UPDATED GEOTECHNICAL ENGINEERING REPORT
for
THE GROVE AT NEVADA CITY
Nevada City Tech Center
Nevada City, California

Prepared for:
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Project No. 3006B-01
June 10, 2014

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

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Mr. Robert Upton
Nevada City Tech Center LLC
12555 Dunbar Road
Glenn Ellen, California 95442

Reference: ***The Grove at Nevada City***
Nevada City Tech Center
Nevada City, Nevada County, California

Subject: ***Updated Geotechnical Engineering Report***

Dear Mr. Upton,

This report presents the results of our geotechnical engineering investigation for the proposed residential development to be constructed on the approximate 15-acre development area to the west of the existing Nevada City Tech Center campus in Nevada City, California. As currently proposed, development of the property will likely include the construction of single unit and multi-family residential structures. Associated improvements will include grading to develop building pads and minor residential street improvements, as well as the construction of associated utilities.

The findings presented in this report are based on our subsurface investigation, laboratory test results, and our experience with subsurface conditions in the area. From a geotechnical standpoint, our primary concern regarding the proposed development is the presence of disturbed surface soil and the presence of abandoned historical excavations associated with past mining at the project site. Our opinion is that residential development at the project site is feasible, provided the recommendations presented in this report are implemented.

Please contact us if you have any questions regarding our observations or the recommendations presented in this report.

Sincerely,

HOLDREGE & KULL

REGISTERED PROFESSIONAL ENGINEER
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1 INTRODUCTION

At the request of Nevada City Tech Center LLC, Holdrege & Kull (H&K) performed a geotechnical investigation for the proposed residential development to be constructed to the west of the existing Nevada City Tech Center campus in Nevada City, California. The geotechnical investigation was performed in general accordance with our August 19, 2013 proposal for the project, a copy of which is included as Appendix A of this report. For your review, Appendix B contains a document prepared by ASFE entitled *Important Information About Your Geotechnical Engineering Report,* which summarizes the general limitations, responsibilities, and use of geotechnical reports.

1.1 SITE DESCRIPTION

The approximate 15-acre project site is generally located to the west of the Nevada City Tech Center campus, accessed from Providence Mine Road in Nevada City, California. The project site is located within a portion of Nevada County Assessor's Parcel Number (APN) 05-190-53, located in the northwest quarter of section 13, Township 16 North, Range 8 East based on the Mount Diablo base and meridian.

The site is located in an area of past soil disturbance due to past mining activity, timber harvests, brush clearing, and limited grading. The subject property is located within the historic Nevada City gold mining district, on the southern edge of the Champion group of mines. A review of historical mining maps identified three inclined shafts at the site, several spoils piles, and evidence of near-surface prospecting. The site is generally bordered by undeveloped land to the northwest, the Nevada City Tech Center campus to the north and east, and an existing graded road alignment to the south and west.

The subject property is situated in the Sierra Nevada physiographic province at elevations ranging from approximately 2,460 to 2,600 feet above mean sea level. The southern portion of the property is relatively flat-lying, while other portions of the site slope moderately to steeply towards Peck Ravine. Regional native vegetation typically includes mixed conifer and oak woodlands.

1.2 PROPOSED IMPROVEMENTS

Based on our review of a September 2013 conceptual site plan prepared by KPFF Consulting Engineers, we understand that the proposed improvements will include the construction of relatively high density and multi-unit residential structures within

the southern portion of the parcel. In addition, 13 individual residential lots are proposed in the northern portion of the parcel. Associated improvements will include grading to develop building pads and minor residential streets and driveways, and construction of underground utilities and asphalt pavement. A preliminary site plan prepared by KPFF depicting the proposed lots and street locations was used as the base for our Exploratory Trench and Boring Location Map, included as Figure 2.

1.3 PURPOSE

The purpose of our investigation was to evaluate existing soil conditions with regard to the proposed improvements and to provide design-level geotechnical recommendations focusing on the area of the proposed residential improvements.

We performed a surface reconnaissance and subsurface geotechnical investigation at the site, collected soil samples for laboratory testing, and performed engineering calculations to provide grading recommendations, foundation design criteria and geotechnical recommendations for the proposed improvements.

1.4 SCOPE OF SERVICES

To prepare this report, we performed the following scope of services:

- We performed a site investigation, including a literature review and a limited subsurface investigation.
- We performed a geotechnical site reconnaissance to observe the general surface conditions and to coordinate with Underground Service Alert for underground utility clearance.
- We advanced twenty exploratory trenches at selected locations across the project site to reveal the shallow subsurface conditions.
- Following exploratory trenching, we returned to the site and advanced four exploratory borings at locations near historical mining excavations.
- We collected relatively undisturbed soil samples and bulk soil samples from exploratory trenches and borings.
- We performed laboratory tests on select soil samples obtained during our subsurface investigation to determine their engineering material properties.
- Based on observations made during our subsurface investigation and the results of laboratory testing, we performed engineering calculations to provide

geotechnical engineering recommendations for earthwork and proposed structural improvements.

Our scope of services did not include a groundwater flow analysis nor an evaluation of the site for the presence of hazardous materials, asbestiform minerals, mold, or corrosive subsurface conditions.

2 SITE INVESTIGATION

We performed a site investigation to characterize the existing surface conditions and shallow subsurface soil/rock conditions. Our site investigation included a literature review and field investigation as described below.

2.1 LITERATURE REVIEW

We performed a limited review of geologic literature pertaining to the project site. The following sections summarize our findings.

2.1.1 Soil Survey

As part of our evaluation, we reviewed the online USDA soil survey accessed through the U.C. Davis California Soil Resource Laboratory web site. The soil survey indicated that several dominant soil classifications exist on the project site including Musick sandy loam, Hoda sandy loam, Secca-Rock outcrop complex, and Josephine loam.

According to the soil survey, the northern approximate half of the project site, within areas of proposed single family residential development, likely contains Musick sandy loam, 15 to 50 percent slopes. The Musick soil consists of well drained residual soil underlain by weathered granodiorite. The surface horizon of the Musick soil profile typically consists of 25 inches of brown and reddish-brown sandy loam, light loam, and loam. The surface soil is typically underlain by approximately 73 inches of yellowish red and red heavy clay loam and variegated reddish yellow and yellow loam. Weathered granodiorite is encountered at a depth of approximately 98 inches. For the Musick sandy loam, 15 to 50 percent classification, up to 10 percent of the surface can consist of rock outcrop and the shrink-swell potential is moderate.

The central portion of the project site, also proposed to contain future single family residential development, is depicted as containing Hoda sandy loam, 15 to 50 percent slopes. The soil survey describes the Hoda series soil as consisting of well-drained soil underlain by weathered granodiorite. The surface soil typically

consists of 12 inches of brown sandy loam. The surface soil is typically underlain by reddish yellow loam, yellowish red clay, and yellowish red sandy clay loam to an approximate depth of 63 inches or more. The soil survey notes that the soil class presents high corrosion rating for uncoated steel and a moderate shrink-swell potential.

The southwestern portion of the project site, within areas of proposed multi-family residential construction, is mapped as containing Secca-Rock outcrop complex, 2 to 50 percent slopes. The Secca soil consists of moderately well drained residual soil underlain by metabasic or basic rock. The typical Secca soil profile includes 15 inches of brown and reddish brown gravelly silt loam. This surface soil is underlain by 30 inches of yellowish red, cobbly silty clay loam, strong brown cobbly clay, and light yellowish brown gravelly light clay. Variably weathered rock is typically encountered at an approximate depth of 45 inches. The soil survey notes that areas mapped as Secca-Rock outcrop complex contain 10 to 40 percent rock outcrop. The Secca soil is also noted as having a high shrink-swell potential.

Josephine loam, 15 to 30 percent slopes is depicted in the southeastern portion of the project site, in an area of proposed multifamily residential development. The soil survey describes the Josephine series soil as consisting of well-drained soil underlain by vertically tilted slate, shale, and contact metamorphic rock. The surface soil typically consists of 18 inches of reddish-brown loam and gravelly loam. The surface soil is typically underlain by reddish yellow silty clay loam. Weathered slate and shale are typically encountered at a depth of 70 inches below the ground surface (bgs). The soil survey notes that the soil series possesses a moderate rating for uncoated steel and a low shrink-swell potential.

2.1.2 Geologic Setting

We also reviewed the Geologic Map of the Chico Quadrangle (California Division of Mines and Geology, 1992) for information about site geology. The map indicates that the site is located near the contact of two geologic units. To the southwest of the contact, Paleozoic and Mesozoic diabase associated with the Lake Combie complex is shown. To the northeast of the contact, the geologic map depicts Jurassic granite and granodiorite associated with the Yuba Rivers Pluton.

In addition to the geologic map of the Chico Quadrangle, we reviewed historical geologic maps of the Nevada City Special Folio of the 1896 United States Geological Survey Folio 29 prepared by Waldemar Lindgren. According to Lindgren, the project site is generally located on a narrow belt of Calaveras slate bounded by diabase (to the southwest) and granodiorite (to the northeast).

Another reference for the site geology is William B. Clark's *Gold Districts of California* (California Department of Conservation, Division of Mines and Geology, Bulletin 193, seventh printing 1998) which describes the geology as slate, schist and quartzite located between greenstone and amphibolite to the southwest and granitic rocks to the northeast. Several gold-bearing quartz veins are mapped near these geologic contacts, one of which strikes southeast across the property and dips toward the northeast.

We reviewed California Geological Survey Open File Report 96-08, Probabilistic Seismic Hazard Assessment for the State of California, and the 2002 update entitled California Fault Parameters. The documents indicate the property is not located within any active fault systems. The 2007 edition of California Geological Survey Special Publication 42, Fault Rupture Hazard Zones in California, describes active faults and fault zones (activity within 11,000 years), as part of the Alquist-Priolo Earthquake Fault Zoning Act. The map and document indicate the site is not located within an Alquist-Priolo active fault zone.

2.1.1 Previous Reports

Holdrege & Kull previously performed an investigation of the project site in an effort to characterize soil conditions and potential impacts due to historical activities at the site, as summarized in our *Preliminary Soils Report for Nevada City Tech Center Housing Area* (July 26, 2010). The historical research and field investigation associated with this study identified surficial disturbance from shallow prospecting, as well as three mine shafts which were likely located on the project site. Slightly elevated concentrations of arsenic and lead were detected in soil near the suspected locations of the three mine shafts, which are referenced herein as the Crosby, Williams and New Shaft.

In addition, Holdrege & Kull prepared a soil management plan for the project dated January, 2014. The plan outlines procedures for management of soil with naturally-occurring metals concentrations that are slightly above typical background concentrations for the local area. The management plan describes the removal of slightly mineralized soil by excavation from selected locations and placement as fill beneath the proposed paved roadway to be constructed as a part of the proposed development. The procedures described in the plan are intended to reduce the chance of future contact with the slightly mineralized soil. As identified in the plan, an estimated 1,710 cubic yards of soil will be managed within the subject property.

2.2 FIELD INVESTIGATION

We performed our field investigation of the project site during October and November, 2013. During our field investigation, we observed the local topography and surface conditions and performed a limited subsurface investigation. The following sections summarize the surface and subsurface conditions observed during our field investigation.

Our subsurface investigation included the excavation of twenty exploratory trenches and the advancing of four exploratory borings at the project site.

Exploratory trenching was performed on October 21 and 22, 2013. The exploratory trenching focused on areas of observed surface depressions which were likely attributable to past excavations associated with prospecting or mining activity at the site. The exploratory trenches were excavated to depths ranging from three to seventeen feet below the ground surface (bgs) using a Kobelco SK-200 excavator equipped with a 48-inch bucket.

The exploratory borings were advanced on November 5, 2013 using a CME 55 drill rig at locations selected to allow evaluation of the subsurface soil and rock conditions near the New Shaft, as depicted on historical maps. The exploratory borings varied in depth from 6 feet (boring B-3 terminated at shallow depth due to suspected boulder) to 35 feet below the ground surface. An engineer from our firm logged the soil conditions revealed in the exploratory trenches and collected relatively undisturbed and bulk soil samples for laboratory testing. Figure 2 shows the approximate exploratory trench and boring locations.

2.2.1 Surface Conditions

The project site is generally described as gently to moderately sloping to the west toward Peck Ravine, a seasonal drainage generally located along the western edge of the property, flowing northward along a previously graded road alignment toward Deer Creek. In the southern portion of the project site, in the area of proposed multi-unit residential development, relatively gentle slopes exist. However, moderate to steeply sloping areas are present in the northern portion of the site, including within or adjacent to areas of proposed residential lots.

At the time of our field investigation, dominant vegetation at the site consisted of conifers, black oaks, and big leaf maples typical of a mixed oak-conifer woodland in this area. Blackberries and other exotic plants were observed, typically along areas which appeared to have been previously disturbed by past vegetation removal, access road grading, and timber harvest or clearing activities.

Several surface depressions were observed throughout the project site which appeared to have been past excavations likely associated with historical prospecting or mining activity at the site. These depressions were often relatively circular and varied in dimension from approximately 10 feet to 40 feet in diameter with depths ranging from a few to several feet. The depressions typically contained significant accumulations of loose soil, occasional boulders, and vegetative debris in varying stages of decomposition.

Review of historical documents indicated that three shafts are located in the area of the proposed project Suspect shaft locations were identified during our previous studies of the site based on historical maps as well as the topographic conditions observed. Following our recent field investigation, further review of historical documents by KPFF revealed revised probable shaft locations which are depicted on Figure 2.

Based on these revised locations, the Crosby Shaft is located near the proposed development area. A significant stockpile of soil associated with the Crosby Shaft is located in the low lying, western portion of the project site.

The New Shaft is located in a steep, densely vegetated area between the proposed development area and Providence Mine Road. This location is currently inaccessible to large excavation equipment without significant tree removal and the construction of temporary access.

The Williams Shaft, as depicted in historical mining documents, appears to be located outside of the area of proposed improvements, near the southeastern property boundary. Based on our observation of surface conditions in this area, we suspect that the Williams Shaft may be located on the neighboring property.

2.2.2 Subsurface Soil Conditions

The soil conditions described in the following paragraphs are generalized, based on our observations of soil revealed in our exploratory trenches and borings. More detailed information can be found in the trench logs in Appendix C.

Exploratory Trenches

The majority of the exploratory trenches were excavated within existing surface depressions to allow an evaluation of the apparent historical excavations. A primary goal of this trenching was to determine if the depressions were associated with relatively shallow excavations, or if they were indicative of deeper excavations

(e.g. shafts or tunnels) which would require extensive mitigation to facilitate successful site development. These exploratory trenches revealed competent native soil or weathered rock conditions at depths reached with the excavator, indicating that the surface depressions are associated with shallow excavations or prospect pits.

The exploratory trenches also allowed observation of the general subsurface soil and rock conditions which will likely be encountered during site grading and construction. In general, surface soil at the site consists of dark reddish brown and reddish brown silty fine sand to fine sandy silt underlain by yellowish brown sandy silt and silty sand and variably weathered rock. However, significant variability in both the material types encountered and the depths of individual soil horizons was observed.

Exploratory trenches T-10 and T-11 were excavated in the southern portion of the property, in the general vicinity of a large stockpile of historically excavated material believed to be associated with the Crosby Shaft. These trenches were excavated in an effort to determine if the Crosby Shaft was located within an area of irregular surface topography located to the northeast of the stockpile. The excavation of trenches T-10 and T-11 began on October 21, 2013 beginning at the location of shallow depressions which were thought to have been possibly attributable to subsidence of backfill placed over the historical Crosby Shaft. These trenches revealed shallow, disturbed surface soil conditions underlain by variably weathered rock. Because no clear indication of the historical shaft was revealed, we elected to extend exploratory trench T-10 to the north, alongside the existing stockpile, resulting in an excavation varying from 12 to 14 feet in depth and extending approximately 50 feet in length. This extended trench continued to reveal disturbed surface soil underlain by variably weathered rock at shallow depth. The weathered rock revealed in the trench sidewalls appeared undisturbed, and was described as moderately weathered, highly fractured, and excavated as coarse blocky gravel. Frequent caving of the vertical trench sidewalls was observed. The trench was backfilled with trench spoil that evening.

We returned to the location of exploratory trench T-10 on October 22, 2013 and extended the trench excavation to the south. In addition, a perpendicular trench was also excavated across the main trench at a location where loose fill and debris, including steel sections and bricks, was encountered in the subsurface. The trenching did reveal a past excavation running approximately southwest to northeast. The past excavation, which had been backfilled with loose soil fill and debris, appeared to be approximately horizontal, approximately 5 feet wide and 7

feet deep, and partially lined with bricks. The former excavation appeared to terminate or "daylight" near the steeply sloping bank of the seasonal drainage swale to the northeast. The perpendicular trench was extended to the southwest to chase the former excavation, which appeared to end in a shallow, debris and rock filled depression.

Exploratory Borings

We returned to the site on November 5, 2013 to advance exploratory borings in the northern portion of the project site, focusing on the area near the historical New Shaft. The exploratory borings were advanced to reveal the subsurface soil and rock conditions at depths greater than could be revealed by trenching.

Exploratory boring B-1 was located on an existing gravel-surfaced access road, immediately upslope from a significant surface depression which was the suspected location of the historical New Shaft. This exploratory boring revealed a relatively deep residual soil profile dominated by medium dense silty fine sand and firm to stiff fine sandy silt. A gradual transition to completely weathered rock was estimated to occur at an approximate depth of 13 feet below the ground surface. The weathered rock was readily drilled using an 8-inch diameter, hollow-stem auger and the resulting cuttings were described as light reddish brown, slightly moist, medium dense to dense silty fine sand. Boring B-1 was terminated at a depth of approximately 26 feet in very severely weathered rock.

The remaining exploratory borings were also advanced on an existing access road, further east from the suspected New Shaft location. These borings revealed similar subsurface conditions as boring B-1, although boring B-3 was terminated at a shallow depth of approximately 6.5 feet below the ground surface due to the presence of a suspected boulder. The adjacent borings B-2 and B-3 were advanced to approximate depths of 35 feet and 28 feet, respectively.

2.2.3 Groundwater Conditions

During our site investigation, we did not encounter groundwater seepage in our exploratory trenches and borings, nor did we observe onsite springs or seeps emanating from the ground surface. We did observe drainage channels and swales in the area that indicate seasonal flow of surface water.

Although we did not observe groundwater during our subsurface investigation, our experience has shown that seepage may be encountered in excavations which

reveal the soil/weathered rock transition, particularly during or after the rainy season.

3 LABORATORY TESTING

We performed laboratory tests on selected soil samples collected from our exploratory trenches to determine their engineering material properties. These engineering material properties were used to develop geotechnical engineering design recommendations for earthwork and structural improvements. We performed the following laboratory tests:

- Expansion Index (ASTM D4829),
- Atterberg Limits (ASTM D4318),
- Moisture-Density Determination (ASTM D2216 and D2937),
- Direct Shear (ASTM D3080), and
- Particle Size Determination (ASTM D1140).

Table 3.1 summarizes moisture/density and direct shear test results from our investigation. Appendix D presents graphical Atterberg limits determination, particle size distribution, expansion index, maximum density determination, and direct shear test results.

Table 3.1 – Summary of Moisture/Density and Direct Shear Testing

Boring Number	Sample Number	Depth (feet)	Dry Density (pcf)	Moisture Content (%)	Shear Friction Angle (degrees)	Shear Cohesion (psf)
T20	BT20-2	2	81.6	17.3	--	--
T20	BT20-3	3	87.1	15.8	--	--
B1	BT1-5	5	84.3	26.5	--	--
B1	BT1-10	10	84.7	22.6	40	310
B2	BT2-5	5	81.8	23.5	--	--
B2	BT2-10	10	70.7	26.8	--	--
B2	BT2-15	15	65.6	35.8	37	370
B2	BT2-20	20	80.6	31.3	--	--

As part of our investigation, we performed a particle size determination and Atterberg limits determinations on portions of bulk samples collected from exploratory trench T6 (CB6-3), trench T20 (CB20-1) and boring B2 (CB2-10) which

were considered to represent the typical subsurface soil conditions encountered across the project site.

Sample CB6-3 was a composite sample of the soil collected from depths ranging from approximately 2 feet to 4 feet below the ground surface. The sieve analysis revealed that the soil was predominantly coarse grained, with approximately 13 percent gravel, 46 percent sand, and 41 percent silt and clay-size particles. The Atterberg limits determination revealed that the fine grained portion of the sample possessed relatively low plasticity, with a liquid limit of 35 and a plastic limit of 31, resulting in a plasticity index of 4. Based on the results of the particle size analysis and the Atterberg limits determination, the soil sample was classified as silty sand.

Sample CB20-1 was a composite sample of soil collected from depths ranging from the ground surface to approximately 1.5 feet below the ground surface in exploratory trench T20. The particle size analysis revealed that this sample was predominantly fine grained, with 59 percent silt and clay-size particles. The Atterberg limits determination revealed that the fine grained material possessed relatively low plasticity, with a liquid limit of 39, a plastic limit of 28, resulting in a plasticity index of 11. Based on the results of the particle size analysis and the Atterberg limits determination, the soil sample was classified as sandy silt with gravel.

Sample CB2-10 was a composite sample of soil collected from depths ranging from approximately 5 feet to 10 feet below the ground surface in exploratory boring B-2. The particle size analysis revealed that this sample was predominantly fine grained, with 75 percent silt and clay-size particles. The Atterberg limits determination revealed that the fine grained material possessed a liquid limit of 68, and a plastic limit of 41, resulting in a plasticity index of 27. Based on the results of the particle size analysis and the Atterberg limits determination, the soil sample was classified as an elastic silt.

Because of the predominantly fine-grained nature of sample CB2-10, we elected to run an expansion index test to evaluate the expansion potential of the material. Portions of the sample were remolded in a 1.0-inch-high ring and submerged in water under an applied loading of 144 pounds per square foot (psf). We observed the loaded samples for approximately 24 hours. During that time we measured the swell with a dial micrometer. Expansion index test results of 37 indicated low expansion potential.

4 CONCLUSIONS

The following conclusions are based on our field observations, laboratory test results, and our experience in the area.

1. Our opinion is that the site is suitable for the proposed improvements, provided that the geotechnical engineering recommendations and design criteria presented in this report are incorporated into the project plans.

2. Our primary concern regarding the project site, from a geotechnical engineering standpoint, is the possible presence of the historical Crosby Shaft and New Shaft within or adjacent to areas of proposed improvements. These shafts present a potential physical hazard in the form of possible future ground subsidence, settlement, or collapse. We were able to identify the general subsurface soil and rock conditions in the vicinity of the suspected shaft locations to allow an initial evaluation of the potential hazards. We have also used this information to develop geotechnical engineering recommendations to mitigate the potential hazards associated with the historical mining excavations. Our opinion is that the historical shafts can be successfully mitigated by confirming the shaft locations during site preparation and grading, overexcavating as appropriate to allow observation of shaft orientation and adjacent subsurface conditions, and physical closure of the shafts through the placement of engineered backfill, if necessary, depending on the location of the shaft relative to the proposed improvements.

3. An additional concern with the project site is the presence of existing shallow surface depressions, surface irregularities, stockpiled materials, shallow fill, and other features indicating past soil disturbance due to historical mining excavations on the project site. Based on the results of our investigation, it appears that the majority of the existing depressions are relatively shallow features which can be appropriately mitigated during grading by conventional means such as overexcavation as necessary to reveal competent subsurface conditions (e.g. weathered rock or competent, undisturbed native soil) and replacement with compacted fill as needed to restore grades or reach desired finish subgrades. Detailed observation by the project geotechnical engineer during site preparation and grading will be required to confirm and document the appropriate excavation and backfill placement to allow future development over the depressions.

4. Existing stockpiles of soil and previously placed fill associated with historical mining activities, site clearing and vegetation removal, and access road

construction are located on the project site, particularly in the lower portions of the site near the existing seasonal drainage swale. The presence of existing, undocumented fill of varying compaction and derived from varying sources increases the likelihood of future settlement-induced distress to improvements constructed at the site. In general, footings for proposed structures should either be constructed in competent, native soil conditions or compacted and tested fill. To accomplish this, we anticipate that overexcavation of existing fill and replacement as compacted fill, in accordance with the recommendations presented in this report, will be the preferred method to mitigate the presence of existing fill within proposed improvement areas. Other possible mitigation approaches include the use of deepened footings, pier-and-grade-beam foundations, or mat foundations. Recommendations to mitigate the presence of existing fill through overexcavation and grading are included in this report. Once plans for the proposed structures have been prepared, including calculations of anticipated loads, we can provide a review to determine if other mitigation options are feasible from a cost and constructability standpoint.

5. Approximately 1,750 cubic yards of slightly mineralized soil has been identified in existing stockpiles likely associated with the historical Crosby Shaft. As currently described in the January 2014 Soil Management Plan prepared by Holdrege & Kull, this material will be placed as compacted fill within the proposed road alignment. The Soil Management Plan provides more detailed information regarding the characterization of the materials and their placement and should be referenced.

6. Based on our site observations, the geology of the region, and our experience in the area, our opinion is that the risk of seismically induced hazards such as slope instability, liquefaction, and surface rupture are remote at the project site.

7. Prior to grading and construction, we should be retained to review the proposed grading plan and structural improvements to confirm our recommendations.

5 RECOMMENDATIONS

The following geotechnical engineering recommendations are based on our understanding of the project as currently proposed, our field observations, the results of our laboratory testing program, engineering analysis, and our experience in the area.

5.1 SHAFT MITIGATION

Our primary concern regarding the project site is the potential hazard associated with historical mining excavations within or adjacent to areas of proposed residential development. The presence of historical mining excavations presents hazards associated with the settlement of poorly backfilled depressions and collapse of subsurface excavations. While the surface depressions we investigated during our study appear to be mitigatable by overexcavation during site preparation and grading, the presence of the historical Crosby Shaft and New Shaft warrants additional steps to reduce the hazard of differential settlement, ground subsidence and subsurface collapse associated with these deeper excavations. Our review of historical documents indicates that these shafts may be located within or adjacent to areas of proposed residential development. Their probable locations, as established by KPFF based on a review of historical documents following our field investigation, are indicated on Figure 2.

The suspected location of the New Shaft coincides with an area of irregular topography near the western boundary of the project site, generally downslope of the northernmost proposed residential lot (Lot 11). The reported orientation of the shaft indicates that the historical excavation extends beneath the northern portion of proposed Lot 11, in the vicinity of the proposed sewer lift station. At present, access to the suspected shaft location is limited by the presence of dense vegetation and steep slopes. However, during site preparation for grading, we anticipate that the removal of trees and surface vegetation will allow for improved access to this location.

The Crosby Shaft is likely located in an area of proposed residential development. Prior to the identification of probable shaft locations by KPFF, the Crosby Shaft was thought to possibly be located in an area of irregular surface topography to the east of a significant stockpile in the vicinity of proposed Lots 16 and 17. However, trenching in this area performed during our recent investigation revealed shallow surface soil disturbed by past clearing and grading underlain by weathered rock at relatively shallow depth. No subsurface tunnel or shaft was found. It is possible that the former shaft excavation has been obscured by past grading and fill placement in this area, or that the shaft is located elsewhere, as indicated in recent mapping by KPFF. Based on the observations made during our geotechnical investigation and the results of mapping by KPFF, we anticipate that the entrance to the Crosby Shaft is likely located immediately adjacent to or within the existing drainage channel, in an area that is relatively inaccessible to conventional excavation equipment without tree removal.

To mitigate the presence of the historical Crosby Shaft and New Shaft, we recommend that excavation be performed following the removal of trees and surface vegetation at the site as a part of site preparation. The excavations will be observed by representatives of Holdrege & Kull to document shaft dimensions and orientation and also to allow observation of the adjacent subsurface soil and rock conditions. Physical closure of the shafts, if necessary depending on their location relative to the proposed improvements, would then be performed based on the recommendations of the project geotechnical engineer with regard to the subsurface conditions encountered. Typically, the closure would include overexcavation to remove loose or accumulated soil near the shaft entrance and potentially unstable materials, and the placement of compacted backfill to restore surface grades. In some cases, it may be appropriate to utilize grout or concrete to close a shaft, depending on the subsurface conditions encountered.

Backfill placed within proposed lots would be considered structural fill, with the intent of supporting future improvements. If overexcavation is limited due to the presence of drainage swales, steep topography, or other restrictions, it is possible that the mitigation measures may be expanded to include the use of alternative foundation systems such deepened pier-and-grade-beams or mat foundations to further reduce the hazards associated with future differential settlement or subsidence to the proposed structures.

5.2 GRADING

The following sections present our grading recommendations. The grading recommendations address clearing and grubbing, soil preparation, cut slope grading, fill placement, fill slope grading, erosion control, subsurface drainage, surface water drainage, construction dewatering, underground utility trenches, soil corrosion potential, plan review, and construction monitoring.

5.2.1 Clearing and Grubbing

The areas to be graded should be cleared and grubbed to remove vegetation and other deleterious materials as described below.

1. Strip and remove debris from clearing operations and the top 3 to 6 inches of soil containing shallow vegetation, landscaped materials, roots and other deleterious materials. Organic topsoil can be stockpiled onsite and used in landscape areas but is not suitable for use as fill. The project geotechnical engineer should approve any proposed use of the spoil generated from stripping prior to placement.

2. Overexcavate any relatively loose debris and soil that is encountered in existing surface depressions, our previous exploratory trenches or any other onsite excavations to underlying, competent material. Possible excavations include exploratory trenches excavated by others, prospect pits, mantles or soil test pits, and holes resulting from tree stump or boulder removal.

3. Loose or untested fill encountered during site development should be overexcavated as necessary to reveal competent native soil or weathered rock a minimum of 5 feet beyond the areas of proposed structural improvements. To accomplish this, we recommend that a representative of Holdrege & Kull be notified to visit the site during the initial stages of clearing and site preparation in order to observe the subsurface conditions revealed and delineate the extent of existing fill within areas of proposed improvements.

4. Remove rocks greater than 8 inches in greatest dimension (oversized rock) from native soil by scarifying to a depth of 12 inches below finish grade or to resistant, competent rock in areas to support pavement, slabs-on-grade or other flatwork. Oversized rock may be used in landscape areas, rock landscape walls, or removed from the site. Oversized rock can be stockpiled onsite and used to construct fills, but must be placed at or near the bottom of deep fills and must be placed in windrows to avoid nesting. To avoid conflict with future utility or foundation excavations, no oversized rock should be placed in the upper 3 feet of any structural fill. The project geotechnical engineer should approve the use of oversized rock prior to constructing fill.

5. Fine grained, potentially expansive soil, as determined by H&K, that is encountered within proposed building footprints or paved areas during grading should be mixed with granular soil, or overexcavated and stockpiled for removal from the project site or for later use in landscape areas. A typical mixing ratio for granular to expansive soil is 4 to 1. The actual mixing ratio should be determined by H&K.

6. Vegetation, deleterious materials, structural debris, and oversized rocks not used in landscape areas, drainage channels, or other non-structural uses should be removed from the site.

5.2.2 Cut Slope Grading

Site development will result in the grading of permanent cut slopes. We have provided general cut slope grading recommendations to facilitate site planning and grading plan preparation.

We recommend that cut slopes in native soil at the site be graded no steeper than 2:1, horizontal to vertical (H:V), to a maximum height of approximately 20 feet. Steeper cut slopes may be feasible, depending on the soil/rock conditions encountered and should be reviewed on a case-by-case basis. The upper two feet of all cut slopes should be "rolled" or graded to conform to the native slope gradients to reduce sloughing and erosion of looser surface soil.

Temporary cut slopes may be constructed to facilitate retaining wall construction. We anticipate that subsurface conditions will be favorable for construction of temporary cut slopes no steeper than ½:1, H:V, for a maximum height of approximately 8 feet. To reduce the likelihood of sloughing or failure, temporary cut slopes should not remain over the winter.

A representative of H&K must observe temporary cut slopes steeper than 2:1, H:V, during grading to confirm the soil and rock conditions encountered. We recommend that personnel not be allowed between the cut slope and the proposed retaining structure, form work, grading equipment, or parked vehicles during construction, unless the stability of the slope has been reviewed by H&K or the slope has been confirmed to meet OSHA excavation standards.

5.2.3 Soil Preparation for Fill Placement

Where fill placement is proposed, the surface soil exposed by site clearing and grubbing should be prepared as described below.

1. The surface soil should be scarified to a minimum depth of 8 inches below the existing ground surface, or to resistant rock, whichever is shallower. Following scarification, the soil should be uniformly moisture conditioned to within approximately 3 percentage points of the ASTM D1557 optimum moisture content.
2. The scarified and moisture conditioned soil should then be compacted to achieve a minimum relative compaction of 90 percent based on ASTM D1557 maximum dry density. The moisture content, density, and relative percent compaction should be verified by a representative of H&K. The earthwork contractor should assist our representative by excavating test pads with onsite earth moving equipment.
3. Where fill placement is proposed on native slopes steeper than approximately 5:1, H:V, a base key and routine benches must be provided. Unless otherwise recommended by the project geotechnical engineer, the base key should be excavated at the toe of the fill a minimum of 2 feet into competent

stratum or to resistant weathered rock, as determined by a representative of H&K during construction observation. The bottom of the base key should be sloped slightly into the hillside at an approximate gradient of 5 percent or greater.

4. The fill must be benched into existing side slopes as fill placement progresses. Benching must extend through loose surface soil into firm material, and at intervals such that no loose surface soil is beneath the fill. As a minimum, a horizontal bench should be excavated every 5 vertical feet or as determined by a representative of H&K.

5.2.4 Fill Placement

Soil fill placement proposed for the project should incorporate the following recommendations:

1. Soil used for fill should consist of uncontaminated, predominantly granular, non-expansive native soil or approved import soil. If encountered, rock used in fill should be broken into pieces no larger than 8 inches in diameter. Rocks larger than 8 inches are considered oversized material and should be stockpiled for offhaul or later use in landscape areas and drainage channels.
2. Import soil should be predominantly granular, non-expansive and free of deleterious material. Import material that is proposed for use onsite should be submitted to H&K for approval and possible laboratory testing at least 72 hours prior to transport to the site.
3. Cohesive, predominantly fine grained, or potentially expansive soil encountered within proposed building footprints or paved areas during grading should be stockpiled for removal, mixed as directed by H&K, or used in landscape areas.
4. As an option, cohesive fine grained, or potentially expansive soil can often be placed in the deeper portions of proposed fill (e.g., depths greater than 3 feet below subgrade in building footprints). However, this option would have to be evaluated on a case-by-case basis with consideration of the fill depth and proposed loading.
5. Soil used to construct fill should be uniformly moisture conditioned to within approximately 3 percentage points of the ASTM D1557 optimum moisture content. Wet soil may need to be air dried or mixed with drier material to facilitate placement and compaction, particularly during or following the wet season.

6. Fill should be constructed by placing uniformly moisture conditioned soil in maximum 8-inch-thick loose, horizontal lifts (layers) prior to compacting.
7. All fill should be compacted to a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density. The upper 12 inches of fill in paved areas or beneath proposed slabs-on-grade should be compacted to a minimum of 95 percent relative compaction.

The moisture content, density and relative percent compaction of fill should be confirmed by a representative of H&K during construction.

5.2.5 Differential Fill Depth

The recommendations presented in this section are intended to reduce the magnitude of differential settlement-induced structural distress associated with variable fill depth beneath individual structures.

1. Site grading should be performed so that cut-fill transition lines do not occur directly beneath any structures. The cut portion of the cut-fill building pads, if proposed, should be scarified to a minimum depth of 8 inches, and recompacted to 95 percent relative compaction.
2. Differential fill depths beneath structures should not exceed 5 feet. For example, if the maximum fill depth is 8 feet across a building pad, the minimum fill depth beneath that pad should not be less than 3 feet. If a cut-fill building pad is used in this example, the cut portion would need to be overexcavated 3 feet and rebuilt with compacted fill.

5.2.6 Fill Slope Grading

Based on our understanding of the project, we anticipate that grading to develop building pads and driveway areas may result in the creation of minor fill slopes less than 12 feet in height. However, taller fill slopes may be associated with road grading for the project. In general, permanent fill slopes created onsite should be no steeper than 2:1, H:V. H&K should review fill slope configurations greater than approximately 12 feet in height, if proposed, prior to fill placement. Compaction and fill slope grading must be confirmed by H&K in the field.

Steeper fill slopes may be feasible with the use of geotextile reinforcement and/or rock facing. We can provide reinforced or buttressed fill slope design for the project, if requested.

Slopes should be constructed by overbuilding the slope face and then cutting it back to the design slope gradient. Fill slopes should not be constructed or extended horizontally by placing soil on an existing slope face and/or compacted by track walking.

5.2.7 Erosion Controls

Graded portions of the site should be seeded as soon as possible to allow vegetation to become established prior to and during the rainy season. As a minimum, the following controls should be installed prior to and during grading to reduce erosion.

1. Prior to commencement of site work, fiber rolls should be installed down slope of the proposed area of disturbance to reduce migration of sediment from the site. Fiber rolls on slopes are intended to reduce sediment discharge from disturbed areas, reduce the velocity of water flow, and aid in the overall revegetation of slopes. The fiber rolls should remain in place until construction activity is complete and vegetation becomes established.
2. All soil exposed in slope faces should be hydroseeded or hand seeded/strawed with an appropriate seed mixture compatible with the soil and climate conditions of the site as recommended by the local Resource Conservation District.
3. Following seeding, jute netting or erosion control blankets should be placed and secured over the slopes steeper than 2:1, H.V.
4. Surface water drainage ditches should be established as necessary to intercept and redirect concentrated surface water away from cut and fill slope faces. Under no circumstances should concentrated surface water be directed over slope faces. The intercepted water should be discharged into natural drainage courses or into other collection and disposal structures.

5.2.8 Underground Utility Trenches

Underground utility trenches should be excavated and backfilled as described below.

1. The California Occupational Safety and Health Administration (OSHA) requires all utility trenches deeper than 4 feet bgs be shored with bracing equipment prior to being entered by any individuals, whether or not they are associated with the project.

2. We anticipate that shallow subsurface seepage may be encountered, particularly if utility trenches are excavated during the winter or spring. The earthwork contractor may need to employ dewatering methods as discussed in the Construction Dewatering section to excavate, place and compact the trench backfill materials.

3. Trench backfill used within the bedding zone and shading zone portion of the trench should consist of ¾-inch minus crushed rock or a similar, predominantly granular material approved by the engineer.

4. Soil used as trench backfill should consist of non-expansive soil with a PI of less than or equal to 15 (based on ASTM D4318) and should not contain rocks greater than 3 inches in greatest dimension.

5. Soil used to construct trench backfill should be uniformly moisture conditioned to within 3 percentage points of the ASTM D1557 optimum moisture content.

6. Trench backfill should be constructed by placing uniformly moisture conditioned soil in maximum 12-inch-thick loose lifts (layers) prior to compacting.

7. Trench backfill placed in the pipe bedding zone (beneath the utilities) should be compacted to a minimum relative compaction of 95 percent of the ASTM D1557 maximum dry density.

8. Granular trench backfill placed within the pipe shading zone (above the bedding zone and to a height of one pipe radius above the pipe spring line) and transition zone (to one foot over the crown of the pipe) should be compacted to a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density.

9. Soil backfill should be compacted to a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density. Trench backfill placed within the upper 12 inches of finished subgrade in paved areas should be compacted to a minimum relative compaction of 95 percent of the ASTM D1557 maximum dry density.

10. The loose lift thickness, moisture, density and relative compaction of the trench backfill soil should be verified by a representative of H&K.

11. Construction quality assurance tests should be performed at a frequency determined by the project geotechnical engineer.

5.2.9 Construction Dewatering

Seepage may be encountered during grading, particularly in deeper excavations made during site preparation. The earthwork contractor should be prepared to dewater excavations if seepage is encountered during grading. Seepage may be encountered if grading is performed during or immediately after the rainy season. In addition, perched groundwater may be encountered on low permeability soil or weathered rock layers even during the summer months, particularly in areas which were previously subject to landscape irrigation and at excavation locations near existing seasonal drainage swale in the southern and western portions of the project site.

If subsurface seepage or groundwater conditions are encountered which prevent or restrict fill placement or construction of the proposed improvements, subdrains may be necessary. If groundwater or saturated soil conditions are encountered during grading, we should be retained to observe the conditions and provide site specific subsurface drainage recommendations.

5.2.10 Soil Corrosion Potential

Index testing of the soil in an effort to evaluate corrosion potential was not performed as a part of our soil evaluation. To reduce the likelihood of corrosion problems, materials used for underground utilities, permanent subsurface drainage improvements, and foundation systems should be selected based on local experience and practice. If alternative or new construction methods or materials are being proposed, it may be appropriate to have the selected materials evaluated by a corrosion engineer for compatibility with the onsite soil and groundwater conditions.

5.2.11 Surface Water Drainage

Proper surface water drainage is important to the successful development of the project. We recommend the following measures to help mitigate surface water drainage problems:

1. Slope final grades in structural areas so that surface water drains away from building pad finish subgrade at a minimum 4 percent slope for a minimum distance of 10 feet.
2. To reduce surface water infiltration, compact and slope all soil placed adjacent to building foundations such that water is not allowed to pond. Backfill should be free of deleterious materials.

3. Direct downspouts to positive drainage or a closed collector pipe that discharges flow to positive drainage.
4. Construct V-ditches at the top of cut and fill slopes where necessary to reduce concentrated surface water flow over slope faces. Typically, V-ditches should be 3 feet wide and at least 6 inches deep. Surface water collected in V-ditches should be directed away and downslope from proposed building pads and driveways into a drainage channel.

5.2.12 Grading Plan Review and Construction Monitoring

Construction quality assurance includes review of plans and specifications and performing construction monitoring as described below.

1. H&K should be retained to review the final grading plans prior to construction to confirm our understanding of the project at the time of our investigation, to determine whether our recommendations have been implemented, and to provide additional and/or modified recommendations, if necessary.
2. H&K should be retained to perform construction quality assurance (CQA) monitoring of all earthwork grading performed by the contractor to determine whether our recommendations have been implemented, and if necessary, provide additional and/or modified recommendations.

5.3 STRUCTURAL IMPROVEMENT DESIGN CRITERIA

The following sections present our structural improvement design criteria and recommendations. The recommendations address foundations, seismic parameters, concrete slabs-on-grade, and retaining wall design.

5.3.1 Seismic Design Criteria

Table 5.3.1.1 below summarizes seismic design criteria based on ASCE 7-10, the 2013 California Building Code and the United States Geological Survey (USGS), *Java Ground Motion Parameter Calculator, Earthquake Ground Motion Tools, Version 5.1.0*, to develop the following seismic design parameters.

5.3.1.1 - Seismic Design Parameters					
Description	**Value**	**Reference**	**Description**	**Value**	**Reference**
Latitude Longitude	39.253 -121.035	1	Site Class	C	2
Site Coefficient, F_A	1.184	5	Site Coefficient, F_V	1.599	6
S_S modified for Site Class Effects, S_{MS}	0.640*g*	3	S_1 modified for Site Class Effects, S_{M1}	0.321*g*	4
Design Spectral Response Acceleration, Short Periods, S_{DS}	0.426*g*	7	Design Spectral Response Acceleration, Long Periods, S_{D1}	0.214*g*	8

References:

1. *USGS 7.5 min*
2. *ASCE 7-10 Table 20.3-1*
3. *ASCE 7-10 Figure 22-1*
4. *ASCE 7-10 Figure 22-2*
5. *ASCE 7-10 Table 11.4-1*
6. *ASCE 7-10 Table 11.4-2*
7. *ASCE 7-10 Equation 11.4-3*
8. *ASCE 7-10 Equation 11.4-4, CBC, Equation 16-38*

5.3.2 Foundations

Provided that the grading for the project is performed in accordance with the recommendations presented in this report, our opinion is that the site will be suitable for the use of conventional perimeter foundations, isolated interior footings, and interior slabs-on-grade. Following are our recommendations for foundations constructed on compacted and tested fill or competent native soil:

1. We recommend that footings for the proposed residential structures be a minimum of 12 inches wide and deepened as necessary to extend through any loose surface material and provide a minimum embedment of 12 inches into the underlying competent native soil, weathered rock, or compacted and tested fill as confirmed in the field by H&K. Footings for two-story structures, if proposed, should be a minimum of 15 inches wide and trenched a minimum of 18 inches into competent native soil, weathered rock or compacted fill. If clay is encountered at the base of footing excavations, the footing should be deepened through the clay lens into underlying granular material or weathered rock, as determined in the field by H&K.
2. The base of the footing excavation should be approximately level. Because of the sloping nature of the site, it may be necessary to step the base of the

footing excavation as necessary to maintain a slope of less than 10 percent at the base of the footing.

3. Footing trenches should be cleaned of all loose soil and construction debris prior to placing concrete. A representative from H&K should observe the footing excavations prior to concrete placement.

4. As a minimum, the footings should be designed with two No. 4 rebar reinforcement, one near the top of the footing and one near the bottom. A minimum of 3 inches of concrete coverage should surround the bars.

5. Footing excavations should be saturated prior to placing concrete to reduce the risk of problems caused by wicking of moisture from curing concrete. However, concrete should not be placed through standing water in the footing excavations.

6. In an effort to reduce the likelihood of settlement-induced distress to the proposed structures, we recommend that strip and isolated footings with a minimum embedment depth of 12 inches into the underlying, severely weathered rock be sized for an allowable bearing pressure of 2,000 psf for dead plus live loads. This value can be increased by 500 psf for each additional foot of embedment up to a limiting value of 3,000 psf. Allowable bearing may be increased by 33 percent for additional transient loading, such as wind or seismic loads.

7. A triangularly-distributed lateral resistance (passive soil resistance) of 275d psf, where d is footing depth, may be used for footings. This value may be increased by 33 percent for wind and seismic. As an alternate to the passive soil resistance described above, a coefficient of friction for resistance to sliding of 0.35 may be used.

8. Total settlement of individual foundations will vary depending on the plan dimensions of the foundation and actual structural loading. Based on anticipated foundation dimensions and loads, we estimate that total post-construction settlement of footings designed and constructed in accordance with our recommendations will be on the order of one-half inch. Differential settlement between similarly loaded, adjacent footings is expected to be less than one-quarter inch, provided footings are founded on similar materials (e.g., all on structural fill, native soil or rock). Differential settlement between adjacent footings founded on dissimilar materials (e.g., one footing on soil and an adjacent footing on rock) may approach the maximum anticipated total settlement. Settlement of foundations is expected to occur rapidly and should be essentially complete shortly after initial application of loads.

5.3.3 Slabs-on-Grade

Our opinion is that concrete slabs-on-grade may be used in conjunction with perimeter concrete foundations for the proposed improvements. The project structural engineer should design slabs-on-grade with regard to the anticipated loading. This section presents typical slab sections and reinforcement schedules used for construction in the region and presents construction recommendations. We can provide project specific slab-on-grade design for the proposed improvements once anticipated loading and serviceability criteria have been established.

1. The slab-on-grade should be a minimum of 4 inches thick. If floor loads higher than 250 psf or intermittent live loads are anticipated, a structural engineer should determine the slab thickness and steel reinforcing schedule.
2. The subgrade soil around the slab-on-grade should be sloped away from the proposed slab subgrade a minimum of 4 percent for a distance of 10 feet as discussed in the Surface Water Drainage section of this report. A representative from H&K should observe pad and subgrade elevations prior to forming the slab footings.
3. As a minimum, No. 3 rebar on 24-inch centers or flat sheets of 6x6, W4.0xW4.0 welded wire mesh (WWM) should be used as slab reinforcement. We do not recommend using rolls of WWM because vertically centered placement of rolled mesh within the slab is difficult to achieve. All rebar and sheets of WWM should be placed in the center of the slab and supported on concrete "dobies". We do not recommend "hooking and pulling" of steel during concrete placement.
4. Prior to placing the vapor retarder and concrete, slab subgrade soil must be moisture conditioned by the application of water to between 75 and 90 percent saturation to a depth of 24 inches. Moisture conditioning should be performed for a minimum of 24 hours prior to concrete placement. Clayey soil may take up to 72 hours to reach this required degree of saturation. If the soil is not moisture conditioned prior to placing concrete, moisture will be wicked out of the concrete, possibly contributing to shrinkage cracks. Additionally, our opinion is that moisture conditioning the soil prior to placing concrete will reduce the likelihood of soil swell or heave following construction at locations where fine grained, potentially expansive soil is encountered. To facilitate slab-on-grade construction, we recommend that the slab subgrade soil be moisture conditioned following rock placement. Following moisture conditioning, the vapor retarder should be placed.

5. Slabs should be underlain by 4 inches of washed rock. The rock should be uniformly graded so that 100% passes the 1-inch sieve, with 0% to 5% passing the No. 4 sieve. Following rock placement, the subgrade soil should be moisture conditioned for 24 hours. The rock should then be overlain by a vapor retarder at least 15 mils thick. All penetrations through the vapor retarder should be taped or sealed to reduce vapor. Laps in the vapor retarder should be taped. If requested, H&K can provide observation of the vapor retarder prior to placing concrete. The vapor retarder may be omitted in areas that do not have moisture sensitive floor coverings (i.e., exterior parking areas).

6. Regardless of the type of vapor retarder used, moisture can wick up through a concrete slab. Excessive moisture transmission through a slab can cause adhesion loss, warping and peeling of resilient floor coverings, deterioration of adhesive, seam separation, formation of air pockets, mineral deposition beneath flooring, odor and fungi growth. Slabs can be tested for water transmissivity in areas that are moisture sensitive. Commercial sealants, entrained air, fly ash and a reduced water to cement ratio can be incorporated into the concrete to reduce slab permeability. A waterproofing consultant should be contacted if moisture sensitive flooring is proposed.

7. Expansion joints should be provided between the slab and perimeter footings. Control joints should bisect the length and width of the slab at intervals specified by the American Concrete Institute (ACI) or Portland Concrete Association (PCA).

8. Exterior slabs-on-grade, such as sidewalks, may be placed directly on compacted fill without the use of a baserock section. For exterior slabs, the native soil should be ripped, moisture conditioned and recompacted to an 8-inch depth per the grading recommendations presented in this report.

9. All deleterious material must be removed prior to placing concrete.

10. We recommend that concrete have a water/cement ratio no greater than 0.45. Pozzolans or other additives may be added to increase workability.

11. Exposed concrete slabs should be moisture cured for at least seven days after placement. Excessive curling of the slab may occur if moisture conditioning is not performed. This is especially critical for slabs that are cast during the warm summer months.

12. Concrete slabs impart a relatively small load on the subgrade (approximately 50 psf). Therefore, some vertical movement should be anticipated from possible expansion or differential loading.

5.3.4 Retaining Wall Design Criteria

The following active and passive pressures are for retaining walls in cut native soil or backfilled with granular onsite soil. If import soil is used, a representative from our firm should be retained to observe and test the soil to determine its strength properties. The pressures exerted against retaining walls may be assumed to be equal to a fluid of equivalent unit weight.

Table 5.3.4.1 presents equivalent fluid unit weights for cut native soil and onsite fill compacted per the grading recommendations presented in this report. For approximately horizontal backfill we assume that the retained fill surface will be no steeper than 10% for a minimum distance of the wall height from the back of the retaining wall. If surcharge loads (such as adjacent building foundations) or live loads will be applied within a distance of the wall height from the back of the wall, we should be retained to review the loading conditions and revise our recommendations, if necessary.

Table 5.3.4.1 - Equivalent Fluid Unit Weights (1)

Loading Condition	Retained Cut or Compacted Fill (approximately horizontal backfill)	Retained Cut or Compacted Fill (retained slope up to 2:1, H:V)
Active Pressure (pcf)	30	45
Passive Pressure (pcf)	250	250
At-Rest Pressure (pcf)	50	65
Coefficient of Friction	0.35	0.35

Note: (1) The equivalent fluid unit weights presented are ultimate values and do not include a factor of safety. The passive pressures provided assume footings are founded in competent native soil or engineered fill.

Please note that the use of the tabulated active pressure unit weight requires that the wall design accommodate sufficient deflection for mobilization of the retained soil to occur. Typically, a wall yield of less than 1 percent of the wall height is sufficient to mobilize active conditions in granular soil. However, if the walls are rigid or restrained to prevent rotation, at-rest conditions should be used for design.

Recommendations for design and construction of retaining walls are listed below:

1. Compaction equipment should not be used directly adjacent to retaining walls unless the wall is designed or braced to resist the additional lateral pressures.

2. If any surface loads are closer to the top of the retaining wall than its height, H&K should review the loads and loading configuration. We should be retained to review wall details and plans for any wall over 10 feet in height.

3. Retaining walls must be well drained to reduce hydrostatic pressures. Walls should be provided with a drainage blanket to reduce additional lateral forces and minimize saturation of the backfill soil. Drainage blankets may consist of graded rock drains or geosynthetic blankets.

4. Adequate drainage and waterproofing for retaining walls associated with finished interior spaces are essential to reduce the likelihood of seepage and vapor transmission into the living space. We recommend that an appropriate waterproofing sealant be applied to the exterior surface of such retaining walls. A waterproofing consultant may be contacted to further review seepage and vapor transmission.

5. Rock drains should consist of a minimum 12-inch wide, Caltrans Class II, permeable drainage blanket, placed directly behind the wall; or crushed washed rock enveloped in a non-woven geotextile filter fabric such as Amoco 4546™ or equivalent. Drains should have a minimum 4-inch diameter, perforated, schedule 40, PVC pipe placed at the base of the wall, inside the drainrock, with the perforations placed down. The PVC pipe should be sloped so that water is directed away from the wall by gravity. A geosynthetic drainage blanket such as Enkadrain™ or equivalent may be substituted for the rock drain, provided the collected water is channeled away from the wall. If a geosynthetic blanket is used, backfill must be compacted carefully so that equipment or soil does not tear or crush the drainage blanket.

6. Additional lateral loading on retaining structures due to seismic accelerations may be considered at the designer's option. For an earthquake producing a design horizontal acceleration of 0.2g, we recommend that the resulting additional lateral force applied to unrestrained (cantilevered) retaining structures with drained level backfill onsite be estimated as $P_{ae}=9H^2$ pounds, where H is the height of the wall in feet. The additional seismic force may be assumed to be applied at a height of 0.6H above the base of the wall. This seismic loading is for a drained, level backfill condition only; H&K should be consulted for values of seismic loading due to non-level or non-drained backfill conditions. The use of reduced factors of safety is often appropriate when reviewing overturning and sliding resistance during seismic events.

6 LIMITATIONS

The following limitations apply to the findings, conclusions and recommendations presented in this report:

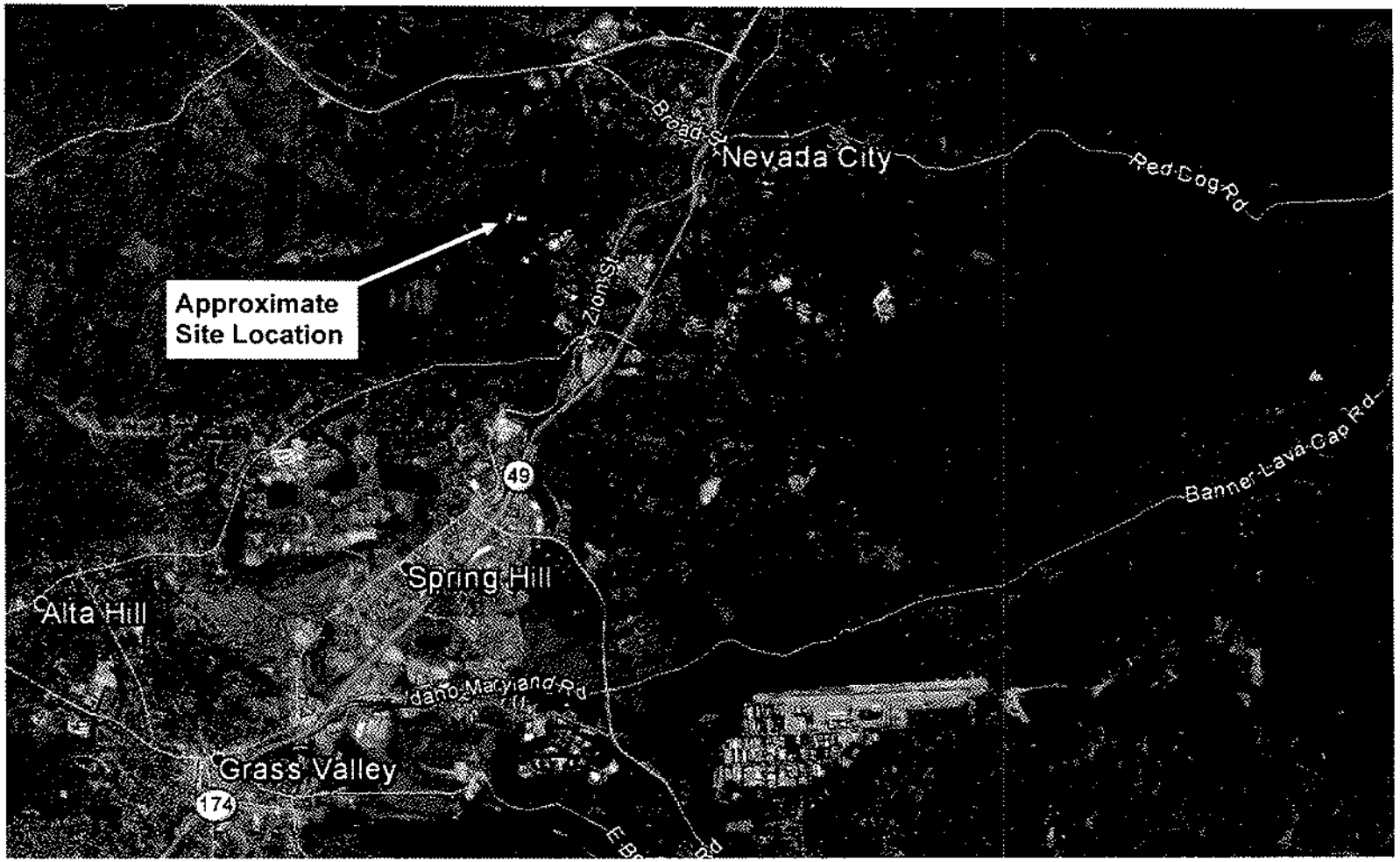
1. Our professional services were performed consistent with the generally accepted geotechnical engineering principles and practices employed in northern California. No warranty is expressed or implied.
2. These services were performed consistent with our agreement with our client. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of our services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report. This report is solely for the use of our client unless noted otherwise. Any reliance on this report by a third party is at the party's sole risk.
3. If changes are made to the nature or design of the project as described in this report, then the conclusions and recommendations presented in this report should be considered invalid. Only our firm can determine the validity of the conclusions and recommendations presented in this report. Therefore, we should be retained to review all project changes and prepare written responses with regards to their impacts on our conclusions and recommendations. However, we may require additional fieldwork and laboratory testing to develop any modifications to our recommendations. Costs to review project changes and perform additional fieldwork and laboratory testing necessary to modify our recommendations are beyond the scope of services presented in this report.
4. The analyses, conclusions and recommendations presented in this report are based on site conditions as they existed at the time we performed our surface and subsurface field investigations. We have assumed that the subsurface soil and groundwater conditions encountered at the locations of our exploratory excavations are generally representative of the subsurface conditions throughout the entire project site. However, the actual subsurface conditions at locations between and beyond our exploratory excavations may differ. Therefore, if the subsurface conditions encountered during construction are different than those described in this report, then we should be notified immediately so that we can review these differences and, if necessary, modify our recommendations.

5. The elevation or depth to groundwater underlying the project site may differ with time and location.

6. The project site map shows approximate exploratory boring and trench locations as determined by pacing distances from identifiable site features. Therefore, the exploratory locations should not be relied upon as being exact nor located with surveying methods.

7. The findings of this report are valid as of the present date. However, changes in the conditions of the property can occur with the passage of time. The changes may be due to natural processes or to the works of man, on the project site or adjacent properties. In addition, changes in applicable or appropriate standards can occur, whether they result from legislation or the broadening of knowledge. Therefore, the recommendations presented in this report should not be relied upon after a period of two years from the issue date without our review.

FIGURES



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Site Vicinity Map
The Grove
Nevada County, California

PROJECT NO. 3006B-01
January 2014
FIGURE 1

LEGEND:

- APPROXIMATE EXPLORATORY TRENCH LOCATION
- APPROXIMATE EXPLORATORY BORING LOCATION

NOTES

BASE MAP PROVIDED BY KPFF CONSULTING ENGINEERS.

N

0 FEET 150

APPROX. SCALE

HOLDREGE & KULL

NEVADA CITY • TRUCKEE • CHICO • YUBA CITY

EXPLORATORY TRENCH AND BORING LOCATION MAP

THE GROVE AT NEVADA CITY

NEVADA CITY TECH CENTER

NEVADA CITY, NEVADA COUNTY, CALIFORNIA

FIGURE 2

JUNE 2014

APPENDIX A PROPOSAL

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

Proposal No. PN13131
August 19, 2013

Mr. Robert Upton
Campus Property Group
12555 Dunbar Road
Glen Ellen, CA 95442

Reference: ***The Glades - Proposed Nevada City Tech Center Housing Area***
Nevada City, California

Subject: ***Proposal to Provide Geotechnical Engineering Services***

Dear Mr. Upton,

At your request, Holdrege & Kull (H&K) is proposing to provide geotechnical engineering services to support future design and construction of residential improvements associated with the Glades project. The project is an approximate 15-acre project site located to the west of the existing Nevada City Tech Center site in Nevada City, California. Associated improvements will include grading to develop building pads and a minor residential street, and construction of underground utilities and pavement.

The project site is located in an area of past soil disturbance due to hydraulic mining and tree and brush removal, as well as grading. In addition, historical hardrock mining has occurred on the project site, resulting in the presence of subsurface tunnel features and wasterock stockpiles on the site. Our geotechnical investigation will focus on determining the general subsurface soil and rock conditions near the proposed building footprints and specifically investigating identified mining relics on the site in an effort to evaluate potential physical hazards and mitigation options.

SCOPE OF SERVICES

We propose to perform a design-level geotechnical investigation in general accordance with the 2010 California Building Code (CBC). Based on our understanding of the project, we propose the following scope of services.

Geotechnical Investigation

H&K will perform a map and literature review of published documents pertinent to the project site, including geologic maps and soil survey maps. We will also review geotechnical reports prepared by Holdrege & Kull for other sites in the vicinity.

Our field investigation will consist of two distinct phases. During the first phase of the field investigation, we will mobilize an excavator to the site to dig exploratory trenches, focusing on apparent mining relics and areas of past soil disturbance. The trenches will be excavated to approximate depths of up to 12 feet, or to refusal on weathered rock if encountered at shallower depths. We plan to have the excavator onsite for two days of trenching.

Following trenching, we will return to the site with a truck mounted, exploratory drill rig for the purposes of advancing up to three exploratory borings in the vicinity of the "New Shaft", a historical mining feature identified on the site. The purpose of the exploratory borings will be to determine the subsurface soil and rock conditions in the area above the historical excavation to allow evaluation of collapse potential. We anticipate that information regarding subsurface rock quality in the area above the shaft will be useful in determining appropriate mitigation measures, including appropriate setbacks. To obtain information about rock quality, we anticipate that the borings would advance through the surface soil and weathered rock to resistant material, and that coring equipment would be used to extend the borings a minimum of 10 feet into resistant rock, if encountered in the upper 30 feet. For cost estimating purposes, we have assumed two full days of drilling services.

An engineer or geologist from our firm will log soil conditions observed and collect relatively undisturbed and bulk soil samples from the exploratory trenches and exploratory borings. Collection of soil samples and the sample intervals will depend upon the soil conditions encountered. The soil samples will be labeled, sealed, and transported to our laboratory where selected samples will be tested to determine their engineering material properties. If groundwater is encountered, the depth to groundwater below the existing ground surface will be measured. Following sample collection, the trenches will be backfilled with soil.

Prior to our field investigation, a representative of H&K will visit the project site to locate the proposed exploratory trench locations for Underground Service Alert (USA). If requested, we can retain a private utility locating service to supplement the USA clearance to reduce the risk of encountering unmarked utilities on the site.

Laboratory Testing

H&K will perform laboratory tests on selected soil samples to determine their engineering material properties. Laboratory tests will be performed using American Society for Testing and Materials (ASTM) and Caltrans methods as guidelines. The testing may include:

D422, Particle Size Determination (if appropriate)
D2216, Moisture Content
D2487, Unified Soil Classification System
D2937, Density
D3080, Direct Shear Strength
D4829, Expansion Index (if appropriate)
D4318, Atterberg Limits (if appropriate).

The actual tests performed may vary, depending on the subsurface conditions encountered. Direct shear testing will be performed to develop site-specific foundation design criteria. If fine-grained soil is encountered during our field investigation, we will perform Atterberg limits and/or expansion index testing in an effort to evaluate expansion potential.

Data Analysis and Engineering

Following the completion of laboratory testing, H&K will develop geotechnical engineering design recommendations for earthwork and structural improvements. The geotechnical engineering design recommendations will address the following:

Earthwork Improvements

1. Soil subgrade preparation.
2. Fill moisture conditioning and compaction.
3. Cut and fill slope grading.
4. Utility trench excavation and backfill.
5. Expansive soil mitigation, if encountered during the investigation.

Structural Improvements

1. Shallow foundation design criteria, including allowable bearing pressure.
2. Retaining wall design criteria.
3. Construction recommendations for slabs-on-grade.
4. Conclusions regarding geologic hazards at the site.
5. Seismic (earthquake shaking) design parameters.

6. Preliminary recommendations for options to mitigate historical mining features.

Report Preparation

We will prepare a geotechnical engineering report for the site that will present our findings, conclusions, and recommendations. The report will include descriptions of site conditions, a summary of the field investigation, laboratory test results, and geotechnical engineering design recommendations for the proposed earthwork and structural improvements, including retaining wall and foundation design criteria. The report will also include a site plan showing the approximate locations of the exploratory trenches and borings. The report appendices will present the exploratory trench and boring logs and laboratory test data.

ASSUMPTIONS AND CLIENT RESPONSIBILITIES

The proposed scope of services is based on the following assumptions:

- The client will provide H&K with the authorization to access the site. Although reasonable care will be used during our investigation, the client understands that unmarked underground utilities may be damaged. H&K will not be responsible for repair of utilities that were not marked or were improperly marked prior to the investigation.
- Five copies of the report will be sent to the client and/or the client's engineers and architects. In addition, we will prepare a pdf format version of the report to facilitate distribution to the project team.

FEES

Our fee to perform the geotechnical investigation described above will be $.
This fee includes the costs associated with two days of excavation services and two days of exploratory drilling for the subsurface investigation. Billing would be monthly on a percent complete basis. If this proposal is acceptable, please sign and return the attached agreement to our office as our authorization to proceed.

SCHEDULE

We will schedule our field investigation within one week of receiving authorization to proceed, weather permitting. We can provide verbal preliminary recommendations within one week following the site investigation based on the field investigation data. However, final recommendations will be developed from

the field and laboratory data. We anticipate the final report will be submitted within three to four weeks following completion of our field investigation.

We appreciate the opportunity to provide you with this proposal. If you have any questions, please feel free to contact our office.

Sincerely,

HOLDREGE & KULL

Robert Fingerson
Principal Engineer

Attached: Terms and Conditions

F:\2 Proposals\PN13131 NC Tech Center\PN13131 Geotechnical Investigation.docx

APPENDIX B *IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT (Included with permission of ASFE, Copyright 2004)*

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

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APPENDIX C EXPLORATORY BORING AND TRENCH LOGS

EXPLORATORY BORING LOG

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

792 Searls Avenue, Nevada City, California, 95959
PHONE: 530-478-1305, FAX: 530-478-1019

Boring No. B-1

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Start:** 11/5/2013	**Sheet:** 1 of 2
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Finish:** 11/5/2013	
Logged By: REF	**Drilling Company:** LAWRENCE AND ASSOCIATES		**Drill Rig Type:** CME 55	
Driller: DAN/JEFF	**Drilling Method:** 8-INCH HOLLOW STEM AUGER (HSA)		**Hammer Type:** -	
Boring Dia. (in.): 8"	**Total Depth (Ft.):** 25.5	**Backfill or Well Casing:** SOIL		

Time (H:M)	Pocket Penetrometer (TSF)	SPT Blow Counts (Blows / Foot)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Well Construction Detail	Graphic Log
			HSA			1			
						2			
						3			
						4			
			2.5" I.D.			5			
		12			BTB-1-5				
			HSA			6			
						7			
						8			
						9			
			2.5" I.D.			10			
		21			BTB-1-10				
			HSA			11			
						12			
						13			
						14			
			2.5" I.D.			15			
		20			BTB-1-15				
			HSA			16			
						17			
						18			
						19			
			2.5" I.D.			20			

Ground Water Information

Date	-	-	-
Time	-	-	-
Depth (ft)	-	-	-

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor, Other)

(GW) GRAVEL ROAD SURFACE - GRAY, SLIGHTLY MOIST, LOOSE WELL GRADED GRAVEL

(SM) REDDISH BROWN, SLIGHTLY MOIST, LOOSE SILTY FINE SAND

(SM) STRONG BROWN, SLIGHTLY MOIST, MEDIUM DENSE SILTY SAND

(SM) YELLOWISH RED (5YR 5/6), SLIGHTLY MOIST, MEDIUM DENSE SILTY SAND. FAINT RELIC ROCK TEXTURE

(ML) GRADES TO YELLOWISH RED, SLIGHTLY MOIST, FINE SANDY SILT

FAINT RESIDUAL ROCK TEXTURE APPARENT IN SAMPLER

(RX-SM) GRADES TO COMPLETELY TO VERY SEVERELY WEATHERED ROCK. DRILLS AS LIGHT REDDISH BROWN (5YR 6/3), SLIGHTLY MOIST, MEDIUM DENSE TO DENSE SILTY SAND

NOTES

EXPLORATORY BORING LOG

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

792 Searls Avenue, Nevada City, California, 95959
PHONE: 530-478-1305, FAX: 530-478-1019

Boring No. B-1

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Start:** 11/5/2013	**Sheet:** 2 of 2
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Finish:** 11/5/2013	
Logged By: REF	**Drilling Company:** LAWRENCE AND ASSOCIATES		**Drill Rig Type:** CME 55	
Driller: DAN/JEFF	**Drilling Method:** 8-INCH HOLLOW STEM AUGER (HSA)		**Hammer Type:** -	
Boring Dia. (In.): 8"	**Total Depth (Ft.):** 25.5	**Backfill or Well Casing:** SOIL		

Time (H:M)	Pocket Penetrometer (TSF)	SPT Blow Counts (Blows / Foot)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Well Construction Detail	Graphic Log
		18	2.5" I.D. HSA		BTB-1-20	21			
						22			
						23			
						24			
			2.5" I.D.			25			
		25			BTB-1-25	26			
						27			
						28			
						29			
						30			
						31			
						32			
						33			
						34			
						35			
						36			
						37			
						38			
						39			
						40			

Ground Water Information

Date	-	-	-
Time	-	-	-
Depth (ft)	-	-	-

Soil and/or Rock Descriptions

(USCS Symbol, USCS Name; Field Estimated Particle Size Gradation (%), Munsel Color; Density/Consistency, Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

(RX-SM) COMPLETELY TO VERY SEVERELY WEATHERED ROCK, FRIABLE. DRILLS AS LIGHT YELLOWISH BROWN AND LIGHT REDDISH BROWN, SLIGHTLY MOIST, MEDIUM DENSE SILTY SAND

BORING TERMINATED AT 25.5 FEET BGS IN VERY SEVERELY WEATHERED ROCK

NOTES

EXPLORATORY BORING LOG

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

792 Searls Avenue, Nevada City, California, 95959
PHONE: 530-478-1305, FAX: 530-478-1019

Boring No. B-2

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Start:** 11/5/2013	**Sheet:** 1 of 2
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Finish:** 11/5/2013	
Logged By: REF	**Drilling Company:** LAWRENCE AND ASSOCIATES		**Drill Rig Type:** CME 55	
Driller: DAN/JEFF	**Drilling Method:** 8-INCH HOLLOW STEM AUGER (HSA)		**Hammer Type:** -	
Boring Dia. (In.): 8"	**Total Depth (Ft.):** 35	**Backfill or Well Casing:** 3 BAGS BENTONITE CHIPS, SOIL		

Ground Water Information

Date	-	-	-
Time	-	-	-
Depth (ft)	-	-	-

Time (H:M) | Pocket Penetrometer (TSF) | SPT Blow Counts (Blows / Foot) | Drilling Method and/or Sampler Type | Sample Recovery (Ft./Ft.) | Sample No. | Depth B.G.S. (Ft.) | Sample Interval And Symbol | Well Construction Detail | Graphic Log

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

11:05 HSA

(SM) DARK REDDISH BROWN (2.5YR 3/4), SLIGHTLY MOIST, LOOSE TO MEDIUM DENSE SILTY FINE SAND

(ML) YELLOWISH RED (5YR 5/6), SLIGHTLY MOIST, STIFF FINE SANDY SILT TO MEDIUM DENSE SILTY FINE SAND

11:11 2.5" I.D.

13 BTB-2-5

HSA

CBB-2-10

11:20 2.5" I.D.

12 BTB-2-10

HSA

(RX-SM) GRADES TO COMPLETELY TO VERY SEVERELY WEATHERED ROCK, DRILLS AS YELLOWISH RED, SLIGHTLY MOIST, MEDIUM DENSE SILTY SAND

2.5" I.D.

10 BTB-2-15

HSA

VERY SEVERELY WEATHERED ROCK.
DRILLS AS BROWN (7.5YR 4/3), MOIST, MEDIUM DENSE SILTY SAND

11:41 2.5" I.D.

NOTES

EXPLORATORY BORING LOG

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

792 Searls Avenue, Nevada City, California, 95959
PHONE: 530-478-1305, FAX: 530-478-1019

Boring No. B-2

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Start:** 11/5/2013	**Sheet:** 2 of 2
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Finish:** 11/5/2013	
Logged By: REF	**Drilling Company:** LAWRENCE AND ASSOCIATES		**Drill Rig Type:** CME 55	
Driller: DAN/JEFF	**Drilling Method:** 8-INCH HOLLOW STEM AUGER (HSA)		**Hammer Type:** -	
Boring Dia. (In.): 8"	**Total Depth (Ft.):** 35	**Backfill or Well Casing:** 3 BAGS BENTONITE CHIPS, SPOIL		

Ground Water Information

Date	-	-	-
Time	-	-	-
Depth (ft)	-	-	-

Time (H:M) | Pocket Penetrometer (TSF) | SPT Blow Counts (Blows / Foot) | Drilling Method and/or Sampler Type | Sample Recovery (Ft./Ft.) | Sample No. | Depth B.G.S. (Ft.) | Sample Interval And Symbol | Well Construction Detail | Graphic Log

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

16 2.5" I.D. BTB-2-20

11:40 HSA

11:55

1:31

TRI-CONE

1:42

1:54

AT ±22 FEET BGS - ENCOUNTERED INCREASED RESISTANCE WITHIN SEVERELY WEATHERED ROCK.

VERY SLOW DRILLING - RESISTANT TO AUGER FROM 22 FEET BGS.

SWITCH TO TRI-CONE BIT AT ±22.5 FEET BGS. RESUME DRILLING WITH MUD ROTARY AND TRI-CONE BIT.

DRILLS QUICKLY WITH TRI-CONE BIT. ROCK IS TOO WEATHERED TO OBTAIN CORE (IN DRILLER'S OPINION)

BORING TERMINATED AT 35 FEET BGS IN COMPLETELY TO VERY SEVERELY WEATHERED ROCK

NOTES

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

EXPLORATORY BORING LOG

792 Searls Avenue, Nevada City, California, 95959
PHONE: 530-478-1305, FAX: 530-478-1019

Boring No. B-3

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Start:** 11/5/2013	
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Finish:** 11/5/2013	**Sheet:** 1 of 1
Logged By: REF	**Drilling Company:** LAWRENCE AND ASSOCIATES		**Drill Rig Type:** CME 55	
Driller: DAN/JEFF	**Drilling Method:** 8-INCH HOLLOW STEM AUGER (HSA)		**Hammer Type:** -	
Boring Dia. (In.): 8"	**Total Depth (Ft.):** 6.5	**Backfill or Well Casing:** 3 BAGS BENTONITE CHIPS, SOIL		

Time (H:M)	Pocket Penetrometer (TSF)	SPT Blow Counts (Blows / Foot)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Well Construction Detail	Graphic Log	Soil and/or Rock Descriptions
2:45			HSA			1				(GW) ROAD SURFACE - GRAY, SLIGHTLY MOIST, LOOSE WELL GRADED GRAVEL
						2				(SM) DARK REDDISH BROWN, SLIGHTLY MOIST, LOOSE TO MEDIUM DENSE SILTY SAND
						3				
2:58						4				(SM) REDDISH BROWN, SLIGHTLY MOIST, MEDIUM DENSE SILTY FINE SAND
			SPT			5				
					BTB-2-5	6				SLOW DRILLING - RESISTANT ROCK / BOULDER ENCOUNTERED AT ±6.5 FEET BGS, VERY RESISTANT TO AUGER
3:21			HSA							BORING TERMINATED AT 6.5 FEET BGS ON RESISTANT BOULDER
3:39						7				
						8				
						9				
						10				
						11				
						12				
						13				
						14				
						15				
						16				
						17				
						18				
						19				
						20				

Ground Water Information

Date	-	-	-
Time	-	-	-
Depth (ft)	-	-	-

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

NOTES

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

EXPLORATORY BORING LOG

792 Searls Avenue, Nevada City, California, 95959
PHONE: 530-478-1305, FAX: 530-478-1019

Boring No. B-4

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Start:** 11/5/2013	**Sheet:** 1 of 2
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Finish:** 11/5/2013	
Logged By: REF	**Drilling Company:** LAWRENCE AND ASSOCIATES		**Drill Rig Type:** CME 55	
Driller: DAN/JEFF	**Drilling Method:** 8-INCH HOLLOW STEM AUGER (HSA)		**Hammer Type:** -	
Boring Dia. (In.): 8"	**Total Depth (Ft.):** 28	**Backfill or Well Casing:** 3 BAGS BENTONITE CHIPS, SOIL		

Ground Water Information

Date	-	-	-
Time	-	-	-
Depth (ft)	-	-	-

Time (H:M)	Pocket Penetrometer (TSF)	SPT Blow Counts (Blows / Foot)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Well Construction Detail	Graphic Log	Soil and/or Rock Descriptions
										(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)
3:45			HSA			1				(SM) DARK REDDISH BROWN, SLIGHTLY MOIST, LOOSE SILTY SAND
						2				(SM) REDDISH BROWN, SLIGHTLY MOIST, MEDIUM DENSE SILTY FINE SAND
						3				
						4				
						5				(SM) YELLOWISH RED (5YR 5/8), SLIGHTLY MOIST, MEDIUM DENSE SILTY FINE SAND TO FINE SANDY SILT
						6				
						7				
3:58			SPT			8				
		10								
			HSA			9				
						10				
						11				
						12				(RX-SM) GRADES TO COMPLETELY TO VERY SEVERELY WEATHERED ROCK. DRILLS AS MEDIUM DENSE SILTY SAND
						13				
						14				
						15				
						16				
						17				
4:09			SPT			18				RELIC ROCK TEXTURE - FRIABLE. DRILLS AS LIGHT REDDISH BROWN SILTY SAND
		11				19				
						20				

NOTES:

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EXPLORATORY BORING LOG

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Boring No. B-4

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Start:** 11/5/2013	**Sheet:** 2 of 2
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Finish:** 11/5/2013	
Logged By: REF	**Drilling Company:** LAWRENCE AND ASSOCIATES		**Drill Rig Type:** CME 55	
Driller: DAN/JEFF	**Drilling Method:** 8-INCH HOLLOW STEM AUGER (HSA)		**Hammer Type:** -	
Boring Dia. (In.): 8"	**Total Depth (Ft.):** 28	**Backfill or Well Casing:** 3 BAGS BENTONITE CHIPS, SPOIL		

Time (H:M)	Pocket Penetrometer (TSF)	SPT Blow Counts (Blows / Foot)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Well Construction Detail	Graphic Log	Ground Water Information	Soil and/or Rock Descriptions
			HSA			21				Date - - -	(RX-SM) COMPLETELY TO VERY SEVERELY WEATHERED ROCK, DRILLS AS LIGHT REDDISH BROWN AND LIGHT YELLOWISH BROWN SILTY SAND
						22				Time - - -	
						23				Depth (ft) - - - -	
						24					MINOR GRAVEL FRAGMENTS IN CUTTINGS
						25					
						26					
						27					
			SPT			28					SPT REFUSAL AT 28 FEET BGS
						29					BORING TERMINATED AT 28 FEET BGS
						30					
						31					
						32					
						33					
						34					
						35					
						36					
						37					
						38					
						39					
						40					

NOTES:

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Trench No. T-1

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/21/2013	**Sheet:** 1 of 1
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Time (Hr:M)	Pocket Penetrometer (TSF)	Dry Density (pcf)	Percentage Moisture	Sample Recovery (Ft./Ft.)	Sample No.	Depth BGS (Ft.)	Sample Interval And Symbol	Graphic Log	Ground Water Information	Soil and/or Rock Descriptions
									Date - - -	
									Time - - -	
									Depth (ft) N/A - -	
						1				(SM) DARK REDDISH BROWN, SLIGHTLY MOIST, LOOSE SILTY FINE SAND
						2				(ML) YELLOWISH BROWN (10YR 5/4), SLIGHTLY MOIST, STIFF FINE SANDY SILT, VERY FAINT RESIDUAL ROCK TEXTURE
						3				
						4				
						5				(RX-ML) GRADES TO COMPLETELY WEATHERED ROCK. EXCAVATES AS PALE YELLOWISH BROWN FINE SANDY SILT, FRIABLE
						6				
						7				
						8				
						9				TRENCH TERMINATED AT 8 FEET BGS IN COMPLETELY WEATHERED ROCK
						10				
						11				
						12				
						13				
						14				
						15				
						16				
						17				
						18				
						19				
						20				

NOTES

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Trench No. T-2

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/21/2013	**Sheet:** 1 of 1
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Time (H:M)	Pocket Penetrometer (TSF)	Dry Density (pcf)	Percentage Moisture	Sample Recovery (Ft./Ft.)	Sample No.	Depth BGS (Ft.)	Sample Interval And Symbol	Graphic Log	Ground Water Information			
									Date	-	-	-
									Time	-	-	-
									Depth (ft)	N/A	-	-

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

Depth BGS (Ft.)	Description
1–2	(SM) DARK REDDISH BROWN, DRY TO SLIGHTLY MOIST, LOOSE SILTY SAND
3–5	(ML) YELLOWISH BROWN, SLIGHTLY MOIST, STIFF FINE SANDY SILT, ISOLATED AREAS OF RESIDUAL ROCK TEXTURE
6–10	(RX) GRADES TO COMPLETELY WEATHERED ROCK. EXCAVATES AS YELLOWISH BROWN, SLIGHTLY MOIST, STIFF SANDY SILT, FRIABLE
11	TRENCH TERMINATED AT 10 FEET BGS

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Trench No. T-3

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/21/2013	**Sheet:** 1 of 1
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Time (H:M)	Pocket Penetrometer (TSF)	Dry Density (pcf)	Percentage Moisture	Sample Recovery (Ft./Ft.)	Sample No.	Depth BGS (Ft.)	Sample Interval And Symbol	Graphic Log	Ground Water Information			
									Date	-	-	-
									Time	-	-	-
									Depth (ft)	N/A	-	-

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

1 — (SM) YELLOWISH BROWN, DRY TO SLIGHTLY MOIST, STIFF SANDY SILT

2 — (ML) GRADES TO COMPLETELY WEATHERED ROCK. EXCAVATES AS PALE YELLOWISH BROWN FINE SANDY SILT, FRIABLE

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4 — TRENCH TERMINATED AT 4 FEET BGS IN COMPLETELY TO VERY SEVERELY WEATHERED ROCK

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Trench No. T-4

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/21/2013	**Sheet:** 1 of 1
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Time (H:M) | Pocket Penetrometer (TSF) | Dry Density (pcf) | Percentage Moisture | Sample Recovery (Ft./Ft.) | Sample No. | Depth BGS (Ft.) | Sample Interval And Symbol | Graphic Log

Ground Water Information

Date	-	-	-
Time	-	-	-
Depth (ft)	N/A	-	-

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

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(SM) REDDISH BROWN, SLIGHTLY MOIST, LOOSE TO MEDIUM DENSE SILTY SAND

(ML) PALE BROWN TO YELLOWISH BROWN, SLIGHTLY MOIST, STIFF FINE SANDY SILT, FAINT RESIDUAL ROCK TEXTURE

(RX) GRADES TO COMPLETELY WEATHERED ROCK. EXCAVATES AS LIGHT YELLOWISH BROWN SILTY FINE SAND

TRENCH TERMINATED AT 14 FEET BELOW BASE OF EXISTING DEPRESSION.

TRENCH EXCAVATED IN BASE OF EXISTING APPROXIMATE 10-FOOT DIAMETER CIRCULAR DEPRESSION

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Trench No. T-5

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/21/2013	**Sheet:** 1 of 1
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Time (H:M)	Pocket Penetrometer (TSF)	Dry Density (pcf)	Percentage Moisture	Sample Recovery (Ft./Ft.)	Sample No.	Depth BGS (Ft.)	Sample Interval And Symbol	Graphic Log	Soil and/or Rock Descriptions
						1			(SM) REDDISH BROWN, SLIGHTLY MOIST, LOOSE SILTY SAND, COMMON FINE ROOTS
						2			
						3			
						4			(ML) YELLOWISH BROWN, SLIGHTLY MOIST, STIFF TO VERY STIFF SANDY SILT, FAINT RESIDUAL ROCK TEXTURE
						5			
						6			
						7			
						8			(RX-ML) GRADES TO COMPLETELY TO VERY SEVERELY WEATHERED ROCK, FRIABLE, IRREGULAR BOUNDARY. EXCAVATES AS YELLOWISH BROWN SANDY SILT
						9			
						10			
						11			TRENCH TERMINATED AT 10 FEET BGS AT BASE OF EXISTING IRREGULAR DEPRESSION
						12			
						13			
						14			
						15			
						16			
						17			
						18			
						19			
						20			

Ground Water Information

Date	-	-	-
Time	-	-	-
Depth (ft)	N/A	-	-

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Trench No. T-6

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/21/2013	
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	**Sheet:** 1 of 1
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Time (H:M) | Pocket Penetrometer (TSF) | Dry Density (pcf) | Percentage Moisture | Sample Recovery (Ft./Ft.) | Sample No. | Depth BGS (Ft.) | Sample Interval And Symbol | Graphic Log

Ground Water Information

Date	-	-	-	
Time	-	-	-	
Depth (ft)	N/A	-	-	

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color, Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

Depth BGS (Ft.)	Sample No.	Description
1–2		(OL) ORGANIC MATERIAL - LEAF LITTER AND DUFF ACCUMULATION
2–4	C86-3	(SM) YELLOWISH BROWN TO BROWN, SLIGHTLY MOIST, LOOSE SILTY SAND AND SANDY SILT. (BACKFILL IN FORMER EXCAVATION)
4–6		(ML) YELLOWISH BROWN, STIFF FINE SANDY SILT WITH COMPLETELY TO VERY SEVERELY WEATHERED ROCK FRAGMENTS
6–15		(RX-SM) GRADES TO COMPLETELY WEATHERED ROCK, LESS WEATHERED WITH DEPTH, EXCAVATES AS GRAVELLY SAND WITH WEATHERED ROCK FRAGMENTS TO ±6 INCHES
13		FORMER EXCAVATION APPEARS TO TERMINATE AT ±13 FEET BGS
15		TRENCH TERMINATED AT 15 FEET BGS

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Trench No. T-7

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/21/2013	
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	**Sheet:** 1 of 1
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Time (H:M)	Pocket Penetrometer (TSF)	Dry Density (pcf)	Percentage Moisture	Sample Recovery (Ft./Ft.)	Sample No.	Depth BGS (Ft.)	Sample Interval And Symbol	Graphic Log
						1		
						2		
						3		
						4		
						5		
						6		
						7		
						8		
						9		
						10		
						11		
						12		
						13		
						14		
						15		
						16		
						17		
						18		
						19		
						20		

Ground Water Information

Date	-	-	-
Time	-	-	-
Depth (ft)	N/A	-	-

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

(SM) DARK BROWN, SLIGHTLY MOIST, LOOSE SILTY SAND

(RX) MODERATELY WEATHERED ROCK. EXCAVATES AS GRAY, DENSE SANDY GRAVEL WITH COMMON SUBANGULAR AND BLOCKY ROCK FRAGMENTS TO 6 INCHES

TRENCH TERMINATED AT 3 FEET BGS IN MODERATELY WEATHERED ROCK

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Trench No. T-8

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/21/2013	
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	**Sheet:** 1 of 1
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Time (H:M)	Pocket Penetrometer (TSF)	Dry Density (pcf)	Percentage Moisture	Sample Recovery (Ft./Ft.)	Sample No.	Depth BGS (Ft.)	Sample Interval And Symbol	Graphic Log	Ground Water Information			Soil and/or Rock Descriptions (USCS Symbol, USCS Name; Field Estimated Particle Size Gradation (%), Munsel Color; Density/Consistency, Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics, Odor; Other)
									Date	-	-	-	
									Time	-	-	-	
									Depth (ft)	N/A	-	-	
						1							(SC) BROWN, DRY TO SLIGHTLY MOIST, LOOSE CLAYEY SAND WITH COMMON ROCK FRAGMENTS TO 8 INCHES
						2							(RX) VERY SEVERELY WEATHERED ROCK. EXCAVATES AS STRONG BROWN, DENSE SILTY SAND WITH GRAVEL AND POCKETS OF SANDY CLAY
						3							
						4							TRENCH TERMINATED AT 3.5 FEET BGS IN VERY SEVERELY WEATHERED ROCK
						5							
						6							
						7							
						8							
						9							
						10							
						11							
						12							
						13							
						14							
						15							
						16							
						17							
						18							
						19							
						20							

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Trench No. T-9

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/21/2013	
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	**Sheet:** 1 of 1
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Time (H:M) | Pocket Penetrometer (TSF) | Dry Density (pcf) | Percentage Moisture | Sample Recovery (Ft./Ft.) | Sample No. | Depth BGS (Ft.) | Sample Interval And Symbol | Graphic Log

Ground Water Information

Date	-	-	-
Time	-	-	-
Depth (ft)	N/A	-	-

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency, Moisture, Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

1 — (SM) BROWN, DRY TO SLIGHTLY MOIST, LOOSE SILTY SAND

2 — (RX) MODERATELY WEATHERED ROCK. EXCAVATES AS GRAY, DENSE SANDY COARSE GRAVEL

3 — TRENCH TERMINATED AT 3 FEET BGS IN MODERATELY WEATHERED ROCK, RESISTANT TO EXCAVATION

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NOTES:

EXPLORATORY TRENCH LOG

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Trench No. T-10

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/21/2013	**Sheet:** 1 of 1
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Time (H:M)	Pocket Penetrometer (TSF)	Dry Density (pcf)	Percentage Moisture	Sample Recovery (Ft./Ft.)	Sample No.	Depth BGS (Ft.)	Sample Interval And Symbol	Graphic Log	Ground Water Information / Soil and/or Rock Descriptions
									Ground Water Information
									Date - - -
									Time - - -
									Depth (ft) N/A - -
									Soil and/or Rock Descriptions (USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness, Dry Strength; Structure; Cementation; Organics; Odor; Other)
						1			(SC) YELLOWISH BROWN, SLIGHTLY MOIST, LOOSE CLAYEY SAND WITH GRAVEL
						2			(RX) MODERATELY WEATHERED, HIGHLY FRACTURED ROCK. EXCAVATES AS COARSE BLOCKY GRAVEL TO 3 INCHES
						3			
						4			
						5			
						6			
						7			
						8			
						9			
						10			
						11			TRENCH TERMINATED AT 10 FEET BGS IN RESISTANT, MODERATELY WEATHERED ROCK
						12			
						13			
						14			
						15			
						16			
						17			
						18			
						19			
						20			

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Trench No. T-11

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/21/2013	
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	**Sheet:** 1 of 1
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Time (H:M)	Pocket Penetrometer (TSF)	Dry Density (pcf)	Percentage Moisture	Sample Recovery (Ft./Ft.)	Sample No.	Depth BGS (Ft.)	Sample Interval And Symbol	Graphic Log	Soil and/or Rock Descriptions
						1			(SM) YELLOWISH BROWN, SLIGHTLY MOIST, LOOSE SILTY SAND WITH COARSE GRAVEL FRAGMENTS
						2			(RX) MODERATELY TO SLIGHTLY WEATHERED, HIGHLY FRACTURED ROCK. EXCAVATES AS COARSE GRAVEL WITH COMMON COBBLE AND BOULDER-SIZE ROCK FRAGMENTS. ROCK IS VARIABLY WEATHERED ACROSS LENGTH OF TRENCH
						3			
						4			
						5			
						6			
						7			
						8			
						9			
						10			
						11			
						12			
						13			TRENCH TERMINATED AT DEPTHS RANGING FROM 12 FEET BGS TO 14 FEET BGS IN MODERATELY TO SLIGHTLY WEATHERED ROCK
						14			
						15			
						16			
						17			
						18			
						19			
						20			

Ground Water Information

Date	-	-	-
Time	-	-	-
Depth (ft)	N/A	-	-

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency, Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure, Cementation; Organics; Odor; Other)

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Trench No. T-12

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/22/2013	**Sheet:** 1 of 1
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Time (H:M)	Pocket Penetrometer (TSF)	Dry Density (pcf)	Percentage Moisture	Sample Recovery (Ft./Ft.)	Sample No.	Depth BGS (Ft.)	Sample Interval And Symbol	Graphic Log

Ground Water Information

Date	-	-	-
Time	-	-	-
Depth (ft)	N/A	-	-

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsell Color; Density/Consistency; Moisture; Fill Material, Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

(SM) ABUNDANT ACCUMULATED ORGANIC DEBRIS AND LOOSE SURFACE SOIL IN CENTER OF APPROXIMATE 30-FOOT DIAMETER DEPRESSION. BOULDERS TO 4-FOOT DIAMETER. DARK REDDISH BROWN, DRY TO SLIGHTLY MOIST, LOOSE SILTY SAND

(SM) YELLOWISH BROWN, SLIGHTLY MOIST, DENSE SILTY SAND WITH COMMON GRAVEL AND COBBLE-SIZE ROCK FRAGMENTS. DEBRIS AND BOULDERS IN FORMER EXCAVATION EXTEND TO APPROXIMATELY 12 FEET BGS

(RX) GRADES TO COMPLETELY TO VERY SEVERELY WEATHERED ROCK

TRENCH TERMINATED AT 17 FEET BELOW SURROUNDING GROUND SURFACE, APPROXIMATELY 12 FEET BELOW BOULDER BACKFILL

NOTES:

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EXPLORATORY TRENCH LOG

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Trench No. T-13

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/22/2013	**Sheet:** 1 of 1
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Ground Water Information			
Date	-	-	-
Time	-	-	-
Depth (ft)	N/A	-	-

Time (H:M) | Pocket Penetrometer (TSF) | Dry Density (pcf) | Percentage Moisture | Sample Recovery (Ft./Ft.) | Sample No. | Depth BGS (Ft.) | Sample Interval And Symbol | Graphic Log

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsell Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

(OL) TRENCH EXCAVATED WITH ELONGATED DEPRESSION.
ACCUMULATED FOREST DUFF - SURFACE ORGANICS

(SM) DARK REDDISH BROWN TO REDDISH BROWN, MOIST, LOOSE SILTY SAND

(SM) YELLOWISH BROWN, SLIGHTLY MOIST, MEDIUM DENSE TO DENSE SILTY SAND, COMMON SUBANGULAR AND PRISMATIC WEATHERED ROCK FRAGMENTS TO 8 INCHES

(RX) VARIABLY WEATHERED, RESISTANT, FRACTURED ROCK. EXCAVATES AS SANDY COARSE GRAVEL TO 8 INCHES.
IRREGULAR BOUNDARY. ROCK ENCOUNTERED AT 3 FEET BGS IN NORTH SIDE OF EXCAVATION, 5 FEET BGS IN SOUTH SIDE.
VARIABLY WEATHERED

TRENCH TERMINATED AT 12 FEET BGS (7 FEET BELOW BASE OF EXISTING DEPRESSION) IN VARIABLY WEATHERED, RESISTANT ROCK

NOTES:

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Trench No. T-14

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/22/2013	**Sheet:** 1 of 1
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Time (H:M) | Pocket Penetrometer (TSF) | Dry Density (pcf) | Percentage Moisture | Sample Recovery (Ft./Ft.) | Sample No. | Depth BGS (Ft.) | Sample Interval And Symbol | Graphic Log

Ground Water Information

Date	-	-	-
Time	-	-	-
Depth (ft)	N/A	-	-

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

1 — (OL) IN APPROXIMATE 12-FOOT DIAMETER CIRCULAR DEPRESSION 8" TO 14" ACCUMULATED ORGANIC MATERIAL

2 — (SM) DARK REDDISH BROWN SILTY SAND

3 — (SM) YELLOWISH BROWN, SLIGHTLY MOIST, DENSE SILTY SAND WITH COMMON WEATHERED ROCK FRAGMENTS TO 6 INCHES

4 — (RX-GW) GRADES TO SEVERELY WEATHERED ROCK. EXCAVATES AS SANDY GRAVEL, RESISTANT

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6 — TRENCH TERMINATED AT 6 FEET BELOW BOTTOM OF DEPRESSION (11 FEET BELOW ESTIMATED NATIVE GROUND SURFACE)

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NOTES:

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Trench No. T-15

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/22/2013	
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	**Sheet:** 1 of 1
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Time (H:M) | Pocket Penetrometer (TSF) | Dry Density (pcf) | Percentage Moisture | Sample Recovery (FL/FL) | Sample No. | Depth BGS (Ft.) | Sample Interval And Symbol | Graphic Log

Ground Water Information

Date	-	-	-
Time	-	-	-
Depth (ft)	N/A	-	-

Soil and/or Rock Descriptions

(USCS Symbol, USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

(SM) T-15 IS NORTH OF T-13, ALSO WITHIN THE LONG, OBLONG TRENCH DEPRESSION.
ACCUMULATED ORGANIC MATERIAL, AS WELL AS COBBLES AND BOULDERS THAT HAVE ROLLED INTO DEPRESSION FROM SLOPES

(SM) YELLOWISH BROWN, SLIGHTLY MOIST, DENSE TO VERY DENSE SILTY SAND WITH COMMON WEATHERED ROCK FRAGMENTS

(RX-GW) MODERATELY TO SLIGHTLY WEATHERED, HIGHLY FRACTURED ROCK. EXCAVATES AS VERY DENSE, RESISTANT COARSE GRAVEL

TRENCH TERMINATED AT 5 FEET BGS (±12 FEET BELOW ESTIMATED FORMER GROUND SURFACE)

NOTES:

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Trench No. T-16

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/22/2013	**Sheet:** 1 of 1
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Time (H:M) | Pocket Penetrometer (TSF) | Dry Density (pcf) | Percentage Moisture | Sample Recovery (Ft./Ft.) | Sample No. | Depth BGS (Ft.) | Sample Interval And Symbol | Graphic Log

Ground Water Information

Date	-	-	-	
Time	-	-	-	
Depth (ft)	N/A	-	-	

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material, Dilatancy; Plasticity Toughness; Dry Strength; Structure, Cementation, Organics; Odor; Other)

1 — (OL) ACCUMULATED ORGANIC MATERIAL AT VARYING STAGES OF DECOMPOSITION

2 — (SM) DARK REDDISH BROWN, SLIGHTLY MOIST, LOOSE SILTY SAND

3 — (SM) YELLOWISH BROWN, MOIST, DENSE SILTY SAND WITH COMMON WEATHERED ROCK FRAGMENTS

4

5 — (RX) GRADES TO MODERATELY WEATHERED, FRACTURED ROCK, RESISTANT TO EXCAVATION - WEST SIDE

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7 — TRENCH TERMINATED AT 7 FEET BGS (ESTIMATED 17 FEET BELOW FORMER NATIVE GROUND SURFACE)

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NOTES:

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Trench No. T-17

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/22/2013	**Sheet:** 1 of 1
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Ground Water Information			
Date	-	-	-
Time	-	-	-
Depth (ft)	N/A	-	-

Time (H:M) | Pocket Penetrometer (TSF) | Dry Density (pcf) | Percentage Moisture | Sample Recovery (Ft./Ft.) | Sample No. | Depth BGS (Ft.) | Sample Interval And Symbol | Graphic Log

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

(OL) ACCUMULATED SURFACE ORGANICS, STUMP

(SM) DARK REDDISH BROWN TO REDDISH BROWN, DRY, LOOSE SILTY SAND

(SM) BROWN TO YELLOWISH BROWN, SLIGHTLY MOIST, MEDIUM DENSE SILTY SAND

(RX) GRADES TO COMPLETELY WEATHERED ROCK. EXCAVATES AS YELLOWISH BROWN, MEDIUM DENSE TO DENSE SANDY SILT TO SILTY SAND

TRENCH TERMINATED AT 7 FEET BELOW DEPRESSION IN APPARENT NATIVE SOIL (ESTIMATE ±11 FEET BELOW ORIGINAL GROUND SURFACE)

NOTES:

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Trench No. T-18

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/22/2013	**Sheet:** 1 of 1
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Time (H:M) | Pocket Penetrometer (TSF) | Dry Density (pcf) | Percentage Moisture | Sample Recovery (Ft./Ft.) | Sample No. | Depth BGS (Ft.) | Sample Interval And Symbol | Graphic Log

Ground Water Information

Date	-	-	-
Time	-	-	-
Depth (ft)	N/A	-	-

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsell Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor, Other)

1 — (OL) DEEP ACCUMULATION OF ORGANIC MATERIAL

2 — (SM) DARK REDDISH BROWN, SLIGHTLY MOIST, LOOSE SILTY FINE SAND

3 — (SM) REDDISH BROWN, SLIGHTLY MOIST, LOOSE SILTY SAND

4 — (SM) GRADES TO BROWN, SLIGHTLY MOIST TO MOIST, SILTY SAND WITH COMMON FINE TO MEDIUM WEATHERED ROCK FRAGMENTS

5 — (RX) GRADES TO COMPLETELY TO VERY SEVERELY WEATHERED ROCK. EXCAVATES AS STRONG BROWN, SLIGHTLY MOIST, DENSE SILTY SAND WITH MEDIUM GRAVEL

6 — TRENCH TERMINATED AT 7 FEET BGS (11 FEET BELOW ORIGINAL GROUND SURFACE)

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NOTES

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Trench No. T-19

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/22/2013	
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	**Sheet:** 1 of 1
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Time (H:M) | Pocket Penetrometer (TSF) | Dry Density (pcf) | Percentage Moisture | Sample Recovery (FL/FL) | Sample No. | Depth BGS (Ft.) | Sample Interval And Symbol | Graphic Log

Ground Water Information

Date	-	-	-
Time	-	-	-
Depth (ft)	N/A	-	-

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

1 — (OL) ACCUMULATED SURFACE ORGANICS

2 — (SM) DARK REDDISH BROWN, SLIGHTLY MOIST, SILTY FINE SAND

3 — (SM) BROWN, SLIGHTLY MOIST TO MOIST, MEDIUM DENSE SILTY SAND WITH COMMON WEATHERED ROCK FRAGMENTS

4 — (RX) GRADES TO COMPLETELY TO VERY SEVERELY WEATHERED ROCK

5 — TRENCH TERMINATED AT 5 FEET BELOW BOTTOM OF DEPRESSION (ESTIMATE 10 FEET BELOW ORIGINAL GROUND SURFACE)

6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

NOTES:

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EXPLORATORY TRENCH LOG

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Trench No. T-20

Project Name: THE GROVE	**Project No.:** 3006B-01	**Task:** 01	**Date:** 10/22/2013	
Location: NEVADA CITY TECH CENTER	**Ground Elev. (Ft. MSL):** -		**Logged By:** REF	**Sheet:** 1 of 1
Excavation Co: CME SERVICES	**Excavator:** KOBELCO SK-200		**Excavation Method:** 48" BUCKET	
Groundwater Encountered: NONE	**Caved:** NONE		**Sampling Method:** GRAB-HAND-BULK	

Time (H:M)	Pocket Penetrometer (TSF)	Dry Density (pcf)	Percentage Moisture	Sample Recovery (Ft./Ft.)	Sample No.	Depth BGS (Ft.)	Sample Interval And Symbol	Graphic Log
					CB20-1	1		
					BT20-1.5	2		
					BT20-2	3		
					BT20-3	4		
						5		
						6		
						7		
						8		
						9		
						10		
						11		
						12		
						13		
						14		
						15		
						16		
						17		
						18		
						19		
						20		

Ground Water Information

Date	-	-	-
Time	-	-	-
Depth (ft)	N/A	-	-

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy, Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

(SM) STRONG BROWN TO DARK YELLOWISH BROWN, DRY, LOOSE SILTY FINE SAND

(ML) STRONG BROWN, DRY, LOOSE TO MEDIUM DENSE FINE SANDY SILT, ISOLATED AREAS OF RESIDUAL ROCK TEXTURE

(SM) YELLOWISH BROWN AND LIGHT GRAY, SLIGHTLY MOIST, DENSE SILTY FINE SAND WITH COMMON GRAVEL-SIZE WEATHERED ROCK FRAGMENTS

(RX-SM) GRADES TO COMPLETELY TO VERY SEVERELY WEATHERED ROCK. EXCAVATES AS YELLOWISH BROWN, DENSE SILTY FINE SAND WITH GRAVEL-SIZE ROCK FRAGMENTS

TRENCH TERMINATED AT 5 FEET BGS

NOTES:

APPENDIX D LABORATORY TEST DATA

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Atterberg Indices

ASTM D4318

DSA File #:

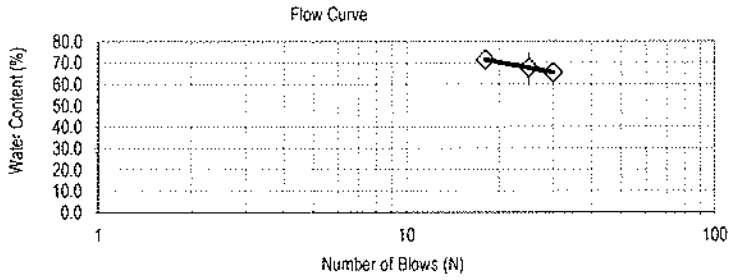
DSA Appl #:

Project No.:	3006B-01	Project Name:	The Grove- Nevada City Tech Center	Date:	12/3/2013
Sample No.:	CB2-10	Boring/Trench:	B-2	Depth, (ft.): 10	Tested By: DWP
Description:	Yellowish Red (5YR 5/6) Elastic Silt with Sand				Checked By: MLH
Sample Location:					Lab. No.: 15-13-391

Estimated % of Sample Retained on No. 40 Sieve: 10% Sample Air Dried: yes

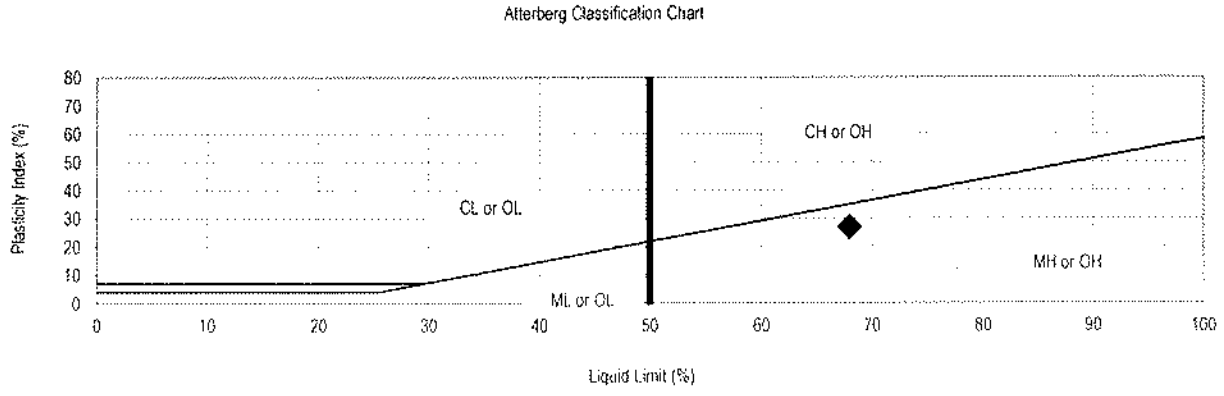
Test Method A or B: A

LIQUID LIMIT:						PLASTIC LIMIT:		
Sample No.:	1	2	3	4	5	1	2	3
Pan ID:	AI	HK	MBE			E	LF	
Wt. Pan (gr)	14.96	14.92	15.18			10.94	10.81	
Wt. Wet Soil + Pan (gr)	24.89	24.20	23.84			19.59	18.86	
Wt. Dry Soil + Pan (gr)	20.96	20.45	20.23			17.08	16.55	
Wt. Water (gr)	3.93	3.75	3.61			2.51	2.31	
Wt. Dry Soil (gr)	6.00	5.53	5.05			6.14	5.74	
Water Content (%)	65.5	67.8	71.5			40.9	40.2	
Number of Blows, N	30	25	18					
				LIQUID LIMIT =	68		PLASTIC LIMIT =	41



Plasticity Index = 27

Group Symbol = MH



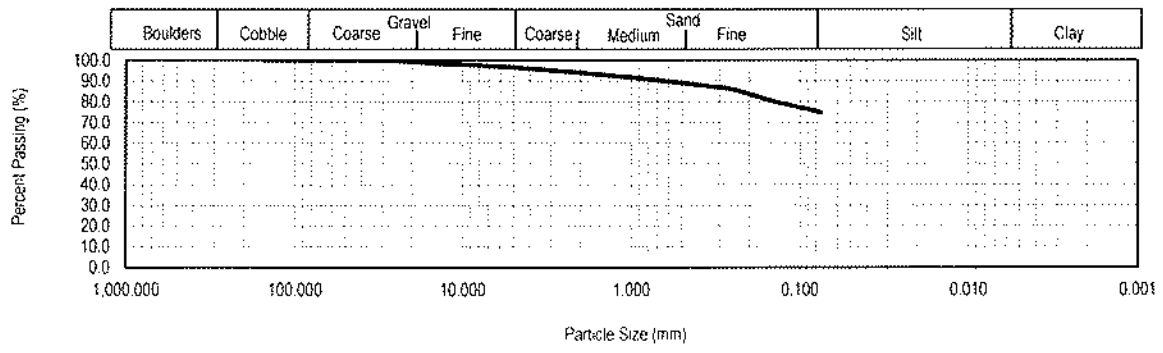
Particle Size Distribution

ASTM D422

Project No.:	3006B-01	Project Name:	The Grove- Nevada City Tech Center	Date:	12/3/2013
Sample No.:	CB 2-10	Boring/Trench:	B-2	Depth, (ft.): 10	Tested By: DWP
Description:	Yellowish Red (5YR 5/6) Elastic Silt with Sand				Checked By: MLH
Sample Location:					Lab. No.: 15-13-391

Sieve Size	Particle Diameter		Dry Weight on Sieve			Percent
	Inches	Millimeter	Retained On Sieve	Accumulated On Sieve	Passing Sieve	Passing
(U.S. Standard)	(in.)	(mm)	(gm)	(gm)	(gm)	(%)
6 Inch	6.0000	152.4	0.00	0.0	2,896.0	100.0
3 Inch	3.0000	76.2	0.00	0.0	2,896.0	100.0
2 Inch	2.0000	50.8	0.00	0.0	2,896.0	100.0
1.5 Inch	1.5000	38.1	0.00	0.0	2,896.0	100.0
1.0 Inch	1.0000	25.4	0.00	0.0	2,896.0	100.0
3/4 Inch	0.7500	19.1	22.25	22.3	2,873.8	99.2
1/2 Inch	0.5000	12.7	27.01	49.3	2,846.7	98.3
3/8 Inch	0.3750	9.5	9.31	58.6	2,837.4	98.0
#4	0.1870	4.7500	42.14	100.7	2,795.3	96.5
#10	0.0787	2.0000	69.35	170.1	2,725.9	94.1
#20	0.0335	0.8500	82.08	252.1	2,643.9	91.3
#40	0.0167	0.4250	82.08	334.2	2,561.8	88.5
#60	0.0098	0.2500	71.29	405.5	2,490.5	86.0
#100	0.0059	0.1500	154.66	560.2	2,335.8	80.7
#200	0.0030	0.0750	164.05	724.2	2,171.8	75.0
Hydrometer						

Particle Size Gradation



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Atterberg Indices

ASTM D4318

DSA File #:

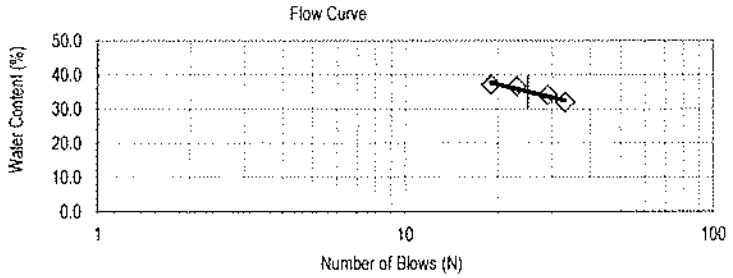
DSA Appl #:

Project No.:	3006B-01	Project Name:	Nevada City Tech Center	Date:	10/23/2013
Sample No.:	CB6-3	Boring/Trench:	T-6	Depth, (ft.): 2-4	Tested By: DWP
Description:	Yellowish Red (5YR 4/6) Sand				Checked By: MLH
Sample Location:					Lab. No.: 15-13-364

Estimated % of Sample Retained on No. 40 Sieve: 25% Sample Air Dried: yes

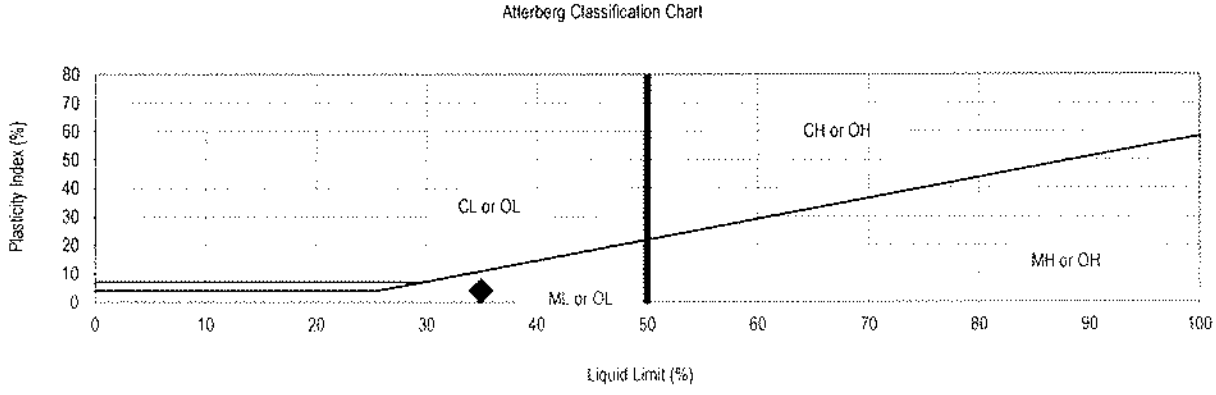
Test Method A or B: A

LIQUID LIMIT:						PLASTIC LIMIT:		
Sample No.:	1	2	3	4	5	1	2	3
Pan ID:	AI	LE	MBE	AT		BC	Q	
Wt. Pan (gr)	14.04	15.05	15.21	15.20		10.90	11.07	
Wt. Wet Soil + Pan (gr)	24.84	24.40	26.95	29.54		21.80	24.64	
Wt. Dry Soil + Pan (gr)	22.22	22.02	23.77	25.69		19.25	21.40	
Wt. Water (gr)	2.62	2.38	3.18	3.85		2.55	3.24	
Wt. Dry Soil (gr)	8.18	6.97	8.56	10.49		8.35	10.33	
Water Content (%)	32.0	34.1	37.1	36.7		30.5	31.4	
Number of Blows, N	33	29	19	23				
				LIQUID LIMIT =	35		PLASTIC LIMIT =	31



Plasticity Index = 4

Group Symbol = ML



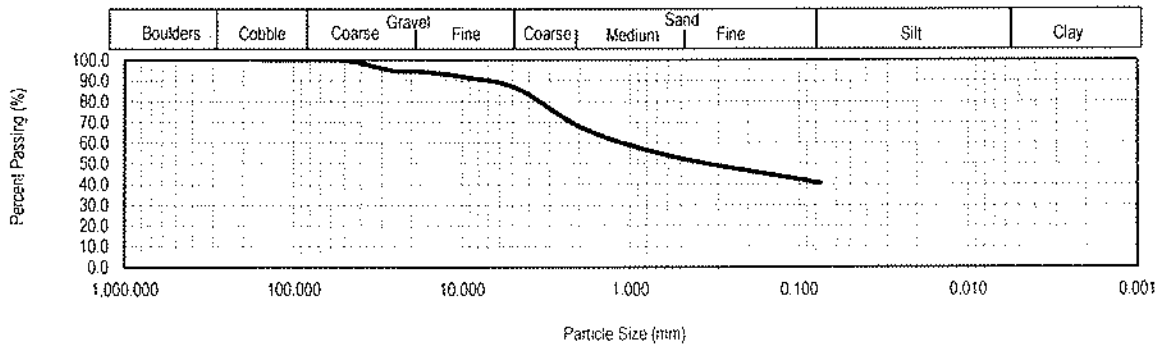
Particle Size Distribution

ASTM D422

Project No.:	3006B-01	Project Name:	Nevada City Tech Center	Date:	10/23/2013
Sample No.:	CB6-3	Boring/Trench:	T-6	Depth, (ft.): 2-4	Tested By: DWP
Description:	Yellowish Red (5YR 4/6) Silty Sand				Checked By: MLH
Sample Location:					Lab. No.: 15-13-364

Sieve Size	Particle Diameter		Dry Weight on Sieve			Percent
	Inches	Millimeter	Retained On Sieve	Accumulated On Sieve	Passing Sieve	Passing
(U.S. Standard)	(in.)	(mm)	(gm)	(gm)	(gm)	(%)
6 Inch	6.0000	152.4	0.00	0.0	5,952.5	100.0
3 Inch	3.0000	76.2	0.00	0.0	5,952.5	100.0
2 Inch	2.0000	50.8	0.00	0.0	5,952.5	100.0
1.5 Inch	1.5000	38.1	108.44	108.4	5,844.0	98.2
1.0 Inch	1.0000	25.4	196.19	304.6	5,647.8	94.9
3/4 Inch	0.7500	19.1	14.08	318.7	5,633.8	94.6
1/2 Inch	0.5000	12.7	76.64	395.4	5,557.1	93.4
3/8 Inch	0.3750	9.5	90.64	486.0	5,466.5	91.8
#4	0.1870	4.7500	315.25	801.2	5,151.2	86.5
#10	0.0787	2.0000	1,108.55	1,909.8	4,042.7	67.9
#20	0.0335	0.8500	643.47	2,553.3	3,399.2	57.1
#40	0.0167	0.4250	340.33	2,893.6	3,058.9	51.4
#60	0.0098	0.2500	210.70	3,104.3	2,848.2	47.8
#100	0.0059	0.1500	177.78	3,282.1	2,670.4	44.9
#200	0.0030	0.0750	252.76	3,534.8	2,417.6	40.6
Hydrometer						

Particle Size Gradation



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Atterberg Indices

ASTM D4318

DSA File #:

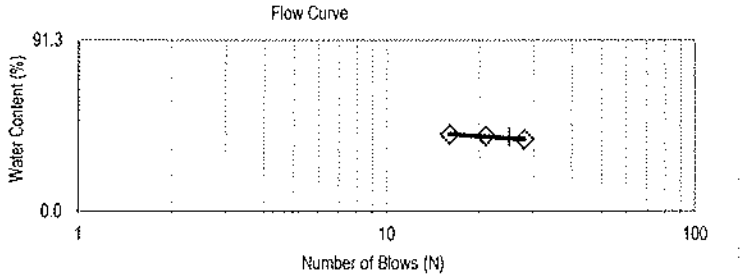
DSA Appl #:

Project No.:	3006B-01	Project Name:	Nevada City Tech Center	Date:	10/23/2013
Sample No.:	CB 20-1	Boring/Trench:	T-20	Depth, (ft.): 0-1.5	Tested By: DWP
Description:	Yellowish Red (10YR 5/8) Sandy Silt with Gravel				Checked By: MLH
Sample Location:					Lab. No.: 15-13-364

Estimated % of Sample Retained on No. 40 Sieve: 33% Sample Air Dried: yes

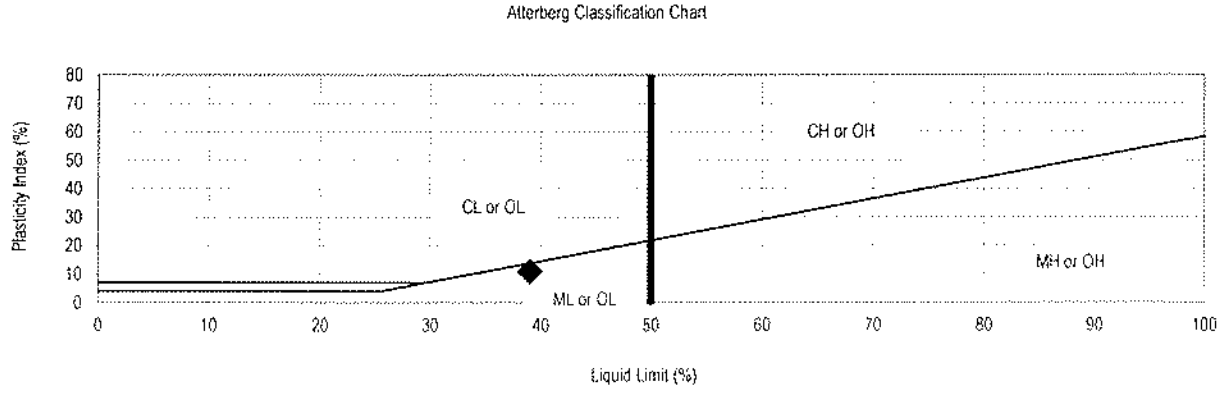
Test Method A or B: A

LIQUID LIMIT:						PLASTIC LIMIT:		
Sample No.:	1	2	3	4	5	1	2	3
Pan ID:	AT	HK	LC			I	LA	
Wt. Pan (gr)	15.31	15.01	15.07			11.36	11.12	
Wt. Wet Soil + Pan (gr)	26.49	25.29	24.79			19.52	20.51	
Wt. Dry Soil + Pan (gr)	23.39	22.34	21.97			17.74	18.43	
Wt. Water (gr)	3.10	2.95	2.82			1.78	2.08	
Wt. Dry Soil (gr)	8.08	7.33	6.90			6.38	7.31	
Water Content (%)	38.4	40.2	40.9			27.9	28.5	
Number of Blows, N	28	21	16					
				LIQUID LIMIT =	39		PLASTIC LIMIT =	28



Plasticity Index = 11

Group Symbol = ML



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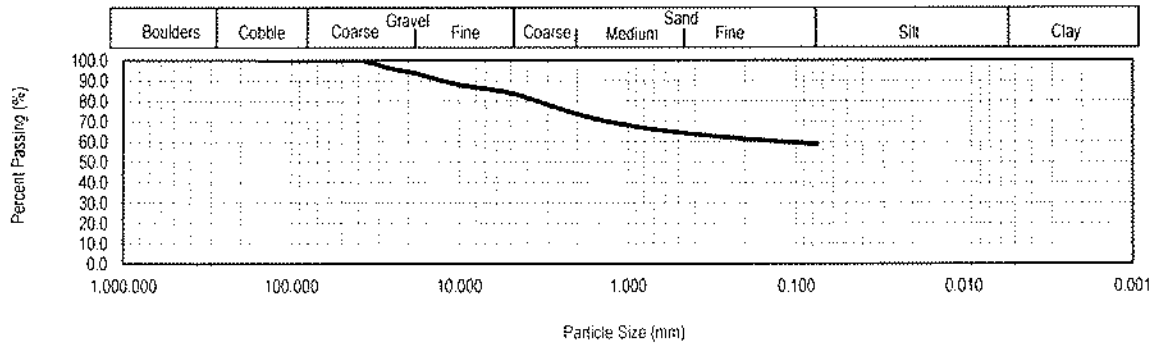
Particle Size Distribution

ASTM D422

Project No.:	3006B-01	Project Name:	Nevada City Tech Center	Date:	10/23/2013
Sample No.:	CB20-1	Boring/Trench:	T-20	Depth, (ft.): 0-1.5	Tested By: DWP
Description:	Yellowish Red (10YR 5/8) Sandy Silt with Gravel				Checked By: MLH
Sample Location:					Lab. No.: 15-13-364

Sieve Size	Particle Diameter		Dry Weight on Sieve			Percent
	Inches	Millimeter	Retained On Sieve	Accumulated On Sieve	Passing Sieve	Passing
(U.S. Standard)	(in.)	(mm)	(gm)	(gm)	(gm)	(%)
6 Inch	6.0000	152.4	0.00	0.0	5,508.2	100.0
3 Inch	3.0000	76.2	0.00	0.0	5,508.2	100.0
2 Inch	2.0000	50.8	0.00	0.0	5,508.2	100.0
1.5 Inch	1.5000	38.1	0.00	0.0	5,508.2	100.0
1.0 Inch	1.0000	25.4	216.06	216.1	5,292.2	96.1
3/4 Inch	0.7500	19.1	104.62	320.7	5,187.5	94.2
1/2 Inch	0.5000	12.7	223.65	544.3	4,963.9	90.1
3/8 Inch	0.3750	9.5	127.49	671.8	4,836.4	87.8
#4	0.1870	4.7500	228.56	900.4	4,607.8	83.7
#10	0.0787	2.0000	550.26	1,450.6	4,057.6	73.7
#20	0.0335	0.8500	357.96	1,808.6	3,699.6	67.2
#40	0.0167	0.4250	172.79	1,981.4	3,526.8	64.0
#60	0.0098	0.2500	103.12	2,084.5	3,423.7	62.2
#100	0.0059	0.1500	81.28	2,165.8	3,342.4	60.7
#200	0.0030	0.0750	100.79	2,266.6	3,241.6	58.9
Hydrometer						

Particle Size Gradation



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Expansion Index/Swell

ASTM D4829

DSA File #:

DSA Appl #:

Project No.:	3006B-01	Project Name: The Grove- Nevada City Tech Center		Date:	12/3/2013
Sample No.:	CB2-10	Boring/Trench No.: B-2	Depth (ft.) 10	Tested By:	DWP
Soil Description:	Yellowish Red (5YR 5/6) Elastic Silt with Sand			Checked By:	MLH
Estimated % of sample retained on #4:		Notes:		Lab. No.:	15-13-391

Specimen Type:	Undisturbed:	Disturbed:	Remolded to:	ASTM Guidelines
Tube Dia. (inch) =		Ring Dia. (inch) = 4	Ring Height (inch) = 1.00	

FIELD DATA Tube Sample Moisture & Density			LAB DATA	Test wt.	144	Test wt.		Test wt.	
				Initial	Final	Initial	Final	Initial	Final
Tare Tube Number		AK	Tare Number	C8					
Tare Weight	(gr)	334.86	Tare Ring Weight (gr)	200.58	200.58				
Wet Soil + Tare	(gr)	435.92	Tare Pan Weight (gr)	0.00	273.42				
Dry Soil + Tare	(gr)	419.43	Wet Soil + Tare (gr)	510.86	853.10				
Weight of Water	(gr)	16.49	Dry Soil + Tare (gr)	460.47	733.89	0.00		0.00	
Dry Soil Weight	(gr)	84.57	Weight of Water (gr)	50.39	119.21	0.00	0.00	0.00	0.00
Moisture Content	(%)	19.50	Dry Soil Weight (gr)	259.89	259.89	0.00	0.00	0.00	0.00
Soil Height	(In.)	1.00	Moisture Content (%)	19.39	45.87	0.00	0.00	0.00	0.00
Wet Unit Weight	(pcf)		Wet Unit Weight (pcf)	94.07	110.61				
Dry Unit Weight	(pcf)		Dry Unit Weight (pcf)	78.80	75.83				
			Sample Height (Inches)	1.00	1.039				
Specific Gravity		2.7	Percent Saturation	45.99	101.37				

Expansion Index Number

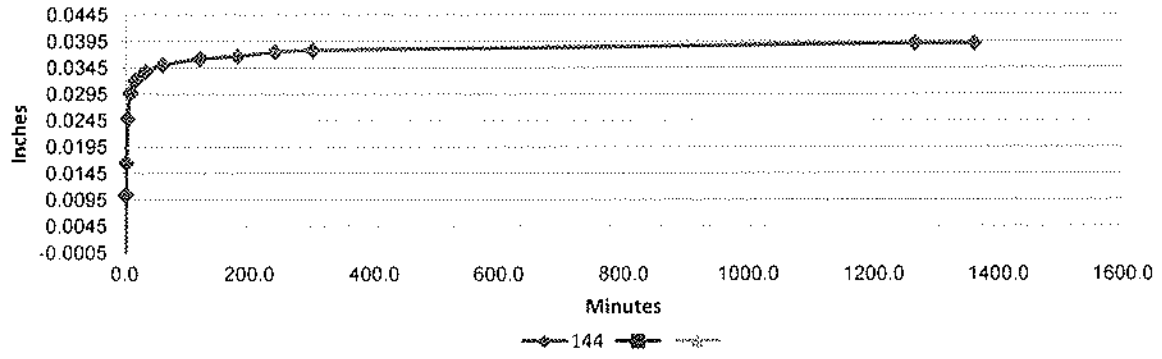
Surcharge (psf)	Uncorrected	Corrected to 50% Saturation
Test wt. 144	39	37
Test wt.		
Test wt.		

Elapsed Time (m:s)	Change in Height (Inches)	Elapsed Time (m:s)	Change in Height (Inches)	Elapsed Time (m:s)	Change in Height (Inches)
0.0	-0.0014				
1.0	0.0104				
2.0	0.0165				
4.0	0.0249				
8.0	0.0297				
16.0	0.0321				
32.0	0.0337				
60.0	0.0350				
120.0	0.0362				
180.0	0.0367				
240.0	0.0375				
300.0	0.0378				
1265.0	0.0391				
1361.0	0.0391				

Expansion Index Values and Descriptions

Expansion Index	Potential Expansion
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
Above 130	Very High

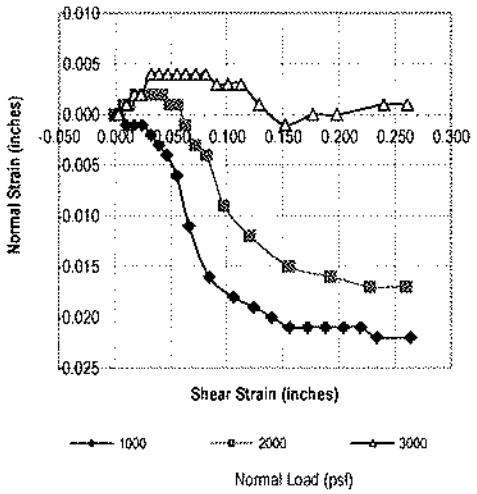
Expansion Versus Time



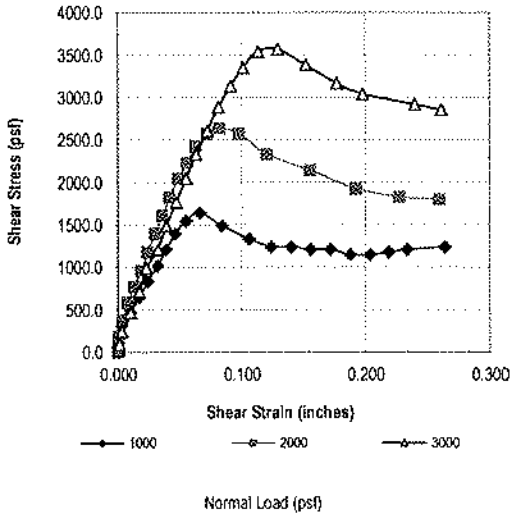
DIRECT SHEAR

TEST RESULTS

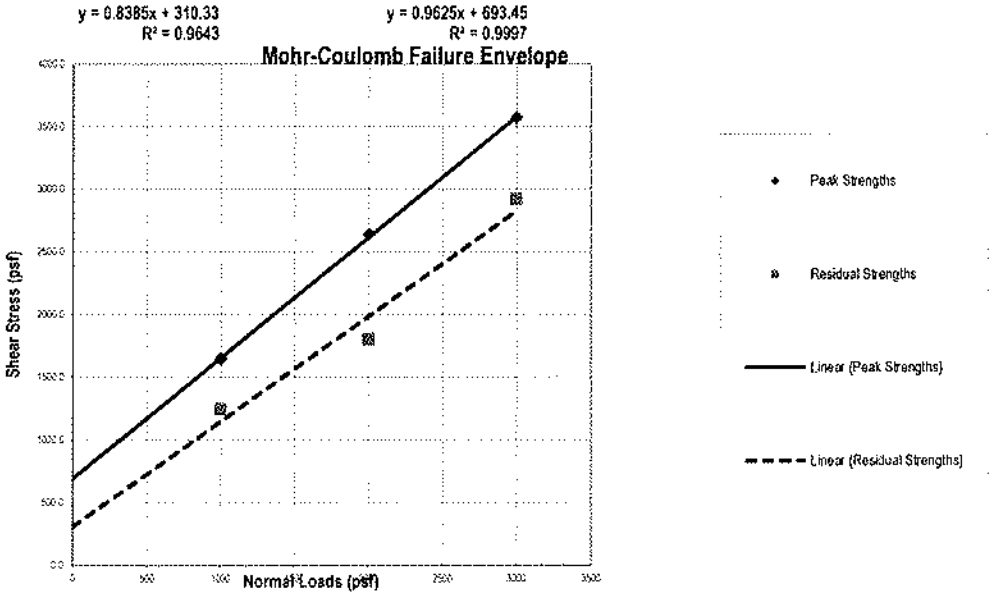
Shear Strain vs. Normal Strain



Shear Strain vs. Shear Stress



Mohr-Coulomb Failure Envelope



SHEAR STRENGTH TEST RESULTS		
PARAMETERS	PEAK STRENGTH:	RESIDUAL STRENGTH:
FRICTION ANGLE, (Degree)	43.9	40.0
COHESION, (psf)	693.0	310.0

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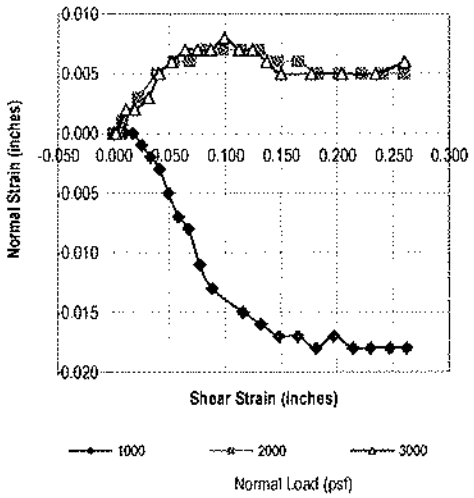
PROJECT NAME:	The Grove- Nevada City Tech Center		
PROJECT NO.:	3006B-01	DATE:	12/3/2013
BORING / TRENCH NO.:	B-1	LAB NO.	15-13-391
SAMPLE NO.:	BT1-10	SAMPLE DEPTH (ft.):	10
DESCRIPTION:	Yellowish Red (5YR 4/6) Silty Sand		

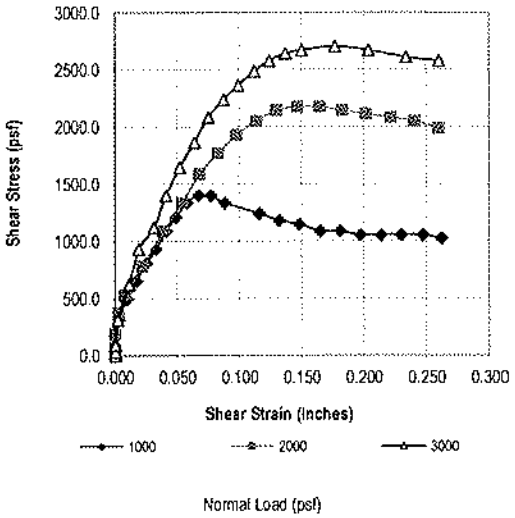
DIRECT SHEAR

TEST RESULTS

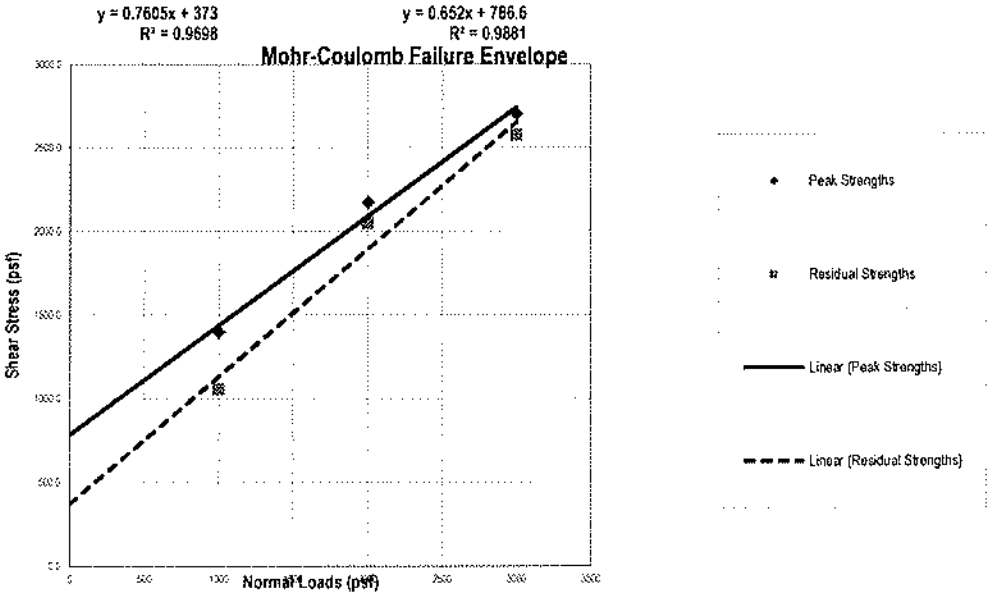
Shear Strain vs. Normal Strain



Shear Strain vs. Shear Stress



Mohr-Coulomb Failure Envelope



SHEAR STRENGTH TEST RESULTS		
PARAMETERS	PEAK STRENGTH:	RESIDUAL STRENGTH:
FRICTION ANGLE, (Degree)	33.1	37.3
COHESION, (psf)	787.0	373.0

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PROJECT NAME:	The Grove- Nevada City Tech Center		
PROJECT NO.:	3006B-01	DATE:	12/3/2013
BORING / TRENCH NO.:	B-2	LAB NO.	15-13-391
SAMPLE NO.:	BT2-15	SAMPLE DEPTH (ft.):	15
DESCRIPTION:	Yellowish Red (5YR 4/6) Sandy Silt		