>CLAYSTONE (Ju)</td>
<td>Hard, moderately weathered; brown, moist, drills hard</td>
<td>79.3</td>
<td>10.9</td>
<td>Gray</td>
<td>50+</td>
<td>20</td>
<td>40</td>
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<tr>
<td>6</td>
<td>Auger refusal at 7 feet</td>
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<td></td>
<td></td>
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<tr>
<td>8</td>
<td>End of Borehole</td>
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</table>

**Drill Method:** Solid Flight  
**Drill Rig:** CME 45C-1  
**Driller:** Chris Wyneken  
**Krazan and Associates**  
**Drill Date:** 4-26-21  
**Hole Size:** 4½ inches  
**Elevation:** 7  
**Sheet:** 1 of 1
**Log of Boring B3**

**Project:** Wildhaven Yosemite Project  
**Client:** Wildhaven  
**Location:** 4808 CA-140, Mariposa, California  
**Depth to Water:**  
**Initial:** None  
**Project No:** 012-21100  
**Figure No.:** A-3  
**Logged By:** Dave Adams  
**At Completion:** None

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<th>Depth (ft)</th>
<th>Symbol</th>
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<th>Dry Density (pcf)</th>
<th>Moisture (%)</th>
<th>Type</th>
<th>Blows/ft</th>
<th>Penetration Test blows/ft</th>
<th>Water Content (%)</th>
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</thead>
<tbody>
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<td>Ground Surface</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 2          |        | CLAYSTONE (Ju) Soft, moderately weathered; brown, moist, drills easily  
Hard and drills firmly below 12 inches | 78.5 | 7.9 | 50+ |  |  |                          |                  |
| 4          |        | Drills hard below 4 feet | 74.0 | 12.4 | 50+ |  |  |                          |                  |
| 8          |        | Auger refusal at 9 feet |                 |              |      |         |                          |                  |
| 10         |        | End of Borehole |                 |              |      |         |                          |                  |

**Drill Method:** Solid Flight  
**Drill Rig:** CME 45C-1  
**Driller:** Chris Wyneken  
**Krazan and Associates**

**Drill Date:** 4-26-21  
**Hole Size:** 4½ Inches  
**Elevation:** 9 Feet  
**Sheet:** 1 of 1
# Log of Boring B4

**Project:** Wildhaven Yosemite Project  
**Client:** Wildhaven  
**Location:** 4808 CA-140, Mariposa, California  
**Depth to Water:**  
**Initial:** None  
**Project No.:** 012-21100  
**Figure No.:** A-4  
**Logged By:** Dave Adams  
**At Completion:** None

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Symbol</th>
<th>Description</th>
<th>Dry Density (pcf)</th>
<th>Moisture (%)</th>
<th>Type</th>
<th>Blows/ft</th>
<th>Penetration Test blows/ft</th>
<th>Water Content (%)</th>
<th></th>
</tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>SANDY SILTY CLAY (CL)</td>
<td>Soft, fine- to medium-grained; dark brown, moist, drills easily Firm below 12 inches Very stiff below 2 feet</td>
<td>116.3</td>
<td>13.6</td>
<td></td>
<td>31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Hard below 5 feet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Very stiff below 10 feet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>CLAYSTONE (Ju) Hard, moderately weathered; brown, moist, drills hard</td>
<td>107.6</td>
<td>19.3</td>
<td></td>
<td>50+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>End of Borehole</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Drill Method:** Solid Flight  
**Drill Rig:** CME 45C-1  
**Driller:** Chris Wyneken  
**Krazan and Associates**  
**Drill Date:** 4-26-21  
**Hole Size:** 4½ Inches  
**Elevation:** 16 Feet  
**Sheet:** 1 of 1
## Log of Boring B5

**Project:** Wildhaven Yosemite Project

**Client:** Wildhaven

**Location:** 4808 CA-140, Mariposa, California

**Depth to Water:** None

**Initial:** None

**Project No.:** 012-21100

**Figure No.:** A-5

**Logged By:** Dave Adams

**At Completion:** None

### Subsurface Profile

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Symbol</th>
<th>Description</th>
<th>Dry Density (pcf)</th>
<th>Moisture (%)</th>
<th>Type</th>
<th>Blows/ft</th>
<th>Penetration Test blows/ft</th>
<th>Water Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>Ground Surface</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>SANDY SILTY CLAY (CL)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Soft, fine- to medium-grained; dark brown, moist, drills easily</td>
<td>94.0</td>
<td>10.9</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>Hard below 5 feet</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>102.6</td>
<td>15.2</td>
<td>50+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td></td>
<td>109.5</td>
<td>18.2</td>
<td>55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>14</td>
<td>CLAYSTONE (Ju)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>Hard, moderately weathered; brown, moist, drills hard</td>
<td>101.1</td>
<td>21.4</td>
<td>50+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>End of Borehole</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Drill Method:** Solid Flight

**Drill Rig:** CME 45C-1

**Driller:** Chris Wyneken

**Krazan and Associates**

**Drill Date:** 4-26-21

**Hole Size:** 4½ Inches

**Elevation:** 16 Feet

**Sheet:** 1 of 1
Log of Boring B6

**Project:** Wildhaven Yosemite Project  
**Client:** Wildhaven  
**Location:** 4808 CA-140, Mariposa, California  
**Initial:** None  
**Logged By:** Dave Adams  
**At Completion:** None

### Subsurface Profile

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Symbol</th>
<th>Description</th>
<th>Dry Density (pcf)</th>
<th>Moisture (%)</th>
<th>Type</th>
<th>Blows/ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>Ground Surface</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td><strong>SANDY SILTY CLAY (CL)</strong> Soft, fine- to medium-grained; dark brown, moist, drills easily Firm below 12 inches Very stiff below 2 feet</td>
<td>118.2</td>
<td>10.6</td>
<td></td>
<td>32</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td><strong>CLAYSTONE (Ju)</strong> Hard, moderately weathered; brown, moist, drills hard</td>
<td>113.1</td>
<td>13.5</td>
<td></td>
<td>50+</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>113.4</td>
<td>17.2</td>
<td></td>
<td>50+</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>End of Borehole</td>
<td>86.1</td>
<td>11.5</td>
<td></td>
<td>50+</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Penetration Test blows/ft</th>
<th>Water Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>40</td>
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</tbody>
</table>

**Drill Method:** Solid Flight  
**Drill Rig:** CME 45C-1  
**Driller:** Chris Wyneken  
**Kraza and Associates**  
**Drill Date:** 4-26-21  
**Hole Size:** 4½ Inches  
**Elevation:** 16 Feet  
**Sheet:** 1 of 1
# Log of Boring B7

**Project:** Wildhaven Yosemite Project  
**Client:** Wildhaven  
**Location:** 4808 CA-140, Mariposa, California  
**Depth to Water:** Initial: None  
**Logged By:** Dave Adams  
**At Completion:** None  

## Subsurface Profile

<table>
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<tr>
<th>Depth (ft)</th>
<th>Symbol</th>
<th>Description</th>
<th>Dry Density (pcf)</th>
<th>Moisture (%)</th>
<th>Type</th>
<th>Blows/ft</th>
<th>Penetration Test Nails</th>
<th>Water Content (%)</th>
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</thead>
<tbody>
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</tr>
<tr>
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<td>SANDY SILTY CLAY (CL)</td>
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<tr>
<td>4</td>
<td></td>
<td>Soft, fine-to-coarse-grained with trace GRAVEL; dark brown, moist, drills easily Firm below 12 inches Very stiff below 2 feet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>CLAYSTONE (Ju)</td>
<td>94.0</td>
<td>11.6</td>
<td>50+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
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<td>Hard, moderately weathered; brown, moist, drills hard</td>
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<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>10</td>
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<td>73.5</td>
<td>10.6</td>
<td>50+</td>
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</tr>
<tr>
<td>12</td>
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</tr>
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</tr>
<tr>
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<td>End of Borehole</td>
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<td></td>
<td></td>
<td>50+</td>
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<td></td>
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</table>

## Drill Details

**Drill Method:** Solid Flight  
**Drill Rig:** CME 45C-1  
**Driller:** Chris Wyneken  

**Krazan and Associates**  
**Drill Date:** 4-26-21  
**Hole Size:** 4½ Inches  
**Elevation:** 16 Feet

Sheet: 1 of 1
Consolidation Test

<table>
<thead>
<tr>
<th>Project No</th>
<th>Boring No. &amp; Depth</th>
<th>Date</th>
<th>Soil Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>012-21100</td>
<td>B5 @ 2-3'</td>
<td>5/5/2021</td>
<td>CL</td>
</tr>
</tbody>
</table>

% Consolidation @ 2Ksf: 1.1 %

Kraza Testing Laboratory
Shear Strength Diagram (Direct Shear)
ASTM D - 3080 / AASHTO T - 236

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Boring No. &amp; Depth</th>
<th>Soil Type</th>
<th>Date</th>
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<tbody>
<tr>
<td>012-21100</td>
<td>B5 @ 2-3'</td>
<td>CL</td>
<td>5/5/2021</td>
</tr>
</tbody>
</table>

Cohesion: 0.5 Ksf
Angle of Internal Friction: 20°
Gran Size Analysis

Sieve Openings in Inches | U.S. Standard Sieve Numbers
---|---
3" | #4
1 1/2" | #8
1" | #16
3/4" | #30
1/2" | #50
3/8" | #100
| #200

Grain Size in Millimeters

<table>
<thead>
<tr>
<th>Grain Size in Millimeters</th>
<th>PERCENT PASSING</th>
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<tbody>
<tr>
<td>100</td>
<td>100.0</td>
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<td>80.0</td>
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<td>0.1</td>
<td>70.0</td>
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<tr>
<td>0.01</td>
<td>60.0</td>
</tr>
<tr>
<td>0.001</td>
<td>50.0</td>
</tr>
</tbody>
</table>

Gravel | Sand | Silt or Clay
---|---|---
Coarse | Coarse | (Unified Soils Classification)
Fine | Medium | Fine

Project Name: Wildhaven Yosemite Project
Project Number: 012-21100
Soil Classification: CL
Sample Number: B4 @ 2-3'

Krazan Testing Laboratory
Expansion Index Test
ASTM D - 4829

Project Number: 012-21100
Project Name: Wildhaven Yosemite Project
Date: 5/5/2021
Sample location/ Depth: B4 @ 1-2'
Sample Number: X2
Soil Classification: CL

<table>
<thead>
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<th>Trial #</th>
<th>1</th>
<th>2</th>
<th>3</th>
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</thead>
<tbody>
<tr>
<td>Weight of Soil &amp; Mold, gms</td>
<td>768.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight of Mold, gms</td>
<td>368.0</td>
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</tr>
<tr>
<td>Weight of Soil, gms</td>
<td>400.7</td>
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<tr>
<td>Wet Density, Lbs/cu.ft.</td>
<td>120.8</td>
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<tr>
<td>Weight of Moisture Sample (Wet), gms</td>
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<td></td>
</tr>
<tr>
<td>Weight of Moisture Sample (Dry), gms</td>
<td>181.5</td>
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<tr>
<td>Moisture Content, %</td>
<td>10.2</td>
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<tr>
<td>Dry Density, Lbs/cu.ft.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Specific Gravity of Soil</td>
<td>2.7</td>
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<td>Degree of Saturation, %</td>
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<tr>
<th>Time</th>
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<th>30 min</th>
<th>1 hr</th>
<th>6 hrs</th>
<th>12 hrs</th>
<th>24 hrs</th>
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<td>--</td>
<td>--</td>
<td>0.0493</td>
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Expansion Index measured = 49.3

Expansion Index = 49

Expansion Potential Table

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<th>Potential Exp.</th>
</tr>
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<td>0 - 20</td>
<td>Very Low</td>
</tr>
<tr>
<td>21 - 50</td>
<td>Low</td>
</tr>
<tr>
<td>51 - 90</td>
<td>Medium</td>
</tr>
<tr>
<td>91 - 130</td>
<td>High</td>
</tr>
<tr>
<td>&gt;130</td>
<td>Very High</td>
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</tbody>
</table>

Krazan Testing Laboratory
**Plasticity Index of Soils**

ASTM D4318/AASHTO T89 T90/CT 204

**Project:** Wildhaven Yosemite Project  
**Project Number:** 012-21100  
**Date Sampled:** 4/26/2021  
**Sampled By:** DA  
**Sample Number:** -  
**Sample Location:** B6 @ 2-3'  
**Sample Description:** CL

<table>
<thead>
<tr>
<th>Trial Number</th>
<th>Plastic Limit</th>
<th>Liquid Limit</th>
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<tr>
<td></td>
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<tr>
<td>Weight of Wet Soil &amp; Tare (g)</td>
<td>30.32</td>
<td>33.88</td>
</tr>
<tr>
<td>Weight of Dry Soil &amp; Tare (g)</td>
<td>28.12</td>
<td>31.30</td>
</tr>
<tr>
<td>Weight of Tare (g)</td>
<td>13.37</td>
<td>13.55</td>
</tr>
<tr>
<td>Weight of water (g)</td>
<td>2.21</td>
<td>2.58</td>
</tr>
<tr>
<td>Weight of Dry Soil (g)</td>
<td>14.75</td>
<td>17.75</td>
</tr>
<tr>
<td>Water Content (% of dry wt.)</td>
<td>15.0%</td>
<td>14.5%</td>
</tr>
<tr>
<td>Number of Blows</td>
<td>16</td>
<td>23</td>
</tr>
</tbody>
</table>

Plastic Limit: 15  
Liquid Limit: 28

**Plasticity Index:** 13  
**Unified Soil Classification:** CL  
**Requirement:**  
**Approx. % of Material Retained on # 40 Sieve:**

![Plasticity Index Diagram](image)

Departures from Outlined Procedure:

Unusual Conditions, Other Notes:

Page 7 of 7
APPENDIX B

EARTHWORK SPECIFICATIONS

GENERAL

When the text of the report conflicts with the general specifications in this appendix, the recommendations in the report have precedence.

SCOPE OF WORK: These specifications and applicable plans pertain to and include all earthwork associated with the site rough grading, including but not limited to the furnishing of all labor, tools, and equipment necessary for site clearing and grubbing, stripping, preparation of foundation materials for receiving fill, excavation, processing, placement and compaction of fill and backfill materials to the lines and grades shown on the project grading plans, and disposal of excess materials.

PERFORMANCE: The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications. This work shall be inspected and tested by a representative of Krazan and Associates, Inc., hereinafter known as the Geotechnical Engineer and/or Testing Agency. Attainment of design grades when achieved shall be certified by the project Civil Engineer. Both the Geotechnical Engineer and the Civil Engineer are the Owner's representatives. If the Contractor should fail to meet the technical or design requirements embodied in this document and on the applicable plans, he shall make the necessary readjustments until all work is deemed satisfactory as determined by both the Geotechnical Engineer and the Civil Engineer. No deviation from these specifications shall be made except upon written approval of the Geotechnical Engineer, Civil Engineer or project Architect.

No earthwork shall be performed without the physical presence or approval of the Geotechnical Engineer. The Contractor shall notify the Geotechnical Engineer at least 2 working days prior to the commencement of any aspect of the site earthwork.

The Contractor agrees that he shall assume sole and complete responsibility for job site conditions during the course of construction of this project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that the Contractor shall defend, indemnify and hold the Owner and the Engineers harmless from any and all liability, real or alleged, in connection with the performance of work on this project, except for liability arising from the sole negligence of the Owner or the Engineers.

TECHNICAL REQUIREMENTS: All compacted materials shall be compacted to a density not less than 90 percent relative compaction based on ASTM Test Method D1557 or CTM-216, as specified in the technical portion of the Soil Engineer's report. The location and frequency of field density tests shall be as determined by the Geotechnical Engineer. The results of these tests and compliance with these specifications shall be the basis upon which satisfactory completion of work will be judged by the Geotechnical Engineer.

SOILS AND FOUNDATION CONDITIONS: The Contractor is presumed to have visited the site and to have familiarized himself with existing site conditions and the contents of the data presented in the soil report.
The Contractor shall make his own interpretation of the data contained in said report, and the Contractor shall not be relieved of liability under the Contract documents for any loss sustained as a result of any variance between conditions indicated by or deduced from said report and the actual conditions encountered during the progress of the work.

**DUST CONTROL:** The work includes dust control as required for the alleviation or prevention of any dust nuisance on or about the site or the borrow area, or off-site if caused by the Contractor's operation either during the performance of the earthwork or resulting from the conditions in which the Contractor leaves the site. The Contractor shall assume all liability, including court costs of codefendants, for all claims related to dust or windblown materials attributable to his work.

**SITE PREPARATION**

Site preparation shall consist of site clearing and grubbing and the preparations of foundation materials for receiving fill.

**CLEARING AND GRUBBING:** The Contractor shall accept the site in this present condition and shall demolish and/or remove from the area of designated project earthwork all structures, both surface and subsurface, trees, brush, roots, debris, organic matter, and all other matter determined by the Geotechnical Engineer to be deleterious or otherwise unsuitable. Such materials shall become the property of the Contractor and shall be removed from the site.

Tree root systems in proposed building areas should be removed to a minimum depth of 3 feet and to such an extent which would permit removal of all roots larger than 1 inch. Tree roots removed in parking areas may be limited to the upper 1½ feet of the ground surface. Backfill of tree root excavations should not be permitted until all exposed surfaces have been inspected and the Geotechnical Engineer is present for the proper control of backfill placement and compaction. Burning in areas which are to receive fill materials shall not be permitted.

**SUBGRADE PREPARATION:** Surfaces to receive Engineered Fill, building or slab loads shall be prepared as outlined above, excavated/scarified to a depth of 18 inches, moisture-conditioned as necessary, and compacted to 90 percent relative compaction.

Loose soil areas, areas of uncertified fill, and/or areas of disturbed soils shall be moisture-conditioned as necessary and recompacted to 90 percent relative compaction. All ruts, hummocks, or other uneven surface features shall be removed by surface grading prior to placement of any fill materials. All areas which are to receive fill materials shall be approved by the Geotechnical Engineer prior to the placement of any of the fill material.

**EXCAVATION:** All excavation shall be accomplished to the tolerance normally defined by the Civil Engineer as shown on the project grading plans. All over-excavation below the grades specified shall be backfilled at the Contractor's expense and shall be compacted in accordance with the applicable technical requirements.

**FILL AND BACKFILL MATERIAL:** No material shall be moved or compacted without the presence of the Geotechnical Engineer. Material from the required site excavation may be utilized for construction site fills provided prior approval is given by the Geotechnical Engineer. All materials utilized for constructing site fills shall be free from vegetation or other deleterious matter as determined by the Geotechnical Engineer.
PLACEMENT, SPREADING AND COMPACTION: The placement and spreading of approved fill materials and the processing and compaction of approved fill and native materials shall be the responsibility of the Contractor. However, compaction of fill materials by flooding, ponding, or jetting shall not be permitted unless specifically approved by local code, as well as the Geotechnical Engineer.

Both cut and fill areas shall be surface-compacted to the satisfaction of the Geotechnical Engineer prior to final acceptance.

SEASONAL LIMITS: No fill material shall be placed, spread, or rolled while it is frozen or thawing or during unfavorable wet weather conditions. When the work is interrupted by heavy rains, fill operations shall not be resumed until the Geotechnical Engineer indicates that the moisture content and density of previously placed fill are as specified.
APPENDIX C

PAVEMENT SPECIFICATIONS

1. DEFINITIONS - The term "pavement" shall include asphalt concrete surfacing, untreated aggregate base, and aggregate subbase. The term "subgrade" is that portion of the area on which surfacing, base, or subbase is to be placed.


2. SCOPE OF WORK - This portion of the work shall include all labor, materials, tools, and equipment necessary for, and reasonably incidental to the completion of the pavement shown on the plans and as herein specified, except work specifically noted as "Work Not Included."

3. PREPARATION OF THE SUBGRADE - The Contractor shall prepare the surface of the various subgrades receiving subsequent pavement courses to the lines, grades, and dimensions given on the plans. The upper 12 inches of the soil subgrade beneath the pavement section shall be compacted to a minimum relative compaction of 90 percent. The finished subgrades shall be tested and approved by the Soils Engineer prior to the placement of additional pavement courses.

4. UNTREATED AGGREGATE BASE - The aggregate base material shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate base material shall conform to the requirements of Section 26 of the Standard Specifications for Class 2 material. The aggregate base material shall be spread and compacted in accordance with Section 26 of the Standard Specifications. The aggregate base material shall be spread in layers not exceeding 6 inches and each layer of aggregate material course shall be tested and approved by the Soils Engineer prior to the placement of successive layers. The aggregate base material shall be compacted to a minimum relative compaction of 95 percent.

5. AGGREGATE SUBBASE - The aggregate subbase shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate subbase material shall conform to the requirements of Section 25 of the Standard Specifications for Class 2 material. The aggregate subbase material shall be compacted to a minimum relative compaction of 95 percent, and it shall be spread and compacted in accordance with Section 25 of the Standard Specifications. Each layer of aggregate subbase shall be tested and approved by the Soils Engineer prior to the placement of successive layers.
6. ASPHALT CONCRETE SURFACING - Asphalt concrete surfacing shall consist of a mixture of mineral aggregate and paving grade asphalt, mixed at a central mixing plant and spread and compacted on a prepared base in conformity with the lines, grades and dimensions shown on the plans. The viscosity grade of the asphalt shall be PG 64-10 and the asphalt concrete mix shall conform to the requirements set forth in Section 39 of the Standard Specifications. The drying, proportioning and mixing of the materials shall conform to Section 39.

The prime coat, spreading and compacting equipment and spreading and compacting mixture shall conform to the applicable chapters of Section 39, with the exception that no surface course shall be placed when the atmospheric temperature is below 50°F. The compaction of asphalt concrete shall be performed as described in Section 39-2.01. The surface course shall be placed with an approved self-propelled mechanical spreading and finishing machine.

7. FOG SEAL COAT - The fog seal (mixing type asphalt emulsion) shall conform to and be applied in accordance with the requirements of Section 37.
June 4, 2021

Mr. Brian Lawrence
Wildhaven
c/o Environmental Science Associates
550 Kearny Street, Suite 800
San Francisco, California 94108
Attention: Ms. Mary Laux

RE: Percolation Testing and Septic Design Letter
Proposed Wildhaven Yosemite Project
4808 CA-140
Mariposa, California

Dear Ms. Laux:

In accordance with your request and as part of the geotechnical engineering services we are providing for the subject project, we have completed an investigation for the planned septic system at the above-referenced project site. This investigation was conducted to evaluate the absorption characteristics of the soil in that area of the project site, suitability of this area to support the proposed sewage system, and design data related to the construction and placement of the sewage disposal system within the area that was evaluated.

It is understood that a new campground will be constructed at the site, which will include a communal bathhouse and an associated wastewater disposal system. Once completed, the campground will accommodate up to 200 people. In addition, it is anticipated that there will be three full-time staff with RV’s and up to six other full or part-time staff onsite during the day when the campground is open.

Project Setting

The project site is located along the south side of Highway 140, approximately one mile south of Mariposa, in Mariposa County, California. The site lies within a rural area that is partially developed with a covered animal shelter, corrals, a manager’s residence, a ropes course, ziplines, and both paved and unpaved roadways, which are part of the “Yosemite Zip Lines and Adventure Ranch”. The ground surface is covered with a light to heavy growth of native grass, some brush, and varying amounts of trees as indicated by the pictures provided below. The project site lies in an area with gently to moderately sloping terrain with ground surface elevations ranging from less than 2,200 to approximately 2,300 feet in the northeastern and southern parts of the site, respectively.
Photo 1: Covered Animal Shelter (to be removed), looking north.

Photo 2: View of Ropes Course and property to the north.
Photo 3: View of Property South of the Ropes Course

Field Exploration and Subsurface Conditions

Subsurface soil conditions were explored by drilling 7 exploratory soil borings to depths ranging from 7 to 16 feet in the area of the planned bathhouse and leach field improvements. The approximate locations of the borings are shown on the attached Site Map, Figure 1.

Based on our findings, the subsurface conditions encountered appear typical of those found in the geologic region of the site. Our borings indicate the near-surface soils consist primarily of firm to very stiff silty and sandy clay to depths ranging from less than one foot to approximately 14 feet. These soils appear to be derived from heavily to completely weathered-in-place claystone. Based on our observations and laboratory testing, these soils are moderately strong and have a medium expansion potential. The penetration resistance ranged from 19 blows per foot to over 50 blows per 6 inches. The dry densities of relatively undisturbed samples of these soils ranged from approximately 97 to 118 pcf. A representative soil sample expanded approximately 0.6 percent under a 500 psf load when saturated, but had an overall consolidation of approximately 1.1 percent under a 2,000 psf load when saturated. In addition, another representative soil sample had an angle of internal friction of 20 degrees with a cohesion of approximately 500 psf. Our testing also indicated that the clayey soils have an Expansion Index of 49, a Liquid Limit of 28, and a Plasticity Index of 13, which are indicative of a moderate shrink/swell potential. Sieve analysis
tests performed on two representative samples indicate that approximately 82 to 87 percent of the clayey soils will pass through the No. 200 Sieve. Below the surface layer described above, moderately to heavily weathered claystone was encountered in the test borings. This material appeared to have similar characteristics to a very hard silty or sandy clay to the maximum depth explored of 16 feet. Drilling was relatively difficult in the weathered rock and practical drilling refusal was experienced in two of our borings, as noted in the following table.

<table>
<thead>
<tr>
<th>Boring No.</th>
<th>Approximate Depth to Weathered Rock (feet)</th>
<th>Approximate Depth to Practical Drilling Refusal (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>8</td>
<td>&gt;15</td>
</tr>
<tr>
<td>B2</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>B3</td>
<td>&lt;1</td>
<td>9</td>
</tr>
<tr>
<td>B4</td>
<td>14</td>
<td>&gt;15</td>
</tr>
<tr>
<td>B5</td>
<td>13</td>
<td>&gt;15</td>
</tr>
<tr>
<td>B6</td>
<td>5</td>
<td>&gt;15</td>
</tr>
<tr>
<td>B7</td>
<td>5</td>
<td>&gt;15</td>
</tr>
</tbody>
</table>

Field and laboratory tests suggest that the weathered rock is very strong and slightly compressible. Penetration resistance ranged from 50 blows per 2 inches to 50 blows per 5 inches. The dry density of relatively undisturbed samples of this material ranged from approximately 101 to 113 pcf.

Test boring locations were checked for the presence of groundwater during and immediately following the drilling operations. Free groundwater was not encountered within the maximum depth explored of 16 feet below the existing ground surface at the project site. It should be recognized that water table elevations may fluctuate with time, being dependent upon seasonal precipitation, irrigation, land use, and climatic conditions, as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered during the construction phase of the project. The evaluation of such factors is beyond the scope of this report.

For additional information about the soil and bedrock encountered in the test borings at the project site, please refer to the attached boring logs and laboratory test data at the end of this report.

**Percolation Test Results**

Three percolation tests were performed within the site to evaluate the soils absorption characteristics. The percolation tests were performed inside test holes drilled near the exploratory test boring. The percolation tests were performed at depths 4 and 5 feet below the existing ground surface. The tests were conducted in general accordance with the criteria set in the “Manual of Septic Tank Practice” published by the Department of Health, Education, and Welfare. Results of the tests are as follows:
The test results indicate that the native soils at the project site have poor absorption characteristics. The test results do not include a factor of safety. The percolation rates given are based on 1 inch of fall within a 4½-inch diameter hole with a 12- to 18-inch head of water.

**Geotechnical Analysis and Recommendations**

Our field exploration and percolation testing indicate the onsite soil/weathered bedrock profile is not suitable for the installation of a septic system with a standard disposal field that utilizes leach lines, leaching beds, or seepage pits. However, a mounded leach field or some other engineered onsite wastewater disposal system, such as an aerobic pretreatment system with a raised sand bed, may be feasible. Recommendations for a septic system with a mounded leach field are provided below. Recommendations for other engineered onsite wastewater disposal systems that could be used for the project are beyond the scope of this report.

Based on our understanding of this project and the design requirements in the 2019 California Plumbing Code (see Table H 201.1(4)), the design wastewater flow in gallons per day (gpd) that will be generated during peak operations of the planned campground is provided in the following table.

<table>
<thead>
<tr>
<th>Type of Occupancy</th>
<th>Number of People</th>
<th>Design Waste Water Flow (gpd per person)</th>
<th>Total Waste Water Flow (gpd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campground with Central Comfort Station</td>
<td>200</td>
<td>35</td>
<td>7,000</td>
</tr>
<tr>
<td>Staff with Recreational Vehicle</td>
<td>3</td>
<td>75</td>
<td>225</td>
</tr>
<tr>
<td>Other Staff</td>
<td>6</td>
<td>20</td>
<td>120</td>
</tr>
<tr>
<td><strong>Estimated Total Daily Peak Wastewater Flow (gpd)</strong></td>
<td></td>
<td></td>
<td><strong>7,345</strong></td>
</tr>
</tbody>
</table>

In accordance with Footnote 1 that accompanies Table H 201.1(4) in the 2019 CPC, if the estimated waste/sewage flow rate is over 1,500 gpd, the sewage disposal system should be sized using the formula: Flow x 0.75 + 1,125 = septic tank size. Therefore, the septic tank for this project should have a capacity of at least 6,634 gallons.

The minimum absorption area required within a mounded leach field will depend on the percolation characteristics of the soils that are used to construct the mounded system. Considering the relatively large volume of wastewater that will need to be disposed of for this project, it is anticipated that a sandy loam soil will be utilized, which will have a percolation rate within the range of 10 to 30 minutes per inch (mpi). In order to achieve this percolation rate, an imported fill material that meets the following requirements is recommended:
A material with a percolation rate of less than 8 mpi is not recommended, since the wastewater may not be properly filtered before migrating to the perimeter of the mound. This select granular fill should extend from a depth equal to or above the bottom of the leach pipes to at least three (3) feet below the bottom of the leach field trenches. Both the top and bottom of the mounded leach field should be level, which will require a cut be performed where the natural ground surface has a slope. In addition, the top of the mound should extend at least 5 feet outside of the leach trenches. The slopes around the perimeter of the mounded leach field should be 2.5H:1V or flatter and must be protected from erosion. The mound should also be located at least 10 feet horizontally away from the outside edge of building foundations. The select granular fill material should be placed in 8 to 12-inch loose lifts and compacted to between 82 and 86 percent of ASTM D1557 Maximum Density. Over-compaction of this material MUST be avoided.

As indicated below, the required size of the mounded leach field cannot be determined until the percolation characteristics of the granular fill has been evaluated. Therefore, once a suitable material has been identified, it is recommended that a test area be constructed that is two feet deep and at least 500 ft² in plan. Subsequently, at least two percolation tests must be performed in accordance with Mariposa County Standards in order to confirm that the percolation characteristics of the granular fill are acceptable and to determine the applicable percolation rate for construction purposes. During the construction of the rest of the mounded leach field, at least three (3) percolation tests should be performed for every foot of granular fill placed after the first two feet of fill has been placed and compacted as recommended above.

The minimum absorption area, total trench line length, and overall area of the mounded leach field for different percolation rates are provided in the following table. This takes into account a design wastewater flow of 6,634 gpd and the following engineering formulas.

- Design Absorption Rate \( Q = \frac{5}{\sqrt{t}} \) in gpd/ft², where ‘t’ is the percolation rate in mpi
- Minimum Absorption Area (ft²) = Tank Size (gal)/Q

<table>
<thead>
<tr>
<th>Perc. Rate (mpi)</th>
<th>Q (gpd/ft²)</th>
<th>Min. Required Absorption Area (ft²)</th>
<th>Total Trench Length and Configuration</th>
<th>Top of Mound Area</th>
<th>B (ft²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1.58</td>
<td>4,200</td>
<td>1,400’ (14 trenches, 100’ long)</td>
<td>104’ x 110’ = 11,440</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>1.12</td>
<td>5,934</td>
<td>1,978’ (20 trenches, 100’ long)</td>
<td>146’ x 110’ = 16,060</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>0.91</td>
<td>7,290</td>
<td>2,430’ (25 trenches, 97.5’ long)</td>
<td>181’ x 110’ = 19,910</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
A. Based on using 3-foot wide trenches spaced 7 feet apart, center-to-center.
B. Assumes top of mound extends 5 feet outside the edge of leach trenches.
The leach pipes associated with the mounded leach field must be underlain by at least 12 inches of 1½-inch round river gravel (i.e. drain rock) below the leach pipe, with at least 2 inches of the same gravel mounding over the pipe. A permeable barrier, such as untreated construction paper or suitable geotextile, shall be placed between the gravel backfill and topsoil to prevent the migration of fine materials into the gravel. At least 12 inches of topsoil should then be backfilled over the permeable barrier. The configuration of the mounded leach field and the actual depth of leach trenches should be determined by the Design Civil Engineer and must meet the requirements of the current California Plumbing Code and applicable Mariposa County Standards.

Since the system will require more than 1,000 lineal feet of total leach pipe, a dosing tank must be provided along with two siphons or pumps dosing alternately and each serving one half of the leach field. The tank shall have a capacity equal to 60 to 75 percent of the interior capacity of the pipe to be dosed at one time. The automatic siphons or pumps should discharge the wastewater in the dosing tank once every 3 to 4 hours.

The mounded leach field(s) should be at least 10 feet from any proposed structures. A separation of at least 100 feet shall be incorporated between any water wells and the leach field area. A 100 percent expansion leach field should be set aside in case the primary system cannot absorb all the sewage in the future.

The wastewater stub-out from the structure(s) should be as shallow as practical. Code requires the septic tank be at least 5 feet from the structure(s). A distribution box must be used to balance the wastewater flowing to the five leach lines. The septic tank and distribution box must be installed level for proper flow and distribution of effluent. The pipes extending to the leach field area should be constructed with a fall of at least ¼ inch per foot of line. If the required grade cannot be maintained, the installation contractor shall install an effluent sump pump. All specifications, dimensions, and clearances not specifically mentioned in this report shall conform to the Uniform Plumbing Code unless superseded by Mariposa County Standards.

Storm and irrigation water should be directed away from the leach field area. The leach field should be constructed outside pasture areas. Standing water, due to irrigation and/or precipitation, should not be allowed within the leach field area.

If the field conditions deviate from our test results, the system’s performance could be influenced. The system’s performance may also be influenced by personal hygiene, meal preparation, etc. The system is not designed to accommodate high water demand items, such as hot tubs or swimming pools. Positive grade should be established around the leach field area. Mounding of storm water within the leach field area may damage the leach field and make the septic system non-operative. The system is not designed to accommodate storm water runoff.

The life span of the design system may be substantially reduced if subjected to excessive sewage flows. It is warranted that additional soil absorption area will be necessary if the variables are significantly different from those assumed by the design engineer. Any subsequent building additions or additional phase of development will require modification and/or additions to this septic system design.

Mariposa County requires inspections by the County to verify that the septic system is installed in accordance with the approved design. The County should be contacted to perform inspections in accordance with their requirements. Our office should be contacted to schedule an engineering inspection.
at least one week prior to the construction of the mounded leach field. Supplemental recommendations may be made at the time of our inspections to ensure the designed system will adequately reflect the actual soils that are used to construct the mounded leach field. The owner should be aware that he will be responsible for payment of the inspection fees during the installation of the sewage disposal field.

The conclusions of this report are based on the information provided regarding the construction, as well as the subsurface conditions encountered at the test locations. The geotechnical data presented herewith are based upon professional interpretation utilizing the current “standard of practice” and degree of conservatism deemed proper as of the report date. It is not warranted that such data cannot be superseded by future geotechnical developments.

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (559) 348-2200.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

George P. Hattrup
Senior Geotechnical Engineer
RCE No. 43979/RGE No. 2353

Attachments: Figure 1, Site Map
             Boring Logs (B1 through B7)
             Laboratory Test Data (6 pages)

Distribution: Mary Laux, Environmental Science Associates (pdf to MLaux@esassoc.com)
              Shauna Dunton, Lotus Water (pdf to sdunton@lotuswater.com)
# Log of Boring B1

**Project:** Wildhaven Yosemite Project  
**Client:** Wildhaven  
**Location:** 4808 CA-140, Mariposa, California  
**Depth to Water:** 

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Symbol</th>
<th>Description</th>
<th>Dry Density (pcf)</th>
<th>Moisture (%)</th>
<th>Type</th>
<th>Blows/ft.</th>
<th>Penetration Test blows/ft</th>
<th>Water Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>Ground Surface</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td><strong>SANDY SILTY CLAY (CL)</strong></td>
<td>97.3</td>
<td>13.4</td>
<td></td>
<td>19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 4         |        | Soft, fine- to medium-grained; dark brown, moist, drills easily  
Firm below 12 inches  
Stiff below 2 feet  
Very stiff below 5 feet |                   |              |      |          |                           |                  |
| 6         |        | 110.3 18.3 32 |                   |              |      |          |                           |                  |
| 8         |        | **CLAYSTONE (Ju)**                                | 13.0              |              |      | 50+      |                           |                  |
| 10        |        | Hard, highly weathered; brown, moist,  
drills hard |                   |              |      |          |                           |                  |
| 12        |        | 78.3 16.3 50+ |                   |              |      |          |                           |                  |
| 16        |        | End of Borehole                                   |                   |              |      |          |                           |                  |
| 18        |        |                                                   |                   |              |      |          |                           |                  |
| 20        |        |                                                   |                   |              |      |          |                           |                  |

**Drill Method:** Solid Flight  
**Drill Rig:** CME 45C-1  
**Driller:** Chris Wyneken  

**Krazan and Associates**  
**Drill Date:** 4-26-21  
**Hole Size:** 4½ inches  
**Elevation:** 16 Feet  
**Sheet:** 1 of 1
# Log of Boring B2

**Project:** Wildhaven Yosemite Project  
**Project No:** 012-21100  
**Client:** Wildhaven  
**Location:** 4808 CA-140, Mariposa, California  
**Depth to Water:** Initial: None  
**Logged By:** Dave Adams  
**At Completion:** None

## Subsurface Profile

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Symbol</th>
<th>Description</th>
<th>Dry Density (pcf)</th>
<th>Moisture (%)</th>
<th>Type</th>
<th>Blows/ft</th>
<th>Penetration Test Blows/ft</th>
<th>Water Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>Ground Surface</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>SANDY SILTY CLAY (CL)</td>
<td>100.0</td>
<td>12.2</td>
<td>50+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>CLAYSTONE (Ju)</td>
<td>79.3</td>
<td>10.9</td>
<td>50+</td>
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<tr>
<td>6</td>
<td></td>
<td>Auger refusal at 7 feet</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>8</td>
<td></td>
<td>End of Borehole</td>
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</tr>
<tr>
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<td></td>
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</tr>
</tbody>
</table>

**Drill Method:** Solid Flight  
**Drill Rig:** CME 45C-1  
**Driller:** Chris Wyneken  
**Krazan and Associates**  
**Drill Date:** 4-26-21  
**Hole Size:** 4½ inches  
**Elevation:** 7  
**Sheet:** 1 of 1
# Log of Boring B3

**Project:** Wildhaven Yosemite Project  
**Client:** Wildhaven  
**Location:** 4808 CA-140, Mariposa, California  
**Depth to Water:** Initial: None  
**Logged By:** Dave Adams  
**At Completion:** None

## Subsurface Profile

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Symbol</th>
<th>Description</th>
<th>Dry Density (pcf)</th>
<th>Moisture (%)</th>
<th>Type</th>
<th>Blows/ft</th>
<th>Penetration Test blows/ft</th>
<th>Water Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>Ground Surface</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td><strong>CLAYSTONE (Ju)</strong></td>
<td>Soft, moderately weathered; brown, moist, drills easily</td>
<td>78.5</td>
<td>7.9</td>
<td>50+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Drills hard below 4 feet</td>
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<tr>
<td>6</td>
<td></td>
<td>Auger refusal at 9 feet</td>
<td>End of Borehole</td>
<td>74.0</td>
<td>12.4</td>
<td>50+</td>
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<tr>
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<tr>
<td>14</td>
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<td></td>
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</tr>
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**Drill Method:** Solid Flight  
**Drill Rig:** CME 45C-1  
**Driller:** Chris Wyneken  
**Krazan and Associates**  
**Drill Date:** 4-26-21  
**Hole Size:** 4½ Inches  
**Elevation:** 9 Feet  
**Sheet:** 1 of 1
**Log of Boring B4**

- **Project:** Wildhaven Yosemite Project
- **Client:** Wildhaven
- **Location:** 4808 CA-140, Mariposa, California
- **Initial:** None
- **Logged By:** Dave Adams
- **At Completion:** None
- **Project No:** 012-21100
- **Figure No.:** A-4

### SUBSURFACE PROFILE

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Description</th>
<th>Dry Density (pcf)</th>
<th>Moisture (%)</th>
<th>Type</th>
<th>Blows/ft</th>
<th>Penetration Test blows/ft</th>
<th>Water Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Ground Surface</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>SANDY SILTY CLAY (CL)</td>
<td>116.3</td>
<td>13.6</td>
<td></td>
<td>31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Hard below 5 feet</td>
<td>114.0</td>
<td>14.7</td>
<td></td>
<td>50+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Very stiff below 10 feet</td>
<td>110.0</td>
<td>20.6</td>
<td></td>
<td>38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>CLAYSTONE (Ju)</td>
<td>107.6</td>
<td>19.3</td>
<td></td>
<td>50+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>End of Borehole</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Drill Method:** Solid Flight

**Drill Rig:** CME 45C-1

**Driller:** Chris Wyneken

**Krazan and Associates**

- **Drill Date:** 4-26-21
- **Hole Size:** 4½ Inches
- **Elevation:** 16 Feet
- **Sheet:** 1 of 1
# Log of Boring B5

**Project:** Wildhaven Yosemite Project  
**Client:** Wildhaven  
**Location:** 4808 CA-140, Mariposa, California  
**Depth to Water:** Initial: None  

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Symbol</th>
<th>Description</th>
<th>Dry Density (pcf)</th>
<th>Moisture (%)</th>
<th>Type</th>
<th>Blows/ft</th>
<th>Penetration Test blows/ft</th>
<th>Water Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>Ground Surface</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>SANDY SILTY CLAY (CL)</td>
<td>94.0</td>
<td>10.9</td>
<td></td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Soft, fine- to medium-grained; dark brown, moist, drills easily Stiff below 12 inches Very stiff below 2 feet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Hard below 5 feet</td>
<td>102.6</td>
<td>15.2</td>
<td></td>
<td>50+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>CLAYSTONE (Ju) Hard, moderately weathered; brown, moist, drills hard</td>
<td>109.5</td>
<td>18.2</td>
<td></td>
<td>55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td>End of Borehole</td>
<td>101.1</td>
<td>21.4</td>
<td></td>
<td>50+</td>
<td></td>
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</tbody>
</table>

**Drill Method:** Solid Flight  
**Drill Rig:** CME 45C-1  
**Driller:** Chris Wyneken  
**Krazan and Associates**  

**Drill Date:** 4-26-21  
**Hole Size:** 4½ Inches  
**Elevation:** 16 Feet  
**Sheet:** 1 of 1
# Log of Boring B6

**Project:** Wildhaven Yosemite Project  
**Client:** Wildhaven  
**Location:** 4808 CA-140, Mariposa, California  
**Depth to Water:** Initial: None  
**Logged By:** Dave Adams  
**At Completion:** None  

## Subsurface Profile

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Symbol</th>
<th>Description</th>
<th>Dry Density (pcf)</th>
<th>Moisture (%)</th>
<th>Blows/ft</th>
<th>Penetration Test blows/ft</th>
<th>Water Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>Ground Surface</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 2          |        | **SANDY SILTY CLAY (CL)**  
Soft, fine- to medium-grained; dark brown, moist, drills easily  
Firm below 12 inches  
Very stiff below 2 feet | 118.2 | 10.6 | 32 | 20 | 40 | 60 | 10 | 20 | 30 | 40 |
| 6          |        | **CLAYSTONE (Ju)**  
Hard, moderately weathered; brown, moist, drills hard | 113.1 | 13.5 | 50+ | 20 | 40 | 60 | 10 | 20 | 30 | 40 |
| 12         |        |              | 113.4 | 17.2 | 50+ | 20 | 40 | 60 | 10 | 20 | 30 | 40 |
| 16         |        | End of Borehole | 86.1 | 11.5 | 50+ | 20 | 40 | 60 | 10 | 20 | 30 | 40 |

## Drill Details

**Drill Method:** Solid Flight  
**Drill Rig:** CME 45C-1  
**Driller:** Chris Wyneken  
**Krazan and Associates**  
**Drill Date:** 4-26-21  
**Hole Size:** 4½ Inches  
**Elevation:** 16 Feet  
**Sheet:** 1 of 1
## Log of Boring B7

**Project:** Wildhaven Yosemite Project  
**Client:** Wildhaven  
**Location:** 4808 CA-140, Mariposa, California  
**Depth to Water:** Initial: None  
**Logged By:** Dave Adams  
**At Completion:** None  

### SUBSURFACE PROFILE

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Symbol</th>
<th>Description</th>
<th>Dry Density (pcf)</th>
<th>Moisture (%)</th>
<th>Type</th>
<th>Blows/ft</th>
<th>Penetration Test blows/ft</th>
<th>Water Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>Ground Surface</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td><strong>SANDY SILTY CLAY (CL)</strong> Soft, fine- to coarse-grained with trace GRAVEL; dark brown, moist, drills easily Firm below 12 inches Very stiff below 2 feet</td>
<td>110.7</td>
<td>7.9</td>
<td></td>
<td>31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td><strong>CLAYSTONE (Ju)</strong> Hard, moderately weathered; brown, moist, drills hard</td>
<td>94.0</td>
<td>11.6</td>
<td></td>
<td>50+</td>
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<tr>
<td>16</td>
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<td></td>
<td>73.5</td>
<td>10.6</td>
<td></td>
<td>50+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td><strong>End of Borehole</strong></td>
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<td></td>
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</table>

### Drill Method
- **Drill Method:** Solid Flight
- **Drill Rig:** CME 45C-1
- **Driller:** Chris Wyneken
- **Krazan and Associates**
- **Drill Date:** 4-26-21
- **Hole Size:** 4½ Inches
- **Elevation:** 16 Feet
- **Sheet:** 1 of 1
Grain Size Analysis

Sieve Openings In Inches  U.S. Standard Sieve Numbers

3"  1 1/2"  1"  3/4"  1/2"  3/8"  #4  #8  #16  #30  #50  #100  #200  Hydrometer

Grain Size in Millimeters

Gravel  |  Sand  |  Silt or Clay
Coarse | Fine  | Coarse | Medium | Fine

(Unified Soils Classification)

Project Name  Wildhaven Yosemite Project
Project Number  012-21100
Soil Classification  CL
Sample Number  B7 @ 2-3'

Krazan Testing Laboratory
Plasticity Index of Soils
ASTM D4318/AASHTO T89 T90/CT 204

Project: Wildhaven Yosemite Project
Project Number: 012-21100
Date Sampled: 4/26/2021          Date Tested: 5/4/2021
Sampled By: DA                   Tested By: JD
Tested By: JD
Verified By: JG
Sample Number: -
Sample Location: B6 @ 2-3’
Sample Description: CL

<table>
<thead>
<tr>
<th>Trial Number</th>
<th>Plastic Limit</th>
<th>Liquid Limit</th>
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<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Weight of Wet Soil &amp; Tare (g)</td>
<td>30.32</td>
<td>33.88</td>
</tr>
<tr>
<td>Weight of Dry Soil &amp; Tare (g)</td>
<td>28.12</td>
<td>31.30</td>
</tr>
<tr>
<td>Weight of Tare (g)</td>
<td>13.37</td>
<td>13.55</td>
</tr>
<tr>
<td>Weight of water (g)</td>
<td>2.21</td>
<td>2.58</td>
</tr>
<tr>
<td>Weight of Dry Soil (g)</td>
<td>14.75</td>
<td>17.75</td>
</tr>
<tr>
<td>Water Content (% of dry wt.)</td>
<td>15.0%</td>
<td>14.5%</td>
</tr>
<tr>
<td>Number of Blows</td>
<td>16</td>
<td>23</td>
</tr>
</tbody>
</table>

Plastic Limit: 15  Liquid Limit: 28

Plasticity Index: 13
Unified Soil Classification: CL
Requirement: Approx. % of Material Retained on # 40 Sieve:

Departures from Outlined Procedure:

Unusual Conditions, Other Notes:
Expansion Index Test
ASTM D - 4829

Project Number : 012-21100
Project Name : Wildhaven Yosemite Project
Date : 5/5/2021
Sample location/ Depth : B4 @ 1-2'
Sample Number : X2
Soil Classification : CL

<table>
<thead>
<tr>
<th>Trial #</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of Soil &amp; Mold, gms</td>
<td>768.7</td>
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<tr>
<td>Weight of Mold, gms</td>
<td>368.0</td>
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<tr>
<td>Weight of Soil, gms</td>
<td>400.7</td>
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<td>Wet Density, Lbs/cu.ft.</td>
<td>120.8</td>
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<td>Weight of Moisture Sample (Wet), gms</td>
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<tr>
<td>Weight of Moisture Sample (Dry), gms</td>
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<td>Moisture Content, %</td>
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<tr>
<td>Dry Density, Lbs/cu.ft.</td>
<td>109.7</td>
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<tr>
<td>Specific Gravity of Soil</td>
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<td>Degree of Saturation, %</td>
<td>51.3</td>
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<tr>
<th>Time</th>
<th>Initial</th>
<th>30 min</th>
<th>1 hr</th>
<th>6hrs</th>
<th>12 hrs</th>
<th>24 hrs</th>
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<td>--</td>
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Expansion Index\text{measured} = 49.3

Expansion Index = 49

Expansion Potential Table

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<tr>
<td>0 - 20</td>
<td>Very Low</td>
</tr>
<tr>
<td>21 - 50</td>
<td>Low</td>
</tr>
<tr>
<td>51 - 90</td>
<td>Medium</td>
</tr>
<tr>
<td>91 - 130</td>
<td>High</td>
</tr>
<tr>
<td>&gt;130</td>
<td>Very High</td>
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</table>

Krazan Testing Laboratory
## Consolidation Test

<table>
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<tr>
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<th>Boring No. &amp; Depth</th>
<th>Date</th>
<th>Soil Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>012-21100</td>
<td>B5 @ 2-3'</td>
<td>5/5/2021</td>
<td>CL</td>
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% Consolidation @ 2Ksf: 1.1 %
# Shear Strength Diagram (Direct Shear)

**ASTM D - 3080 / AASHTO T - 236**

<table>
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<th>Project Number</th>
<th>Boring No. &amp; Depth</th>
<th>Soil Type</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>012-21100</td>
<td>B5 @ 2-3'</td>
<td>CL</td>
<td>5/5/2021</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Cohesion:</th>
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<tbody>
<tr>
<td>Angle of Internal Friction:</td>
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</tr>
</tbody>
</table>

Krazan Testing Laboratory