Appendix E:
Preliminary Geotechnical Exploration

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SCHMIDIG/LAM PROPERTY
LIVERMORE, CALIFORNIA

PRELIMINARY GEOTECHNICAL EXPLORATION

SUBMITTED TO
Mr. Jon Revells
WestGate Ventures Fund III, LLC
2551 San Ramon Valley Blvd., Suite 224
San Ramon, CA 94583

PREPARED BY
ENGEO Incorporated

June 13, 2017

PROJECT NO.
13850.000.000

ENGEO
Expect Excellence

Project No.
13850.000.000

June 13, 2017

Mr. Jon Revells
WestGate Ventures Fund III, LLC
2551 San Ramon Valley Blvd., Suite 224
San Ramon, CA 94583

Subject: Schmidig/Lam Property
Springtown Boulevard
Livermore, California

PRELIMINARY GEOTECHNICAL EXPLORATION

Dear Mr. Revells:

With your authorization, we performed a preliminary geotechnical assessment for the properties located south of Springtown Boulevard and north of Interstate 580 in Livermore, California, consisting of Accessor's Parcel Numbers 99-23-8 and 902-8-2-2. This report presents our findings, conclusions and preliminary geotechnical recommendations. We are providing preliminary site grading, drainage, and foundation recommendations for use during land planning.

Based upon our initial assessment, it is our opinion that the proposed residential development is feasible from a geotechnical standpoint. Design-level exploration should be conducted prior to site development once more detailed land plans have been prepared.

We are pleased to have been of service on this project and are prepared to consult further with you and your design team as the project progresses. If you have any questions or comments regarding this report, please call and we will be glad to discuss them with you.

Sincerely,

ENGEO Incorporated

Maggie Parks, EIT
mp/mmg/bvv

Mark M. Gilbert, GE

REGISTERED PROFESSIONAL ENGINEER
MARK M. GILBERT
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GEOTECHNICAL
STATE OF CALIFORNIA

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of this preliminary geotechnical exploration, as described in our agreement dated April 10, 2017, was to provide an assessment of the potential geotechnical concerns associated with the use of the site for a residential development. The scope of our services included a site visit, a review of published geologic maps, excavation of twelve test pits up to 8 feet deep, and preparation of this report to identify potential geotechnical hazards and provide preliminary geotechnical recommendations.

For our use, we received a conceptual grading plan prepared by Ruggeri Jensen Azar dated March 17, 2017 and a conceptual site plan prepared by KTGY Architecture and Planning, dated February 15, 2017.

This report was prepared for the exclusive use of our client and their consultants for evaluation of this project. In the event that any changes are made in the character, design or layout of the development, we must be contacted to review the preliminary conclusions and recommendations contained in this report to determine whether modifications are necessary. This document may not be reproduced in whole or in part by any means whatsoever, nor may it be quoted or excerpted without our express written consent.

1.2 PROJECT LOCATION

The proposed project is located in Livermore, California, as shown on the Vicinity Map, Figure 1. The property consists of two adjoining parcels located north of Interstate 580 and south of Springtown Boulevard, as shown one the Site Plan, Figure 2. The approximately 34-acre Schmidig parcel is identified as Assessor's Parcel Number (APN) 902-8-2-2 and the approximately 1.2-acre Lam parcel is identified as APN 99-23-8.

1.3 PROJECT DESCRIPTION

The conceptual site plan, as shown on Figure 2, includes approximately 195 units of townhomes/condos in multiple two- to three-story buildings. We understand that the layout of the development may change but the areas shown on the conceptual site plan generally represent the development limits. We understand that the residential structures will be generally located in the eastern and northern areas of the site, with areas outside of the development limits left as open space. There may be some grading in the central portions of the site to create a community garden or other landscaping.

Structural loads and grading are yet to be determined; however, we assume that structural loads will be representative for this type of construction and grading will be required to create building pads and roadways. Corrective grading to address geotechnical considerations may also be required.

2.0 FINDINGS

2.1 SITE BACKGROUND

Our preliminary review of historical aerial photographs dating back to 1949 indicates that the properties have been undeveloped and have intermittently been used for dry farming. A water pipeline easement extends across the property as shown on the Site Plan, Figure 2.

2.2 FIELD EXPLORATION

Our field exploration included excavating twelve test pits at the locations shown on the Site Plan, Figure 2. We performed our field exploration on March 27th and May 22nd, 2017. We also performed geologic field mapping concurrently.

The location and elevations of our explorations are approximate and were estimated by pacing from features shown on aerial photos; they should be considered accurate only to the degree implied by the method used. We describe our test pit and geologic field mapping below.

2.2.1 Test Pits

We observed excavation of twelve test pits at the locations shown on the Site Plan, Figure 2. An ENGEO geologist observed the test pit excavation and logged the subsurface conditions at each location. We retained a backhoe with a 28-inch-wide bucket to excavate the test pits and logged the type, location, and uniformity of the underlying soil and rock. The maximum depth of the test pits was 8 feet.

We obtained bulk soil samples from the test pits using hand sampling techniques. The test pit logs present descriptions and graphically depict the subsurface conditions encountered.

We used the field logs to develop the report logs in Appendix B. The logs depict subsurface conditions at the exploration locations for the date of exploration; however, subsurface conditions may vary with time.

2.2.2 Geologic Field Mapping

During our field explorations, an ENGEO geologist performed geologic mapping at the site. The geologic units encountered during our exploration of the site are described in Section 2.6 and also presented on the Site Plan, Figure 2.

2.3 REGIONAL AND SITE GEOLOGY

The project site lies within the Coast Range Province of California, an area dominated by northwest-trending geologic features such as folds and faults. More specifically, the subject site is located in the Livermore Valley within the Diablo Range. The Diablo Range is characterized by anticlines composed of Franciscan cores that are separated by synclinal folds containing younger rocks.

Based on mapping by Helley and Graymer (1997), the site is underlain by the Pliocene to Pleistocene Livermore gravels (Figure 3). These deposits are described as poorly to moderately consolidated, indistinctly bedded, cobble conglomerate, gray conglomeratic sandstone, and gray coarse-grained sandstone that includes some siltstone and claystone. The clasts within the unit contain mostly graywacke, chert, and metamorphic rocks probably derived from the Franciscan complex. In the drainage bordering the southern boundary of the site are mapped deposits of alluvial fan and fluvial deposits consisting of gravely and sand clay, clayey gravel, and sandy clay. An anticline is mapped south of the project boundary by Barlock (1988). Measurement of bedding attitudes on site indicates that bedrock layering has been folded such that it dips generally south on the southern slopes and at low angles to the north on the northern ridge slopes as shown on Figure 2 and discussed in Section 2.6.5.

2.4 SITE SEISMICITY

The San Francisco Bay Area is a seismically active area and contains numerous active faults. Figure 4 shows the approximate location of active and potentially active faults and significant historic earthquake epicenters mapped within the San Francisco Bay Region. An active fault is defined by the State as one that has had surface displacement within Holocene time (about the last 11,000 years). Based on the 2010 USGS Quaternary Fault and Fold Database (QFFD), the nearest active fault is the Greenville fault located approximately 2.7 miles northeast of the site. Other active faults located near the site include the Las Positas fault, located approximately 2.8 miles to the southeast of the site, and the Calaveras fault, located approximately 9.7 miles to the west. These and other active faults in the region are summarized in the table below

TABLE 2.4-1: Active Faults Capable of Producing Significant Ground Shaking at the Site

FAULT NAME	DISTANCE FROM SITE (MILES)	DIRECTION FROM SITE	MAXIMUM MOMENT MAGNITUDE
Greenville	2.7	Northeast	7.0
Las Positas	2.8	Southeast	6.7
Calaveras	9.7	West	6.9
Great Valley	12.2	East	6.9
Hayward	15.5	West	7.0

The site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone and no known surface expression of active faults is believed to exist within the site.

The Uniform California Earthquake Rupture Forecast (UCERF3, 2013) evaluated the 30-year probability of a Moment Magnitude 6.7 or greater earthquake occurring on the known active fault systems in the Bay Area. The UCERF3 generated an overall probability of 72 percent for the San Francisco Region as a whole, a probability of 14.3 percent for the Hayward fault, 7.4 percent for the Calaveras fault, and 6.4 percent for the northern section of the San Andreas fault.

2.5 SURFACE CONDITIONS

The site is situated on the ridgeline and south-facing slope of a northwest-trending hill. The site topography has gentle relief with elevations ranging from approximately 600 feet Mean Sea Level (MSL) in the northern portion of the site to approximately 495 feet MSL in the southwest corner of the site (Ruggeri Jensen Azar, 2017). Existing slopes on the site are generally inclined at between 4:1 and 8:1 (horizontal:vertical). At the southwestern edge of the site is a drainage with seasonal water flow. There were several colluvium-filled swales of lower relief in the south-facing slope, as mapped on Figure 2. The site had no permanent structures, though a utility easement with a water pipeline extended across the site. The site was vegetated with low grasses.

2.6 SUBSURFACE CONDITIONS

The results of our geologic mapping and subsurface exploration indicate that the site is underlain by artificial fills, surficial soils, Quaternary alluvium, Quaternary colluvium, and Pliocene to Pleistocene Livermore Gravels. We describe the geologic units encountered during our exploration of the site.

Consult the Site Plan and test pit logs for specific subsurface conditions at each location. We include our test pit logs in Appendix A. The logs graphically depict the subsurface conditions encountered at the time of the exploration. The depths of surficial soils or colluvium overlying bedrock are indicated at each test pit location on Figure 2.

2.6.1 Artificial Fill

Artificial fill was encountered in TP-11 that consisted of brown to very dark gray, medium to stiff sandy clay, and approximately 2 feet thick. This fill and other minor fills likely present on-site may be related to grading due to road construction adjacent to the site and the utility easement spanning the site.

2.6.2 Surficial Soils

Surficial soils logged in our test pits included red to black, stiff to very stiff, clayey silt and silty clay derived from the weathering of the underling Livermore gravels. Laboratory plasticity index (PI) tests presented in Appendix B indicate that the surficial soils are of very high plasticity.

2.6.3 Quaternary Alluvium (Qa)

Quaternary Alluvium was observed in the active drainage course on the southwest border of the site that consisted of unconsolidated clay, sand, and gravel.

2.6.4 Quaternary Colluvium (Qc)

Test pit TP-9 and TP-10 encountered Quaternary Colluvium, described as dark red, stiff, fat clay. In addition to TP-9 and TP-10, this material was mapped in lower-relief swales on the sloping portions of the site, as indicated on Figure 2. The Colluvium deposits are similar in composition to the surficial soils and have accumulated in swales to thickness greater than 8 feet (TP-10) due to deposition of surficial soils from surrounding slopes. Laboratory PI tests indicate that, like the surficial soils, the Colluvium has very high plasticity.

2.6.5 Pliocene to Pleistocene Livermore Gravels (Qtlg)

We encountered Livermore Gravels in the majority of our test pits underlying the surficial materials and have logged the unit as underlying the majority of project site. We logged several subunits that included friable to weak, yellowish brown sandstone, dark reddish brown conglomerate, and pale olive claystone. The sandstones and claystones contained scattered gravel. Gravel clasts are generally less than 3 inches in size and many consist of friable material than breaks down to soil-like material when excavated. Based on the nature of the Livermore gravel material, we would expect fills derived from it to behave as a sandy clay following excavation and compaction.

Bedding was observed in our test pits in the Livermore Gravels, striking from approximately N70W to approximately N40E and dipping from approximately 70 degrees to the southwest to 14 degrees west (Figure 2). The bedding observed was generally consistent with Barlock (1988), who mapped an anticline to the southwest of the site. During our field mapping and test pit logging, we mapped a possible antiform near the northern portion of the site, based on the change in bedding orientation in TP-7.

2.7 GROUNDWATER CONDITIONS

We did not observe static groundwater in any of our subsurface explorations. Fluctuations in the level of groundwater may occur due to variations in rainfall, irrigation practice, and other factors.

2.8 LABORATORY TESTING

We performed laboratory tests on selected soil samples to determine the plasticity index and gradation of representative samples. Individual test results are presented in Appendix B.

3.0 CONCLUSIONS

Based upon this preliminary study, it is our opinion that the project site is feasible for the proposed multi-family residential development from a geotechnical standpoint, provided the preliminary recommendations contained in this report and future design-level geotechnical studies are incorporated into the development plans. A site-specific geotechnical exploration should be performed as part of the design process. The exploration would include borings and laboratory soil testing to provide data for preparation of design-level recommendations regarding grading, foundation, and drainage for the proposed development. The exploration will also allow for more detailed evaluations of the geotechnical issues discussed below and afford the opportunity to provide recommendations regarding techniques and procedures to be implemented during construction to mitigate potential geotechnical/geological hazards.

Based upon our field exploration and review of readily available published maps and reports for the site, the main geotechnical concerns for the proposed site development include: (1) expansive soils, (2) existing fill, and (3) slope stability. These items and other geotechnical issues are presented in the following sections of this report.

3.1 EXPANSIVE SOILS

Our test pits and laboratory testing indicate that the surficial soil and colluvium mantling bedrock on the site generally consist of highly expansive clays. Additionally, the Livermore Gravels can be considered as having low to moderate expansiveness. Expansive soils change in volume with changes in moisture. These soils can shrink or swell and cause heaving and cracking of slabs-on-grade, pavements, and structures founded on shallow foundations. Building damage due to volume changes associated with highly expansive soil can be reduced by (1) using a rigid mat foundation that is designed to resist the settlement and heave of expansive soil, (2) deepening the foundations to below the zone of significant moisture fluctuation (e.g., deep footings or drilled piers), and (3) removing the expansive soil and replacing with non-expansive fill.

Post-tensioned mat foundations are the preferred foundation system for the residential structures. Preliminary design recommendations for this foundation type are presented in Section 4.2.

Successful performance of structures on expansive soils also requires special attention during construction. It is imperative that exposed soils be kept moist prior to placement of concrete for foundation construction. It can be difficult to remoisturize clayey soils without excavation, moisture conditioning, and recompaction.

We also provide specific grading recommendations for compaction of expansive soil at the site. The purpose of these recommendations is to reduce the swell potential of the clay by compacting the soil at a higher moisture content and limiting the amount of compaction. Expansive soil mitigation recommendations are presented in Section 4.1 of this report.

Where grading is proposed in swale areas we recommend that deposits of colluvium be removed to expose bedrock prior to placement of fills. Preliminary earthwork recommendations are presented in Section 4.1.

3.2 EXISTING FILL

We encountered fill in test pit TP-11 and anticipate fill may exist in the vicinity of the utility easement. Existing fills will likely require subexcavation and recompaction as engineered fill. The extent and quality of existing fills should be evaluated, and potential mitigation measures recommended, at the time of design-level study. The presence of existing fill can lead to differential foundation movement due to the unknown density of the fill and due to differences in material properties for structures that span from the fill to native materials. Mitigation can include removal and recompaction of the fill.

3.3 SLOPE STABILITY

Our geologic mapping did not reveal evidence of existing landslides on the site. Existing slopes on the site are generally inclined at between 4:1 and 8:1, and proposed graded slopes are depicted at inclinations of 3:1. In our experience construction of graded cut and fill slopes in the Livermore Gravels can be constructed in stable configurations by implementing appropriate geotechnical grading practices for hillside developments. These practices generally include construction of drained keyways at the base of fill slopes placed on sloping ground and keying and benching fills into competent native soil.

3.4 SEISMIC HAZARDS

Potential seismic hazards resulting from a nearby moderate to major earthquake can generally be classified as primary and secondary. The primary effect is ground rupture, also called surface faulting. The common secondary seismic hazards include ground shaking, ground lurching, and seismic slope stability. These hazards are discussed in the following sections.

Based on topographic and lithologic data, regional subsidence or uplift, tsunamis, seiches, soil liquefaction, and lateral spreading risk is considered low at the site.

3.4.1 Ground Rupture

The site is not located within a State of California Earthquake Fault Hazard Zone (Altamont, 1982). Therefore, since no known active faults cross the site, it is our opinion that ground rupture is not likely to occur at the site.

3.4.2 Ground Shaking

An earthquake of moderate to high magnitude generated within the San Francisco Bay Region, similar to those that have occurred in the past, could cause considerable ground shaking at the site. To mitigate the shaking effects, all structures should be designed using sound engineering judgment and the latest California Building Code (CBC) requirements as a minimum. Seismic design provisions of current building codes generally prescribe minimum lateral forces, applied statically to the structure, combined with the gravity forces of dead and live loads. The code-prescribed lateral forces are generally substantially smaller than the expected peak forces that would be associated with a major earthquake. Therefore, structures should be able to: (1) resist minor earthquakes without damage, (2) resist moderate earthquakes without structural damage but with some nonstructural damage, and (3) resist major earthquakes without collapse but with some structural as well as nonstructural damage. Conformance to the current building code recommendations does not constitute any kind of guarantee that significant structural damage would not occur in the event of a maximum magnitude earthquake; however, it is reasonable to expect that a well-designed and well-constructed structure will not collapse or cause loss of life in a major earthquake (SEAOC, 1996).

3.4.3 Liquefaction

Soil liquefaction results from loss of strength during cyclic loading, such as imposed by earthquakes. Soils most susceptible to liquefaction are clean, loose, saturated, uniformly graded, fine-grained sands. Sands and groundwater were not encountered in the test pits. For these reasons and based upon engineering judgment, it is our opinion that the potential for liquefaction at the site is low during seismic shaking. Deeper explorations may be performed during the design-level exploration to verify this finding.

3.4.4 Earthquake-Induced Landsliding

Earthquake-induced landsliding involves lateral ground movements caused by seismic shaking. The site occupies a relatively gentle slope and is not mapped within a State of California Seismic Hazard zone. We anticipate that the risk of earthquake-induced landsliding to be low provided slope stability is addressed in the design-level geotechnical report and when preparing grading plans.

3.5 2016 CBC SEISMIC DESIGN PARAMETERS

The 2016 CBC utilizes design criteria set forth in the 2010 ASCE 7 Standard. Based on the subsurface conditions encountered, we characterized the site as Site Class D in accordance with the 2016 CBC. We provide the 2016 CBC seismic design parameters in Table 3.5-1 below, which include design spectral response acceleration parameters based on the mapped Risk-Targeted Maximum Considered Earthquake (MCER) spectral response acceleration parameters.

TABLE 3.5-1: 2016 CBC Seismic Design Parameters, Latitude: 37.70427 **Longitude:** -121.74505

PARAMETER	VALUE
Site Class	D
Mapped MCE_R Spectral Response Acceleration at Short Periods, S_S (g)	1.79
Mapped MCE_R Spectral Response Acceleration at 1-second Period, S_1 (g)	0.67
Site Coefficient, F_A	1.00

PARAMETER	VALUE
Site Coefficient, F_V	1.50
MCE_R Spectral Response Acceleration at Short Periods, S_{MS} (g)	1.79
MCE_R Spectral Response Acceleration at 1-second Period, S_{M1} (g)	1.00
Design Spectral Response Acceleration at Short Periods, S_{DS} (g)	1.19
Design Spectral Response Acceleration at 1-second Period, S_{D1} (g)	0.67
Mapped MCE Geometric Mean (MCE_G) Peak Ground Acceleration, PGA (g)	0.68
Site Coefficient, F_{PGA}	1.00
MCE_G Peak Ground Acceleration adjusted for Site Class effects, PGA_M (g)	0.68
Long period transition-period, T_L	8 sec

4.0 PRELIMINARY RECOMMENDATIONS

The following preliminary recommendations are for initial land planning and preliminary estimating purposes. Final recommendations regarding site grading and foundations will be provided after additional site-specific exploration has been undertaken.

4.1 EARTHWORK

4.1.1 Demolition and Stripping

Site development should commence with the removal of any buried structures, including abandoned utilities and septic tanks and their leach fields, if any exist. All debris should be removed from any location to be graded, from areas to receive fill or structures, or those areas to serve as borrow. The depth of removal of such materials should be determined by the Geotechnical Engineer in the field at the time of grading.

Existing vegetation and pavements (asphalt concrete/concrete and underlying aggregate base) should be removed from areas to receive fill, or structures, or those areas to serve for borrow. Tree roots should be removed down to a depth of at least 3 feet below existing grade. The actual depth of tree root removal should be determined by the Geotechnical Engineer's representative in the field. Subject to approval by the Landscape Architect, strippings and organically contaminated soils can be used in landscape areas. Otherwise, such soils should be removed from the project site. Any topsoil that will be retained for future use in landscape areas should be stockpiled in areas where it will not interfere with grading operations.

All excavations from demolition and stripping below design grades should be cleaned to a firm undisturbed soil surface determined by the Geotechnical Engineer. This surface should then be scarified, moisture conditioned, and backfilled with compacted engineered fill. The requirements for backfill materials and placement operations are the same as for engineered fill.

No loose or uncontrolled backfilling of depressions resulting from demolition and stripping is permitted.

4.1.2 Existing Fill and Disturbed Soil

All existing fill and any compressible soils should be excavated to firm native soils. Excavated material may be used as fill material if it meets the requirements of Section 4.1.3.

4.1.3 Acceptable Fill

Onsite soil is suitable as fill material provided it is processed to remove concentrations of organic material, debris, and particles greater than 6 inches in maximum dimension.

Imported fill materials should meet the above requirements and have a plasticity index less than 12. ENGEO should sample and test proposed imported fill materials at least 72 hours prior to delivery to the site.

4.1.4 Graded Slope Inclinations

Construct graded cut and fill slopes greater than 10 feet in vertical height at gradients to 3:1 (horizontal:vertical) or flatter. Grades slopes less than 10 feet in vertical height can be inclined at 2:1 (horizontal:vertical) or flatter.

4.1.5 Keyways and Subdrains

We recommend keying and benching where fills are placed on original grade with a gradient of 6:1 or steeper. This will include the construction of drained keyways and benched fills to provide proper stability of the compacted fill. We present typical construction details for keyways, benches, and subdrains in Figures 5 and 6.

Due to the complex geology and hillside topography, we recommend that ENGEO be retained to prepare corrective grading plans for this project. This is important to clarify our geotechnical recommendations related to keyways, benches, cut/fill transition subexcavations, and subdrains. In preparing these plans, we intend to overlay the grading plans with graphic representations of our grading and subsurface drainage recommendations presented in this report. This allows the unique hillside geotechnical recommendations to be clearly displayed on the grading plans. This can assist in obtaining more accurate earthwork bids as well as clarifying the geotechnical recommendations as they apply to the final grading plan.

4.1.6 Differential Fill Thickness

Differential building movements may result from conditions where building pads have significant differentials in fill thickness. We recommend that the differential fill thickness across any building footprint be no greater than 10 feet. Local subexcavation of soil material and replacement with compacted fill may be needed to achieve this recommendation. As a minimum, the subexcavation area should include the entire building footprint plus 5 feet beyond the edges.

4.1.7 Fill Placement

For land planning and cost estimating purposes, the following compaction control requirements should be anticipated for general fill areas:

Test Procedures:	ASTM D-1557
Required Moisture Content:	Not less than 4 percentage points above optimum moisture content.
Minimum Relative Compaction:	90 percent.

Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density of the same material. Additional compaction requirements may be required for deeper fills and retaining wall backfill. These additional requirements will be developed during the design-level exploration.

4.1.8 Underground Utility Backfill

Place and compact trench backfill as follows:

1. Trench backfill should have a maximum particle size of 6 inches.

2. Moisture condition trench backfill to at least 4 percentage points above the optimum moisture content. Moisture condition backfill outside the trench.

3. Place fill in loose lifts not exceeding 12 inches;
   and
4. Compact fill to a minimum of 90 percent relative compaction (ASTM D1557).

Additional recommendations may be developed where utility trenches cross adjacent to or underneath buildings. These additional requirements will be developed during the design-level exploration.

4.2 FOUNDATIONS

Based on our findings and experience, we recommend that the proposed multifamily structures be supported on post-tensioned (PT) mat foundation bearing on prepared native soil or engineered fill. The PT mats should be sufficiently stiff to move as rigid units with low differential movements so that architectural or structural cracking does not occur. A minimum mat thickness of 10 to 12 inches should be anticipated for preliminary purposes; however, final mat thickness will be determined by the Structural Engineer after the design-level geotechnical exploration is complete.

4.3 PAVEMENTS

For preliminary design, we judged an R-value of 5 to be appropriate for determination of pavement sections. Using estimated traffic indices for various pavement loading requirements, we developed the following recommended pavement sections using Topic 633 of the Caltrans Highway Design Manual (including the asphalt factor of safety), presented in the table below.

TABLE 4.3-1: Preliminary Asphalt Concrete Pavement Sections

TRAFFIC INDEX	SECTION	
	ASPHALT CONCRETE (INCHES)	CLASS 2 AGGREGATE BASE (INCHES)
5	3	10
6	3½	13
7	4	16

The civil engineer should determine the appropriate traffic indices based on the estimated traffic loads and frequencies.

4.4 DRAINAGE

Building pads must be positively graded at all times to provide for rapid removal of surface water runoff from the foundation systems and to prevent ponding of water under floors or seepage toward the foundation systems at any time during or after construction. Ponding of stormwater must not be permitted on the building pads during prolonged periods of inclement weather. All surface water should be collected and discharged into the storm drain system. Landscape mounds must not interfere with this requirement.

All roof stormwater should be collected and directed to downspouts. Stormwater from roof downspouts should be directed to a solid pipe that discharges to the street or to an approved outlet or onto an impervious surface, such as pavement that will drain at a 2 percent slope gradient.

Due to the generally high fines content anticipated in the near-surface site materials, the site soils encountered are not expected to have adequate permeability values to handle stormwater infiltration in grassy swales or permeable pavers. Therefore, best management practices should assume that little stormwater infiltration will occur at the site.

4.5 STORMWATER BIORETENTION AREAS

If bioretention areas are implemented, we recommend that, when practical, they be planned a minimum of 5 feet away from structural site improvements, such as buildings, streets, retaining walls, and sidewalks/driveways. When this is not practical, bioretention areas located within 5 feet of structural site improvements can either:

1. Be constructed with structural side walls capable of withstanding the loads from the adjacent improvements, or

2. Incorporate filter material compacted to between 85 and 90 percent relative compaction (ASTM D1557, latest edition) and a waterproofing system designed to reduce the potential for moisture transmission into the subgrade soil beneath the adjacent improvement.

In addition, one of the following options should be followed:

> We recommend that bioretention design incorporate a waterproofing system lining the bioswale excavation and a subdrain, or other storm drain system, to collect and convey water to an approved outlet. The waterproofing system should cover the bioretention area excavation in such a manner as to reduce the potential for moisture transmission beneath the adjacent improvements.

Site improvements located adjacent to bioretention areas that are underlain by base rock, sand, or other imported granular materials, should be designed with a deepened edge that extends to the bottom of the imported material underlying the improvement.

Where adjacent site improvements include buildings greater than three stories, streets steeper than 3 percent, or design elements subject to lateral loads (such as from impact or traffic patterns), additional design considerations may be recommended. If the surface of the bioretention area is depressed, the slope gradient should follow the slope guidelines described in earlier section(s) of this document. In addition, although not recommended, if trees are to be planted within bioretention areas, HDPE Tree Boxes that extend below the bottom of the bioretention system should be installed to reduce potential impact to subdrain systems that may be part of the bioretention area design. For this condition, the waterproofing system should be connected to the HPDE Tree Box with a waterproof seal.

Given the nature of bioretention systems and possible proximity to improvements, we recommend ENGEO be retained to review design plans and provide testing and observation services during the installation of linings, compaction of the filter material, and connection of designed drains.

It should be noted that the contractor is responsible for conducting all excavation and shoring in a manner that does not cause damage to adjacent improvements during construction and future maintenance of the bioretention areas. As with any excavation adjacent to improvements, the contractor should reduce the exposure time such that the improvements are not detrimentally impacted.

5.0 FUTURE STUDIES

As previously discussed, a site-specific design-level geotechnical exploration should be performed as part of the design process. Preliminary conclusions and recommendations presented in this report are based on limited site and laboratory data. The exploration would include borings and laboratory soil testing to provide data for preparation of specific recommendations regarding grading, further assess the stability of the slopes, foundation design, corrosion potential, and drainage for proposed development. The exploration will also allow for more detailed evaluations of the geotechnical issues discussed in this report and afford the opportunity to provide recommendations regarding techniques and procedures to be implemented during construction to mitigate potential geotechnical/geological hazards, as well as preparation of a corrective grading plan based on the final project configuration.

6.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

This report presents preliminary geotechnical recommendations for design of the improvements discussed in Section 1.3 for this project. If changes occur in the nature or design of the project, we should be allowed to review this report and provide additional recommendations, if any. It is the responsibility of the owner to transmit the information and preliminary recommendations of this report to the appropriate organizations or people involved in design of the project, including but not limited to developers, owners, buyers, architects, engineers, and designers. The preliminary conclusions and recommendations contained in this report are solely professional opinions and are valid for a period of no more than 2 years from the date of report issuance.

We strived to perform our professional services in accordance with generally accepted geotechnical engineering principles and practices currently employed in the area; no warranty is expressed or implied. There are risks of earth movement and property damages inherent in building on or with earth materials. We are unable to eliminate all risks or provide insurance; therefore, we are unable to guarantee or warrant the results of our services.

This report is based upon field and other conditions discovered at the time of report preparation. We developed this report with limited subsurface exploration data. We assumed that our subsurface exploration data is representative of the actual subsurface conditions across the site. Considering possible underground variability of soil, rock, stockpiled material, and groundwater, additional costs may be required to complete the project. We recommend that the owner establish a contingency fund to cover such costs. If unexpected conditions are encountered, notify ENGEO immediately to review these conditions and provide additional and/or modified recommendations, as necessary.

Our services did not include excavation sloping or shoring, soil volume change factors, or a geohazard exploration. In addition, our geotechnical exploration did not include work to determine the existence of possible hazardous materials. If any hazardous materials are encountered during construction, then notify the proper regulatory officials immediately.

This document must not be subject to unauthorized reuse, that is, reusing without written authorization of ENGEO. Such authorization is essential because it requires ENGEO to evaluate the document's applicability given new circumstances, not the least of which is passage of time.

Actual field or other conditions will necessitate clarifications, adjustments, modifications or other changes to ENGEO's documents. Therefore, ENGEO must be engaged to prepare the necessary clarifications, adjustments, modifications or other changes before construction activities commence or further activity proceeds. If ENGEO's scope of services does not include onsite construction observation, or if other persons or entities are retained to provide such services, ENGEO cannot be held responsible for any or all claims arising from or resulting from the performance of such services by other persons or entities, and from any or all claims arising from or resulting from clarifications, adjustments, modifications, discrepancies or other changes necessary to reflect changed field or other conditions.

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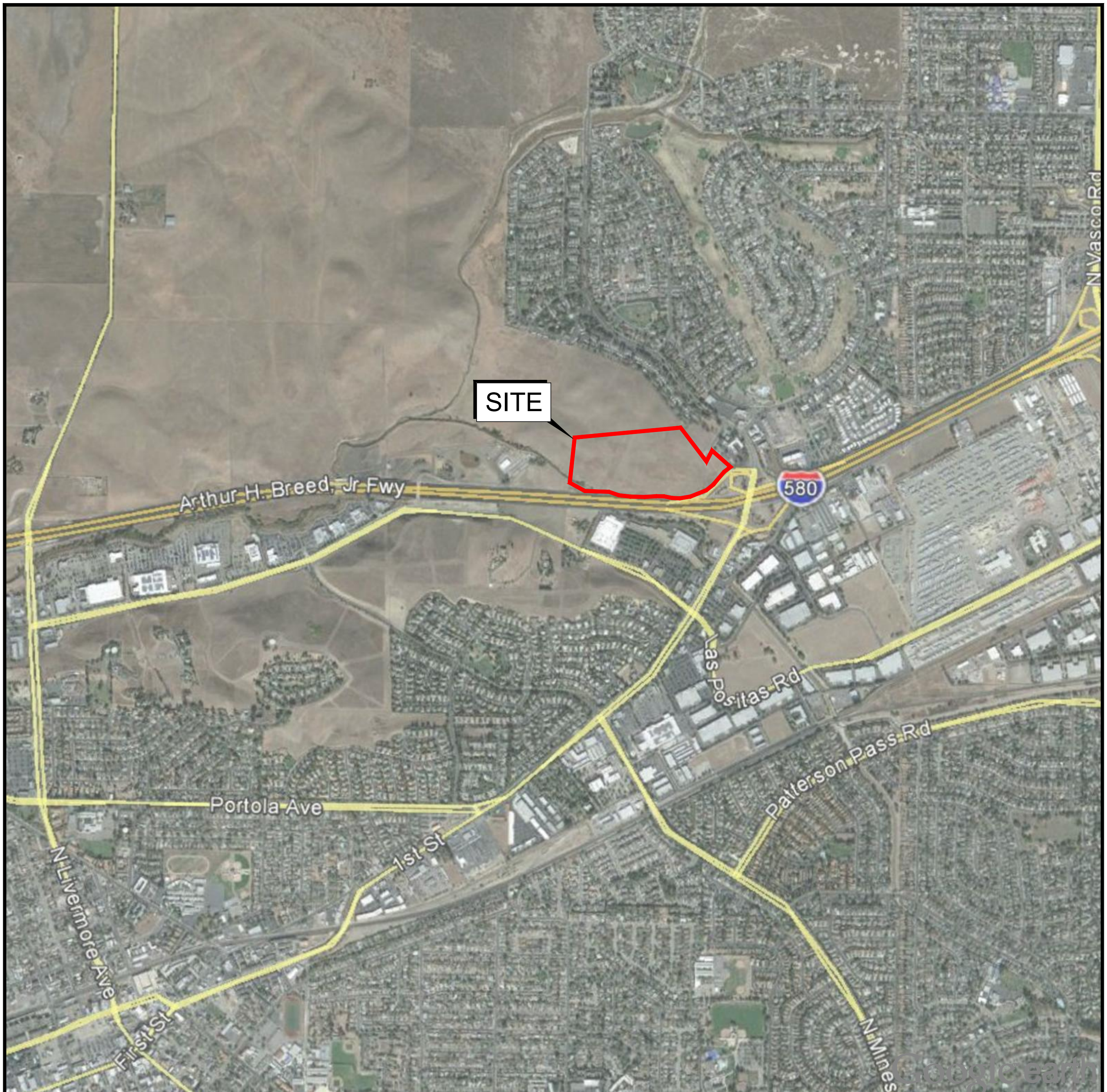
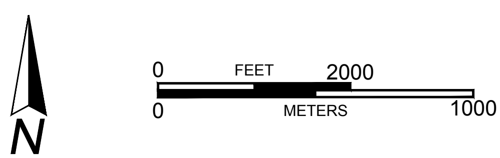
FIGURES



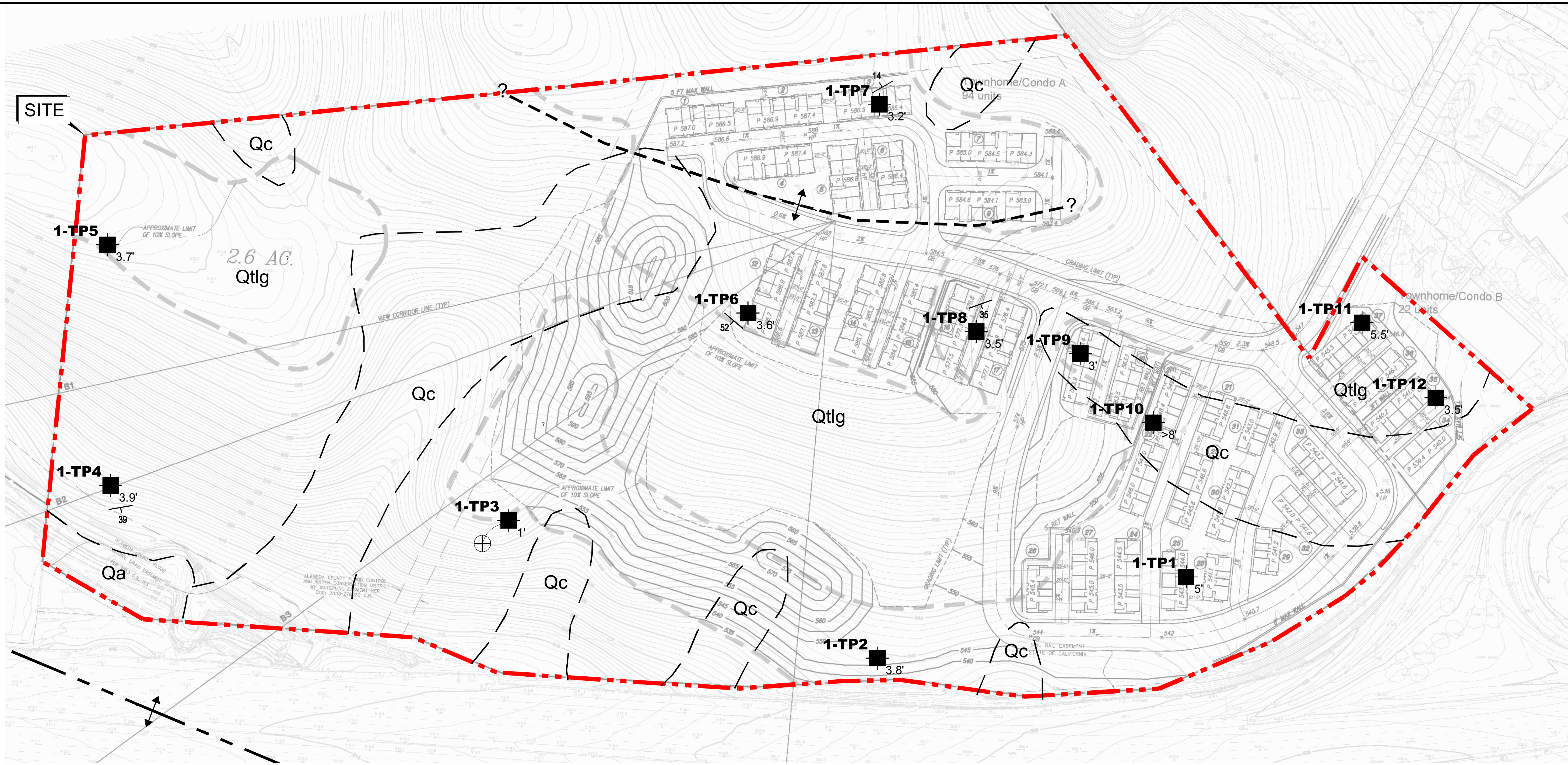


BASE MAP SOURCE: GOOGLE EARTH MAPPING SERVICE

ENGEO Expect Excellence	VICINITY MAP SCHMIDIG/LAM PROPERTY LIVERMORE, CALIFORNIA	PROJECT NO.: 13850.000.000 SCALE: AS SHOWN DRAWN BY: LL / CHECKED BY: JA	FIGURE NO. 1

C:\Users\llee\appdata\local\temp\AcPublish_9284\13850000000-GEX-1-VICMAP-0617.dwg Plot Date: 6-02-17 llee

ORIGINAL FIGURE PRINTED IN COLOR



EXPLANATION

ALL LOCATIONS ARE APPROXIMATE

— —	GEOLOGIC CONTACT	52	STRIKE AND DIP
1-TP12 3.5'	TEST PIT, WITH DEPTH TO ROCK SHOWN IN FEET (ENGEO, 2017)		ANTIFORM (QUERIED)
Qa	ALLUVIUM		ANTICLINE (BARLOCK, 1988)
Qc	COLLUVIUM		
Qtlg	LIVERMORE GRAVELS	⊕	FLAT-LYING BEDDING

N

0 FEET 150

0 METERS 75

BASE MAP SOURCE: RUGGERI-JENSEN-AZAR

ENGEO Expect Excellence	SITE PLAN SCHMIDIG/LAM PROPERTY LIVERMORE, CALIFORNIA	PROJECT NO.: 13850.000.000 SCALE: AS SHOWN DRAWN BY: LL CHECKED BY: JA	FIGURE NO. 2

G:\Drafting\DRAFTING2_Dwg_13000 Plus\13850\000\GEX-060217\13850000000-GEX-2-SITEPLAN-0617.dwg Plot Date:6-09-17 llee

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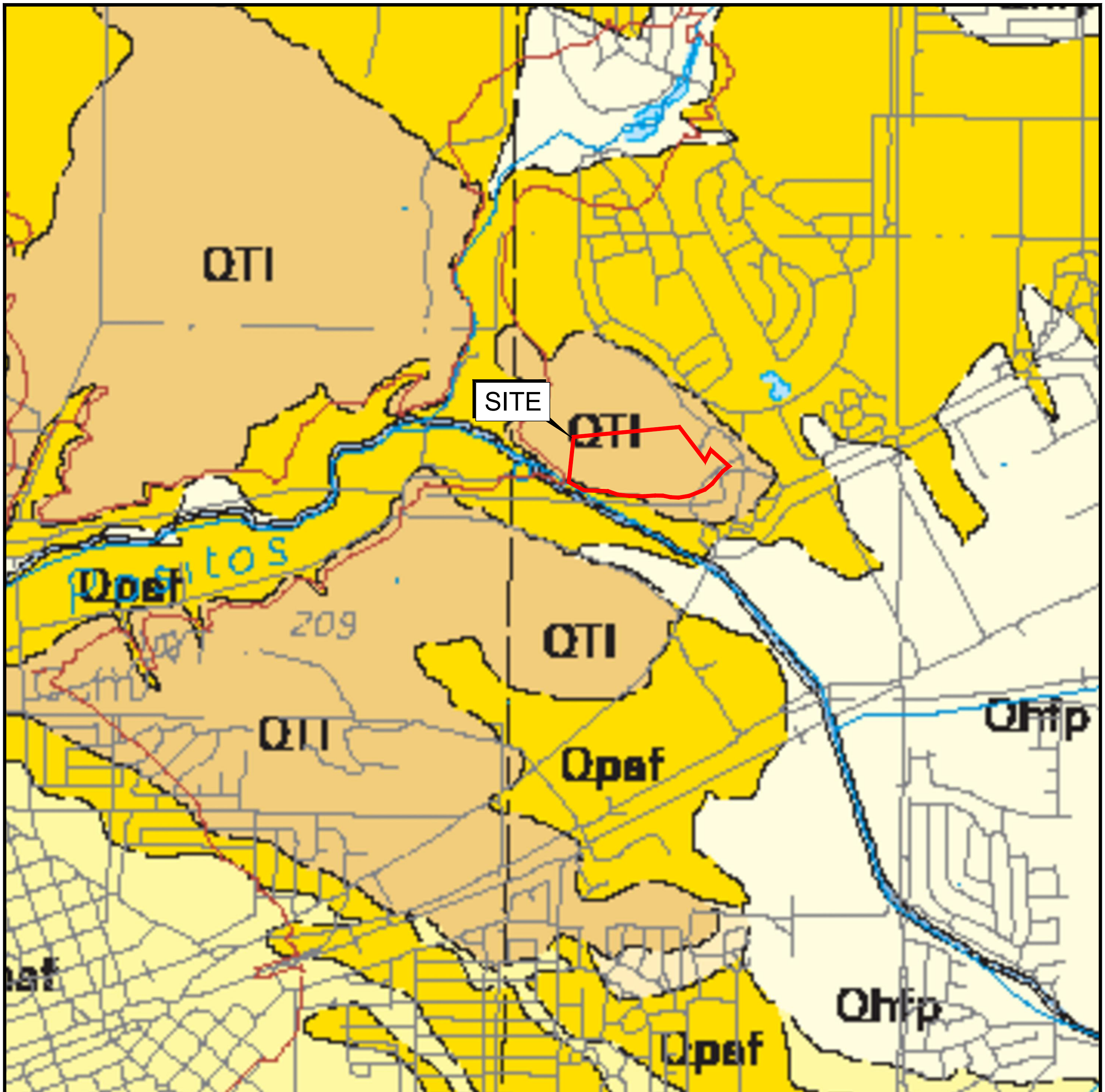


N

0 FEET 2000
0 METERS 1000

EXPLANATION

QTl LIVERMORE GRAVELS
Qhfp ALLUVIAL TERRACE DEPOSITS
Qpaf ALLUVIAL FAN AND FLUVIAL DEPOSITS

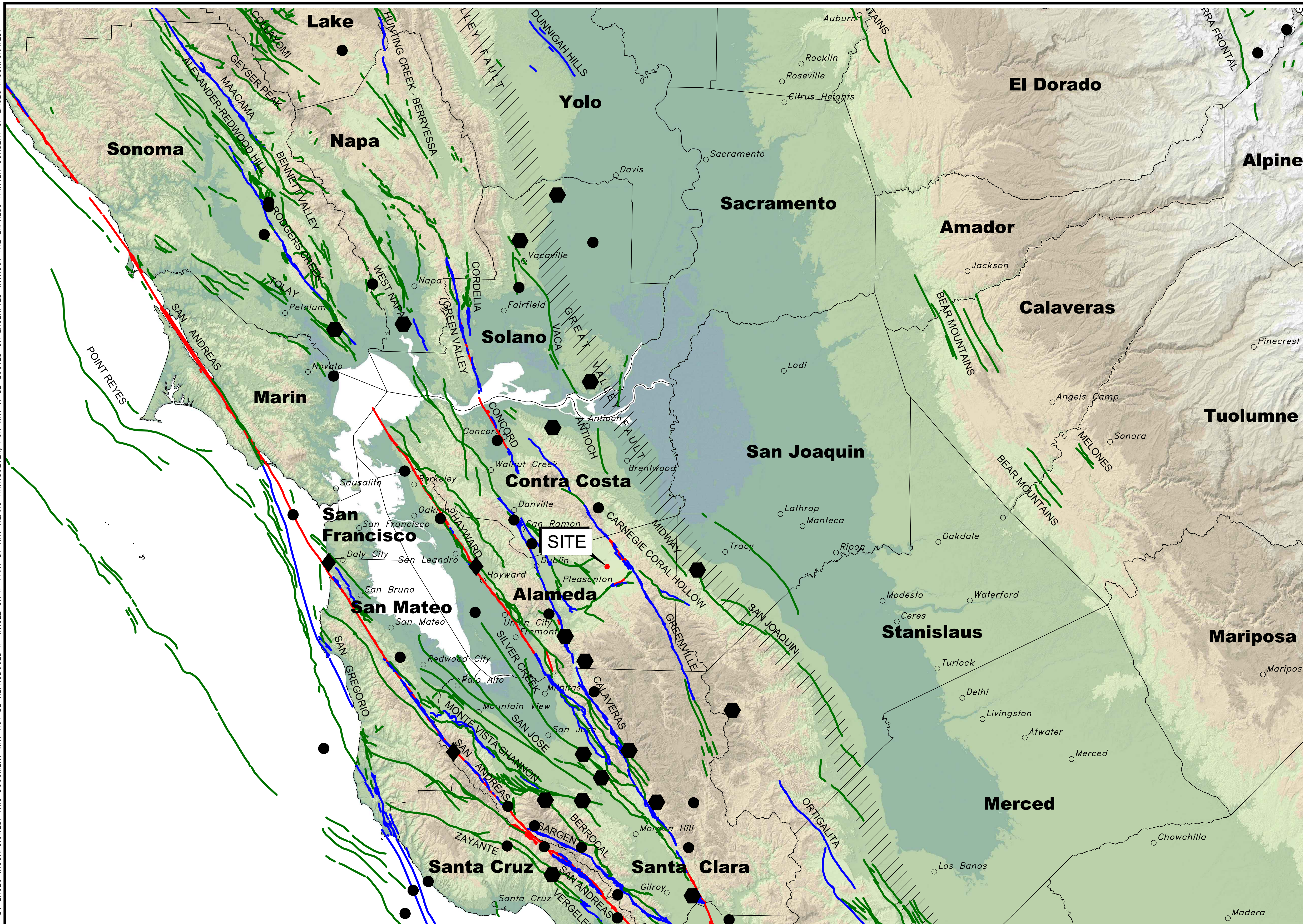
BASE MAP SOURCE: GRAYMER, 2000

ENGEO —Expect Excellence—

REGIONAL GEOLOGIC MAP	PROJECT NO.: 13850.000.000	FIGURE NO.
SCHMIDIG/LAM PROPERTY	SCALE: AS SHOWN	3
LIVERMORE, CALIFORNIA	DRAWN BY: LL / CHECKED BY: JA	

G:\Drafting\DRAFTING2_Dwg_13000 Plus\13850\000\GEX-060217\13850000000-GEX-3-GEOMAP-0617.dwg Plot Date: 6-02-17 llee

ORIGINAL FIGURE PRINTED IN COLOR



EXPLANATION

- MAGNITUDE 7+
- MAGNITUDE 6-7
- MAGNITUDE 5-6
- HISTORIC FAULT
- HOLOCENE FAULT
- QUATERNARY FAULT
- HISTORIC BLIND THRUST FAULT ZONE

BASE MAP SOURCE:
COLOR HILLSHADE IMAGE BASED ON THE NATIONAL ELEVATION DATASET (NED) AT 30 METER RESOLUTION
U.S.G.S. QUATERNARY FAULT DATABASE, NOVEMBER, 2010
U.S.G.S. HISTORIC EARTHQUAKE DATABASE (1800–2000)

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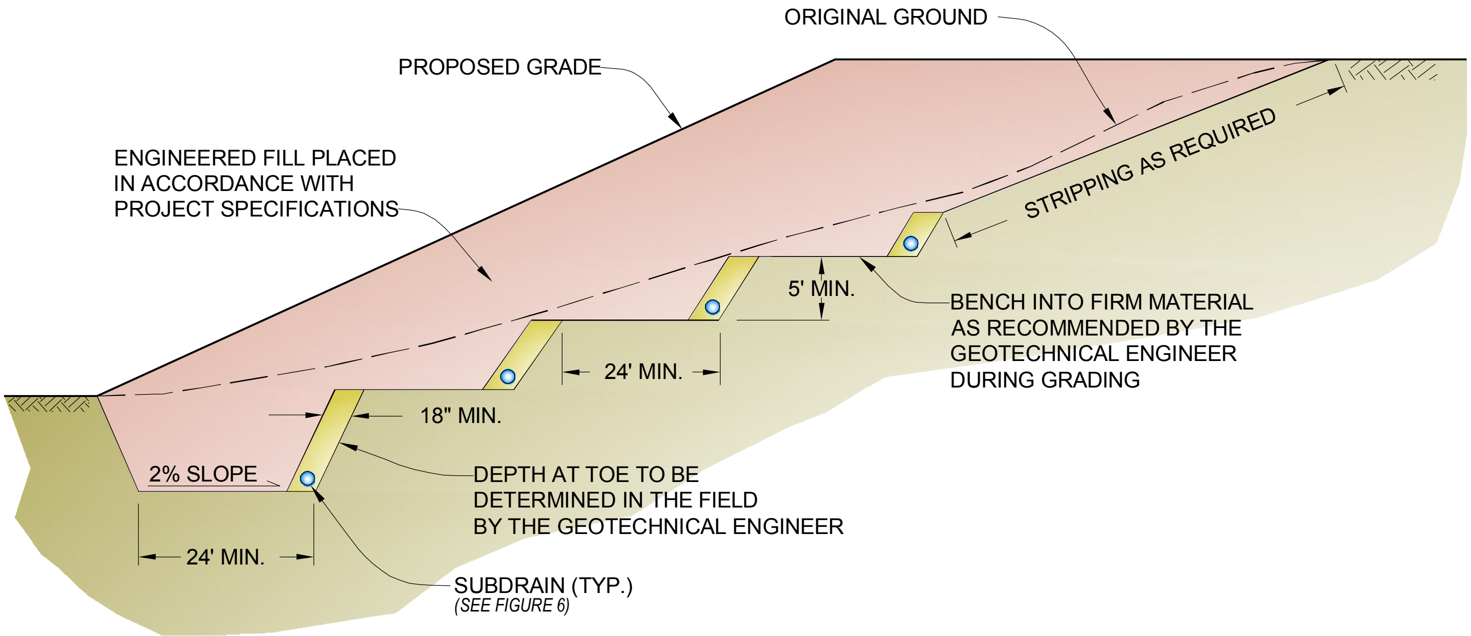
REGIONAL FAULTING AND SEISMICITY
SCHMIDIG/LAM PROPERTY
LIVERMORE, CALIFORNIA

PROJECT NO.: 13850.000.000	FIGURE NO. 4
SCALE: AS SHOWN	
DRAWN BY: LL	CHECKED BY: JA

ORIGINAL FIGURE PRINTED IN COLOR

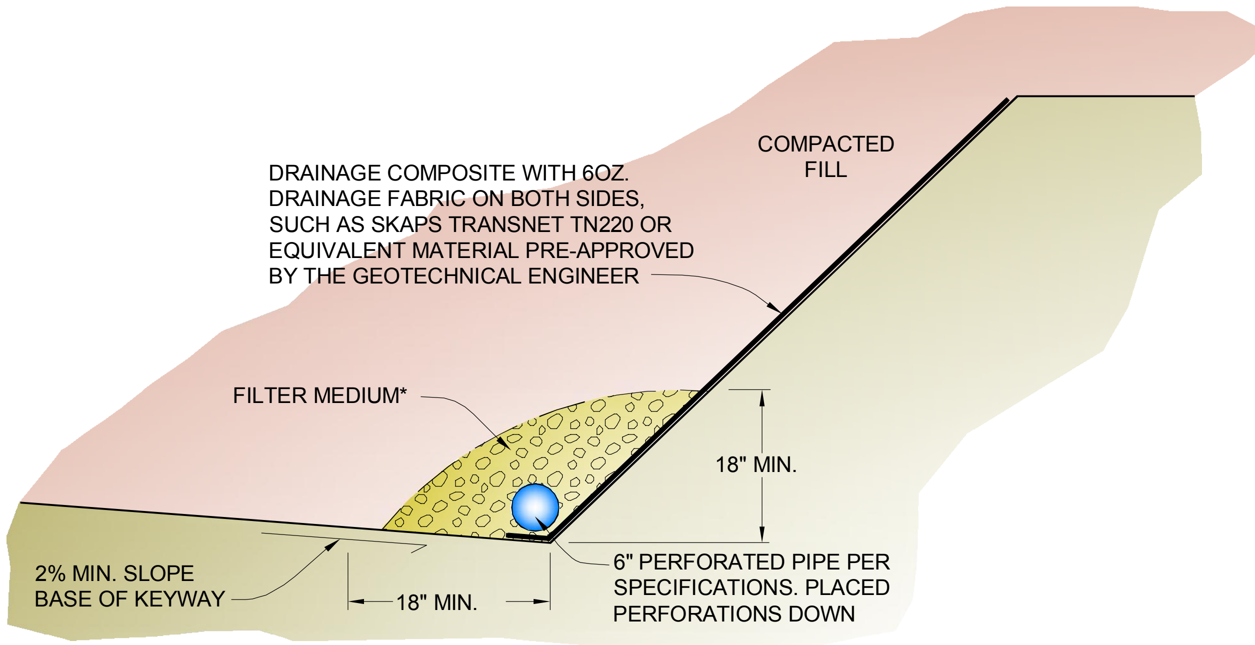
G:\Drafting\DRAFTING2_Dwg_13000 Plus\13850\000\GEX-060217\13850000000-GEX-4-FAULTMAP-0617.dwg Plot Date: 6-02-17 llee

G:\Drafting\DRAFTING2_Dwg_13000 Plus\13850\000\GEX-060217\13850000000-GEX-5-6-KWY-SUBDRN-DTL-0617.dwg Plot Date:6-08-17 llee

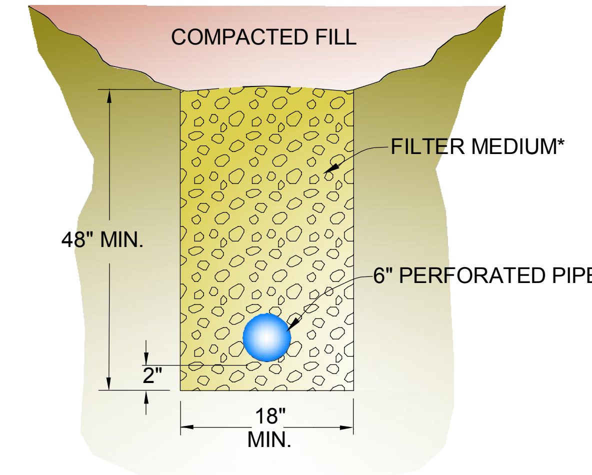


ENGEO Expect Excellence	TYPICAL KEYWAY DETAIL SCHMIDIG/LAM PROPERTY LIVERMORE, CALIFORNIA	PROJECT NO.: 13850.000.000 SCALE: AS SHOWN DRAWN BY: LL / CHECKED BY: JA	FIGURE NO. 5

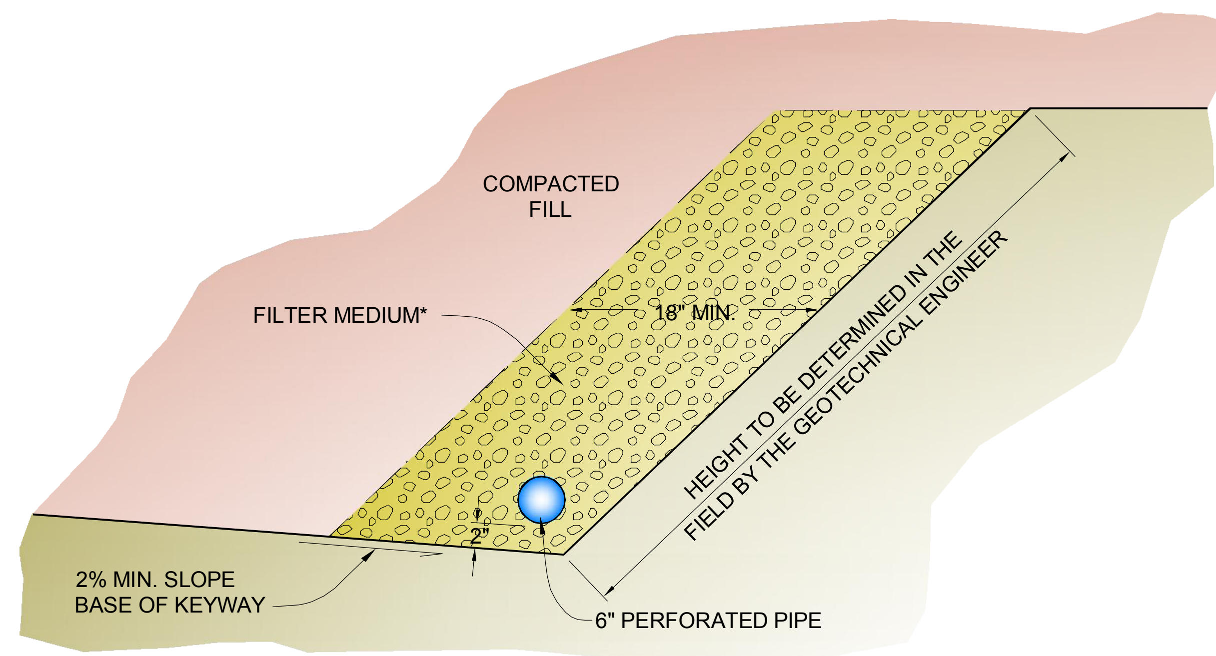
ORIGINAL FIGURE PRINTED IN COLOR



KEYWAY SUBDRAIN - OPTION 1



SWALE SUBDRAIN



KEYWAY SUBDRAIN - OPTION 2

*FILTER MEDIUM

ALTERNATIVE A

CLASS 2 PERMEABLE MATERIAL

MATERIAL SHALL CONSIST OF CLEAN, COARSE SAND AND GRAVEL OR CRUSHED STONE, CONFORMING TO THE FOLLOWING GRADING REQUIREMENTS:

SIEVE SIZE	% PASSING SIEVE
1"	100
3/4"	90-100
3/8"	40-100
#4	25-40
#8	18-33
#30	5-15
#50	0-7
#200	0-3

ALTERNATIVE B

CLEAN CRUSHED ROCK OR GRAVEL WRAPPED IN FILTER FABRIC

ALL FILTER FABRIC SHALL MEET THE FOLLOWING MINIMUM AVERAGE ROLL VALUES UNLESS OTHERWISE SPECIFIED BY ENGEO:

GRAB STRENGTH (ASTM D-4632)	180 lbs
MASS PER UNIT AREA (ASTM D-4751)	6 oz/yd ^{2}
APPARENT OPENING SIZE (ASTM D-4751)	70-100 U.S. STD. SIEVE
FLOW RATE (ASTM D-4491)	80 gal/min/ft
PUNCTURE STRENGTH (ASTM D-4833)	80 lbs

NOTES:

1. ALL PIPE JOINTS SHALL BE GLUED
2. ALL PERFORATED PIPE PLACED PERFORATIONS DOWN
3. 1% FALL (MINIMUM) ON ALL TRENCHES AND DRAIN LINES

ENGEO
Expect Excellence

TYPICAL SUBDRAIN DETAIL
SCHMIDIG/LAM PROPERTY
LIVERMORE, CALIFORNIA

PROJECT NO.: 13850.000.000
SCALE: AS SHOWN
DRAWN BY: LL
CHECKED BY: JA
FIGURE NO. 6

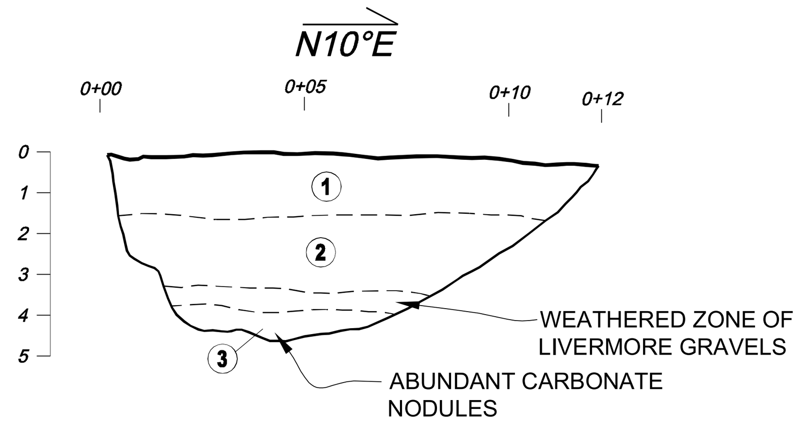
ORIGINAL FIGURE PRINTED IN COLOR

G:\Drafting\DRAFTING2_Dwg_13000 Plus\13850\000\GEX-060217\13850000000-GEX-5-6-KWY-SUBDRN-DTL-0617.dwg Plot Date:6-09-17 llee

APPENDIX A

Figure A-1: Test Pit Logs

TP-1

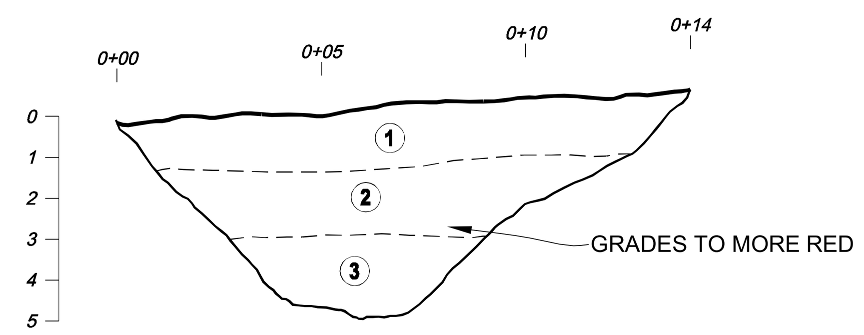


(1) SILTY CLAY (CH), black (7.5YR 2.5/1), stiff to very stiff, moist, high plasticity, some coarse-grained sand, occasional fine gravel, minor ped development, rootlets. [A-Horizon].

(2) SILTY CLAY (ML), reddish black (2.5 YR 2.5/1), very stiff, moist, medium plasticity.

(3) SANDSTONE, yellowish brown (10YR 5/4), friable to weak, massive, moderately weathered, well sorted medium sand, some silt and clay. [LIVERMORE GRAVELS].

TP-2

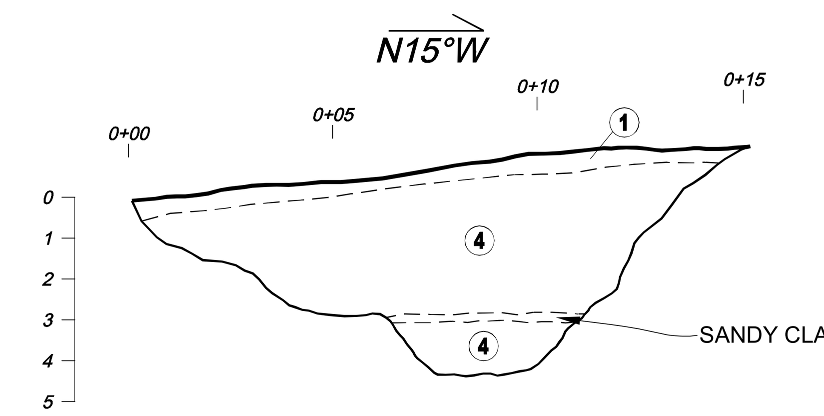


(1) SILTY CLAY (CH), black (7.5YR 2.5/1), stiff to very stiff, moist, high plasticity, some coarse-grained sand, occasional fine gravel, minor ped development, rootlets. [A-Horizon].

(2) SILTY CLAY (ML), red (2.5 YR 4/6), very stiff, moist, medium plasticity, carbonate development.

(3) SANDSTONE, greenish gray (GLEY 1 6/1), friable to weak, massive, moderately weathered, well sorted medium sand, some clay. [LIVERMORE GRAVELS].

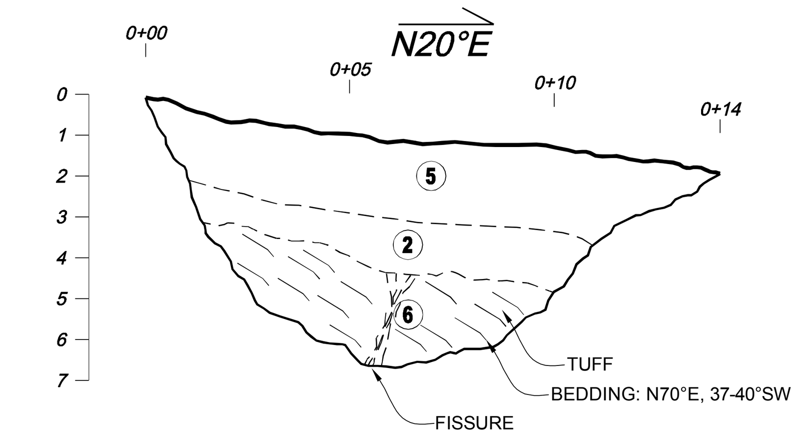
TP-3



(1) SILTY CLAY (CH), black (7.5YR 2.5/1), stiff to very stiff, moist, high plasticity, some coarse-grained sand, occasional fine gravel, minor ped development, rootlets. [A-Horizon].

(4) CONGLOMERATE, dark reddish brown (2.5 YR 3/4), weak, medium to thickly bedded, friable, highly weathered, very dense, poorly sorted gravels, subrounded, clast-supported, fluvial conglomerate with sandy clay matrix, clasts of strong silicic volcanics and metacherts, clasts of friable sandstone. [LIVERMORE GRAVELS].

TP-4

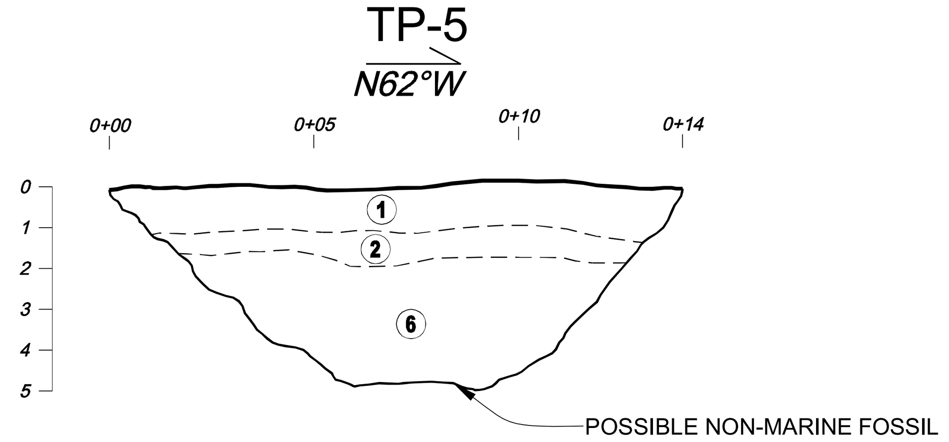


(5) SANDY SILT (ML), reddish black (2.5YR 2.5/1), very dense, damp, medium plasticity. [A-Horizon].

(2) SILTY CLAY (ML), reddish black (2.5 YR 2.5/1), very stiff, damp, medium plasticity.

(6) CLAYSTONE, pale olive (5YR 6/3), friable, steeply bedded, occasional gravels and sand. [LIVERMORE GRAVELS].

TP-5

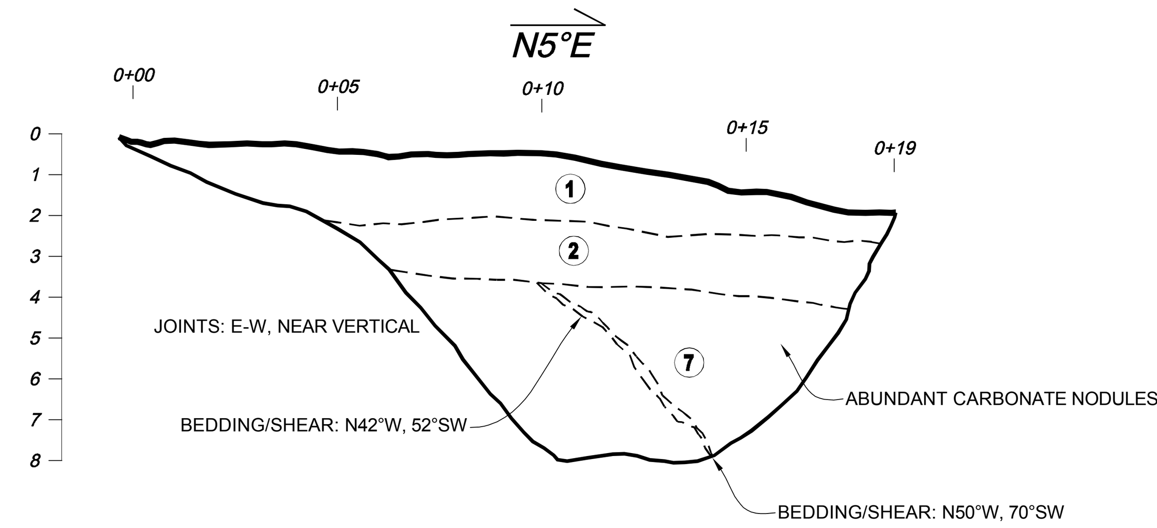


(1) SILTY CLAY (CH), black (7.5YR 2.5/1), stiff to very stiff, moist, high plasticity, some coarse-grained sand, occasional fine gravel, minor ped development, rootlets. [A-Horizon].

(2) SILTY CLAY (ML), reddish black (2.5 YR 2.5/1), very stiff, moist, medium plasticity.

(6) CLAYSTONE, pale olive (5YR 6/3), friable, massively bedded, occasional gravels and sand. [LIVERMORE GRAVELS].

TP-6

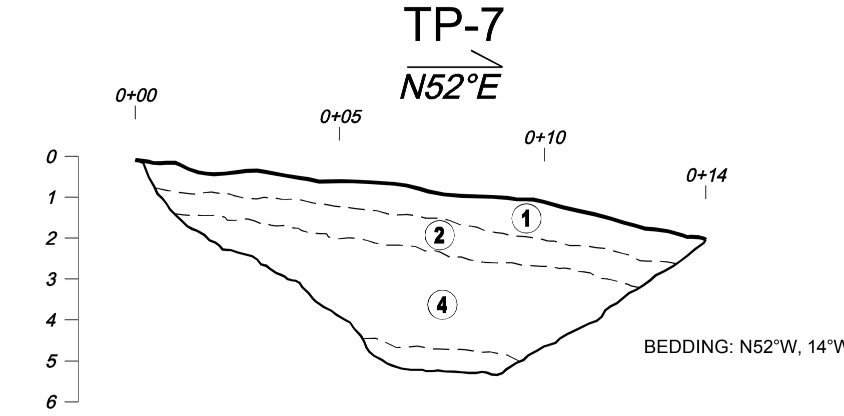


(1) SILTY CLAY (CH), black (7.5YR 2.5/1), stiff to very stiff, moist, high plasticity, some coarse-grained sand, occasional fine gravel, minor ped development, rootlets. [A-Horizon].

(2) SILTY CLAY (ML), reddish black (2.5 YR 2.5/1), very stiff, moist, medium plasticity.

(7) SANDSTONE, pale olive (5YR 6/4), weak, moderately to closely fractured and bedded, moderately weathered, very fine grained sand with clay cementation, carbonate nodules abundant. [LIVERMORE GRAVELS].

TP-7

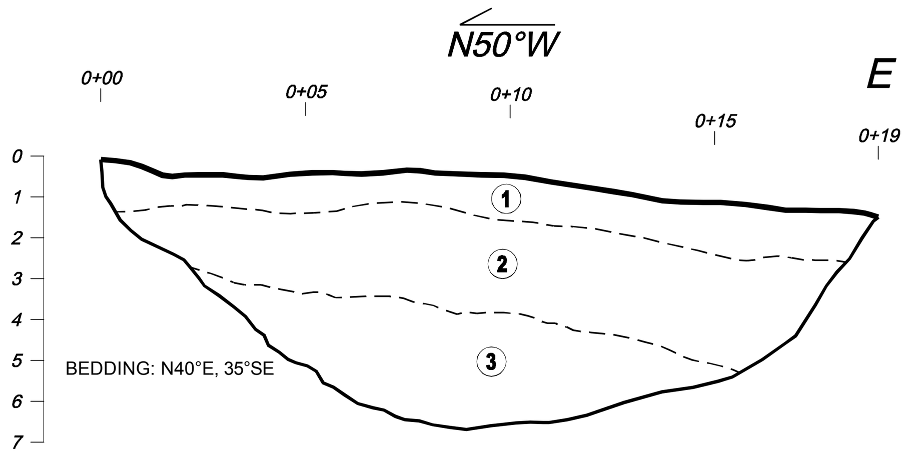


(1) SILTY CLAY (CH), black (7.5YR 2.5/1), stiff to very stiff, moist, high plasticity, some coarse-grained sand, occasional fine gravel, minor ped development, rootlets. [A-Horizon].

(2) SILTY CLAY (ML), reddish black (2.5 YR 2.5/1), very stiff, moist, medium plasticity.

(4) CONGLOMERATE, dark reddish brown (2.5 YR 3/4), weak, medium to thickly bedded, flat to undulatory bedding, friable, highly weathered, very dense, poorly sorted gravels, subrounded, clast-supported, fluvial conglomerate with sandy clay matrix, clasts of strong silicic volcanics and metacherts, clasts of friable sandstone. [LIVERMORE GRAVELS].

TP-8

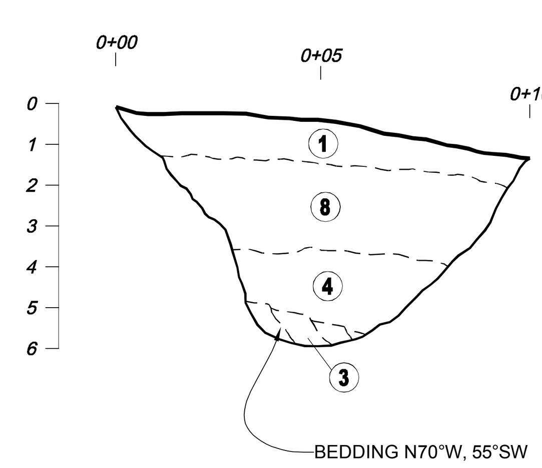


(1) SILTY CLAY (CH), black (7.5YR 2.5/1), stiff to very stiff, moist, high plasticity, some coarse-grained sand, occasional fine gravel, minor ped development, rootlets. [A-Horizon].

(2) SILTY CLAY (ML), red (2.5 YR 4/6), very stiff, moist, medium plasticity, carbonate development.

(3) SANDSTONE, greenish gray (GLEY 1 6/1), friable to weak, massive, moderately weathered, well sorted medium sand, some clay. [LIVERMORE GRAVELS].

TP-9



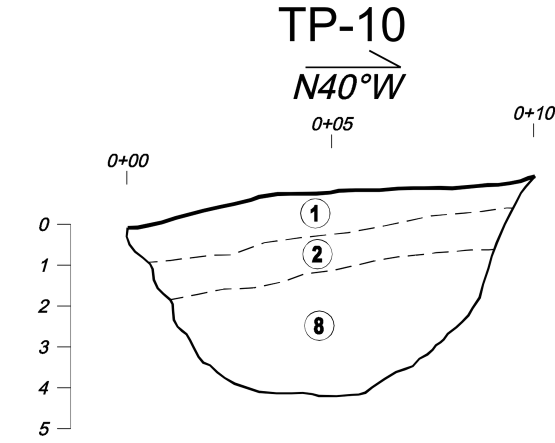
(1) SILTY CLAY (CH), black (7.5YR 2.5/1), stiff to very stiff, moist, high plasticity, some coarse-grained sand, occasional fine gravel, minor ped development, rootlets. [A-Horizon].

(8) FAT CLAY (CH), dark red (2.5 YR 3/6), medium stiff, moist, high plasticity. [COLLUVIUM].

(4) CONGLOMERATE, dark reddish brown (2.5 YR 3/4), weak, medium to thickly bedded, friable, highly weathered, very dense, poorly sorted gravels, subrounded, clast-supported, fluvial conglomerate with sandy clay matrix, clasts of strong silicic volcanics and metacherts, clasts of friable sandstone. [LIVERMORE GRAVELS].

(3) SANDSTONE, greenish gray (GLEY 1 6/1), friable to weak, massive, moderately weathered, well sorted medium sand, some clay. [LIVERMORE GRAVELS].

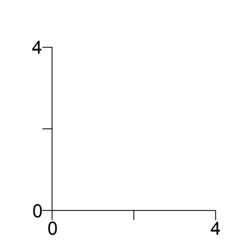
TP-10



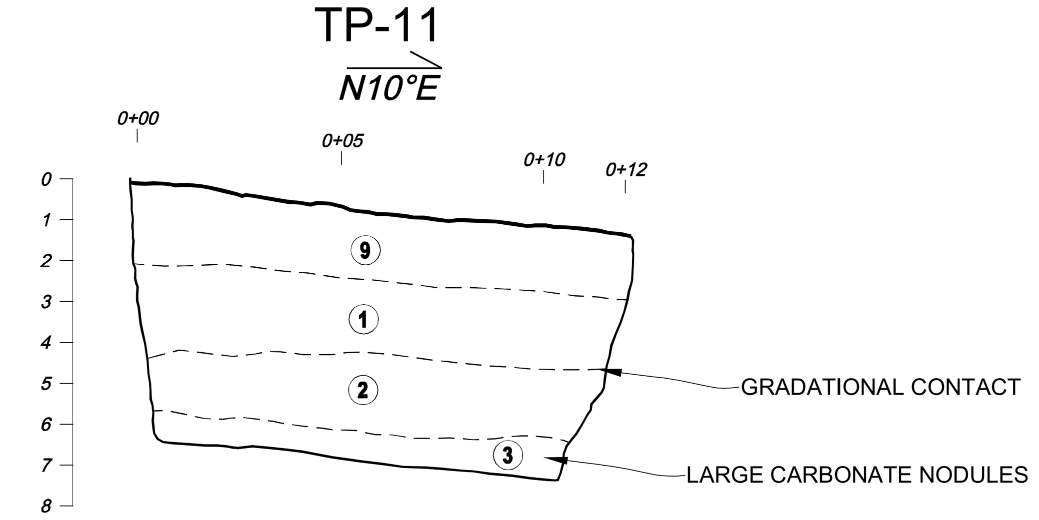
(1) SILTY CLAY (CH), black (7.5YR 2.5/1), stiff to very stiff, moist, high plasticity, some coarse-grained sand, occasional fine gravel, minor ped development, rootlets. [A-Horizon].

(2) SILTY CLAY (ML), reddish black (2.5 YR 2.5/1), very stiff, moist, medium plasticity.

(8) FAT CLAY (CH), dark red (2.5 YR 3/6), medium stiff, moist, high plasticity, Pocket Penetrometer = 2.5 tsf. [COLLUVIUM].



TP-11



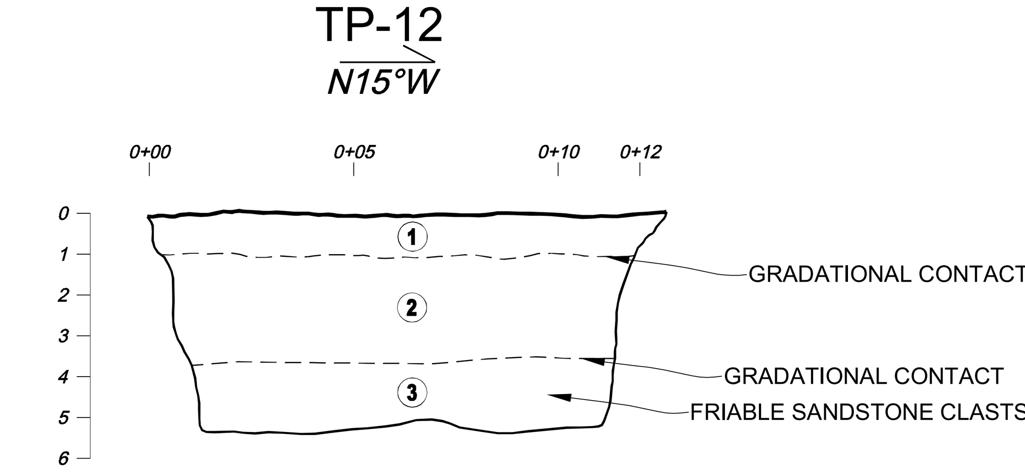
(9) SANDY CLAY (CL), brown (7.5 YR 5/4) to very dark gray (7.5 YR 3/1), medium stiff to stiff, moist, medium plasticity, clay clasts of Unit 1. [ARTIFICIAL FILL].

(1) SILTY CLAY (CH), very dark gray (7.5YR 3/1 to 2.5/1), stiff to very stiff, moist, high plasticity, well developed peds, rootlets. [A-Horizon].

(2) SILTY CLAY (CL), dark brown (7.5 YR 3/2), stiff, moist, medium plasticity. [Bt-Horizon]

(3) SANDSTONE, greenish gray (GLEY 1 5/5G), friable to weak, massive, moderately weathered, some clay. [LIVERMORE GRAVELS].

TP-12



(1) SILTY CLAY (CH), very dark gray (7.5YR 3/1 to 2.5/1), stiff to very stiff, moist, high plasticity, well developed peds, rootlets. [A-Horizon].

(2) SILTY CLAY (CL), dark brown (7.5 YR 3/2), stiff, moist, medium plasticity. [Bt-Horizon]

(3) SANDSTONE, greenish gray (GLEY 1 5/5G), friable to weak, massive, moderately weathered, some clay. [LIVERMORE GRAVELS].

ENGEO Expect Excellence

TEST PIT LOGS
SCHMIDIG/LAM PROPERTY
LIVERMORE, CALIFORNIA

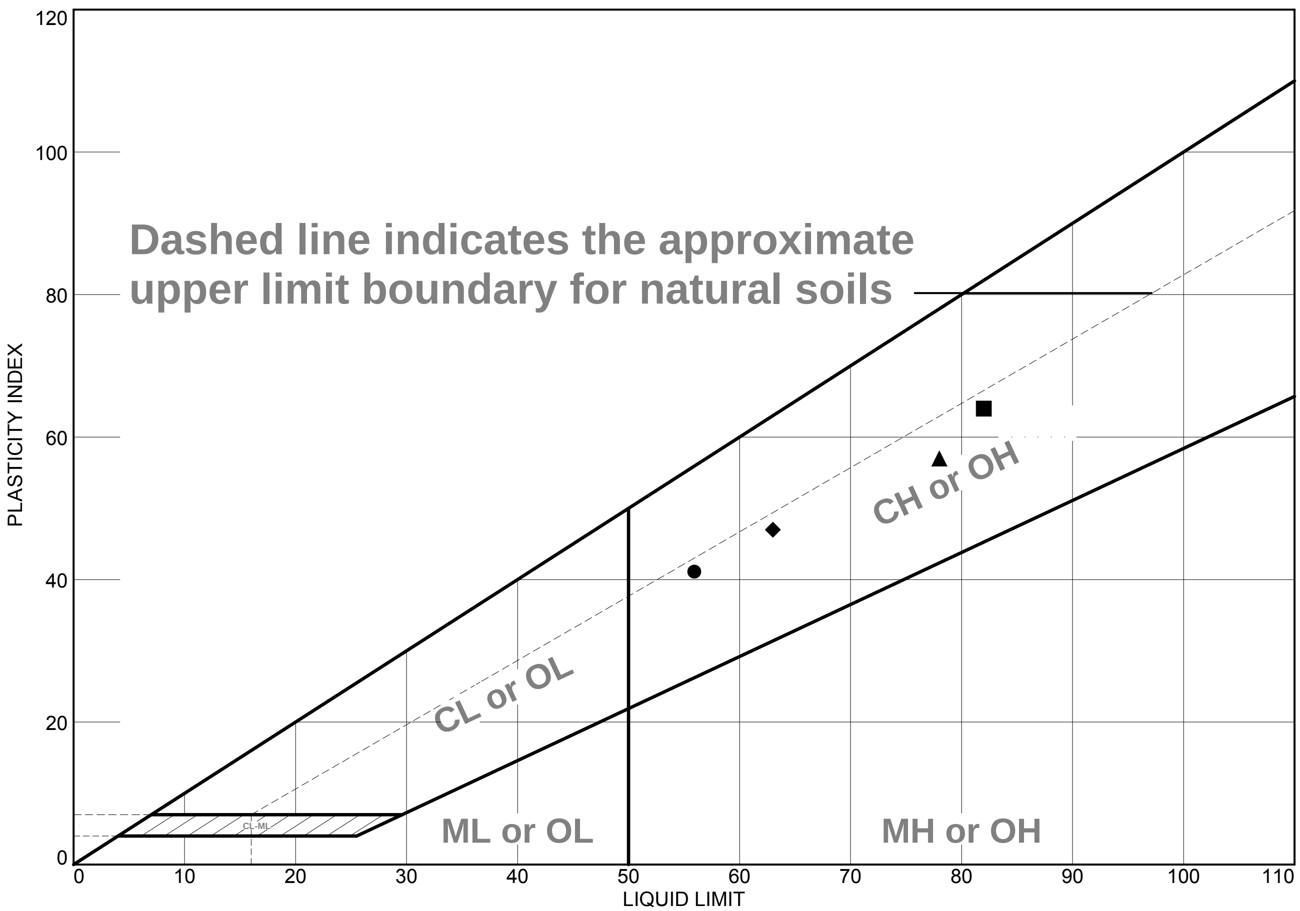
PROJECT NO.: 13850.000.000	FIGURE NO. A-1
SCALE: AS SHOWN	
DRAWN BY: JCS	CHECKED BY: PJS

ORIGINAL FIGURE PRINTED IN COLOR

APPENDIX B

LABORATORY TEST DATA

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	See exploration logs	56	15	41			
■	See exploration logs	82	18	64			
▲	See exploration logs	78	21	57	76.8	65.6	CH
◆	See exploration logs	63	16	47			

Project No. 13850.000.000 **Client:** WestGate Ventures

Project: Schmidig/Lam Property

●**Depth:** 2.0 feet **Sample Number:** TP-1 @ 2
■**Depth:** 2.7 feet **Sample Number:** TP-9 @ 2.7
▲**Depth:** 6.0-7.0 feet **Sample Number:** TP-10 @ 6-7
◆**Depth:** 2.5 feet **Sample Number:** TP-11 @ 2.5

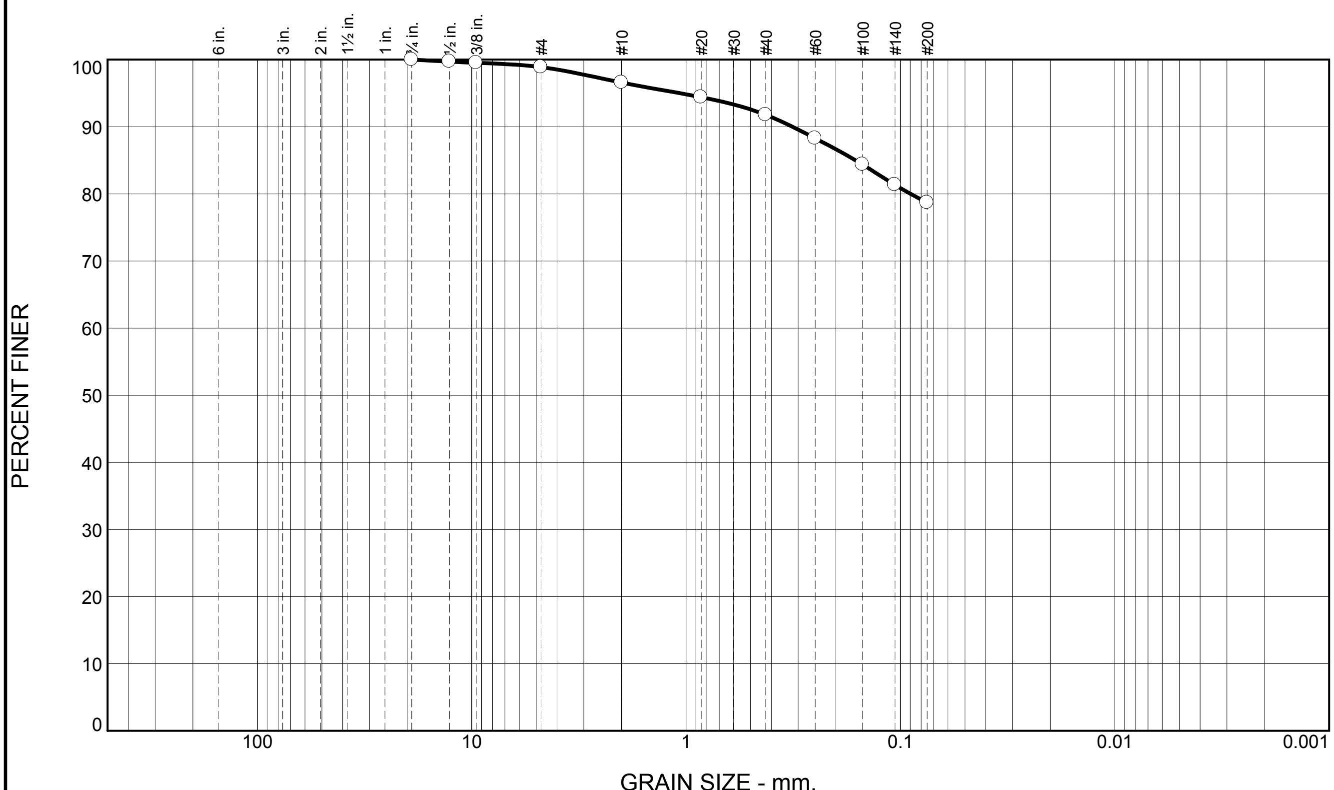
ENGEO INCORPORATED

Remarks:
●ASTM D4318, Wet method
■ASTM D4318, Wet method
▲PI: ASTM D4318, Wet method
GS: ASTM D6913
USCS: ASTM D2487
◆ASTM D4318, Wet method

Figure

Tested By: M. Quasem **Checked By:** G. Criste

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	2.3	4.8	13.1	78.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	99.7		
3/8	99.5		
#4	98.9		
#10	96.6		
#20	94.4		
#40	91.8		
#60	88.3		
#100	84.4		
#140	81.3		
#200	78.7		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3194 D_{85}= 0.1618 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D6913

Sample Number: TP-2@ 3.5 **Depth:** 3.5 feet

Date: 05/22/17

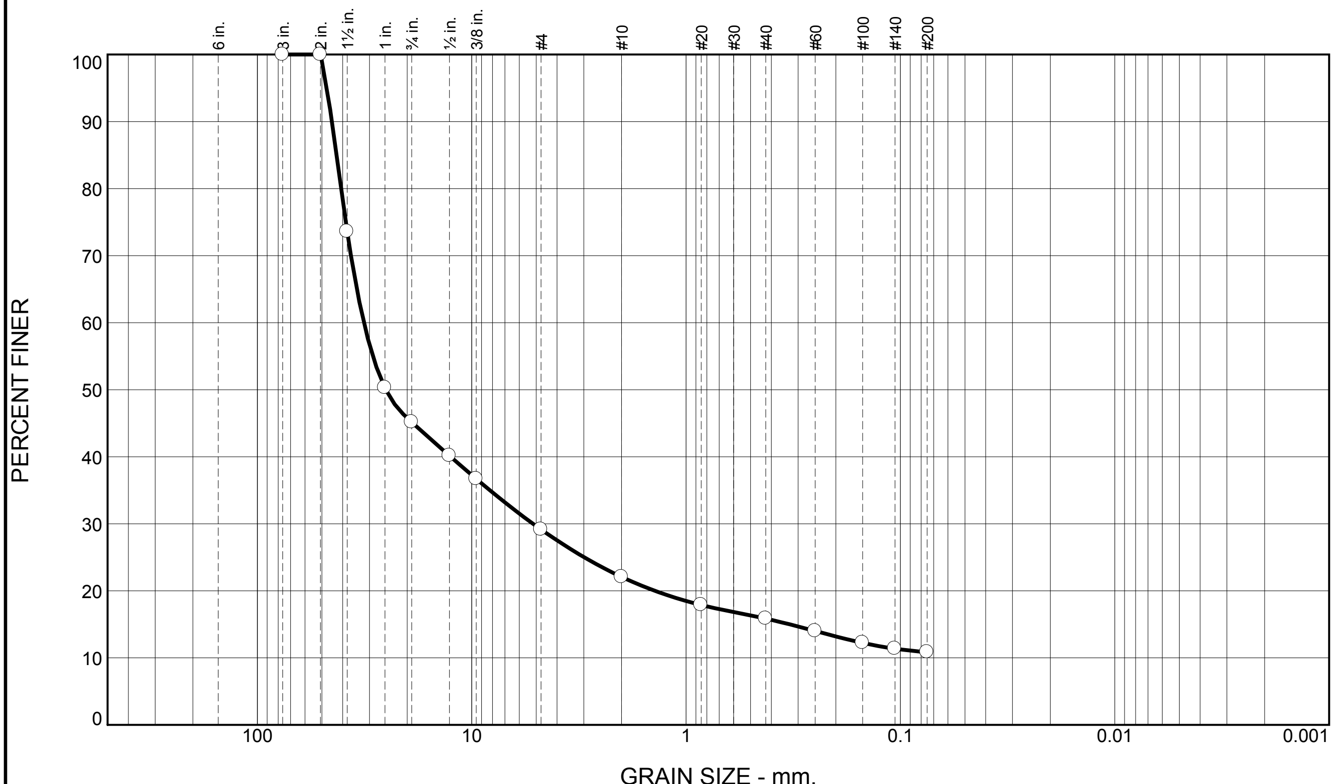
ENGEO INCORPORATED

Client: WestGate Ventures
Project: Schmidig/Lam Property

Project No: 13850.000.000

Tested By: M. Quasem **Checked By:** G. Criste

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	54.8	16.1	7.0	6.3	5.0	10.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
2	100.0		
1-1/2	73.6		
1	50.3		
3/4	45.2		
1/2	40.2		
3/8	36.7		
#4	29.1		
#10	22.1		
#20	17.9		
#40	15.8		
#60	14.0		
#100	12.2		
#140	11.4		
#200	10.8		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 44.8999 D_{85}= 42.7072 D_{60}= 31.8411
D_{50}= 25.1516 D_{30}= 5.1747 D_{15}= 0.3293
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D6913

Sample Number: TP-3 @ 4 **Depth:** 4.0 feet

Date: 05/22/17

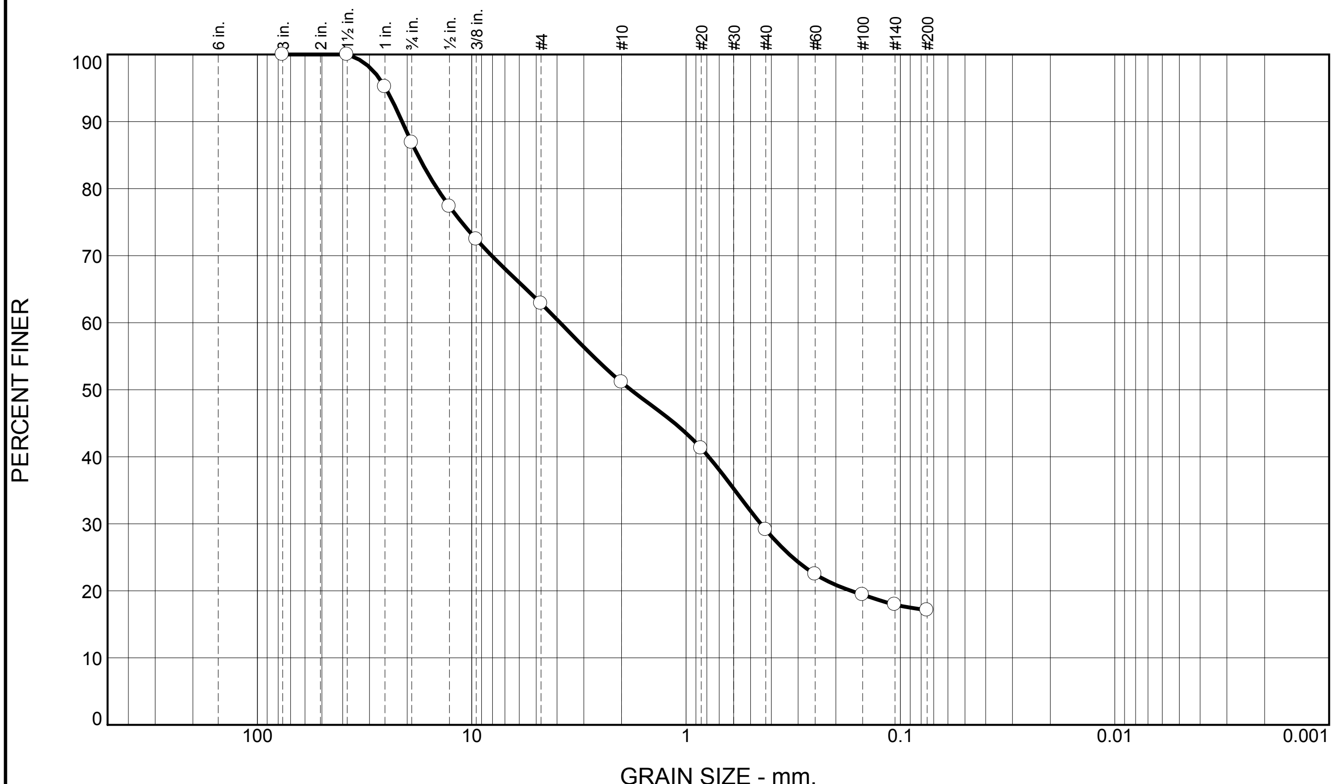
ENGEO INCORPORATED

Client: WestGate Ventures
Project: Schmidig/Lam Property

Project No: 13850.000.000

Tested By: M. Quasem **Checked By:** G. Criste

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	13.1	24.0	11.8	22.0	12.0	17.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3	100.0		
1-1/2	100.0		
1	95.2		
3/4	86.9		
1/2	77.3		
3/8	72.4		
#4	62.9		
#10	51.1		
#20	41.3		
#40	29.1		
#60	22.5		
#100	19.4		
#140	17.9		
#200	17.1		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 21.1292 D_{85}= 17.8320 D_{60}= 3.8730
D_{50}= 1.8122 D_{30}= 0.4484 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D6913

Sample Number: TP-7 @ 4 **Depth:** 4.0 feet

Date: 05/22/17

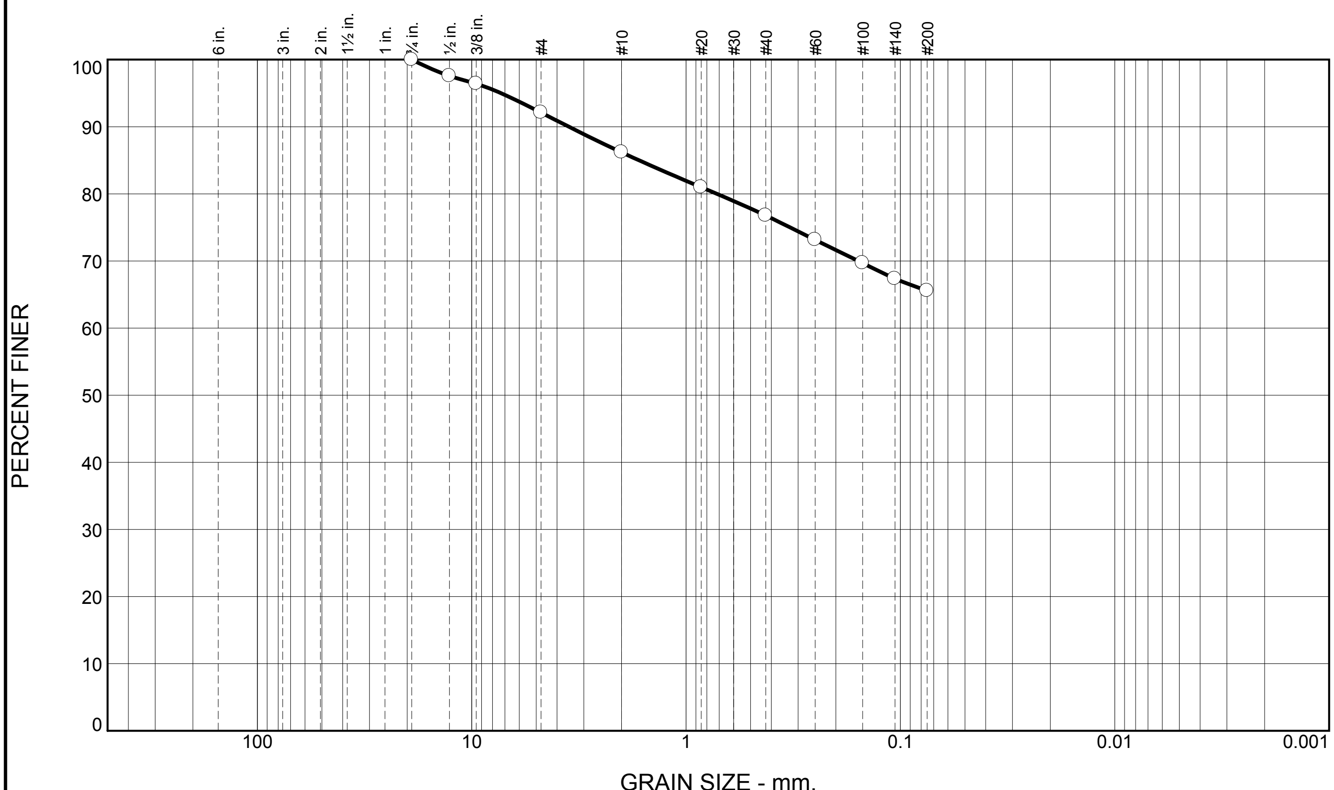
ENGEO INCORPORATED

Client: WestGate Ventures
Project: Schmidig/Lam Property

Project No: 13850.000.000

Tested By: M. Quasem **Checked By:** G. Criste

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	7.9	5.9	9.4	11.2	65.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	97.6		
3/8	96.4		
#4	92.1		
#10	86.2		
#20	81.0		
#40	76.8		
#60	73.1		
#100	69.7		
#140	67.4		
#200	65.6		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= 21 LL= 78 PI= 57

Coefficients

D_{90}= 3.5218 D_{85}= 1.6570 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CH AASHTO= A-7-6(36)

Remarks

GS: ASTM D6913
PI: ASTM D4318, Wet method
USCS: ASTM D2487

Sample Number: TP-10 @ 6-7 **Depth:** 6.0-7.0 feet

Date: 05/22/17

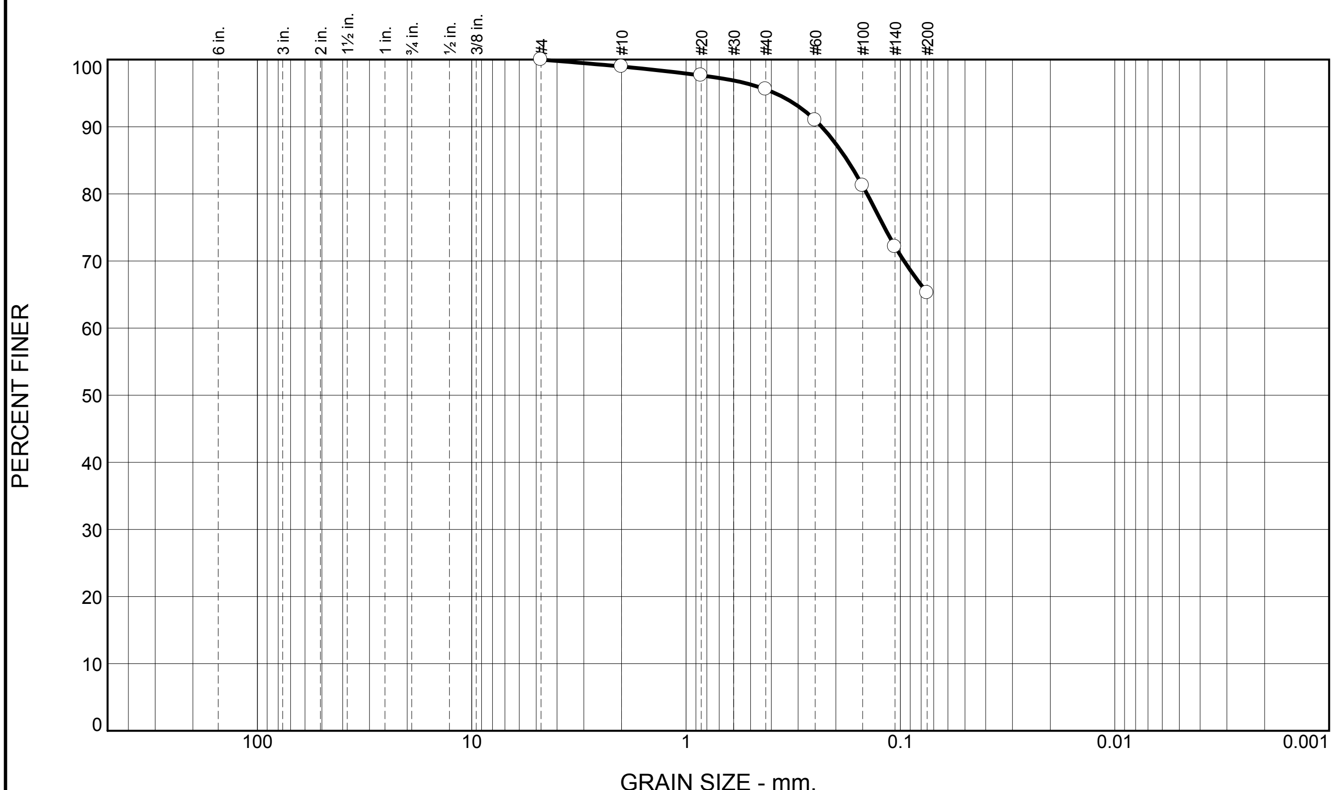
ENGEO INCORPORATED

Client: WestGate Ventures
Project: Schmidig/Lam Property

Project No: 13850.000.000

Tested By: M. Quasem **Checked By:** G. Criste

Particle Size Distribution Report



% +75mm	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.0	3.4	30.3	65.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.0		
#20	97.6		
#40	95.6		
#60	91.0		
#100	81.2		
#140	72.1		
#200	65.3		

* (no specification provided)

Soil Description

See exploration logs

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2332 D_{85}= 0.1766 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

ASTM D6913

Sample Number: TP-12 @ 5.5 **Depth:** 5.5 feet

Date: 5/31/17

ENGEO INCORPORATED

Client: WestGate Ventures
Project: Schmidig/Lam Property

Project No: 13850.000.000

Tested By: M. Quasem **Checked By:** G. Criste

SAN RAMON

SAN FRANCISCO

SAN JOSE

OAKLAND

LATHROP

ROCKLIN

SANTA CLARITA

IRVINE

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