APPENDIX E

Preliminary Geotechnical Engineering Report

Preliminary Geotechnical Engineering Report

JAEGER RANCH PROPERTY

WKA No. 11103.02

September 26, 2016

Prepared For:

The True Life Companies

12647 Alcosta Boulevard, Suite 470

San Ramon, California 94583

Preliminary Geotechnical Engineering Report

JAEGER RANCH PROPERTY

WKA No. 11103.02

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

Wallace Kuhl & Associates

Corporate Office
3050 Industrial Boulevard
West Sacramento, CA 95691
916.372.1434 phone
916.372.2565 fax

Stockton Office
3422 West Hammer Lane, Suite D
Stockton, CA 95219
209.234.7722 phone
209.234.7727 fax

Preliminary Geotechnical Engineering Report
JAEGER RANCH PROPERTY
Rancho Cordova Parkway near Pericles Drive
Rancho Cordova, California
WKA No. 11103.02
September 26, 2016

INTRODUCTION

We have completed a preliminary evaluation of the subsurface soil and groundwater conditions at the Jaeger Ranch property located easterly of the intersection of Rancho Cordova Parkway and Pericles Drive in Rancho Cordova, California (see Figure 1). The purpose of our study has been to gather information on the nature and general engineering properties of the soil and groundwater conditions at the site, and to provide findings and conclusions regarding the feasibility of developing the site with a residential subdivision.

It is emphasized that the findings and conclusions contained in this report are preliminary in nature and are not intended for use in specific design of structural improvements. This study is limited to a general overview of soil and groundwater conditions to assist in planning and budgeting for the project.

Scope of Services

The scope of services for the project included the following:

1. site reconnaissance;
2. review of available reports, historical aerial photographs, topographic maps, groundwater information, geologic maps, and of the United States Department of Agriculture Natural Resources Conservation Service (NRCS) Web Soil Survey;
3. subsurface exploration, including the excavation and sampling of 10 test pits across the site to a maximum depth of 10½ feet below existing grades;
4. laboratory testing of select soil samples;
5. engineering analysis; and,
6. preparation of this preliminary geotechnical report.

Supplemental information reviewed during the preparation of this report included the review of our *Draft Phase I Environmental Site Assessment* (WKA No. 11103.01, dated September 22, 2016), prepared for the subject property.

Figures and Attachments

A Vicinity Map is presented as Figure 1 and a Site Plan showing the locations of our test pits is presented as Figure 2. Logs of Test Pits are presented as Figures 3 through 12, and an explanation of the symbols and classification system used on the logs appears on Figure 13. Appendix A contains general information regarding this investigation; and, a description of the field exploration and laboratory testing.

Proposed Development

The subject property is rectangular in shape and encompasses a total area of approximately 529 acres of vacant, undeveloped, agricultural land. The property consists of one parcel identified as Sacramento County Assessor Parcel Number 067-0040-008-0000.

We understand the major components of the property will consist of about 200 acres of residential (including high-density residential), about 6 acres of commercial developments, a recreation center, and about 245 acres of designated nature preserves. Residential structures are currently planned to consist of one- and two-story structures, with the high-density, residential structures potentially being as much as three stories in height. We anticipate these residential structures will be wood-framed with interior concrete slab-on-grade lower floors. We understand that the commercial and recreation center structures are likewise currently planned to be one- or two-story structures. Structural loads are anticipated to be relatively light and consistent with this type of construction. Associated development will include underground utilities, exterior flatwork, retaining walls, new streets and typical residential landscaping.

FINDINGS

Site Description

The project site is comprised of approximately 529 acres, located easterly of the intersection of Pericles Drive and Rancho Cordova Parkway in Rancho Cordova, California (Figure 1). The property is bounded to the north and east by existing residential subdivisions and grazing/ranch land; and to the south and west by grazing land containing a few minor ranch structures and houses. Blodgett Reservoir lies about one-mile south of the site and an unnamed minor reservoir lies about a half mile to the east of the site near some existing housing and ranch structures. Topography across the site generally consists of modest rolling hills. Review of topographic maps of the area indicates the site elevations[1] vary from a high point of just over +200 feet relative to mean seal level (msl) to a low point of just under +180 feet msl (North American Vertical Datum of 1988).

[1] All elevations reported are provided with respect to the North American Vertical Datum of 1988 (NAVD88). Reported elevations in this report are approximate, and are generally based on available topographic data from the United States Geological Society.

At the time of our field exploration activities in August and September of 2016, the major portion of the property consists of vacant, grazing land, with vernal ponds and streams draining in from the northeast corner towards the southwest corner of the site. The property is covered with a moderate growth of volunteer weeds and grass up to 3 feet in height. High-voltrage transmission power lines cross through the site extending from the substation located immediately north of the northeast corner of the site and extending to the south west through the site. A fenced yard containing a transformer and monitoring well (EX-22) were observed about 1100 feet south of where Big Meadow Way intersects the northern boundary of the site. One other well (EX-27) is located near the northeast corner of the site along the northern boundary.

Minor amounts of domestic refuse were observed along then northern and western site boundaries. In addition, three livestock watering troughs were observed along the northern site boundary, and a metal water storage tank was observed north of the existing groundwater extraction well. Additional details regarding these wells and associated structures can be found in our *Phase I Environmental Site Assessment* (WKA No. 11103.01, dated September 22, 2016).

Site History

Review of available historic maps and aerial photographs indicates the site has historically remained essentially vacant since the early 1800's. Dry farming and livestock grazing appear to have been the historic land uses. In addition, there has been some minor development of the site including installation of monitoring wells and groundwater extraction wells (associated with the former McDonald Douglas/Rancho Cordova Test Site located north of the site), high-voltage transmission power lines, and a small transformer associated with the power lines.

General Site Geology

The site is located within the northeastern portion of the Great Valley geomorphic province of California. The Great Valley of California is generally considered to be an elongated sedimentary trough, approximately 450 miles long and 50 miles wide, which has been filled by a thick sequence of Jurassic to Holocene continental and marine sediments. The sediments have been folded into an asymmetric syncline, the axis of which lies immediately east of the interior of the Coast Ranges. The geology in the Great Valley is characterized by thick sequences of alluvial and flood plain deposits consisting of sedimentary material derived from the Coast Ranges to the west and the Sierra Nevada mountain range to the east.

The local geology, as characterized by the Geologic Map of the Sacramento Quadrangle, California (1981), consists primarily of Laguna Formation deposits (Tl) which are consolidated Tertiary age alluvial deposits. Surface soil deposits were mapped by the NRCS as consisting of the following units:

- Fiddyment Fine Sandy Loam, 1 to 8 percent slopes (0.4% of area of interest - AOI[2]);
- Hicksville gravelly loam, 0 o 2 percent slopes, occasionally flooded (2.4% of AOI);
- Red Bluff-Redding complex, 0 to 5 percent slopes (16.2% of AOI);
- Redding loam, 2 to 8 percent slopes (10.7% of AOI); and,
- Redding gravelly loam, 0 to 8 percent slopes (70.4% of AOI).

The NRCS also maps the site use with the following characteristics:

- Somewhat limited for small commercial buildings, and dwellings without basements, due in part to the presence of expansive soils.
- Somewhat limited for excavations, due in part to the stability of excavation walls.
- Somewhat limited for local roads and streets, due in part to presence of expansive soils.
- Low to Moderate corrosion potential to concrete.

The soils encountered in the test pits excavated on site were generally consistent with these mapped soil units based on laboratory testing and field and laboratory classification of soils.

Soil and Rock Conditions

The site is generally composed of loose to medium dense, alluvial deposits consisting of silty and clayey sand, lean clay, gravels, and clayey gravel. Surface soils in the upper two to three feet generally consist of silty or clayey sand or sandy, silty clay with some gravel and occasional cobbles. These soils generally have a low plasticity index (PI) of 6 or less and dry unit weights ranging from 109 to 119 pounds per cubic foot (pcf), with some potential for corrosion (pH = 5.22). Soils beneath the silty sand to a depth of approximately 4 to 8 feet consist of clay and silty or clayey sand with some gravel and cobbles. These soils generally have a higher plasticity index (PI = 16 to 20) and dry unit weights ranging from 89 to 112 pcf. Beneath these soils are sand, silty sand, gravel, and clayey gravel with some cobbles extending to the maximum depth explored of 10½ feet below existing grades. Cobbles of up to 6 inches were observed in many locations increasing in concentration with depth.

Detailed soil descriptions and soil lithology at a specific test pit location are provided in logs of the test pits presented in Figures 3 through 12. At the conclusion of the field explorations, the test pits were backfilled with excavation spoils compacted with a sheepsfoot wheel attachment.

[2] Coverages of area of interest are approximate.

Groundwater

The site is located within the California department of Water Resources defined Sacramento Valley Groundwater Basin/South American Sub-Basin of the Sacramento River Hydrologic Region.

Groundwater was not encountered in the test pits excavated at the site in August of 2016. Based on groundwater depth observations taken from 2008 to 2012 in nearby wells (e.g. Wells EX-20, EX-21, EX-22, and EX-27 from Central Valley Regional Water Quality Control Board Case Number SL205493018) permanent groundwater is anticipated to vary between 150 and 240 feet below existing surface grades.

However, perched seasonal groundwater is anticipated to occur at this site. Surface water features observed during site exploration activities included vernal ponds and ephemeral streams/washes. Based on these surface features, and the underlying geology, we anticipate the perched groundwater conditions are likely to occur at the site with potential for significant surface water flows. Perched groundwater conditions should be expected after heavy rainfall or during the wetter seasons of the year.

PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

Seismic Hazards

The Alquist-Priolo (AP) Earthquake Fault Zoning Act regulates activities near active faults within what is known as an earthquake fault zone. Active faults are defined as a fault that has ruptured in the last 11,000 years. Review of the AP Maps of California, prepared by the California Geological Survey (CGS), shows that there are no regulated earthquake fault zones near the site.

We note, however, that low to moderate amounts of earthquake induced ground shaking can occur at the site. The average peak ground acceleration (PGA_M) at the site for the maximum considered earthquake (MCE) event (per ASCE 7-10) is 0.244 g.

Faults likely contributing significantly to this hazard include the Hunting Creek – Berryessa Fault and the Great Valley fault system among other sources. The closest fault zone to the site is the Foothills Fault System, located about 20 miles north east of the site. The Foothills Fault System has been historically active, with magnitude 5 to 6 events occurring in 1975 near Oroville, CA and microseismicity recorded in the vicinity of the Penryn and Rocklin plutons (Cramer et al., 1978).

No known active faults cross through the site and fault displacement hazard is considered to be negligible at the site.

Seismic Design Parameters (2013 CBC/ASCE 7-10)

Code based seismic design parameters were developed for the site consistent with section 1613 of the 2013 edition of the California Building Code (2013 CBC), which references the American Society of Civil Engineers Standard 7-10 (ASCE 7-10). For the purposes of preliminary evaluations, we assumed a site class of D for the site.

Seismic design parameters were obtained for Site Class D using the online USGS U.S. Seismic Design Maps application. Using this tool, values were obtained for a point near the center of the site located at latitude 38.5423˚ and longitude -121.2091˚, and are provided in Table 1. These seismic design parameters may be used for preliminary evaluations. Applicability to the site should be confirmed prior to use in final design.

TABLE 1
2013 CBC/ASCE 7-10 SEISMIC DESIGN PARAMETERS

Latitude: 38.5423° N Longitude: 121.2091° W	ASCE 7-10 Table/Figure	2013 CBC Table/Figure	Factor/Coefficient	Value
Mapped MCE_R S_a, 0.2 sec	Figure 22-1	Figure 1613.3.1(1)	S_S	0.515 g
Mapped MCE_R S_a, 1.0 sec	Figure 22-2	Figure 1613.3.1(2)	S_1	0.252 g
Soil Class	Table 20.3-1	Section 1613.3.2	Site Class	D
Site Coefficient	Table 11.4-1	Table 1613.3.3(1)	F_a	1.388
Site Coefficient	Table 11.4-2	Table 1613.3.3(2)	F_v	1.896
Transition Period	Figure 22-12	-	T_L	12 sec
Adjusted MCE_R S_a Parameters	Equation 11.4-1	Equation 16-37	S_{MS}	0.715 g
	Equation 11.4-2	Equation 16-38	S_{M1}	0.478 g
Design Level S_a Parameters	Equation 11.4-3	Equation 16-39	S_{DS}	0.477 g
	Equation 11.4-4	Equation 16-40	S_{D1}	0.319 g
Seismic Design Category	Table 11.6-1 and Table 11.6-2	Table 1613.3.5(1) & Table 1613.3.5(2)	-	D

NOTES:
MCE_R = Risk-Targeted Maximum Considered Earthquake
S_a = Five percent damped spectral response acceleration (for a given period)
g = gravity
sec = seconds

Liquefaction Potential

Earthquake induced soil hazards to buildings associated with seismicity include liquefaction and seismically induced bearing capacity failure, lateral spreading, and total/differential settlement of soils below foundations. These effects, when significant, can contribute to structural damage or collapse of structures, and damage to utilities and other engineered structures. Typically, the risk of these types of hazards occurring is considered low in the Central Valley due to the low potential for nearby large magnitude seismic events.

Groundwater at the site is greater than 50 feet below grades, and saturated soils were not encountered during site exploration activities. Soils will likely remain unsaturated during the majority of the year, and are thus not considered susceptible to liquefaction. The silty sands, and sands are susceptible to seismic compression.

Based on this, it is our opinion that liquefaction potential at the site is considered very low. However, the low to moderate ground shaking expected at the site may be capable of causing some limited settlement in the sands. The expected total and differential settlements of the soils should be evaluated in more detail in a final geotechnical engineering report.

Naturally Occurring Asbestos (NOA)

Review of *Relative Likelihood for the Presence of Naturally Occurring Asbestos in Eastern Sacramento County, California* (Higgins and Clinkenbeard, 2006) indicates the site is not likely to be underlain by ultramafic rocks likely to contain naturally occurring asbestos. In addition, we did not observe or encounter ultramafic rocks likely to contain naturally occurring asbestos. Therefore, naturally occurring asbestos is not considered likely to exist at the site.

Soil Expansion Potential

According to section 1803.5.3 of the *California Building Code*, soils with a PI greater than 15, more than 10 percent fines, and having more than 10 percent of particles less than 5 micrometers in size; and/or soils having an expansion index (EI) of more than 20 shall be considered expansive.

Laboratory test results performed on samples collected in the upper 2 to 3 feet indicate that these soils typically have a PI of less than 15 and can be considered to have a low expansion potential. The soils beneath about two feet typically have a PI of greater than 15, and should be considered to have a low to moderate expansion potential. Additional testing of the clay and silty/clay should be conducted to confirm the expansive potential of this soil layer prior to final design. These soils were typically encountered in the northwestern area of the property, with the presence of these soils less prominent to the south and east.

Based on the presence of the low to moderately expansive clay at the site, recommendations to mitigate the effects of the expansive clay would be provided for the design-level geotechnical report. Mitigation measures will likely be required if final site grades will expose the clayey subgrade or of the clayey soils are within the upper 12 to 18 inches of the final building pads, exterior flatwork, or pavement subgrades. Typical mitigation includes deepened conventional foundations and/or use of post-tensioned slabs.

Soil Corrosion Potential

One sample of near-surface soil from TP5 was submitted to Sunland Analytical Lab for testing to determine pH, chloride and sulfate concentrations, and minimum resistivity to help evaluate the soils corrosion potential. The results of the corrosivity testing are summarized in Table 2 and copies of the analytical test reports are presented in Figures A6 through A7.

TABLE 2
SOIL CORROSIVITY TESTING

Analyte	Test Method	TP3 (0'-3')
pH	CA DOT 643 Modified*	5.22
Minimum Resistivity	CA DOT 643 Modified*	7,500 Ω-cm
Chloride	CA DOT 417	6.5 ppm
Sulfate	CA DOT 422	1.9 ppm
	ASTM D516	2.04 ppm

NOTES: * = Small cell method, Ω-cm = Ohm-centimeters, ppm = Parts per million

The California Department of Transportation Corrosion and Structural Concrete Field Investigation Branch, 2012 Corrosion Guidelines, considers a site to be corrosive to foundation elements if one or more of the following conditions exists for the representative soil and/or water samples taken: has a chloride concentration greater than or equal to 500 ppm, sulfate concentration greater than or equal to 2000 ppm, or a pH of 5.5 or less (Caltrans, 2012).

Based on this criterion, soils tested with a lower pH and may be considered corrosive to steel reinforcement properly embedded within Portland cement concrete (PCC).

Table 19.3.1.1 – Exposure Categories and Classes, of American Concrete Institute (ACI) 318-14, Section 19.3 – Concrete Design and Durability Requirements, as referenced in Section 1904.1 of the 2013 CBC, indicates the severity of sulfate exposure for the sample tested is Exposure Class S0 (water-soluble sulfate concentration in contact with concrete is low and injurious sulfate attack is not a concern). However, additional requirements for concrete strength and design may be required for soils with low pH. Consideration to the potential corrosive nature of soil should be considered in development of the project. Concrete design will ultimately need to be developed by a structural engineer, who should evaluate the requirements of ACI 318-14 and determine their applicability to the site.

Wallace-Kuhl & Associates are not corrosion engineers. Therefore, if it is desired to further define the soil corrosion potential at the site a corrosion engineer should be consulted.

Building Support

An important aspect of site development will be the adequate clearing of surface and subsurface items associated with the existing vegetation and depressions revealed during site grading. Proper abandonment of irrigation and domestic wells, if any, must be performed in accordance with the Sacramento County Environmental Management Department requirements. Wells not designated for abandonment should be appropriately protected against damage.

It is our opinion that undisturbed native soils and/or recompacted native soils will be capable of supporting the proposed structures and pavements provided the further preliminary recommendations regarding preparation and soil compaction are followed. Our work also indicates that engineered fill, properly placed and compacted in accordance with the recommendations of this report, will be capable of supporting the proposed improvements.

Buildings where expansive clayey soils are encountered within the upper 12 to 18 inches of the foundations or final building pad subgrade will require specific recommendations to mitigate the effects of the expansive soils. Mitigation measures may include deepening foundations, post-tension (PT) construction, and/or removal of the expansive clays and replacement with non-expansive engineered fill.

Excavation Conditions

Soil test pits were excavated to depths ranging from 7 to 10½ feet with a Case 580 Super M backhoe. Excavation refusal was generally reached at depths of 7 feet or more. Based on this information, and our local experience, we anticipate the soils at the site will be readily excavatable to depths of approximately five feet across most of the site with conventional earthmoving and trenching equipment. Gravely soils and cobbles will be encountered in most locations at the site. Excavations deeper than five feet are likely to encounter greater concentrations of gravel and cobbles and may require additional effort or larger equipment to excavate.

Near surface soils generally consist of silty sands and generally classify as OSHA Type B/C soils requiring excavation slopes of not more than 1H:1V to 1½H:1V (horizontal to vertical) for shallow excavations. Sloped excavations, bracing, and/or shoring may be required to control sloughing and caving of excavations within the near-surface soils at the site. Excavations should be sloped or braced in accordance with current California Occupational Safety and Health Administration (Cal/OSHA) regulations.

The contractor must provide a safely sloped excavation or an adequately constructed and braced shoring system in accordance with federal, state, and local safety regulations for individuals working in an excavation that may expose them to the danger of moving ground. If material is stored or heavy equipment is operated near an excavation, stronger shoring must be used to resist the extra pressure due to the superimposed loads.

Material Suitability for Engineered Fill Construction

In our opinion, the on-site surface and near-surface soils are considered suitable for use as engineered fill materials provided they are appropriately processed such that they are free of debris, do not contain significant concentrations of clay or gravel, are at or near optimum moisture content (e.g. moisture at which adequate compaction can be achieved), and contain organics less than two percent by weight.

Surface soils may require stripping of organics prior to work at the site. Strippings and other organically laden soil stripped from the surface of the site may not be used in fill construction or anywhere within five feet of a structure, pavement, or exterior flatwork.

We anticipate that soils in the upper 2 to 3 feet will require only minimal on site processing after stripping has been completed to meet the requirements for engineered fill. Deeper soils may require more extensive processing including mixing with other soil and breaking down of larger particles to be considered suitable. Additionally, expansive soils if present in the upper 12 to 18 inches beneath the bottom of the foundations may require alternative foundation systems (e.g. post-tensioned slab systems).

Groundwater and Seasonal Moisture

Based on the soil and groundwater conditions encountered at the site, it is our opinion that the static groundwater table should not adversely affect design, construction, or performance of the proposed residential improvements. Although the static groundwater table should not impact future development, perched water may be encountered above and within the soils at the site. The potential for encountering perched water is greater during and shortly after the rainy season; however, perched water could be encountered throughout the year in some areas. Seepage in utility excavations (if encountered) can likely be removed by sump pumps without major dewatering efforts.

We note that an important aspect of this project will be to develop an overall water management plan. The potential for perched groundwater, seeps, and surface ponding at the site is high, especially in the wetter seasons of the year. Management of groundwater using subdrains or similar methods should be incorporated into the overall project plan. Subdrains, if used, should be designed to adequately carry water collected in the system, and should have a designated drainage outlet at an appropriate location.

The near-surface soils will be in a near-saturated condition during and for a considerable period following the rainy season. Grading operations attempted following the onset of winter rains and prior to prolonged drying periods will be hampered by high soil moisture contents. Such soils, intended for use as engineered fill, will require considerable aeration to reach a moisture content that will permit the recommended compaction to be achieved.

Site Clearing and Grading Considerations

Future geotechnical engineering investigations should be performed to develop site-specific clearing and grading recommendations.

Site clearing would include removal of abandoned water wells, and deleterious debris. Excavations and depressions resulting from the removal of these items must be backfilled with engineered fill.

Removal of surface organics would depend on the condition and quantity of the organics at the time grading is to begin. Discing of the organics may be suitable for construction, if the organic concentrations are not too heavy at the time of grading. Stripping of the organics likely would be required if organic concentrations are very thick, with strippings being completely removed from the site or used only in landscape areas.

Loose, soft, organically contaminated, or saturated soils encountered during site preparation, are not considered suitable for support of future improvements. Removal of these materials to expose firm, undisturbed native soils, and backfilling with engineered fill will be required.

Drainage swales to be backfilled should be drained of water, and cleaned of organics and saturated or unstable soils to expose firm, native soil. The excavated soils from the features are anticipated to be at elevated moisture contents and may contain high concentrations of organics; therefore, the materials may need to be disposed of off-site and not reused as fill materials within structural areas. Subsurface drainage should be provided in areas with drainage swales.

Areas designated to receive fill and at-grade areas are typically ripped to a depth of about 12 inches, thoroughly moisture conditioned, and uniformly compacted. Standard fill construction and compaction procedures, including uniform moisture conditioning, placement of fill in six-inch lifts and compaction to at least 90 percent of the maximum dry density, would be suitable for support of the planned structures. Engineered fills placed on sloping ground would need to be properly keyed and benched into existing hillsides.

Typically, only native soils (in lieu of select sand backfill) are recommended for use as backfill in the upper portion of utility trenches located within building footprints and extend at least five feet beyond the perimeter foundation to minimize water transmission beneath the homes. Utility

trench backfill is generally thoroughly moisture conditioned to at least the optimum moisture content and mechanically compacted.

Due to the potential expansion characteristics of the native clay soils, the upper 12 to 18 inches of the final subgrade below the building footprints and at-grade structures, including exterior flatwork, should consist of imported non-expansive engineered fill or on site soils that have been determined to be non-expansive. Consideration may also be given to chemically amending the native clayey soils.

Building Foundations

In general, we anticipate the proposed residential structures at the site could be supported upon conventional continuous and/or isolated spread foundations. Minimum foundation widths of 12 inches for continuous foundation and 18 inches wide for isolated spread foundations would be applicable.

However, areas where clayey soils are exposed or are within 12 to 18 inches of the final building pad may require alternative foundations or designs, such as post-tensioned slabs. Post-tension slabs are typically 10-inches thick with deepened edges.

We anticipate a bearing capacity on the order of 2000 pounds per square foot (psf) for dead plus live load would be applicable for residential foundations bearing in re-compacted native materials, engineered fill, or a combination of these materials.

Interior concrete slab-on-grade floors used in conjunction with conventional foundations would be suitable for this site, provided slabs are properly designed and constructed with regard to reinforcement and moisture vapor penetration resistance. Typical slab reinforcement used in conjunction with deepened conventional foundations would consist of at least No. 3 rebar at 18-inch center-to-center spacing, and include appropriate slab ties typically spaced at 54-inch centers. Proper reinforcement of slab-on-grade and moisture conditioning (i.e. pre-saturation) of upper 12 inches of subgrade soils prior to concrete placement will be particularly crucial due to the on-site expansive soils.

Final foundation design will depend on the final site grades relative to the expansive clay soils and should be determined in a design level report once additional information regarding the proposed development becomes available.

Preliminary Pavement Design

The surface and near-surface soils at the test pit locations exhibited moderate to good subgrade qualities for support of asphalt concrete pavements. Laboratory testing of two samples of near-surface soils indicate that these materials possess Resistance ("R") values of

30 and 51; as presented on Figures A4 and A5. We have conservatively used an R-value of 25 for preliminary design purposes for the calculation of alternative pavement sections.

The following preliminary pavement sections provided in Table have been calculated based on the R-value test results and a design life of 20 years. Traffic indices (TI) were selected consistent with the minimum requirements of Sacramento County.

TABLE 3
PRELIMINARY PAVEMENT DESIGN ALTERNATIVES

Traffic Index (TI)	Street Class Right-of-Way Width	R-value = 25	
		Type B Asphalt Concrete (inches)	Class 2 Aggregate Base (inches)
5.0	Residential Streets <54' Right-of-Way	2½	8
		3*	7
6.0	Residential Collector Street ≥54' Right-of-Way (no bus traffic)	2½	11
		3½*	9
6.5	Two lane commercial street with all bus routes	3	12
		4*	10
8.0	Arterial (84' Right-of-Way)	4	14
		5*	12

Note: *Asphalt thickness includes Caltrans Factor of Safety.

We emphasize that the performance of a pavement is critically dependent upon uniform compaction of the subgrade soils, as well as all engineered fill and utility trench backfill within the limits of the pavements.

Efficient drainage of all surface water to avoid infiltration and saturation of the supporting aggregate base and subgrade soils is important to the performance of pavements. Where drop inlets or other surface drainage features are to be constructed, weep holes could be provided at the base/subgrade level to allow free drainage of collected water, and reduce the potential of saturating the subgrade soils.

Future Geotechnical Engineering Study

Prior to final design and the start of construction, a design-level geotechnical engineering report must be prepared for this property that includes additional subsurface explorations and soil sampling, laboratory testing, and engineering evaluation. The final report should present geotechnical engineering conclusions and specific recommendations for site preparation, foundation design, floor support, retaining wall design, site drainage, and pavement design. When the project reaches this stage of development, we would be pleased to provide a proposal for these services.

LIMITATIONS

The findings and conclusions contained in this preliminary report are intended as a general overview of available geologic information combined with limited fieldwork and office analysis. We have used engineering judgment based upon the information provided and the data generated from the site reconnaissance, field exploration, and review of files for adjacent projects. We emphasize that this report is general in nature and intended for use in planning and budgeting for the project, and is applicable only to the investigated site.

This report has been prepared in substantial compliance with generally accepted geotechnical engineering practices that exist in the area of the project at the time the report was prepared. No warranty, either express or implied, is provided.

Wallace-Kuhl & Associates

REGISTERED PROFESSIONAL ENGINEER
MICHAEL M. WATARI
NO. 2675
Exp. 12-31-17
GEOTECHNICAL
STATE OF CALIFORNIA

9/26/16

Alexander D. Wright
Staff Engineer

Michael M. Watari
Senior Engineer

ADW:MMW:/adw

REFERENCES

American Society of Civil Engineers (ASCE), 2010, Minimum Design Loads for Buildings and Other Structures.

California Building Standards Commission, 2013, California Code of Regulations, Title 24, Chapter 16A, "California Building Code," California amendments to the 2012 edition of the International Building Code.

California Division of Mines and Geology, 1981, *Geologic Map of the Sacramento Quadrangle, California, 1:250,000*. Compiled by: Wagner, D. L., Jennings, C. W., Bedrossain, T. L., and Bortugno, E.J.

California Department of Transportation (Caltrans), 2012, Corrosion Guidelines, v2.0: Sacramento, CA, November, 44 p.

California Department of Transportation (CALTRANS), 2016, Highway Design Manual, 6th edition, July.

Cramer, C.H., Toppozada, T.R., and Parke, D.L., 1978, Seismicity of the Foothills Fault System between Fulsom and Oroville, California. California. Bulletin of the Seismological Society of America, v. 68, no. 1, pp 245-249.

Higgens, C.T., and Clinkenbeard, J.P, 2006, *Relative Likelihood for the Presence of Naturally Occuring Asbestos in Eastern Sacramento County, California.* California Geological Survey Special Report 192.

Sacramento County, 2009, Improvement Standards (New Development). November, 127p.

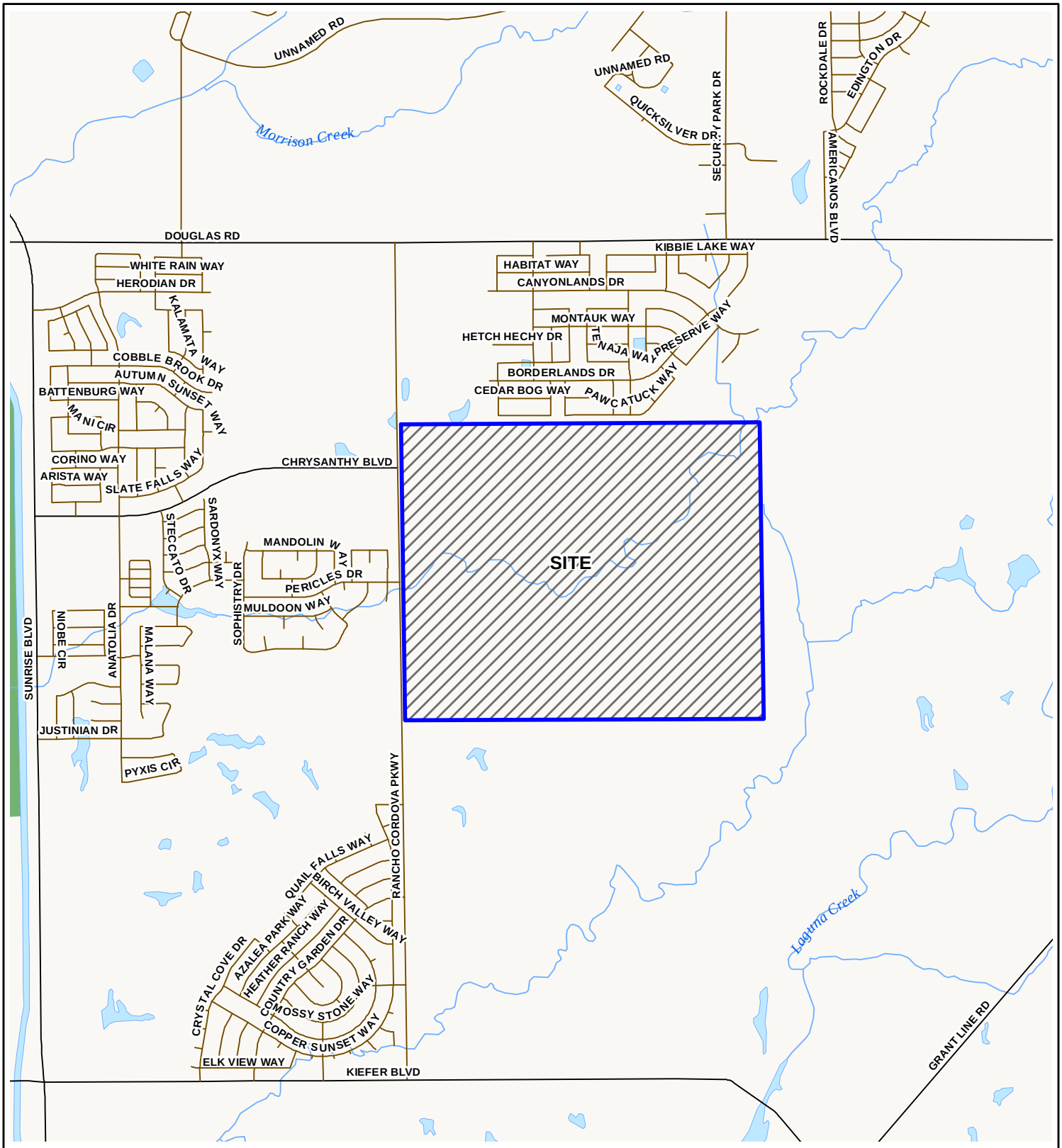
Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. *Web Soil Survey*. Available online at http://websoilsurvey.nrcs.usda.gov/. Accessed September 13, 2016.

State Water Resources Control Board, California Water Boards. GeoTracker GAMA. *Central Valley Regional Water Quality Control Board Case Number SL205493018*. Available online at http://geotracker.waterboards.ca.gov/. Accessed September 13, 2016.

Wallace-Kuhl & Associates, 2016, *DRAFT Phase I Environmental Site Assessment Jaeger Ranch Property*. Prepared for the True Life Companies of San Ramon California. September, 65p.

United States Geological Society. *U.S. Seismic Design Maps*. Available online at http://earthquake.usgs.gov/designmaps/us/application.php. Accessed September 13, 2016.

FIGURES



Street data courtesy of Sacramento County.
Hydrography courtesy of the U.S. Geological Survey
acquired from the GIS Data Depot, December, 2007.
Projection: NAD 83, California State Plane, Zone II

0 1,000 2,000
Feet

WallaceKuhl & ASSOCIATES

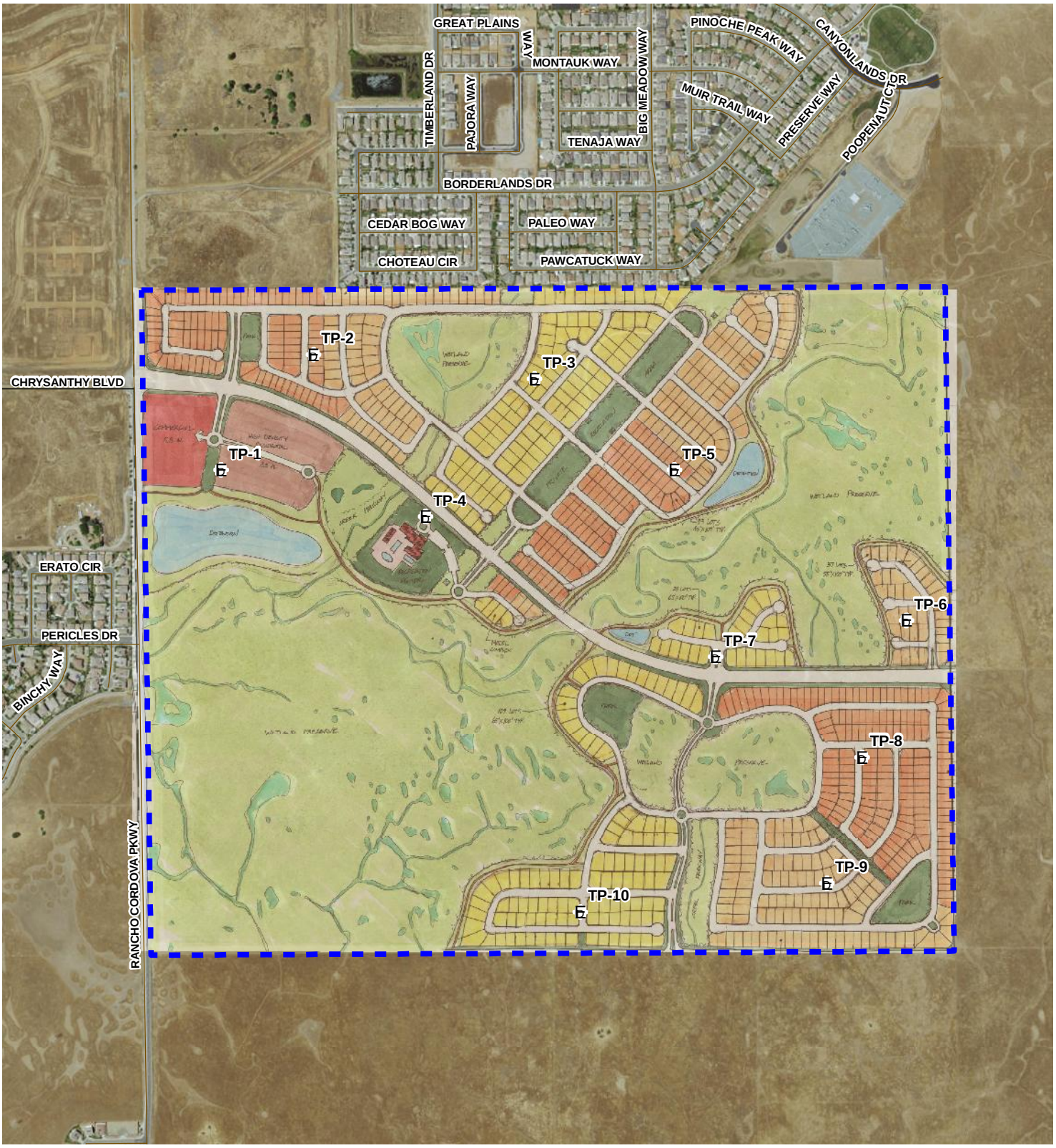
VICINITY MAP

JAEGER RANCH PROPERTY

Sacramento, California

FIGURE	1
DRAWN BY	RWO
CHECKED BY	ADW
PROJECT MGR	MMW
DATE	09/16

WKA NO. 11103.02



Aerial provided by ESRI.
Site Plan adapted from drawing provided by Wood Rodgers, dated May 11, 2016.
Projection: NAD 83, California State Plane, Zone II

Legend

- Site Boundary
- Approximate Test Pit Location

0 450 900
Feet

WallaceKuhl & Associates

SITE PLAN

JAEGER RANCH PROPERTY

Sacramento, California

FIGURE	2
DRAWN BY	RWO
CHECKED BY	ADW
PROJECT MGR	MMW
DATE	09/16
WKA NO. 11103.02	

Project: Jaeger Ranch Property
Project Location: Rancho Cordova, California
WKA Number: 11103.02

LOG OF SOIL BORING TP1

Sheet 1 of 1

Date(s) Drilled	**8/16/16**	Logged By	**ADW**	Checked By	**MMW**
Drilling Method	**Backhoe**	Drilling Contractor	**Ron Tillford**	Total Depth of Drill Hole	**10.0 feet**
Drill Rig Type	**580 Case Super M**	Diameter(s) of Hole, inches	**24" Bucket**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**Bulk, Hand Sampler**	Drill Hole Backfill	**Soil cuttings**
Remarks				Driving Method and Drop	

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DATA: NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Brown, moist, silty fine to coarse SAND [SM]		TP1-1				RV
			Light brown, moist, lean clayey / silty fine SAND [SC/SM]		TP1-2I		11.6	89	
	5		Brown, moist, poorly graded fine to coarse GRAVEL with fine to coase sand and cobbles [GP]						
			Brown, moist, lean clayey fine to coarse rounded GRAVEL with fine to coarse sand [GC]						
			Brown, moist, silty fine to coarse GRAVEL with fine to coarse sand and cobbles [GM]						
	10		Bottom of test pit at 10 feet. Groundwater not encountered.						

BORING LOG 11103.02 - JAEGER RANCH PROPERTY.GPJ WKA.GDT 9/26/16 10:43 AM

Wallace Kuhl & ASSOCIATES

FIGURE 3

Project: Jaeger Ranch Property
Project Location: Rancho Cordova, California
WKA Number: 11103.02

LOG OF SOIL BORING TP2

Sheet 1 of 1

Date(s) Drilled	**8/16/16**	Logged By	**ADW**	Checked By	**MMW**
Drilling Method	**Backhoe**	Drilling Contractor	**Ron Tillford**	Total Depth of Drill Hole	**7.5 feet**
Drill Rig Type	**580 Case Super M**	Diameter(s) of Hole, inches	**24" Bucket**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**Bulk, Hand Sampler**	Drill Hole Backfill	**Soil cuttings**
Remarks				Driving Method and Drop	

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DATA: NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Brown, moist, silty fine to coarse SAND [SM] with trace fine to medium gravel		TP2-1				
			Red, moist, fine sandy lean CLAY [CL] with trace fine to medium gravel		TP2-2I		16.0	95	GD, AT
	5		Red, moist, lean clayey GRAVEL with fine sand [GC] with trace cobbles		TP2-3I				
			Practical refusal encountered at 7.5 feet. Groundwater not encountered.						

BORING LOG 11103.02 - JAEGER RANCH PROPERTY.GPJ WKA.GDT 9/26/16 10:43 AM

Wallace Kuhl & ASSOCIATES

FIGURE 4

Project: Jaeger Ranch Property
Project Location: Rancho Cordova, California
WKA Number: 11103.02

LOG OF SOIL BORING TP3

Sheet 1 of 1

Date(s) Drilled	**8/16/16**	Logged By	**ADW**	Checked By	**MMW**
Drilling Method	**Backhoe**	Drilling Contractor	**Ron Tillford**	Total Depth of Drill Hole	**9.5 feet**
Drill Rig Type	**580 Case Super M**	Diameter(s) of Hole, inches	**24" Bucket**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**Bulk, Hand Sampler**	Drill Hole Backfill	**Soil cuttings**
Remarks				Driving Method and Drop	

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DATA: NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Brown, dry, variably cemented, fine sandy silty lean CLAY [CL-ML] with trace fine gravel		TP3-1				GD
					TP3-2I		4.8	109	AT
			Brown, dry to moist, variably cemented, fine to coarse SAND with silt [SP]						
	5		Reddish brown, moist, poorly graded fine to coarse GRAVEL with fine to coarse sand [GP]						
			Reddish bronw, moist, poorly graded fine to coarse GRAVEL with fine to coarse sand and cobbles [GP]						
			Bottom of test pit at 9.5 feet. Groundwater not encountered.						

BORING LOG 11103.02 - JAEGER RANCH PROPERTY.GPJ WKA.GDT 9/26/16 10:43 AM

Wallace Kuhl & ASSOCIATES

FIGURE 5

Project: Jaeger Ranch Property
Project Location: Rancho Cordova, California
WKA Number: 11103.02

LOG OF SOIL BORING TP4

Sheet 1 of 1

Date(s) Drilled	**8/16/16**	Logged By	**ADW**	Checked By	**MMW**
Drilling Method	**Backhoe**	Drilling Contractor	**Ron Tillford**	Total Depth of Drill Hole	**9.3 feet**
Drill Rig Type	**580 Case Super M**	Diameter(s) of Hole, inches	**24" Bucket**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**Bulk**	Drill Hole Backfill	**Soil cuttings**
Remarks				Driving Method and Drop	

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DATA: NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Reddish brown, dry, variably cemented, lean clayey fine to medium SAND [SC] with trace fine to medium gravel		TP4-1				
			Red, dry to moist, lean clayey fine to coarse SAND with gravel [SC] with trace fine to coarse gravel						
	5		Reddosh brown, moist, lean clayey fine to coarse GRAVEL with fine to coarse sand [GC]						
			Reddish brown, moist, well graded fine to coarse GRAVEL withfine to coarse sand [GP]						
			Practical refusal encountered at 9.25 feet. Groundwater not encountered.						

BORING LOG 11103.02 - JAEGER RANCH PROPERTY.GPJ WKA.GDT 9/26/16 10:43 AM

Wallace Kuhl & ASSOCIATES

FIGURE 6

Project: Jaeger Ranch Property
Project Location: Rancho Cordova, California
WKA Number: 11103.02

LOG OF SOIL BORING TP5

Sheet 1 of 1

Date(s) Drilled	**8/16/16**	Logged By	**ADW**	Checked By	**MMW**
Drilling Method	**Backhoe**	Drilling Contractor	**Ron Tillford**	Total Depth of Drill Hole	**10.0 feet**
Drill Rig Type	**580 Case Super M**	Diameter(s) of Hole, inches	**24" Bucket**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**Bulk, Hand Sampler**	Drill Hole Backfill	**Soil cuttings**
Remarks				Driving Method and Drop	

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DATA: NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Red, dry, silty fine to medium SAND [SM] with trace fine gravel		TP5-1				CR
					TP5-2I		5.6	119	TR
			Red, moist, lean clayey fine SAND [SC]						
	5		Reddish brown, moist, variably cemented, well graded fine to coarse SAND with lean clay [SW]						
			Reddish brown, moist, well graded fine to coarse GRAVEL with fine to coarse sand and cobbles [GW]						
	10		Bottom of test pit at 10.0 feet. Groundwater not encountered.						

BORING LOG 11103.02 - JAEGER RANCH PROPERTY.GPJ WKA.GDT 9/26/16 10:43 AM

Wallace Kuhl & ASSOCIATES

FIGURE 7

Project: Jaeger Ranch Property
Project Location: Rancho Cordova, California
WKA Number: 11103.02

LOG OF SOIL BORING TP6

Sheet 1 of 1

Date(s) Drilled	**8/16/16**	Logged By	**ADW**	Checked By	**MMW**
Drilling Method	**Backhoe**	Drilling Contractor	**Ron Tillford**	Total Depth of Drill Hole	**10.0 feet**
Drill Rig Type	**580 Case Super M**	Diameter(s) of Hole, inches	**24" Bucket**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**Bulk**	Drill Hole Backfill	**Soil cuttings**
Remarks				Driving Method and Drop	

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DATA: NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Dark reddish brown, dry, silty fine SAND [SM]		TP6-1				
			becomes variably cemented at 2 feet						
	5		Brown, moist, well graded fine to coarse GRAVEL with fine to coarse sand and cobbles [GW]						
					TP6-2		7.2		
			Brown, moist, clayey fine to coarse GRAVEL with fine to coarse sand and cobbles [GC]						
	10		Practical refusal encountered at 10 feet. Groundwater not encountered.						

BORING LOG 11103.02 - JAEGER RANCH PROPERTY.GPJ WKA.GDT 9/26/16 10:43 AM

Wallace Kuhl & ASSOCIATES

FIGURE 8

Project: Jaeger Ranch Property
Project Location: Rancho Cordova, California
WKA Number: 11103.02

LOG OF SOIL BORING TP7

Sheet 1 of 1

Date(s) Drilled	**8/16/16**	Logged By	**ADW**	Checked By	**MMW**
Drilling Method	**Backhoe**	Drilling Contractor	**Ron Tillford**	Total Depth of Drill Hole	**10.0 feet**
Drill Rig Type	**580 Case Super M**	Diameter(s) of Hole, inches	**24" Bucket**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**Bulk**	Drill Hole Backfill	**Soil cuttings**
Remarks				Driving Method and Drop	

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DATA: NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Dark brown, dry, variably cemented, silty fine to medium SAND [SM] with trace fine gravel		TP7-1				
			Dark brown, moist, variably cemented, well graded fine to coarse SAND [SW]						
	5		Dark brown, moist, well graded fine to coarse GRAVEL with fine to coarse sand [GW] and trace cobbles						
	10		Bottom of test pit at 10 feet. Groundwater not encountered.						

BORING LOG 11103.02 - JAEGER RANCH PROPERTY.GPJ WKA.GDT 9/26/16 10:43 AM

Wallace Kuhl & ASSOCIATES

FIGURE 9

Project: Jaeger Ranch Property
Project Location: Rancho Cordova, California
WKA Number: 11103.02

LOG OF SOIL BORING TP8

Sheet 1 of 1

Date(s) Drilled	**8/16/16**	Logged By	**ADW**	Checked By	**MMW**
Drilling Method	**Backhoe**	Drilling Contractor	**Ron Tillford**	Total Depth of Drill Hole	**10.5 feet**
Drill Rig Type	**580 Case Super M**	Diameter(s) of Hole, inches	**24" Bucket**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**Bulk, Hand Sampler**	Drill Hole Backfill	**Soil cuttings**
Remarks				Driving Method and Drop	

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DATA: NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Dark reddish brown, dry, variably cemented, silty fine to medium SAND [SM]		TP8-1				
					TP8-2I		9.5	107	
					TP8-3I				
			Dark reddish brown to brown, moist, variably cemented, lean clayey fine SAND [SC]		TP8-4I		10.8	112	GD, AT
					TP8-5I				GD
	5								
			Brown, moist, silty fine to medium SAND [SM]						
	10								
			Bottom of test pit at 10.5 feet. Groundwater not encountered.						

BORING LOG 11103.02 - JAEGER RANCH PROPERTY.GPJ WKA.GDT 9/26/16 10:43 AM

Wallace Kuhl & ASSOCIATES

FIGURE 10

Project: Jaeger Ranch Property
Project Location: Rancho Cordova, California
WKA Number: 11103.02

LOG OF SOIL BORING TP9

Sheet 1 of 1

Date(s) Drilled	**8/16/16**	Logged By	**ADW**	Checked By	**MMW**
Drilling Method	**Backhoe**	Drilling Contractor	**Ron Tillford**	Total Depth of Drill Hole	**10.0 feet**
Drill Rig Type	**580 Case Super M**	Diameter(s) of Hole, inches	**24" Bucket**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**Bulk**	Drill Hole Backfill	**Soil cuttings**
Remarks				Driving Method and Drop	

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DATA: NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Dark reddish brown, dry, variably cemented, silty clayey fine to medium SAND [SC-SM]		TP9-1				RV
			Dark reddish brown, moist, variably cemented, lean clayey fine to medium SAND [SC]						
			Brown, moist, variably cemented, poorly graded fine to medium SAND with lean clay [SP]						
	5				TP9-2				
			Reddish brown, moist, well graded fine to coarse GRAVEL with fine to coarse sand [GW]						
	10		Bottom of test pit at 10 feet. Groundwater not encountered.						

BORING LOG 11103.02 - JAEGER RANCH PROPERTY.GPJ WKA.GDT 9/26/16 10:43 AM

Wallace Kuhl & ASSOCIATES

FIGURE 11

Project: Jaeger Ranch Property
Project Location: Rancho Cordova, California
WKA Number: 11103.02

LOG OF SOIL BORING TP10

Sheet 1 of 1

Date(s) Drilled	**8/16/16**	Logged By	**ADW**	Checked By	**MMW**
Drilling Method	**Backhoe**	Drilling Contractor	**Ron Tillford**	Total Depth of Drill Hole	**7.0 feet**
Drill Rig Type	**580 Case Super M**	Diameter(s) of Hole, inches	**24" Bucket**	Approx. Surface Elevation, ft MSL	
Groundwater Depth [Elevation], feet		Sampling Method(s)	**Bulk**	Drill Hole Backfill	**Soil cuttings**
Remarks				Driving Method and Drop	

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: SAMPLE NUMBER	SAMPLE DATA: NUMBER OF BLOWS	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			Dark reddish brown, dry, variably cemented, silty fine to medium SAND [SM]		TP10-1				
					TP10-2		11.1		
			Brown, dry to moist, variably cemented, poorly graded fine to medium SAND with silt [SP]						
	5				TP10-3				
			Practical refusal encountered at 7 feet. Groundwater not encountered.						

BORING LOG 11103.02 - JAEGER RANCH PROPERTY.GPJ WKA.GDT 9/26/16 10:43 AM

Wallace Kuhl & ASSOCIATES

FIGURE 12

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		SYMBOL	CODE	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of soil > no. 200 sieve size)	GRAVELS (More than 50% of coarse fraction > no. 4 sieve size)	GW		Well graded gravels or gravel - sand mixtures, little or no fines
		GP		Poorly graded gravels or gravel - sand mixtures, little or no fines
		GM		Silty gravels, gravel - sand - silt mixtures
		GC		Clayey gravels, gravel - sand - clay mixtures
	SANDS (50% or more of coarse fraction < no. 4 sieve size)	SW		Well graded sands or gravelly sands, little or no fines
		SP		Poorly graded sands or gravelly sands, little or no fines
		SM		Silty sands, sand - silt mixtures
		SC		Clayey sands, sand - clay mixtures
FINE GRAINED SOILS (50% or more of soil < no. 200 sieve size)	SILTS & CLAYS LL < 50	ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL		Organic silts and organic silty clays of low plasticity
	SILTS & CLAYS LL ≥ 50	MH		Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH		Inorganic clays of high plasticity, fat clays
		OH		Organic clays of medium to high plasticity, organic silty clays, organic silts
HIGHLY ORGANIC SOILS		Pt		Peat and other highly organic soils
ROCK		RX		Rocks, weathered to fresh
FILL		FILL		Artificially placed fill material

OTHER SYMBOLS

= Drive Sample: 2-1/2" O.D. Modified California sampler

= Drive Sampler: no recovery

= SPT Sampler

= Initial Water Level

= Final Water Level

= Estimated or gradational material change line

= Observed material change line

Laboratory Tests

AT = Atterberg Limits Test
EI = Expansion Index
CR = Corrosion Test
TR = Triaxial Compression Test
GD = Gradational Analysis (Sieve)
RV = R-Value

GRAIN SIZE CLASSIFICATION

CLASSIFICATION	RANGE OF GRAIN SIZES	
	U.S. Standard Sieve Size	Grain Size in Millimeters
BOULDERS	Above 12"	Above 305
COBBLES	12" to 3"	305 to 76.2
GRAVEL coarse (c) fine (f)	3" to No. 4 3" to 3/4" 3/4" to No. 4	76.2 to 4.76 76.2 to 19.1 19.1 to 4.76
SAND coarse (c) medium (m) fine (f)	No. 4 to No. 200 No. 4 to No. 10 No. 10 to No. 40 No. 40 to No. 200	4.76 to 0.074 4.76 to 2.00 2.00 to 0.420 0.420 to 0.074
SILT & CLAY	Below No. 200	Below 0.074

WallaceKuhl & ASSOCIATES

UNIFIED SOIL CLASSIFICATION SYSTEM

JAEGER RANCH PROPERTY

Sacramento, California

FIGURE	13
DRAWN BY	RWO
CHECKED BY	ADW
PROJECT MGR	MMW
DATE	09/16
WKA NO.	11103.02

APPENDIX A
Field and Laboratory Test Results

APPENDIX A

A. GENERAL INFORMATION

The performance of a preliminary geotechnical engineering study for the *Jaeger Ranch Property* located easterly of the intersection of Pericles Drive and Rancho Cordova Parkway in Rancho Cordova, California was authorized by Ms. Leah Dreger of The True Life Companies on August 9, 2016. Authorization was for a preliminary geotechnical study as described in our proposal letter dated August 2, 2016, sent to our client, The True Life Companies, whose mailing address is 12647 Alcosta Boulevard, Suite 470 in San Ramon, California 94583; telephone (925) 380-1699.

To assist in the preparation of this preliminary report, we have reviewed the Conceptual Site Plan, dated May 11, 2016, prepared by Wood Rodgers, Inc. of Sacramento, California.

B. FIELD EXPLORATION

We observed the site conditions and performed subsurface explorations at the site on August 16 and September 12, 2016. Field explorations consisted of excavating and sampling 10 test pits to depths of approximately 7 to 10½ feet below the existing surface grades. Soils exposed in the trenches were classified as required by the 2013 CBC in accordance with ASTM D2487 (USCS symbol shown on logs). Soil names and descriptions are reported using a modified system.

Test pits were completed by using a Case 580 Super M excavator and a 24-inch-wide bucket provided by Ron Tilford Backhoe of Orangevale, California. Relatively undisturbed soil samples were obtained at various intervals in selected test pits using a hand driven core sampler and California Sampler liners (1.875-inch-inside diameter). In addition, bulk samples were obtained from the test pits at various depths. \At the completion of exploration activities, the test pits were backfilled with excavation spoils, and compacted using a sheepsfoot compaction wheel.

The approximate locations of the test pits are provided in Figure 2. Descriptions of the soils encountered in the test pits are presented in Figures 3 to 12. An explanation of the Unified Soil Classification System symbols used in the soil descriptions is presented on Figure 13.

C. LABORATORY TESTING

Selected soil samples were tested to determine dry unit weight (ASTM D2937) and natural moisture content (ASTM D4643). The results of these tests are included on the boring logs at the depth each sample was obtained.

Selected representative samples of soils at the site were also tested to determine Atterberg limits (ASTM D4318) and grain-size distribution (gradation) (ASTM C136); the results are contained in Figures A1 and A2, respectively.

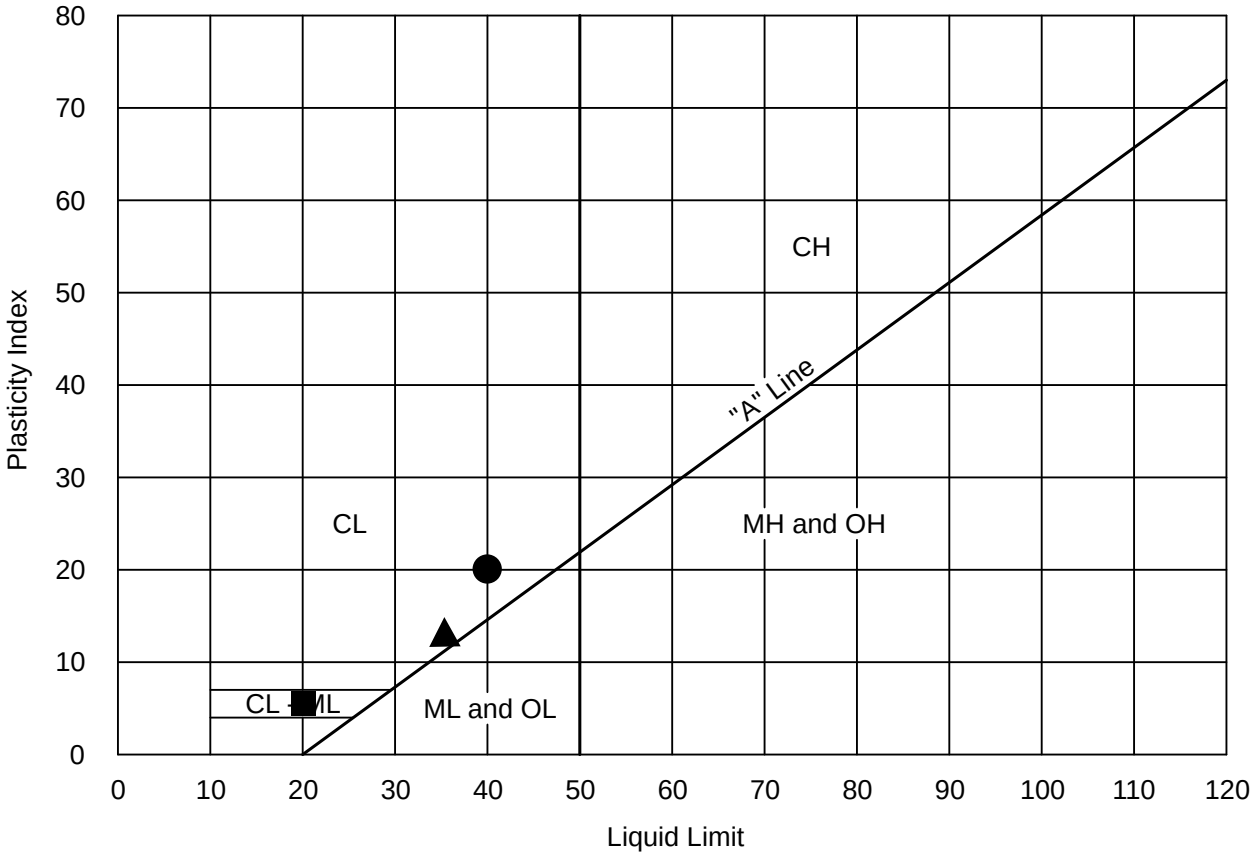
A sample of the near-surface soil was tested to evaluate shear strengths using a consolidated undrained with pore pressures triaxial test, commonly known as a CUPP triaxial test (ASTM D4767) with results presented in Figure A3.

Two representative samples of near-surface soil were subjected to Resistance “R” value testing (CT 301). The test results were used for pavement design purposes and are presented in Figure A4.

A sample of the near-surface soil was submitted to Sunland Analytical of Rancho Cordova, California, to determine the soil pH and minimum resistivity (California Test 643), Sulfate concentration (California Test 417, ASTM D516) and Chloride concentration (California Test 422). The results of these tests are presented in Figures A5 and A6.

ATTERBERG LIMITS

ASTM D4318



KEY SYMBOL	LOCATION	SAMPLE DEPTH	NATURAL WATER CONTENT (%)	ATTERBERG LIMITS		PASSING No. 200 SIEVE (%)	UNIFIED SOIL CLASSIFI-CATION SYMBOL
				LIQUID LIMIT (%)	PLASTICITY INDEX (%)		
●	TP2-2I	2.0'-2.5'	16.0	40	20	64.5	CL
■	TP3-2I	1.5'-2.0'	4.8	20	6	59.8*	CL-ML
▲	TP8-4	3.0'-3.5'	10.8	36	13	28.8	SC

Wallace Kuhl & ASSOCIATES

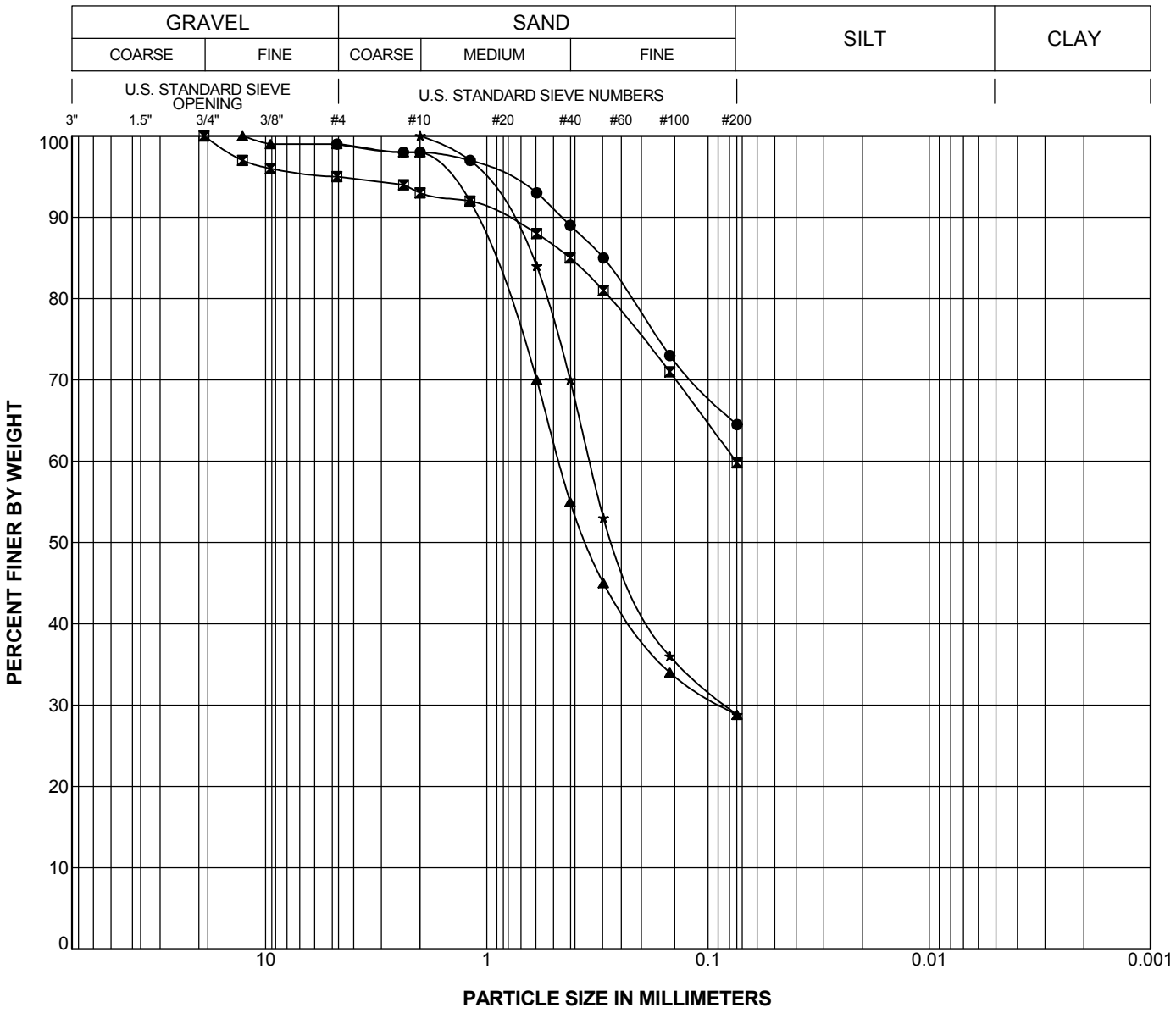
ATTERBERG LIMITS

JAEGER RANCH PROPERTY

Sacramento, California

FIGURE	A1
DRAWN BY	RWO
CHECKED BY	ADW
PROJECT MGR	MMW
DATE	09/16

WKA NO. 11103.02



Boring Number	Sample Number	USCS	Depth (feet)	Symbol	LL	PI	Classification
TP2	2I	CL	2.0	●	40	20	Red fine sandy lean CLAY [CL]
TP3	1	CL-ML	0.0	⊠			Fine sandy silty lean CLAY [CL-ML]
TP8	4	SC	3.0	▲	36	23	Lean clayey fine SAND [SC]
TP8	5	SC	4.0	★			Lean clayey fine SAND [SC]

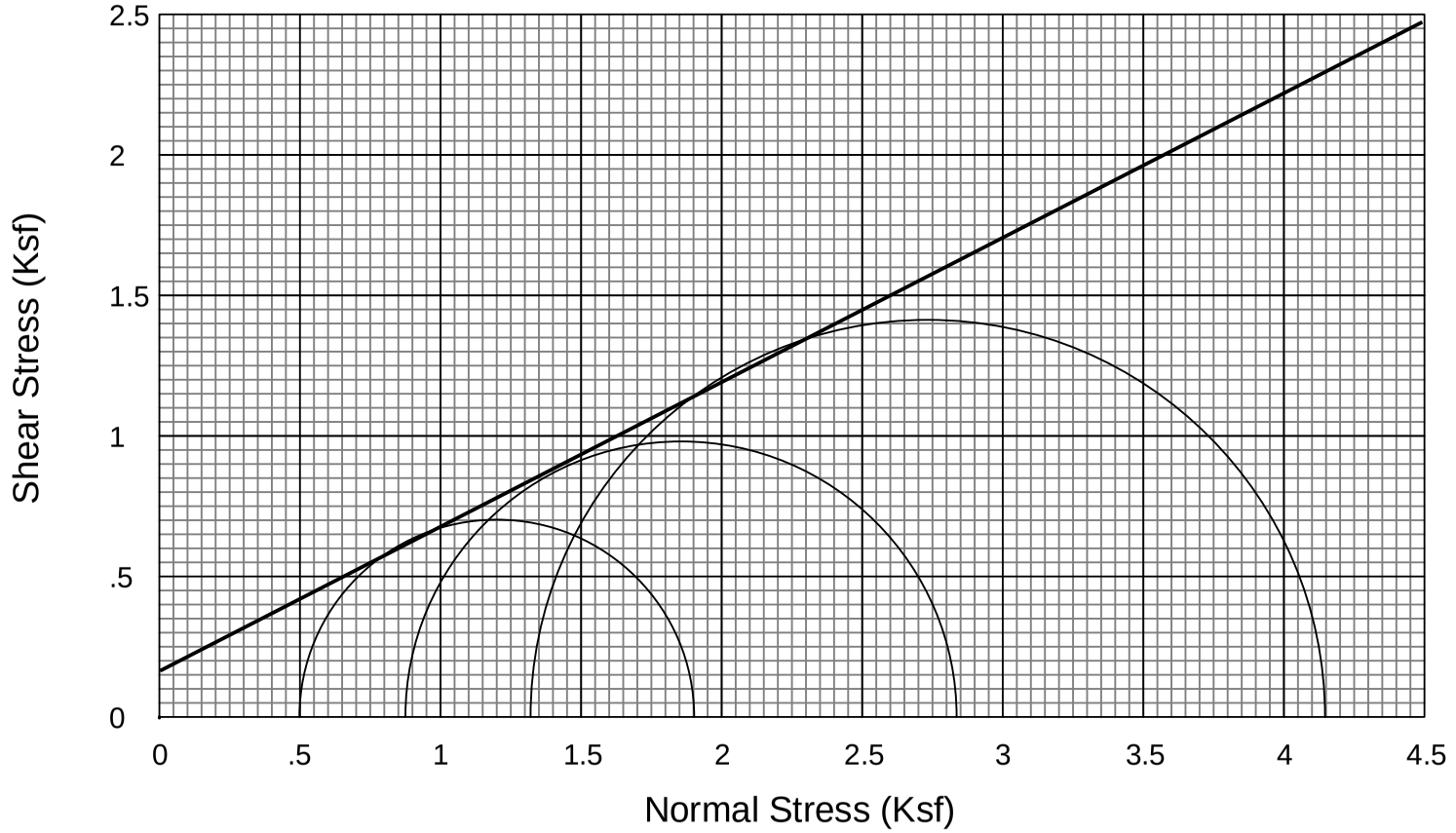
PARTICLE SIZE DISTRIBUTION

Project: Jaeger Ranch Property
WKA No. 11103.02

FIGURE A-2

TRIAXIAL COMPRESSION TEST

ASTM D4767



SAMPLE NO. : TP5-2 (1.0' - 1.5')

SAMPLE DESCRIPTION : Red silty fine SAND [SM]

DRY DENSITY (PCF) : 118.8
INITIAL MOISTURE (%) : 5.6
FINAL MOISTURE (%) : 15.5

ANGLE OF INTERNAL FRICTION (ø) : 27.2°
COHESION (PSF) : 167

WallaceKuhl & ASSOCIATES

TRIAXIAL COMPRESSION TEST RESULTS

JAEGER RANCH PROPERTY

Sacramento, California

FIGURE	A3
DRAWN BY	RWO
CHECKED BY	ADW
PROJECT MGR	MMW
DATE	09/16
WKA NO.	11103.02

RESISTANCE VALUE TEST RESULTS

(California Test 301)

MATERIAL DESCRIPTION: Brown silty fine to coarse SAND [SM]

LOCATION: TP1-1 (0' - 2')

Specimen No.	Dry Unit Weight (pcf)	Moisture @ Compaction (%)	Exudation Pressure (psi)	Expansion (dial, inches x 1000)	Expansion (psf)	R Value
1	123	11.8	247	0	0	20
2	124	11.2	466	9	39	44
3	123	11.4	348	0	0	38

R-Value at 300 psi exudation pressure = 30

MATERIAL DESCRIPTION: Dark reddish brown silty clayey fine to medium SAND [SC-SM]

LOCATION: TP9-1 (0' - 2')

Specimen No.	Dry Unit Weight (pcf)	Moisture @ Compaction (%)	Exudation Pressure (psi)	Expansion (dial, inches x 1000)	Expansion (psf)	R Value
1	125	13.1	108	0	0	6
2	127	12.2	229	2	9	43
3	126	11.4	670	27	117	80

R-Value at 300 psi exudation pressure = 51

WallaceKuhl & ASSOCIATES

RESISTANCE VALUE TEST RESULTS

JAEGER RANCH PROPERTY

Sacramento, California

FIGURE	A4
DRAWN BY	RWO
CHECKED BY	ADW
PROJECT MGR	MMW
DATE	09/16
WKA NO.	11103.02

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 09/16/2016
Date Submitted 09/13/2016

To: Alexander Wright
Wallace-Kuhl & Assoc.
3050 Industrial Blvd
West Sacramento, CA 95691

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following:
Location : 11103.02 JAEGER RNCH Site ID : TP 5-1.
Thank you for your business.

* For future reference to this analysis please use SUN # 72816-152019.

Extractable Sulfate in Water

TYPE OF TEST	RESULTS	UNITS
Sulfate-SO4	2.04	mg/kg

ASTM D-516 from sat.paste extract-reported based on dry wt.

WallaceKuhl & ASSOCIATES

CORROSION TEST RESULTS

JAEGER RANCH PROPERTY

Sacramento, California

FIGURE	A5
DRAWN BY	RWO
CHECKED BY	ADW
PROJECT MGR	MMW
DATE	09/16
WKA NO.	11103.02

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 09/16/2016
Date Submitted 09/13/2016

To: Alexander Wright
Wallace-Kuhl & Assoc.
3050 Industrial Blvd
West Sacramento, CA 95691

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 11103.02 JAEGER RNCH Site ID : TP 5-1.
Thank you for your business.

* For future reference to this analysis please use SUN # 72816-152020.

EVALUATION FOR SOIL CORROSION

Soil pH	5.22		
Minimum Resistivity	7.50 ohm-cm (x1000)		
Chloride	6.5 ppm	00.00065	%
Sulfate	1.9 ppm	00.00019	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

WallaceKuhl & ASSOCIATES

CORROSION TEST RESULTS

JAEGER RANCH PROPERTY

Sacramento, California

FIGURE	A6
DRAWN BY	RWO
CHECKED BY	ADW
PROJECT MGR	MMW
DATE	09/16
WKA NO.	11103.02