Appendix E:
Geology and Soils Supporting Information

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E.1 - Geologic and Geotechnical Feasibility Evaluation

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GEOLOGIC AND GEOTECHNICAL FEASIBILITY EVALUATION

MASSON ESTATES
On APN 503-46-005
at
Pierce Road
Saratoga, California

For

Chateau Masson LLC

By
Quantum Geotechnical, Inc.

Project No. E041.G
December 11, 2023

QUANTUM GEOTECHNICAL INC.

Project No. E041.G
December 11, 2023

Mr. William Hirschman
Chateau Masson LLC
258 Union Avenue
Los Gatos, CA 95032

Subject: Proposed Residential Subdivision
Masson Estates
On APN 503-46-005
Pierce road
Saratoga, California
GEOLOGIC AND GEOTECHNICAL FEASIBILITTY EVALUATION

Dear Mr. Hirschman:

In accordance with your authorization, ***Quantum Geotechnical, Inc.,*** has provided a geologic and geotechnical feasibility evaluation of the proposed residential development at the subject site located in Saratoga, California. The accompanying report presents the results of our evaluation. Our findings indicate that development of the site for the proposed improvements is feasible from a geologic and geotechnical viewpoint.

Should you have any questions relating to the contents of this report or should additional information be required, please contact our office at your convenience.

Sincerely,
Quantum Geotechnical, Inc.

Craig S. Harwood, P.G., E.G.
Principal Geologist

Simon Makdessi, P.E., G.E.
President

Joseph W. Farrow, P.G.
Senior Geologist

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GEOLOGIC/GEOTECHNICAL FEASIBILITY EVALUATION

INTRODUCTION

The proposed project consists of developing a portion of the Mountain Winery property for a residential development consisting of twenty five (25) new single-family residences including several townhouse structures a primary and secondary access road, two auto bridges, driveways, and associated improvements on APN 503-46-005 located on Pierce road in Saratoga, California. The subject residential development, given the moniker "Masson Estates," consists of a portion of the overall Mountain Winery Property. The Masson Estates Development site is located on the west side of Pierce Road, just on the northeast of an abandoned rock quarry.

The site was the subject of a soils engineering study in 1989 (United Soils Engineering) and a geologic reconnaissance summary in 1991(John Coyle and Associates). Both of these studies covered the larger "Paul Masson Winery" property which includes the subject parcel (APN 503-46-005). Neither of these studies include subsurface explorations. In 2013 T. Makdissy conducted a geologic assessment of the site (APN 503-46-005) which did not include any exploratory borings or test pits. In 2015, our firm conducted 7 exploratory borings and in 2018 we conducted six exploratory test pit excavations. More recently, in 2022 and 2023 our firm conducted subsurface explorations which included borings, test pits and trenches. This current evaluation summarizes the geologic conditions and constraints in the context of a feasibility level evaluation of the proposed development.

PURPOSE AND SCOPE

The purpose of the current investigation and report is to generally define and evaluate the site geologic conditions and constraints, determine the stability of slopes that impact the proposed improvements and offer conclusions on the geologic and geotechnical feasibility and provide general preliminary engineering recommendations for potential mitigation of assessed hazards. Several of our recent exploratory trenches were observed by an engineering geologist from the office of the Town of Saratoga's geotechnical peer review consultant Cotton, Shires and Associates (CSA). It is our intent that this report be used exclusively by the client and the client's architect/engineer to form the geologic and geotechnical basis of the preliminary layout and design of the project as described herein, and in the preparation of preliminary plans. Analysis of the soil and rock for radioisotopes, asbestos, hydrocarbons, or chemical properties are beyond the scope of this geologic and geotechnical feasibility evaluation. Our evaluation included the following:

a. Review of available geologic maps and literature pertinent to the area of the site;
b. Review of geologic and geotechnical consultant's reports previously conducted at and adjacent to the site;
c. Field reconnaissance and mapping by the Principal and Project Geologists;
d. Logging of exploratory borings at the site.
e. Logging of exploratory test pits and trenches at the site.
f. Laboratory analysis of soil samples collected during the field exploration of the site.

g. Perform slope stability along a geologic cross sections extending through the proposed improvements.
h. Analysis of geologic data and preparation of geologic conclusions and preliminary recommendations, for mitigation of hazards.
i. Characterization of the site subsurface and preparation of preliminary geotechnical recommendations; and
j. Preparation of this written report.

PROPOSED PROJECT

According to the plans by Hanna Brunetti (Site Development Plan, dated November, 2023) we understand that the proposed project consists of constructing 25 residences, new access roads, two auto bridges, driveways and associated improvements at the locations generally shown on the Site Geologic Map (Appendix A). The proposed primary and secondary access roads will extend from Pierce Road at the east property line and extend into the eastern portion of the property, across Upper Calabasas Creek and provides access to residential lots (Lots 18 through 23) on the west side of Upper Calabasas Creek. The main site access road will extend across a deep drainage gulch where an auto bridge will be constructed spanning the boundary between Lot 25 and Lot 9. An auto bridge will extend across Upper Calabasas Creek (a seasonal drainage) in the area of Lot 17 and Lot 18. A secondary access road will extend into the in the area of Lot 13 within the eastern portion of the site from Pierce Road. The septic systems will be connected to the city facilities at Pierce Road at the east property line. As the project is in its early stages, the final design grades have not been determined. Based on the site characteristics, we anticipate the residential lots will require a minor to moderate amount of grading. The access roads will require a moderate amount of grading.

SITE SETTING

The site is in the foothills along the eastern margin of the Santa Cruz Mountains within the San Francisco Bay area region (see Site Location Map, Appendix A). The property (APN 503-46-005) encompasses a northerly trending canyon alongside the west side of Pierce Road in the rolling hills and canyons of Saratoga. Upper Calabasas Creek trends northerly through the central portion of the canyon and site. An abandoned rock quarry is located in the western-central portion of the property and served as a source of construction fill for a few decades. On the west side of the creek, the topography is characterized as a mid-slope terrace with steep, westerly facing slopes above the terrace and moderate to locally steep, westerly facing slopes below the terrace. On the east side of the creek the site is characterized as a steep slope with a terrace located at the mid-slope portion. Easterly facing slopes on the west side of the creek are generally gently inclined but locally moderate to steep.

Developed residential parcels exist on the north of the property, and Pierce Road trends along the eastern east site boundary. The area to the northeast is open sparsely developed land. The quarry area located adjacent to the southeast side of the proposed development is characterized by over steepened fill slopes and cut slopes up to 125 to 175 feet high, respectively. The subject site is undeveloped except for a corrugated metal water tank shed on Lot 20. On the west side of the creek there is approximately 120 feet of topographic relief between the west property lne and the creek channel in

the central portion of the site. The proposed residences on Lots 19 through 23 are located on a gently inclined terrace with an average elevation of portion of the site. There is approximately 6 to 10 feet of relief across the individual building envelopes on these lots. On the east side of the creek (south of the gully) there is approximately 120 feet of topographic relief between the east property line at Pierce Road and the creek channel in the central portion of the site. The proposed residences on Lots 9 through 17 are located on a gently inclined terrace. There is approximately 6 to 12 feet of relief across the individual building envelopes on these lots. Natural runoff sheets down the site slopes and enters Upper Calabasas Creek as well as a deep drainage gully which extends westerly across the property. The creek flows to downslope areas to the north.

Vegetation type and patterns across the canyon is highly variable and consists of Oak, Madrone, locally thick understory shrubs and weeds. Riparian vegetation is focused along the corridor for Upper Calabasas Creek.

GEOLOGIC SETTING

The regional geologic setting has been previously presented in the report of Coyle (1991), and T. Makdissy (2013).

Local Geology

The geology of the Saratoga region has been mapped and published through a number of sources including those of: Rogers and Armstrong, 1973; Sorg & McLaughlin, 1975; William Cotton and Associates (1980), Vanderhurst (1981), Brabb (1993), Reddig (1994), Brabb and other (1998), and Dibblee and Minch (2007). The most detailed published mapping of the area is that by William Cotton and Associates ("WCA") compiled for the geologic map series covering the Upper Calabasas Creek Watershed. WCA (1980) show the site as underlain by Plio-Pleistocene Santa Clara Formation (mapping unit "QTsc") within the eastern portion, and by Franciscan bedrock (mapping unit "KJf") adjacent to the the western portion. These two formations are juxtaposed by a major tectonic contact, the Berrocal Fault. Another small-scale mapping project covering the area is that of Reddig (1994) for his Master's Thesis on the subject of the Santa Clara Formation. In addition to the Franciscan bedrock and Santa Clara Formation, additional geologic units at the site include; a dormant landslide mass (Ols), a narrow band of Holocene stream channel fill (Qhc) and overlying historic alluvium within the Upper Calabazes Creek corridor, and locally reworked landslide debris within the creek corridor. Colluvium mantles most of the geologic units at the site, with the exception of the creek alluvium within the creek channel. Wedges of fill occur locally, primarily along roads and at the locations of exploratory trenches and test pits.

The Franciscan Bedrock is relatively hard (moderately strong to strong), highly fractured, sandstone and shale. Reddig assigns the Santa Clara Formation in the immediate area as belonging to the Arastradero lithofacies, which is the stratigraphically lowest (oldest) portion of the Santa Clara Formation and has been assigned a Pliocene age based on fossil assemblages within the facies. The Arastadero facies is characterized as "moderately well sorted, sandy, cross bedded pebble gravel and minor claystone and laminated lacustrine mudstone, deposited in braided stream and flood-

plain/overbank settings" (Reddig, 1994; McLaughlin and Clark, 2004). Reddig provides a detailed description of the Arastradero facies as follows:

> The Arastradero lithofacies is a sequence of poorly lithified conglomerate, sandstone, siltstone, mudstone, and claystone. The predominant rock type is a moderately-sorted pebble conglomerate with a moderately sorted, medium-grained sandstone matrix. Mudstone and claystone make up a minor portion of the Arastradero and occur as interbeds with poorly sorted sandstone or as very thin, discontinuous beds or lenses. Locally, mudstone occurs as massive tabular beds at least 15 m thick and traceable for over 1 km. The Arastradero apparently was deposited in an extensive, coarse grained, braided stream environment with minor associated floodplain and lacustrine environments (Vanderhurst, 1981).

The abandoned quarry on the southwest of the site was excavated in Franciscan Complex sandstone and shale, and these bedrock materials are well exposed in the various cuts within the quarry. These bedrock materials exhibit a general northwest strike and a moderately steep dip to the southwest. A large portion of the hillside located below the main quarry access road is overlain by surficial accumulations of undocumented fill. This area is outside of the proposed development and therefore does not impact it.

Due to the proximity to the Berrocal fault, the pre-quaternary geologic units at the site (KJf and QTsc) have been tectonically deformed by previous fault movement (see Faulting). Accordingly, pervasive fracturing is prevalent throughout the geologic units and bedding attitudes can vary considerably near the fault traces. The QTsc subunits (claystone, pebble conglomerate and minor sandstone and minor siltstone and shale) are moderately consolidated (very stiff and dense to very dense in soil terms), and generally moderately weathered. The narrow band of alluvium concentrated within and directly adjacent to the creek channel for Upper Calabazas Creek is unconsolidated.

The Site Geologic Map (Appendix A) presents a more detailed depiction of the existing physical features of the site and the proposed building envelopes and access drives.

PREVIOUS GEOLOGIC/GEOTECHNICAL INVESTIGATIONS AT THE SITE

United Soil Engineering (1989)

In 1989 United Soil Engineering, Inc. ("USE") conducted a "Preliminary Soil and Geologic Investigation" for the Paul Masson Winery (now "Mountain Winery") who own the subject site. Their scope of work included a site reconnaissance and geologic mapping, review of published maps and literature. No subsurface investigation was conducted at that time and Site Geologic Map was generated from the "USE" study. As such the report by USE is only general enough in nature to be of limited use in characterization of the site.

Coyle (1991)

In 1991 John Coyle and Associates conducted a geologic evaluation of the Paul Masson property which includes the subject Masson Estates site. It was characterized as a "Geologic Reconnaissance Study"

and included detailed geologic mapping and the resulting report included a discussion of the larger regional geologic and seismic setting. While the primary focus of the Coyle study was the larger Mountain Winery property, the mapping extended into the property currently designated as Masson Estates. Coyle's map is included in Appendix A.

T. Makdissy (2013)

In 2013 T. Makdissy conducted a Geologic Assessment (summary) of the site geology to date. This evaluation included a discussion of the larger regional geologic and seismic setting, and a summary of previous studies on the Winery Property but did not include any subsurface explorations.

GEOLOGIC RECONNAISSANCE

Between 2013 and 2023 several reconnaissances were conducted at the site. The purpose of these reconnaissances was to confirm general geologic structure and conditions with particular focus on geologic hazards. Additionally we sought to determine if conditions had changed since that earlier site surface mapping of Coyle in 1991. The subject site contains no permanent structures other than a corrugated metal shed for a water tank on Lot 20.

The Abandoned Quarry

The quarry area is characterized by oversteepened fill slopes and cutslopes up to 125 to 175 feet high, respectively. Fill slopes are as steep as 40° and the cutslope exhibits bedrock slopes that range in inclination from precipitous (greater than 36°) to near vertical. The quarry was excavated in Franciscan Complex sandstone and shale, and these bedrock materials are well exposed in the cutslope. In the quarry these bedrock materials exhibit a general northwest strike and a moderately steep dip to the southwest. A large portion of the hillside located below the main quarry access road (and extending into the canyon consists of surficial accumulations of fill which is non-engineered. Concrete, metal and wood debris are present. This area is not located upslope of any of the currently proposed residential lots.

The Masson Estates Development Area

The main geologic units at the site consist of Santa Clara Formation subunits as well as colluvium, alluvium within the creek channel, and landslide debris. Colluvium and residual soil mantle all of the geologic units at the site, except for the stream channel alluvium (Qhc). Franciscan Complex bedrock occurs just west and southwest of the site. The Santa Clara Formation (Pliocene Arastadero Facies) underlies the entire site. The QTsc subnits units consist of claystone and conglomerate and lesser amounts of sandstone, siltstone, and shale. These subunits are generally weak in terms of bedrock classification however in terms of soil classification they are generally very dense (cohesionless units), and very stiff and hard (cohesive units) in nature. These subunits can be generally susceptible to instability where exposed to springing or saturating ground conditions, oversteepened and/or undercutting by stream flow. The alluvium is unconsolidated and concentrated within and directly adjacent to the channel of Upper Calabazas Creek. Locally the stream channel deposits are overlain by

Anthrogenic deposits (deposits containing man-made materials; glass, concrete fragments, metal cans, etc.).

The results of the reconnaissance are shown on the Site Geologic Map and our Geologic Cross Sections A-A′ through G-G′ (Appendix A). Some of the observations are discussed under separate subheadings in subsequent sections.

FIELD INVESTIGATIONS AT THE SITE BY QUANTUM GEOTECHNICAL, INC. (2015-2023)

Field Investigations (2015)

As part of our initial field exploration in 2015, seven exploratory test borings were drilled, logged and sampled within the site. The borings varied from 35.5 feet deep (B-3) to as much as 48.0 feet (B-4).

Boring B-1 was a dry corehole. The dry corehole was accomplished using a track-mounted CME-55 drill rig using 3” diameter, 5 foot long split spoon dry core sampler. As the sampler was advanced in 5-foot long segments by way of a rotating cutter head, the core sampler collected 5-foot long segments (samples) of the encountered soil and bedrock. The cores were examined for crushed zones, surfaces and other features. The test borings were accomplished using a track-mounted (CME-55) drill rig using 8” diameter hollow stem augers. As the augers were advanced, relatively undisturbed soil samples were collected for visual classification and laboratory analyses. The stratification of the soils and other details pertinent to the encountered subsurface conditions are depicted on the respective "Logs of Soil Borings" contained within Appendix A. The locations of the exploratory locations are shown on the Site Geologic Map (Appendix A).

Field Investigation (2018)

In 2018, six exploratory test pits (designated TP-1 through TP-6) were excavated, and logged. The test pits varied from 5 feet deep to as much as 14 feet deep and the lengths varies from 18 feet to 35 feet. The test pits were accomplished using a track-mounted excavator. As the excavations were advanced, the walls were cleared of clay smear in order to examine and log the exposed subsurface profile. The stratification of the soils and other details pertinent to the encountered subsurface conditions are depicted on the graphic logs of the explorations contained within Appendix A. The test pit locations and the aerial distribution of the encountered subsurface materials are depicted on the Site Geologic Map (Appendix A).

Field Investigation (2022-23) (Test Pits and Trenches)

In the winter of 2022-23 eleven test pits were conducted at the site. In the summer of 2023, fourteen trenches excavated, and logged at various locations across the site. The test pits varied from 5 feet deep to as much as 14 feet deep and the lengths varies from 14 feet to 17 feet. The trenches varied from 6

feet deep to as much as 10 feet deep and the lengths varies from 14 feet to as much as 93 feet. The test pits and trenches were accomplished using a track-mounted excavator. As the excavations were advanced, the walls were cleared of clay smear in order to examine and log the exposed subsurface profile. The stratification of the soils and other details pertinent to the encountered subsurface conditions are depicted on the graphic logs of the explorations contained within Appendix A. The test pit and trench locations and the aerial distribution of the encountered subsurface materials are depicted on the Site Geologic Map (Appendix A). Several of the trenches were field-reviewed by an engineering geologist with the geotechnical consultant for the City of Saratoga.

Field Investigation (2023) (Borings)

As part of our field exploration program in 2023, seven exploratory test borings were drilled, logged and sampled within the site. The borings were drilled to depths ranging from 26 feet to 35.5 feet below the ground surface. The test borings were accomplished using a truck mounted CME 45 drill rig using 4 inch solid flight augers, and track-mounted CME-55 drill rig using 8" diameter hollow stem augers. As the augers were advanced, relatively undisturbed soil samples were collected for visual classification and laboratory analyses. The stratification of the soils and other details pertinent to the encountered subsurface conditions are depicted on the respective "Logs of Soil Borings" contained within Appendix A. The locations of the exploratory locations are shown on the Site Geologic Map (Appendix A).

SUMMARY OF SUBSURFACE CONDITIONS FROM COLLECTIVE EXPLORATIONS 2015-2023

East Side of Creek/South of Steep-sided Gully

The exploratory borings and test excavations revealed relatively thin residual/colluvial soils overlying insitu Santa Clara Formation (QTsc) subunits. The QTsc geologic unit consisted of alternating layers of sandstone, claystone and minor gravelly sand (conglomerate). The cohesionless subunits were found to be in a medium dense to very dense condition. The cohesive subunits were found to be in a stiff to hard condition. These conditions are generally consistent with the degree of consolidation that would be expected of a geologic unit of Pliocene age. The surficial soils overlying the subunits across this area are generally highly expansive, and subject to accelerated creep on sloping ground. The QTsc subunits were locally deformed by faulting (see Faulting)

East Side of Creek/North of Steep-sided Gully

The previous borings and test excavations revealed relatively thin residual/colluvial soils overlying subunits of Santa Clara Formation which has been displaced as part of a relatively large-scale bedrock landslide (see Landsliding). The QTsc geologic units encountered consisted of alternating layers of sandstone, claystone and minor gravelly sand (conglomerate) and shale. The cohesionless subunits were found to be in a medium dense to very dense condition. The cohesive subunits were found to be in a stiff to hard condition. The surficial soils overlying the subunits across this area are generally highly expansive, and subject to accelerated creep on sloping ground.

West Side of Creek

The borings and test excavations revealed relatively thin residual/colluvial soils overlying subunits of Santa Clara Formation which have been impacted locally by faulting. The colluvial soils in this area are considered to be the result of sheetwash events coming off of the very steep hillside at the west boundary of the property. The QTsc geologic units encountered consisted of alternating layers of sandstone, claystone and gravelly clayey sand (conglomerate) and minor shale. The cohesionless subunits were found to be in a medium dense to very dense condition and locally hard. The cohesive subunits were found to be in a stiff to hard condition. The surficial soils overlying the subunits across this area are generally highly expansive, and subject to accelerated creep on sloping ground.

The Site Geologic Map (Appendix A) depicts the locations of current and past exploratory locations, geologic units and proposed building envelope areas.

FAULTING

Based on Published Mapping

As previously noted, the published mapping covering the region of the site indicates site projects one or more traces (depending on source) of the Berrocal Fault Zone (Rogers and Armstrong, 1973; Sorg and McLaughlin, 1975; CDMG, 1998; U.S.G.S. Quaternary Fault and Fold database, 2006; Dibblee and Minch, 2007; Jennings and Bryant, 2010). More local mapping by William Cotton Associates (1980), shows the Berrocal Fault trending through the western edge of the site. According to the published mapping, the main fault trace traditionally shown on published maps has a reverse or thrust geometry and juxtaposes Santa Clara Formation (on the east) against Franciscan Complex bedrock (on the west). Due to the differences in criteria between the state versus county jurisdictions the site is not included within a state-designated Alquist-Priolo Earthquake Fault Zone but the site is located within a Santa Clara County Fault Rupture Hazard Zone (CDMG, 1974; Santa Clara Planning Department, 2003). Because of the published mapping, the City of Saratoga Ground Movement Potential Map indicates some of the residential lots at the site are within a regulatory "Pf" zone or "areas with potential for surface faulting" (Cotton and Associates, 1980). Specifically, the "Pf" zone follows the mapped surface trace of the westerly trace traditionally shown on published maps but not the easterly fault trace that was identified by Coyle.

Based on Previous Consultant's Studies

Coyle (1991) mapped a secondary fault trace extending through the central portion of the site with a northwesterly trend. For the purpose of clarity in description, within this report we have designated the main trace shown traditionally on published maps as the "west fault trace" and the secondary trace of Coyle as the "east fault trace." This east fault trace is shown on Coyle's map as following the path of Upper Calabasas Creek through the subject site. According to the surficial mapping of Coyle, this easterly trace has a thrust geometry and tectonically disrupts the structure of the Santa Clara Formation sediments but does not juxtapose dissimilar formations (i.e., KJf vs. QTsc). On the south of the site,

Coyle shows the Berrocal Fault splitting into two distinct surface traces (i.e., east trace vs. west trace) where the fault intersects Pierce Road. In their respective mapping of the Santa Clara Formation, Vanderhurst (1981) and Reddig (1994) apparently adopted the earlier mapping of Coyle for the Berrocal Fault, showing two traces extending through the site.

On a parcel located 300 to 400 feet northwest of the north property line, JCP confirmed the presence of an easterly Berrocal Fault trace (a continuation of the trace of Coyle) cutting through the QTsc unit. JCP designated the main fault (KJf against QTsc) as the "west fault" and the more easterly fault trace (exclusively cutting only the QTsc) as the "east fault." JCP characterized the "east fault" as a 40-foot wide zone of deformation with a steeply inclined geometry and a reverse sense of offset (uplifted on the west). Their graphic logs for their Trench T-1 and T-2 show the QTsc unit cut by the east fault trace. The following is a summary of JCP's conclusions on the east fault trace:

> The exploratory trench was excavated across the suspected East fault trace. The trench revealed pronounced evidence of recent faulting at one location within a zone of shearing approximately 40 feet wide (Trench Log T-1). The primary fault plane was traced into a thin clay layer located immediately below the 8 inch thick topsoil layer. No shearing in the topsoil was observed. Slickensides on the fault plane in both the subject trench and in the trench on adjacent property indicated oblique fault movement, apparently reverse in nature, in a direction approximately N 20° W. Also, at least one stream bed [Calabasas Creek] appears to be off-set in a right lateral direction which agrees with the relative movement as indicated by the slickensides. We should note here that other trenches on adjacent properties did not show clear fault displacement close to the ground surface. The evidence gathered strongly suggests that the dip (at depth) of the secondary fault trace is near vertical and the trend across the site constitutes a relatively straight line irrespective of the topography.

Further afield, Terratech in 1978 conducted a geologic study of a large parcel located several hundred feet southeast of the Masson Estates, site, on the east side of Pierce Road. They trenched through the mapped west fault trace of the Berrocal Fault. Their graphic logs depict the encountered fault as a nearly vertical fault zone juxtaposing indurated sandstone (on the west) against conglomerate (on the east). This is consistent with the characterization of the west fault trace. They described the encountered fault as consisting of a 1" wide zone of mildly slickensided clay oriented Nl7W/87°NE. Based on the characterization of the west fault trace, this trench exposure appears to be an incomplete exposure. Their trench barely extended into the Franciscan geologic unit and they may have only encountered the far northeast bounding edge of the west fault trace.

Based on Site-Specific Fault Field Investigation (QGI, 2023)

Our previous investigation of 2018 indicated that the traditionally mapped "west fault trace" trends through the hillside area located just west of the western property line for the Masson Estates Development. Our test pits and trenches did not encounter Franciscan Complex bedrock and therefore we infer the west fault trace is located on the hillside just at and beyond the west of the site

(west/upslope of our explorations TP-1, TP-2, TP-14 and TP-15). Due to its trend, the fault may clip the far southwest corner of Lot 20 and Lot 21.

Our field investigation revealed a complex surface outcrop pattern for the "east fault trace" where it crosses Calabasas Creek (in a northward direction). This fault was exposed in our explorations T-1, T-3, T-4, and T-6 and the fault trace extends through Lot 13, Lot 14, Lot 15 and Lot 18. Where exposed locally in the creek this east fault trace is associated with compressional features (primarily reverse geometry and drag folding, with relative up on the west). Within our explorations this fault is characterized as one or more surfaces and is associated with truncation of beds, discrete zones of shearing, multiple subparallel traces and locally near the faults, locally bedding plane slips. Relative sense of movement is up on the west. The fault is steeply inclined and, accordingly, follows a relatively straight trace across variable topography.

Additionally, on the terraced land on the west side of the creek we encountered an additional (previously unknown) fault trace located between the east trace and west fault trace. We designate this newly discovered trace as the "central fault trace." The "central fault trace" extends through our explorations T-8, T-9 and T-11 and therefore, extends through Lot 18, Lot 22 and Lot 23. This fault is bounded by two parallel surfaces, is largely vertically oriented and includes: discrete zones of shearing, truncation of units, bedding plane slips and warping of beds. At least one surface associated with the fault dies out within the exposed, Pliocene stratigraphic section of the QTsc. The fault exposures indicate this fault is a steeply inclined, reverse fault offsetting beds upward on the east side (i.e., "up on the east"). This particular trace does not follow the larger fault mechanics model for the relative movement of the Berrocal Fault Zone (i.e., up on the west). It may represent a fault-bounded wedge or sliver between the west and east fault traces. The fault follows a relatively straight trace across variable topography.

On the east side of the creek an additional minor splay fault (referred to here as the "minor splay trace") breaks off of the "east fault trace" as it trends northerly (see Site Geologic Map). Our trenches T-2, T-3, T-5, T-7, T-12, and T-13 encountered this "minor splay trace" which consisted of one or more surfaces or tightly constrained zones of shearing. This fault is associated with minor offset (less than 2 inches) and the sense of offset was up on the east as it is vaguely defined in some trenches. This "minor splay trace" is oriented nearly vertical and extends through Lot 14, Lot 15, Lot 16 and a portion of Lot 24. Accordingly, the fault follows a relatively straight course across variable topography. These characteristics suggest it may represent an older, incomplete phase of fault movement that was abandoned or terminated (within the Pliocene) once the more well-defined west fault trace and east fault trace movement began to develop.

Style of Deformation: It should be noted that our field investigation indicates the east fault trace located onsite is somewhat more complicated than was shown by Coyle and subsequent workers. Overall the east fault trace has a reverse geometry with a nearly vertical fault surface inclination near the ground surface as opposed to a thrust geometry as speculated by Coyle. We infer that this fault surface bends to a shallower angle with depth and joins with the westerly fault trace at depth. The area between the "west fault" and the "east fault" forms one or more wedges with the "central fault" trace

being an internal expression of the larger fault mechanics. The larger sense of offset across the entire Berrocal Fault Zone is undoubtedly up on the west, with the Cretaceous Franciscan complex thrust over the Plio-Pleistocene QTsc geologic unit.

The current development plan shows the building envelopes adhering to fault setbacks that were developed in the field during trenching in consultation with the engineering geologist from CSA (see Geologic Conclusions).

LANDSLIDING

Literature-Based

Some of the published maps reviewed for this study show suspected landslides on the subject site (Sorg and McLaughlin, 1975; William Cotton & Associates, 1980; Reddig, 1994; Ellis et al., (1999), California Geological Survey, 2002 and 2016). It should be noted that these maps are not based on site-specific information (explorations) but are based on interpretation of landforms using remote sensing techniques (aerial photos and topographic maps) and some of these maps adopt earlier mapping without conducting site-specific investigation. Due to the mapping already discussed, the site is included in a Santa Clara County Geologic Hazard Zone for landslide hazards (Santa Clara County Planning Department, 2002).

The interpretive mapping of Sorg and McLaughlin shows a small, dormant landslide in the northern part of Lot-13 and southwest part of Lot-14, adjacent to the creek and a large-scale landslide encompassing the area of Lot 23. WCA mapping adopted the earlier mapping of Sorg and McLaughlin (1975) and additionally, show a relatively large landslide encompassing much of the hillside and terrace on the west side of the creek. The California Geological Survey (2002, and 2016) has adopted the Sorg and McLaughlin mapping and the mapping of WCA (1980) for their deep-seated landslide interactive web application [see Landsliding (Site-Specific)].

Site-Specific

WCA (1980), also shows a small-scale landslide encompassing the lower portion of the hillside in the area of Lots 12, 13 and 14. Our explorations in this general area encountered gently easterly dipping QTsc subunits which is consist with the larger structural trends on the east side of the east fault trace. There is ample evidence of accelerated slope creep across the ground surface (i.e., deep/wide expansion cracks) and multiple surfaces within the claystone and overlying colluvial soils across the areas underlain by the claystone. WCA (1980) also show a relatively large landslide encompassing much of the hillside and terrace on the west side of the creek. Our field investigation however has revealed this area is underlain by a insitu section of QTsc. Coyle‘s mapping, which drew in part of extensive exposures within the abandoned quarry, is in agreement with our own findings.

GROUNDWATER

Our borings did not encounter groundwater to the depths explored (48.0 feet). Localized seepage was encountered in a few of our test pits but this was attributed to the fact that these were excavated during a period of off and on wet weather in the 2022-23 winter. There is no record of historic high groundwater conditions in the area of the site (CGS, 2002). In general, groundwater conditions and fluctuations in the level of subsurface water are possible due to variations in rainfall, temperature, irrigation and other factors.

GROUND SHAKING/SEISMICITY AND 2022 CBC SEISMIC DESIGN CRITERIA

Moderate to severe (design-level) earthquakes can cause very strong ground shaking, which is the case for most sites within the Bay Area. Ground shaking from a seismic event is considered the primary hazard that will impact the proposed residential subdivision within its design life span.

The potential damaging effects of regional earthquake activity should be considered in the design of structures. As a minimum, seismic design should be in accordance with Chapter 16 of the 2022 California Building Code (CBC). The 2022 CBC utilizes the design procedures outlined in the ASCE 7-16 Standard. The site is underlain at shallow depth by Santa Clara Formation bedrock, and although some of the material encountered in our borings and test pits had more soil like characteristics, the material became harder with depth and is characterized as soft rock. Using the criteria in Chapter 20 of ASCE 7-16, in its current condition, the site is classified as Site Class C very dense soil and soft rock. The seismic design parameters have been developed using the online "Seismic Design Maps" tool by the Structural Engineering Association (SEA) and Office of Statewide Health Planning and Development (OSHPD), and a site location based on longitude and latitude. The parameters generated for the subject site for a latitude of 37.260765° N, and longitude of 122.053978° W, are presented in the following Table I:

Table I
2022 CBC Seismic Design Criteria

Seismic Parameter	Coefficient	Value
Site Class – C - very dense Soil and Soft Rock		C
Peak Ground Acceleration (Site Modified)	PGA_M	1.255
Mapped MCE Spectral Acceleration at Short-Period 0.2 secs	S_s	2.558
Mapped MCE Spectral Acceleration at a Period of 1.0s	S_1	0.926
Adjusted MCE, 5% Damped Spectral Response Acceleration at Short Period of 0.2s	S_{MS}	3.069
Adjusted MCE, 5% Damped Spectral Response Acceleration at Period of 1.0s	S_{M1}	1.296
Design 5% Damped Spectral Response Acceleration at Short Period of 0.2s for Occupancy Category I/II/III	S_{DS}	2.046
Design 5% Damped Spectral Response Acceleration at Period of 1.0s for Occupancy Category I/II/III	S_{D1}	0.864

SLOPE STABILITY ANALYSIS AND ASSESSMENT

Based on our investigation, the only significant slide feature to evaluate was the smaller old/dormant landlside on Lot 25. We did not evaluate the larger overall dormant landslide as this landslide is considered dormant as described earlier. One cross-section B-B′ was produced based upon current topography to assess its current stability. No groundwater was encountered within the depths explored for the soil borings, and no groundwater table will be used in our analyses.

A sample of the shear material encountered in Trench T-14 was tested for direct shear and a result of C = 655 psf Ø = 13° was obtained. The slide was analyzed using the slide surface shown on cross - section B-B' utilizing a shear strength obtained from the direct shear test.

The slope stability analyses was performed using the procedures outlined in the Southern California Earthquake Center (SCEC) document titled "Recommended Procedures for Implementation of DMG Special Publication 117, Guidelines for Analyzing and Mitigating Landslide Hazards in California", June 2002. The document provides guidance on evaluating static and seismic slope stability analyses.

The static slope stability is analyzed using limit equilibrium techniques, while the seismic slope stability analyses could be performed using either one of the following methods

1. pseudo-static slope stability using limit equilibrium techniques and a seismic coefficient of 0.15g.
2. pseudo-static slope stability using limit equilibrium techniques and a seismic coefficient based on Newmark type displacement methods

The SCEC document recommends that an analysis based on the second method as it accounts for the effects of seismicity on slope deformation, particularly the relatively small deformation tolerance of residential hillside construction.

To take into account the degree of uncertainty and potential variability of strength parameters and analysis methods, factors of safety are used to evaluate the acceptable stability of a slope. The stability analysis results are reported as factor of safety (FOS), which is the ratio of resisting loads over driving (sliding) loads. Failure of a slope under static conditions occurs when the factor of safety falls below 1.0. The generally accepted geotechnical industry standard for acceptable static stability is a FOS to be greater than 1.5. For seismic conditions, the factor of safety varies from 1.0 to 1.15 depending on the method used to calculate the seismic coefficient, and the associated acceptable levels of deformation. It should be noted that, if the factor of safety falls below 1.0 in the pseudo-static analysis, it does not imply failure. The results imply that the slide mass will, over a certain time period (on the order of seconds) have a safety factor less than 1.0 during which the acceleration is greater than a certain value, and that during these periods, certain minor displacements of the slide could occur.

For seismic loading conditions, the soil mass is subjected to rapid or undrained loading. The SCEC document indicates that the dynamic strengths relating to undrained (rapid) loading are higher than for drained (static) loading conditions. However, for the purpose of this analysis, the static soil strength

properties will be also used for the seismic analysis, which will provide conservative results. In addition SCEC recommends that for old slide planes residual shear strengths be used regardless of age. For this analysis we used a shear strength of C = 0 psf, Ø = 13°

The evaluation of an appropriate seismic coefficient for use in the pseudo-static analysis was based on the methods presented in the California Geologic Survey (CGS) Note 48, dated October 2013 and SCEC. CGS Note 48 recommends that the determination of the design-level ground motion based on geometric mean and without risk coefficient (i.e., PGA_M /1.5). Based on the PGA_M value presented in Table I of this report, of 1.255 g, the maximum horizontal acceleration (MHA) is calculated to be 0.836g. Using the displacement design procedures in SCEC, for a threshold displacement of 5 cm (2 inches), and with a design Moment Magnitude (M_w) of 7.1, the seismic coefficient to be used in the pseudo-static analysis is calculated to be 0.41 g.

Our slope stability analysis was performed using the computer program SLIDE 2, Version 9. We performed a static and seismic analysis and the results of the slope stability analyses are graphically presented in Appendix D. The analysis indicate the current slide surface under static conditions exhibited a factor of safety (FOS) of 1.787, and under seismic conditions exhibited a FOS of 0.426.

GEOLOGIC/GEOTECHNICAL CONCLUSIONS AND ASSESSMENT

GENERAL

Changes to the natural conditions at or adjacent to the site can directly affect the risk levels from geologic hazards to the proposed development. For example, grading activities (cutting or filling), altering natural drainage characteristics, removing vegetative ground cover or excessive landscape irrigation activity can increase the risk from geologic hazards at a site. Conclusions are drawn based on the current site conditions. General recommendations offered considering the current proposed development concept. We should be notified if any changes to the development concept are contemplated or proposed.

Based on the information obtained during this geologic and geotechnical investigation, we judge that there are no significant geologic conditions or geologic hazards that would preclude development of the property for residential purposes as is currently generally proposed. The main hazard encountered on the site was fault surface rupture and this has been mitigated through appropriate setback distances.There are other local hazards that will require mitigation as described below. The mitigation measures proposed are general in nature and will require detailed design at later stages of the project design and development after feasibility.

FAULT SURFACE RUPTURE

Our investigation has identified three fault surface traces trending through the development site. These faults presumably connect with the West Fault Trace at depth and have the potential to rupture coseismic-ally in a large seismic eenet withte ron the west trace or the San Andreas Fault. A discontinuous subsidiary shear zone We summarize these faults as follows:

West Fault Trace: This feature is a major tectonic contact which fault juxtaposes two dissimilar geologic formations of significantly different ages against one another. Specifically, the fault thrusts Cretaceous Franciscan Complex on the west over Pliocene QTsc (Arastradero Facies) on the east. Previous mapping and our explorations indicate this feature is located west of the west property line but clips the southwest corner of Lot 20, and Lot 21. Using our test pit explorations as an indication of minimum distance, we estimate that this fault feature is located at least 100 feet west of the nearest building pad. This distance provides adequate mitigation for the hazard of fault surface rupture hazard to the proposed residences due to its location. Our study revealed two lesser faults trending through the site which cut the Santa Clara Formation.

Central Fault Trace: This trace extends though Lot 18, Lot 23 and Lot 22. This feature appears to be part of a wedge structure that is bounded by the east fault trace and the west fault trace. This feature may represent internal deformation with the wedge structure. The fault traces appear to be relatively steeply inclined (reverse geometry) near the ground surface. At least one fault surface within the zone appears to have died out within the formation which is Pliocene and none of the traces offset B-horizon soils. We infer that this fault zone is a Pleistocene feature.

East Fault Trace: This trace extends though Lot 13, Lot 14 and Lot 18. This feature appears to be part of a wedge structure on the east side of the Central Fault Trace and presumably connects with the West Fault Trace at depth. The fault traces appear to be relatively steeply inclined (reverse geometry) near the ground surface. The westerly bounding trace of this fault appears to have experienced significant offset since the Pliocene as compared to the Central Trace. We did not detect offset of B-horizon soils within this fault zone. We infer that this fault zone is a Pleistocene feature.

Minor splay trace: our field investigation encountered a splay fault that trends off of the overall northwesterly trend of the overall Berrocal Fault zone (West Trace, Central Trace and east Trace). This trace appears to be associated with minor offset and is subtle in some excavations. We infer that this feature may be an early phase or proto tectonic feature that died out in the past. We infer this feature underlies the Ols landslide in the northeast portion of the site (Lot 25).

Mitigation Regarding Fault Surface Rupture:

Central Fault trace/East Fault trace vs. Minor splay trace:
For the Cenral and East fault traces, we have established a setback for habitable structures equal to 15 feet from either side of the bounding fault trace. These setbacks increase as one goes in a northwesterly and southeasterly direction further from the datapoints (trenches). This widening accounts for some uncertainty in the fault trace's location further away from he data points.

For the minor splay fault trace we have established a 5 foot setback from either side of the fault trace for habitable structures. This setback increases in a northwesterly and southeasterly direction further from the datapoints (trenches). These sebacks are shown on the Site Geologic Map.

LANDSLIDING

Our study identified a large-scale, dormant landslide within the northeast quarter of the site (Lot 25). This nested landslide feature is in an area where several residences are proposed. This feature is positioned at or near the base of the larger slope from which it emanated and there is minimal topographic relief in the toe area within the creek. Geomorphic characteristics across this feature suggest that it has a gently inclined basal shear surface. It is highly eroded such that the original landslide features are subtle. WCA's interpretation of this feature is that it is an old landslide (Ols) with a smaller reactivated, dormant lobe (Dls) within its western reaches closer to the creek. We are in agreement of WCA's interpretation of its classification and relative stability status. We noted in our explorations through the basal shear surface at the Ols/Dls transition that the shear surface had accumulations of large $CaCO_3$ nodules concentrated within the slide plane surface. This and the overall geormorphic evolution of the Ols/Dls features suggest an advanced age for these landslides. It is our interpretation that these features most likely moved initially when the relief in the creek area was significantly greater and the climate significantly wetter (perhaps in the Late Pleistocene). Subsequently the lower elevation, westerly portion was reactivated by stream undercutting in the toe area (also probably in the Late Pleistocene). The modern stream shows minimal downcutting in this local stretch of the watershed.

One residence (Lot 25) is proposed within the transition area between the scarp area and the lower portion of this Ols feature (see area of T-14 and TP-5). The lower portion of the old landslide exhibited a unacceptably low factor of safety under seismic conditions. Recommendations are offered to mitigate this condition to create a stable pad.

Additionally, our study revealed evacuated landslide scarps (slide debris removed by scour and/or reworked by stream processes within the creek channel over time) along the creek corridor on the border of Lot 14/15 and adjacent to the access road (near B-11). These are areas of active slope processes (creep and sloughing). Active creek channel processes (scour and shifting stream course) and have a potential to exacerbate the adjacent slope crest over time. Recommendations are offered to mitigate this potential for slope crest retreat in these areas.

Mitigation Regarding Landsliding:

The proposed residence on Lot 25 will span the area of the scarp and the landslide lobe (deposits). We recommend that this building pad be subexcavated to below the old slide plane and placement of a buttressed, drained engineered fill slope, to mitigate against the variation of subsurface materials. In addition, slope stability analyses of the smaller old landslide within and below Lot 25, indicated the slide feature was unstable during a seismic event. In order to mitigate this condition and provide a stable mass of soil within the improved area of Lot 25, we recommend that a row of reinforced concrete piers be constructed downslope of the improved area of the lot, to act as shear pins. The final design of this system will be performed at a later time.

Two landslide scarps were identified along the creek, one scar at the boundary of Lot 14/Lot 15 and an additional scar adjacent to the east of the access road on lot 18. For the scar at the boundary of Lot 14/15, we recommend the use of closely spaced piers for the house foundations. For the scar adjacent to the east of the access road on lot 18 we recommend the placement of a subgrade slough wall supported on closely spaced piers placed parallel and on the east side of the proposed access road.This may be incorporated into the bridge abutment.

The above proposed preliminary mitigation measures are shown on the Geologic Mitigation Plan attached to Appendix A.

DEBRIS FLOWS

Our trench explorations on the terrace on the west side of the creek revealed a layer of sandy soils overlying the tilted QTsc subunits that appears to be the result of sheet wash deposition over time (debris flows) (see area of T-9 and T-11). This material generally lacks gravel at the location of our trenches and may represent the distal region of deposition. However our test pits located at the base of the major slope break along the west property line have cobbles within the colluvium (see TP-1, TP-2 and TP-3). Recommendations are offered for mitigation the debris flow potential for residence building pads proposed for the west side of the creek (Lots 20, 21, 22 and 23).

Mitigation Regarding Debris Flows:

We recommend the construction of debris catchment fences/walls located upslope of the proposed building envelopes on Lot 20, 21, 22 and 23. These walls may be up to 3 to 4 feet in height.

SEISMIC SHAKING

As with sites throughout northern coastal California, the geologic hazard that poses the greatest impact to the site is the potential for very strong seismic shaking. The San Gregorio fault, the San Andreas fault zone or the Hayward fault system are likely to produce the highest level of seismic shaking at the site, although there are a number of active faults in the region that are capable of producing very strong levels of seismic shaking during the design life of the improvements.

OTHER GEOLOGIC HAZARDS

The site is located in an area characterized with a low potential for liquefaction according to the published interpretive hazard mapping. The previous and current explorations at the site did not encounter evidence of groundwater and the Santa Clara Formation is not generally known as a significant groundwater bearing unit (CGS, 2005). There is a low potential for liquefaction occurring at the site. The site is underlain at shallow depths by well consolidated Santa Cara Formation materials of Pliocene age and in our opinion are not susceptible to seismically-induced settlement.

The surface soils across much of the site are highly expansive and subject to extreme expansion and contraction over varying moisture conditions. These soils are also subject to accelerated creep on sloping ground.

Mitigation Regarding Expansive soils:

Mitgation of expansive soils can be addressed through appropriate foundation, grading and drainage design, such as use of pier and grade beam foundations, use of select fill, and subdrains.

BRIDGE FOUNDATIONS

Two bridges are planned for the development, and the bridges can be adequately supported on cast-in-place reinforced concrete pier/pile foundations.

DRAINAGE AND EROSION CONTROL

In general, control of surface runoff and appropriate design of drainage facilities are critical to the long term stability of the site slopes as well as provide protection from severe erosion. We recommend all surface runoff and any new runoff generated from the proposed construction (roofs, flatwork, roads, etc.) should also be collected and directed to appropriate discharge facilities located well away for the site slopes.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The conclusions and assessment of this report are based upon the assumption that the geologic conditions do not deviate from those disclosed in the test excavations and from a reconnaissance of the site. Should any variations or undesirable conditions be encountered during the development of the site, ***Quantum Geotechnical,*** will provide supplemental recommendations as dictated by the field conditions.

2. This report is issued with the understanding that it is the responsibility of the owner, or his representative, to ensure that the information and recommendations contained herein are brought to the attention of the Architect and Engineer for the project and incorporated into the plans and the necessary steps are taken to see that the Contractor and Subcontractors carry out such recommendations in the field.

3. At the present date, the findings of this report are valid for the property investigated. With the passage of time, significant changes in the conditions of a property can occur due to natural processes or works of man on this or adjacent properties. In addition, legislation or the broadening of knowledge may result in changes in applicable standards. Changes outside of our control may render this report invalid, wholly or partially. Therefore, this report should not be considered valid after a period of two (2) years without our review, nor should it be used, or is it applicable, for any properties other than those investigated.

4. Not withstanding all the foregoing, applicable codes must be adhered to at all times.

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Stereoscopic Aerial Photographs

Date	Scale	Photo ID	Type	Source
09/26/1948	1:23,600	GS-HR-2, 175, 176	B/W	USGS
07/01/1953	1:20,000	GS-XY-3, 17, 23	B/W	USGS
08/23/1960	1:30,000	GS-VACY-2., 190, 191	B/W	USGS

APPENDIX A

Site Location Map

Local Geologic Map (WCA, 1980)

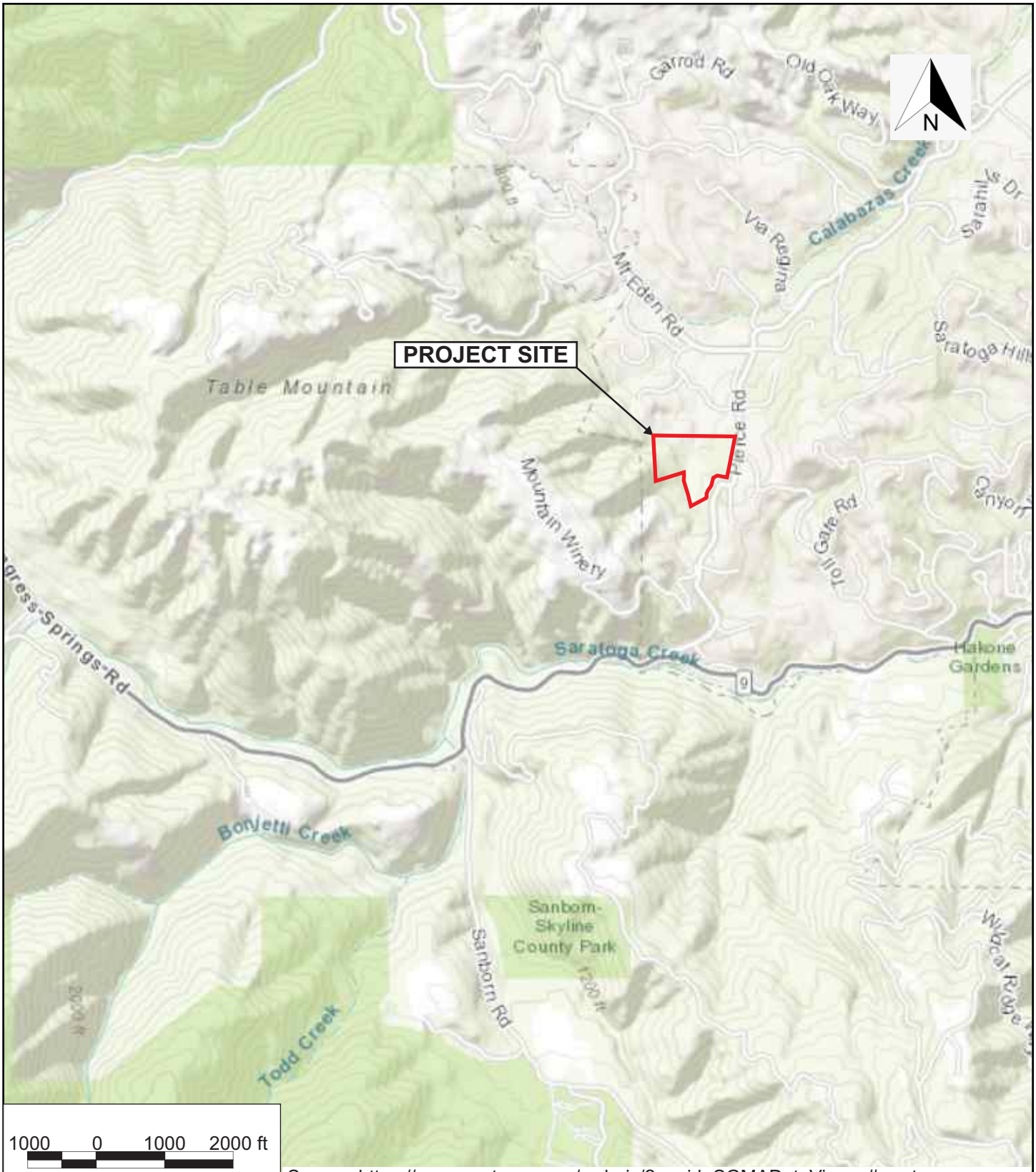
City's Ground Movement Potential Map

Site Geologic Map (Coyle, 1991)

Site Geologic Map (This Study)

Geologic Cross Section A-A′ through G-G′

Geologic Mitigation Plan



Source: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#gwstorage
United States Geological Survey, 2009, Cupertino 7.5 Minute Topographic Quadrangle

SITE LOCATION MAP

QUANTUM GEOTECHNICAL INC.

Geotechnical and Geological Feasibility Assessment
Chateau Masson Development
14831 Pierce Road, Saratoga California

Project No.	Figure No.
E041.G	

EXPLANATION

Af — ARTIFICIAL FILL: BROKEN ROCK MATERIALS DERIVED FROM QUARRY, ROAD CONSTRUCTION, GRADING, ETC. PREDOMINANTLY COMPOSED OF FRANCISCAN SANDSTONE, SHALE, AND CONGLOMERTATE OF THE SANTA CLARA FORMATION

COLLUVIUM: UNCONSOLIDATED MIXTURE OF THICK SOIL, WEATHERED BEDROCK AND SLOPE WASH DEBRIS ACCUMULATED ON MOST HILLS AND IN SMALL GULLIES. MOST OF THE THICKER COLLUVIUM (> 3 FT) ARE CHARACTERIZED BY SLOW, DOWNSLOPE SOIL CREEP ACTIVITY. THE CONTACT BETWEEN COLLUVIUM AND BEDROCK IS GENERALIZED. THEREFORE THE ACTAL EXTENT CAN VARY CONSIDERABLY FROM SHOWN

Qal — ALLUVIUM: UNCONSOLIDATED STREAM DEPOSITS CONFINED TO THE PRESENTLY ACTIVE STREAM CHANNELS AND ADJOINING VALLEY FLOORS; CHARACTER OF THESE DEPOSITS RANGE FROM VERY COARSE, POORLY SORTED MIX OF COBBLES AND SANDY GRAVELS TO FINE, CRUDELY STRATIFIED DEPOSITS OF SAND, SILT AND CLAY

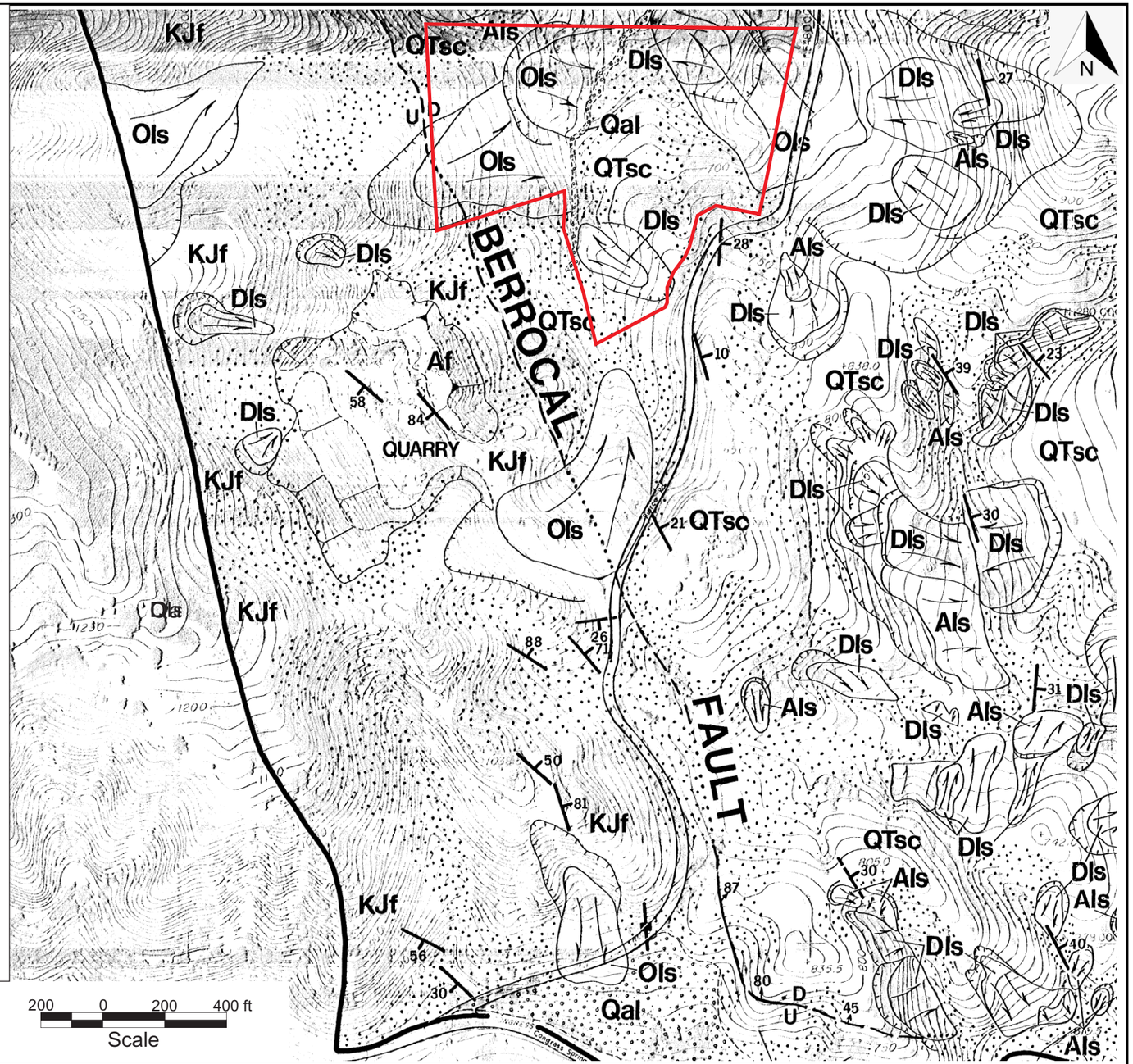
Als — ACTIVE LANDSLIDE: CURRENTLY INACTIVE LANDSLIDE WITH FRESH, UNVEGETATED SCARPS AND BROKEN GROUND, UNDRAINED DEPRESSIONSAND RECENTLY DISTURBED MAN-MADE FEATURES AND VEGETATION

Dls — DORMANT LANDSLIDE: CURRENTLY INACTIVE LANDSLIDE WITH WEATHERED AND OVERGROWN SCARPS, ROUNDED HUMMOCKY SURFACE TOPOGRAPHY, AND UNDISTURBED MAN-MADE FEATURES OR VEGETATION

Ols — OLD LANDSLIDE: RELATIVE STABLE, INACTOVE LANDSLIDE WITH SUBDUED, IRREGULAR TOPOGRAPHY, LOW SLOPE POSITION, WELL ESTABLISHED DRAINAGE SYSTEM AND UNDISTURBED VEGETATION

Qtsc — SANTA CLARA FORMATION: SEMI-CONSOLIDATED TO LOCALLY CONSOLIDATED, CRUDELY STRATIFIED SEQUENCE OF INTERBEDDED YELLOW-BROWN TO REDDISH-BROWN CONGLOMERATE, POORLY SORTED SANDSTONE AND FINE-GRAINED ROCKS SUCH AS SILTSTONE, MUDSTONE AND CLAYSTONE; WEATHERS TO A LIGHT TAN TO DEEP RED POORLY DEVELOPED, SANDY SOIL IN AREAS SITUATED OVER THE COARSE-GRAINED BEDROCK SECTIONS.

KJf — FRANCISCAN COMPLEX: CONSOLIDATED TO LOCALLY UNCONSOLIDATED TAN, TO DARK GRAY, MASSIVE TO THICK BEDDED SEQUENCE OF FINE TO MEDIUM-GRAINED FRACTURED SANDSTONE(I.E. GRAYWACKE), INTERLAYERED WITH SHALE, SILTSTONE, CHERT, LIMESTONE AND GREENSTONE (I.E. ALTERED MAFIC VOLCANIC ROCK).



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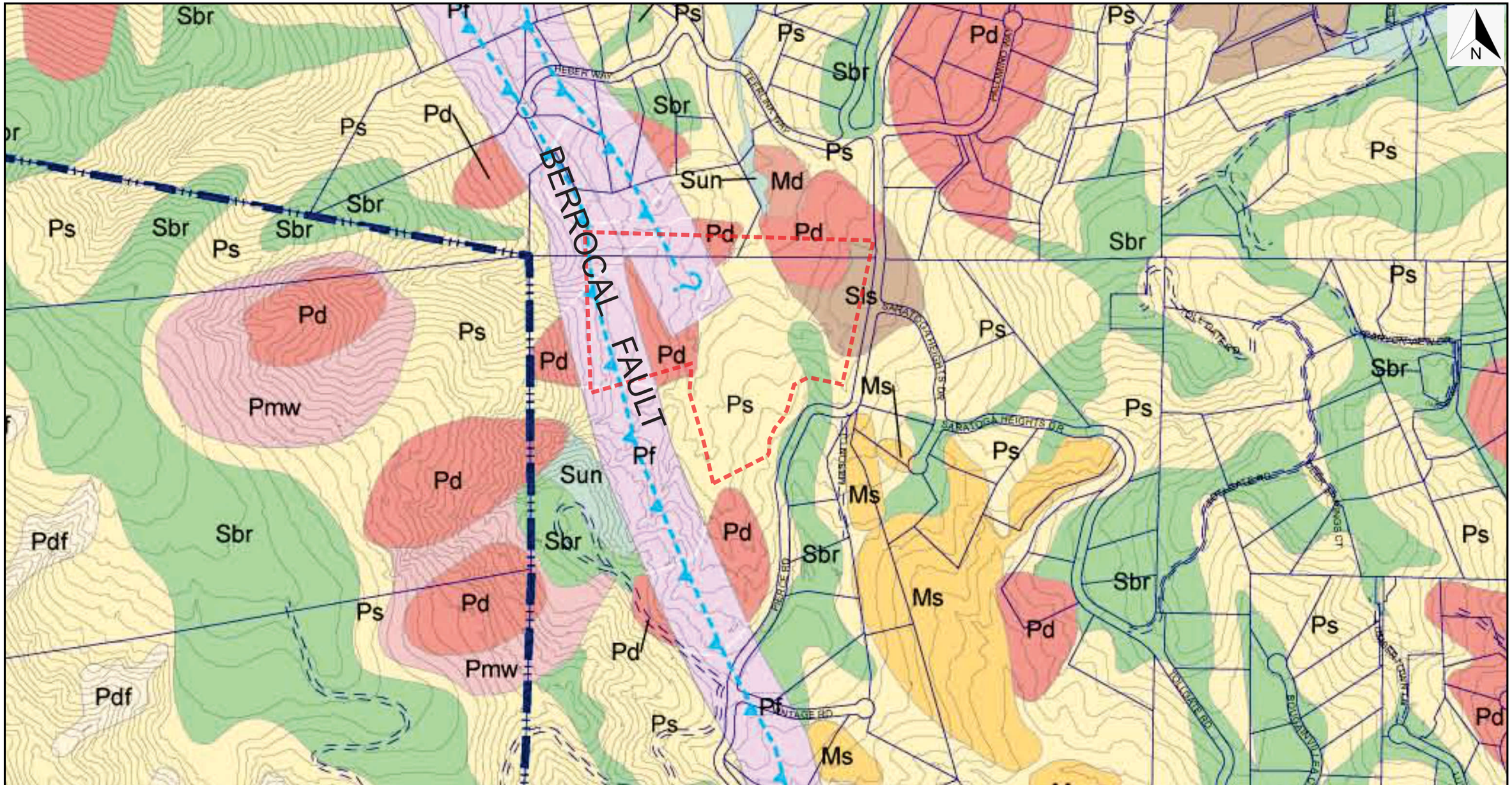
QUANTUM GEOTECHNICAL INC.

REGIONAL GEOLOGIC MAP

Geotechnical and Geological Feasibility Assessment Chateau Masson Development 14831 Pierce Road, Saratoga California	Project No.	Drawn By	Figure No.
	E041.G	JF	



QUANTUM GEOTECHNICAL INC.	**CITY OF SARATOGA GROUND MOVEMENT POTENTIAL MAP**			
	Geotechnical and Geological Feasibility Assessment **Chateau Masson Development** **14831 Pierce Road, Saratoga California**	**Project No.** E041.G	**Drawn By** JF	**Figure No.**

EXPLANATION

Relatively Stable Ground

Sbr — Level ground to moderately steep slopes underlain by bedrock within approximately three feet of the ground surface or less; relatively thin soil mantle may be subject to shallow landsliding, settlement, and soil creep

Sun — Unconsolidated granular material (alluvium, slope wash, and thick soil) on level ground and gentle slopes; subject to settlement and soil creep; liquefaction possible at valley floor sites during strong earthquakes

Sls — Naturally stabilized ancient landslide debris on gentle to moderately steep slopes; subject to settlement and soil creep

Areas with Significant Potential for Ground Movement

Pmw — Steep to very steep slopes generally underlain by weathered and fractured bedrock subject to mass-wasting by rockfall, slumping, and raveling

Paf — Areas of artificial fill materials subject to localized settlement and/or potential landsliding on moderately steep to steep ground and where placement may not have met engineering specifications

Ps — Unstable, unconsolidated material, commonly less than 10 feet in thickness, on gentle to moderately steep slopes subject to shallow landlsiding, slumping, settlement, and soil creep

Liquefaction hazard zones as mapped by the California Geological Survey depicted by stipple

Pd — Unstable, unconsolidated material, commonly more than 10 feet in thickness, on moderate to steep slopes; subject to deep landsliding

Pdf — Debris flows (shallow, rapidily moving landslides) including recognized source areas and flow paths. Depositional runout areas may not be fully depicted

Areas with Potential for Primary Fault Rupture

Pf — Zone of potential primary surface fault rupture

Potentially active fault traces

Unstable Ground Characterized by Seasonally Active Downslope Movement

Ms — Moving shallow landslides, commonly less than 10 feet in thickness

Md — Moving deep landslides, commonly more than 10 feet in thickness

QUANTUM GEOTECHNICAL INC.	LEGEND - CITY OF SARATOGA GROUND MOVEMENT POTENTIAL MAP			
	Geotechnical and Geological Feasibility Assessment Chateau Masson Development 14831 Pierce Road, Saratoga California	Project No. E041.G	Drawn By JF	Figure No.



JOHN COYLE AND ASSOCIATES, INC.	251 Lowcks Avenue Los Altos, California

PRELIMINARY ENGINEERING GEOLOGIC RECONNAISSANCE MAP
ACCESS ROAD AND QUARRY AREA
THE MOUNTAIN WINERY
CITY OF SARATOGA & SANTA CLARA COUNTY, CALIFORNIA

PLATE NO. 1	SCALE: 1" = 200'	DATE: 05-29-91
PROJECT NO. P089-90	GEOLOGY BY: JC, BS	APPROVED BY: JC

EXPLANATION

EARTH MATERIALS

AF — Artificial fill: Heterogeneous mixture of rock, soil, and colluvium derived from grading operations along roads and in quarry area. Thickness can vary from a thin veneer to 10's of feet. Distribution shown is approximate. See note below.

Als — Active landslide: Active or recently moving landslide; can be composed of artificial fill, soil, colluvium, and/or bedrock materials.

Col — Colluvium: Unsorted mixtures of unconsolidated gravel, sand, silt, and clay.

Qls — Landslide: Heterogeneous mixture of bedrock, soil, and slide debris; relatively unstable. Could be reactivated under current environmental conditions.

QTsc — Santa Clara Formation: Interbedded, poorly consolidated gravel, sand, silt, and clay.

KJF — Franciscan Complex: Interbedded sandstone and shale, locally pervasively sheared, highly fractured.

MAP SYMBOLS

- Geologic contact; queried where uncertain.
- Fault; dotted where concealed; queried where uncertain; barbs on upper plate.
- 38 — Strike and dip of beds.
- Cut/Fill line
- Boundary of quarry excavation
- Landslide deposit; hachures show crown of scarp; arrows show direction of movement
- Culvert; asterisk where energy dissipator is needed.
- Gullying
- Seep
- 30 — Slope inclination in degrees.
- D — D' Geologic Cross Section Line

NOTES TO USERS:

Contacts defining the aerial distribution of the fill are approximate and could vary somewhat, especially on steeper slopes.

Mapping of colluvium was confined to areas adjacent to the paved access road. For the sake of clarity, these deposits have not been depicted elsewhere within the area mapped. Lack of these deposits being shown on the Geologic Map should not be construed as evidence that these deposits do not exist in these areas.

Field reconnaissance mapping methods were used to prepare this map. Information presented should be considered no more accurate than the method used. This information should not be used as a substitute for detailed studies.

For purposes of clarity cut/fill line shown in quarry area only.

THE USE OF THESE PLANS AND SPECIFICATIONS SHALL BE RESTRICTED TO THE ORIGINAL SITE FOR WHICH THEY WERE PREPARED AND PUBLICATION THEREOF IS EXPRESSLY LIMITED TO SUCH USE. REPRODUCTION OR PUBLICATION BY ANY METHOD, IN WHOLE OR PART, IS PROHIBITED. TITLE TO THE PLANS AND SPECIFICATIONS SHALL CONSTITUTE PRIMA FACIE EVIDENCE OF THE ACCEPTANCE OF THESE RESTRICTIONS. THE PLANS AND SPECIFICATIONS REMAINS IN THE ENGINEER WITHOUT PREJUDICE. VISUAL CONTACT WITH THESE PLANS

LOT 23 57,949 SF 1.33 AC
LOT 22 27,072 SF 0.62 AC
LOT 21 31,739 SF 0.73 AC
LOT 20 35,643 SF 0.82 AC
LOT 19 31,074 SF 0.71 AC
LOT 18 55,450 SF 1.27 AC
LOT 17 15,555 SF 0.36 AC
LOT 16 16,994 SF 0.39 AC
LOT 15 20,743 SF 0.48 AC
LOT 14 27,828 SF 0.64 AC
LOT 13 85,556 SF 1.96 AC
LOT 12 31,028 SF 0.71 AC
LOT 11 25,159 SF 0.58 AC
LOT 10 21,771 SF 0.50 AC
LOT 9 48,198 SF 1.11 AC
LOT 25 84,731 SF 1.95 AC
LOT 24 71,406 SF 1.64 AC
LOT 1 3,818 SF
LOT 2 2,088 SF
LOT 3 2,082 SF
LOT 4 2,077 SF
LOT 5 3,288 SF
LOT 66 2,090 SF
LOT 7 2,090 SF
LOT 8 2,047 SF
PARCEL A 24,818 SF 0.57 AC

QTsc
Ols
KJf
Continues
Central Fault Trace
East Fault Trace
West Fault Trace

GRAPHIC SCALE
(IN FEET)
1 inch = 50 ft.

Map Explanation

- ~~B-3~~ ~~Exploratory boring location (QGI, 2018)~~
- B-11 Exploratory boring location (QGI, 2022-23)
- ~~TP-3~~ ~~Exploratory test pit location (QGI, 2018)~~
- ~~TP-12~~ ~~Exploratory test pit location (QGI, 2022)~~
- ~~T-6~~ ~~Exploratory trench location (QGI, 2023)~~
- A — A' Trend of Geologic Cross Section
- 39° Bedding attitude (dip indicated)
- Fault Surface Trace (dashed lines = fault setbacks)
- ~~Landslide scarp (evacuated)~~
- Ols Old landslide deposits
- ~~QTsc Santa Clara Formation (Arastradero Facies, Pliocene)~~
- KJf Franciscan Complex (Sandstone and Shale) (Cretaceous)

EXISTING UNDERGROUND UTILITIES ARE SHOWN IN THEIR APPROXIMATE LOCATIONS BASED ON RECORD INFORMATION AVAILABLE TO THE ENGINEER AT THE TIME OF PREPARATION OF THESE PLANS. LOCATION MAY NOT HAVE BEEN VERIFIED IN THE FIELD AND NO GUARANTEE IS MADE AS TO THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN. THE CONTRACTOR SHALL NOTIFY UTILITY COMPANIES AT LEAST 2 WORKING DAYS IN ADVANCE OF CONSTRUCTION TO FIELD LOCATE UTILITIES. CALL UNDERGROUND SERVICE ALERT (U.S.A.) AT 1-800-642-2444. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE EXISTENCE AND LOCATION OF UTILITIES SHOWN ON THESE PLANS, INDICATED IN THE FIELD BY LOCATING SERVICES, OR EVIDENCE BY FACILITIES VISIBLE AT OR ADJACENT TO THE JOB SITE. ANY ADDITIONAL COST INCURRED AS A RESULT OF THE CONTRACTORS FAILURE TO VERIFY LOCATIONS OF EXISTING UTILITIES PRIOR TO BEGINNING CONSTRUCTION SHALL BE BORNE BY THE CONTRACTOR AND IS DEEMED INCLUDED AND MERGED IN THE CONTRACT UNIT PRICE.

REVISIONS:

DATE	DESCRIPTION	BY

HANNA-BRUNETTI
CIVIL ENGINEERS · LAND SURVEYORS
CONSTRUCTION MANAGERS
7651 EIGLEBERRY STREET · GILROY · 95020 · CALIFORNIA
OFFICE (408) 842-2173
EMAIL ENGINEERING@HANNABRUNETTI.COM

DATE: NOVEMBER 2023
HORIZ. SCALE: 1"=50'
VERT. SCALE: NONE
DESIGNED BY: AM
CHECKED BY:
DRAWN BY: TM

date: Hanna – Brunetti

Amanda Joy Mussy-Verdoni
R.C.E. # 69278

REGISTERED PROFESSIONAL ENGINEER
AMANDA JOY MUSSY-VERDONI
NO. 69278
CIVIL
STATE OF CALIFORNIA

REFERENCES

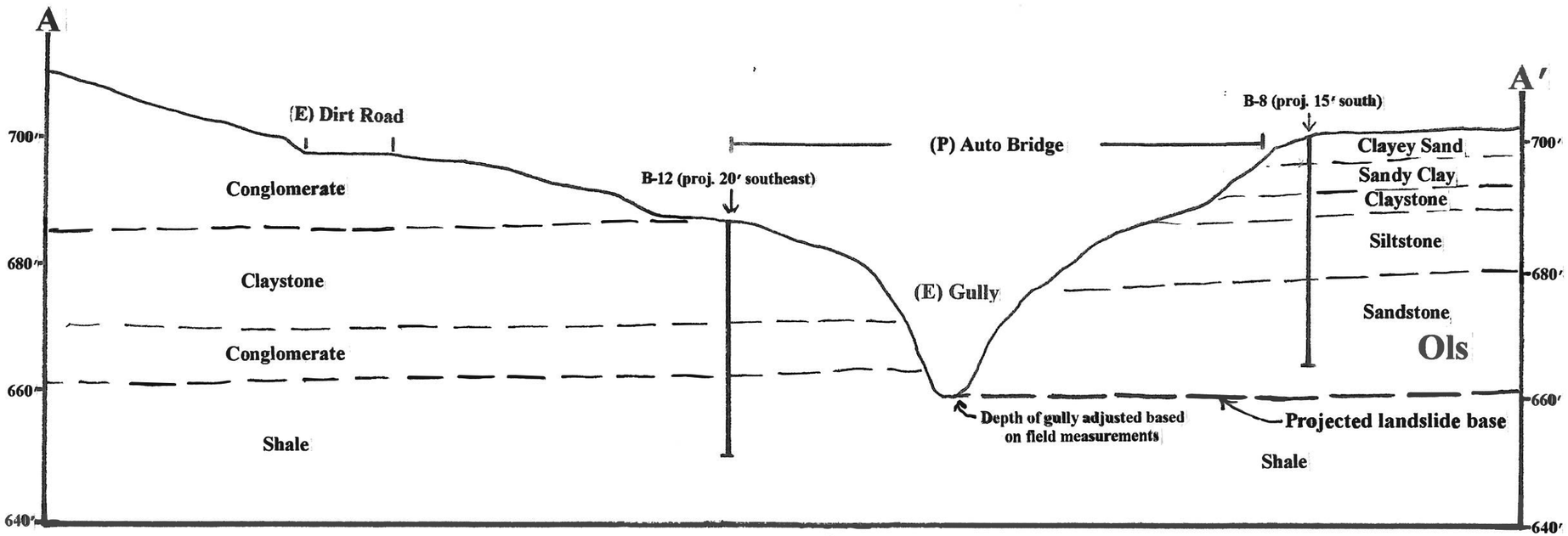
SITE GEOLOGIC MAP

Chateau Masson LLC - Pierce Road - apn 503-46-005

CITY OF SARATOGA
NOVEMBER 2023

SANTA CLARA COUNTY
CALIFORNIA

SHEET
OF
JOB NO. 19012



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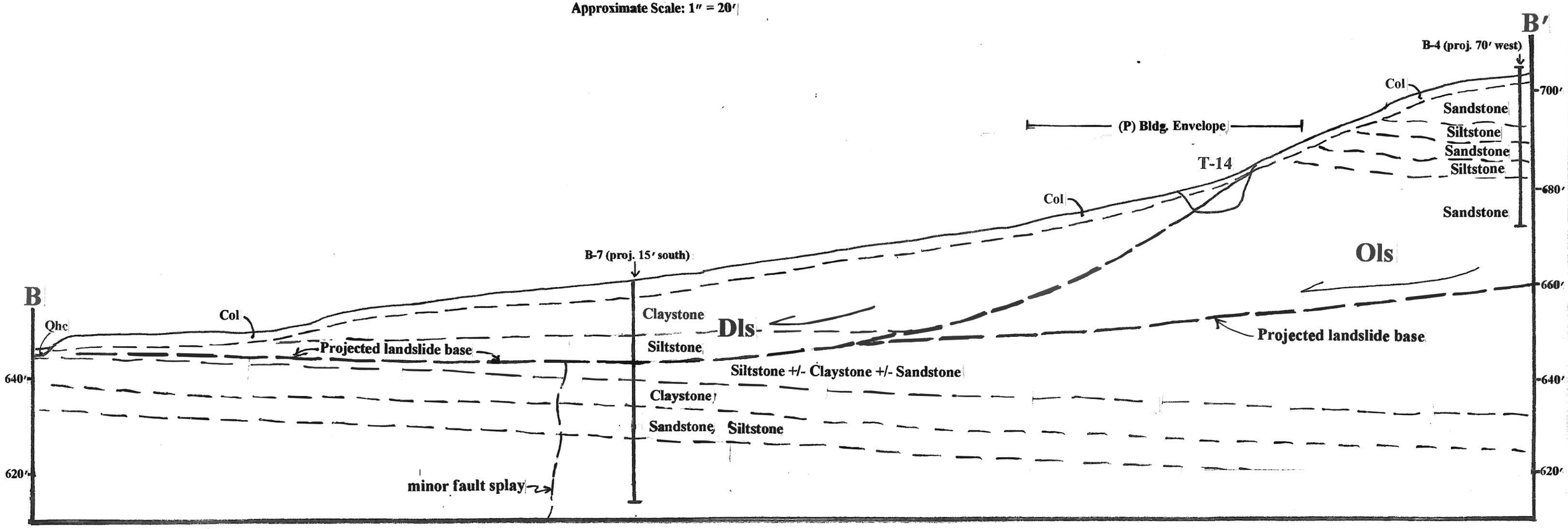
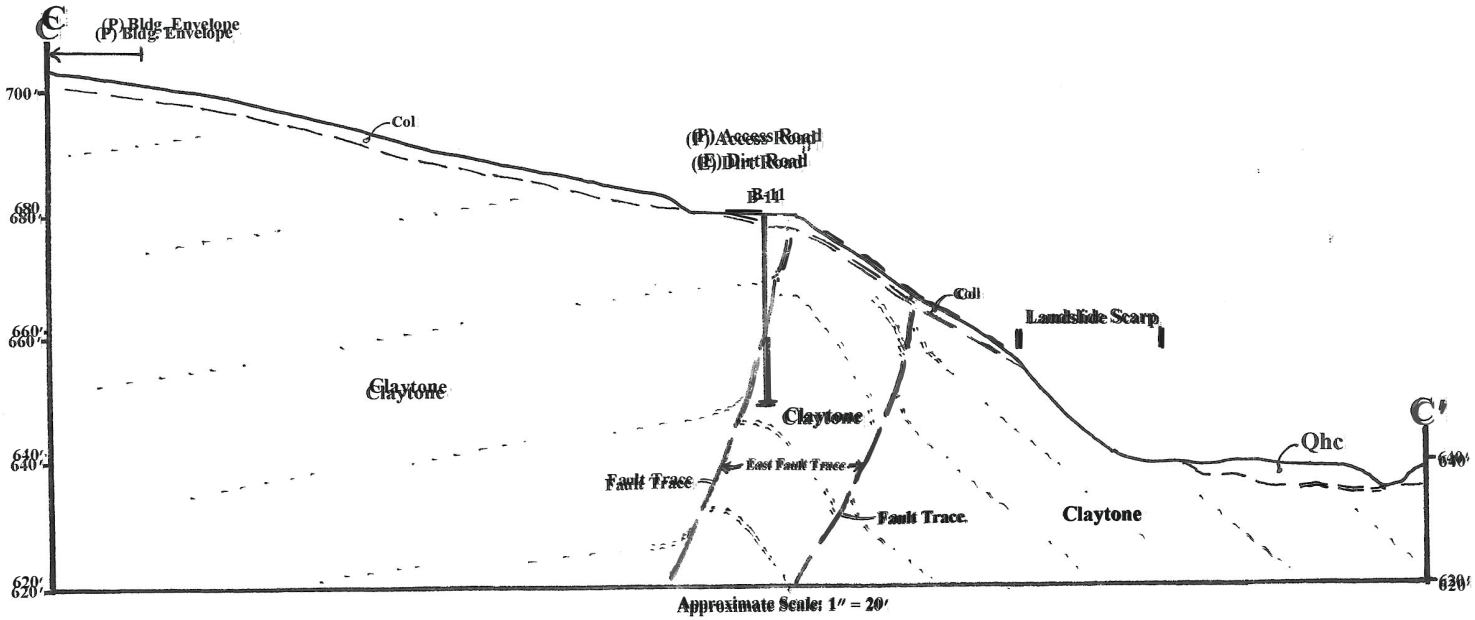
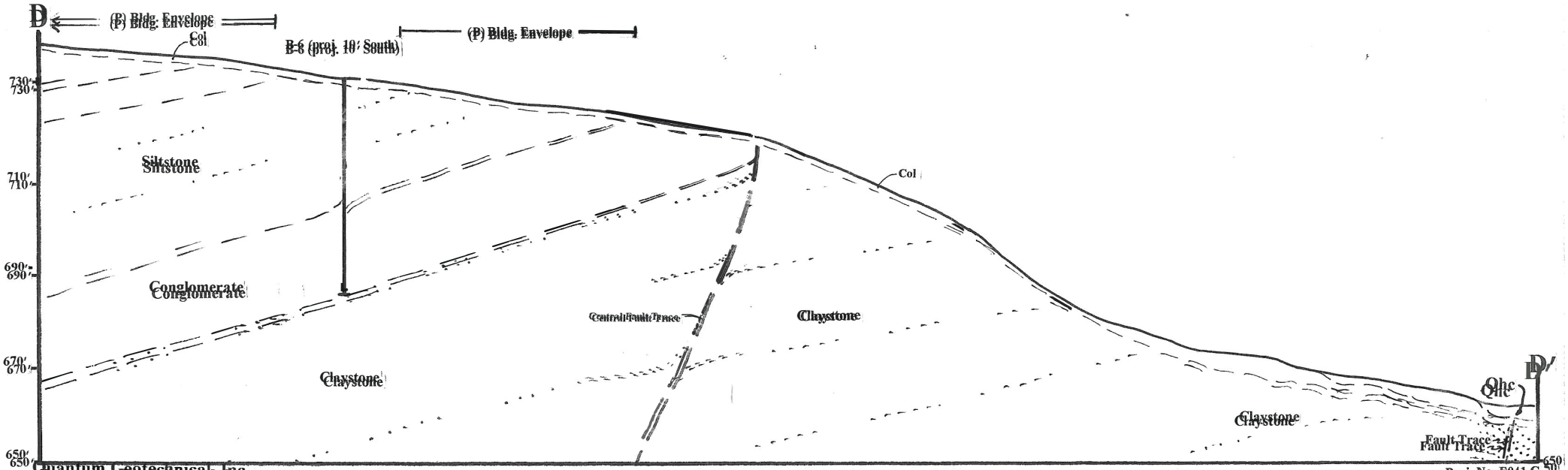
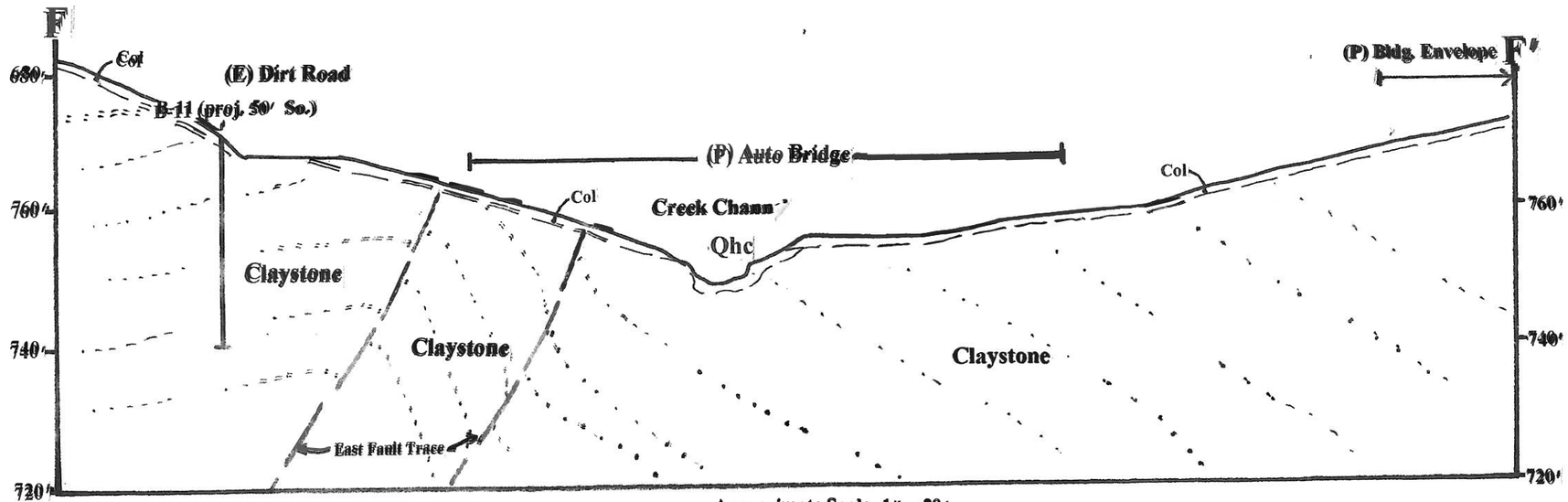


Quantum Geotechnical Inc.

Proj. No. E041.G


C
(P) Bldg. Envelope
700'
Col
(P) Access Road
(E) Dirt Road
B-11
680'
660'
Col
Landslide Scarp
Claytone
Claytone
C'
Qhc
640'
East Fault Trace
Fault Trace
Fault Trace
Claytone
620'
630'
Approximate Scale: 1" = 20'


D
(P) Bldg. Envelope
(P) Bldg. Envelope
Col
B-6 (proj. 10' South)
730'
Siltstone
710'
Col
690'
Conglomerate
Central Fault Trace
Claystone
670'
Claystone
D'
Qhc
Claystone
Fault Trace
650'



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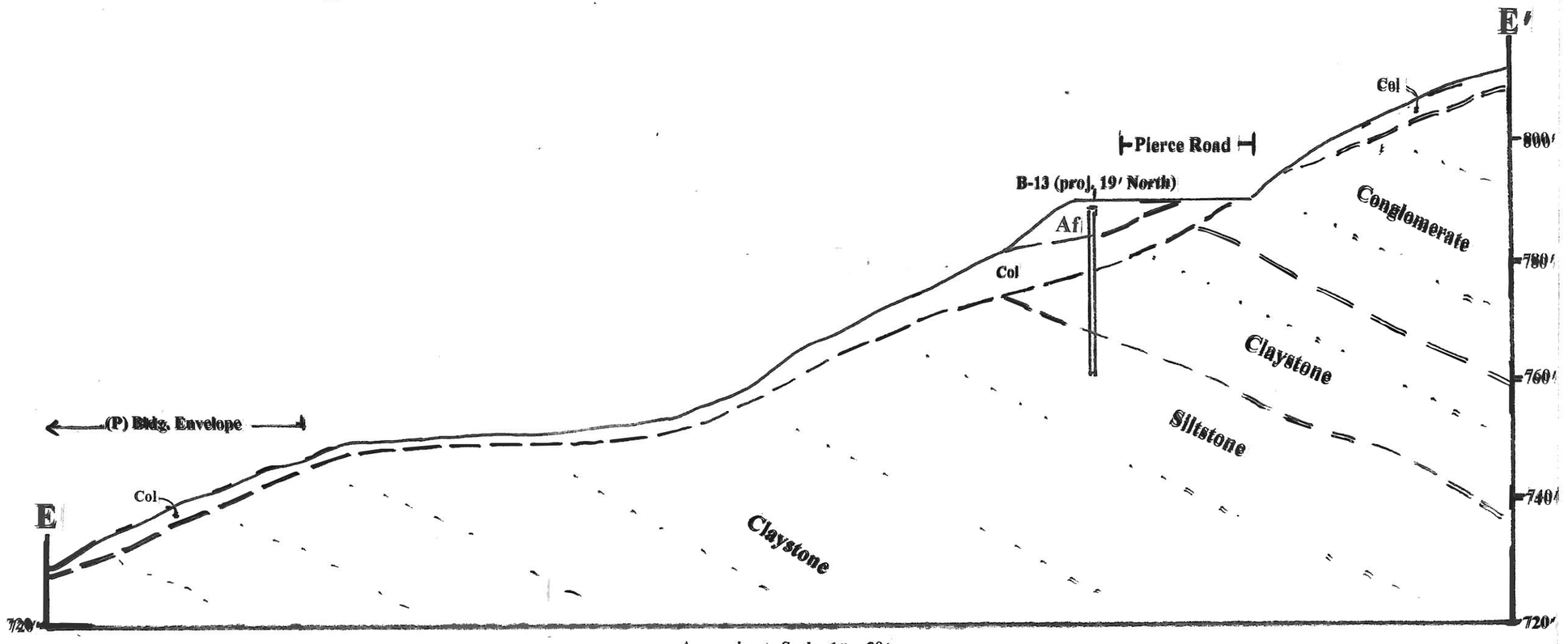

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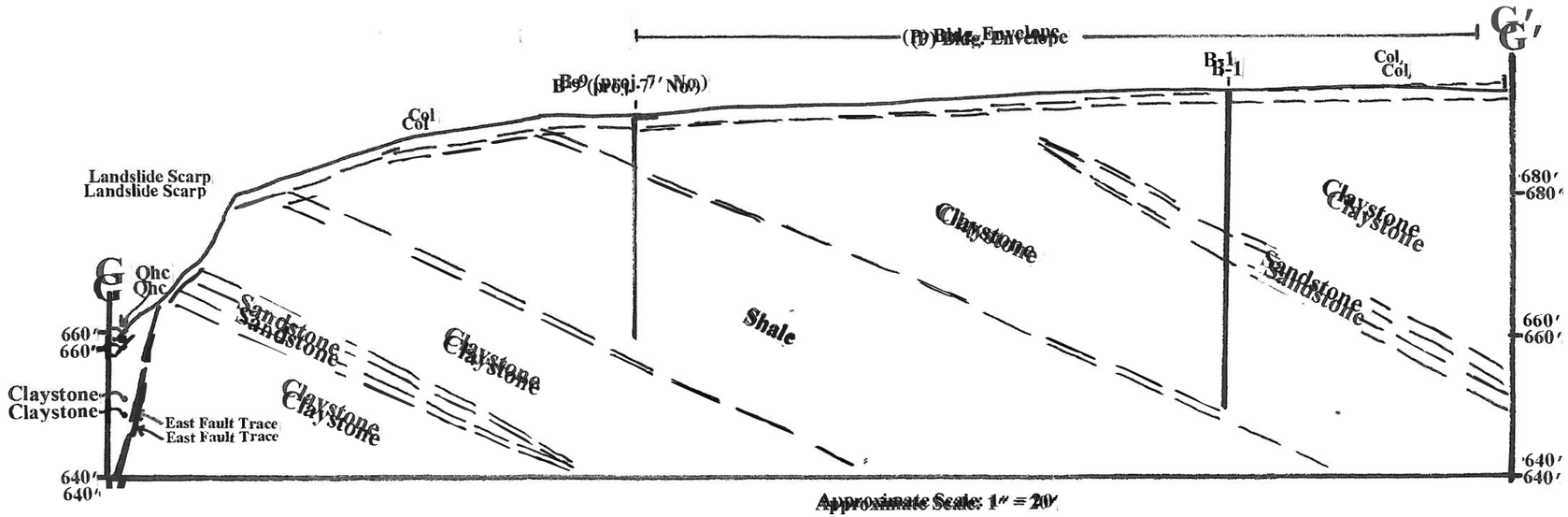
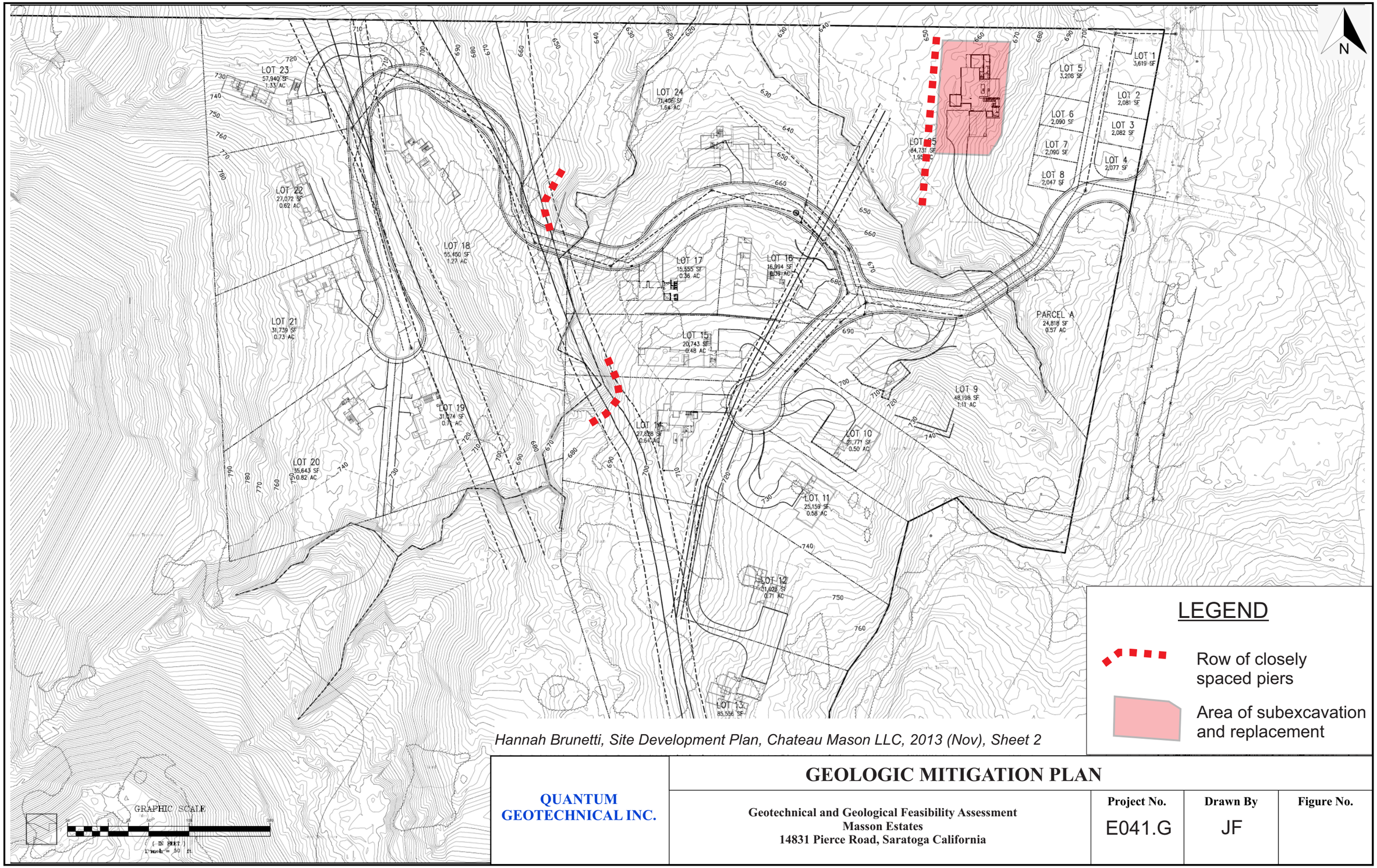


Approximate Scale: 1" = 20'

Quantum Geotechnical, Inc.

Proj. No. E041.G



Hannah Brunetti, Site Development Plan, Chateau Mason LLC, 2013 (Nov), Sheet 2

LEGEND

Row of closely spaced piers

Area of subexcavation and replacement

QUANTUM GEOTECHNICAL INC.

GEOLOGIC MITIGATION PLAN

Geotechnical and Geological Feasibility Assessment
Masson Estates
14831 Pierce Road, Saratoga California

Project No.	Drawn By	Figure No.
E041.G	JF	

APPENDIX B

Logs of Exploratory Borings (This Study)

Logs of Exploratory Test Pits (This Study)

Logs of Exploratory Trenches (This Study)

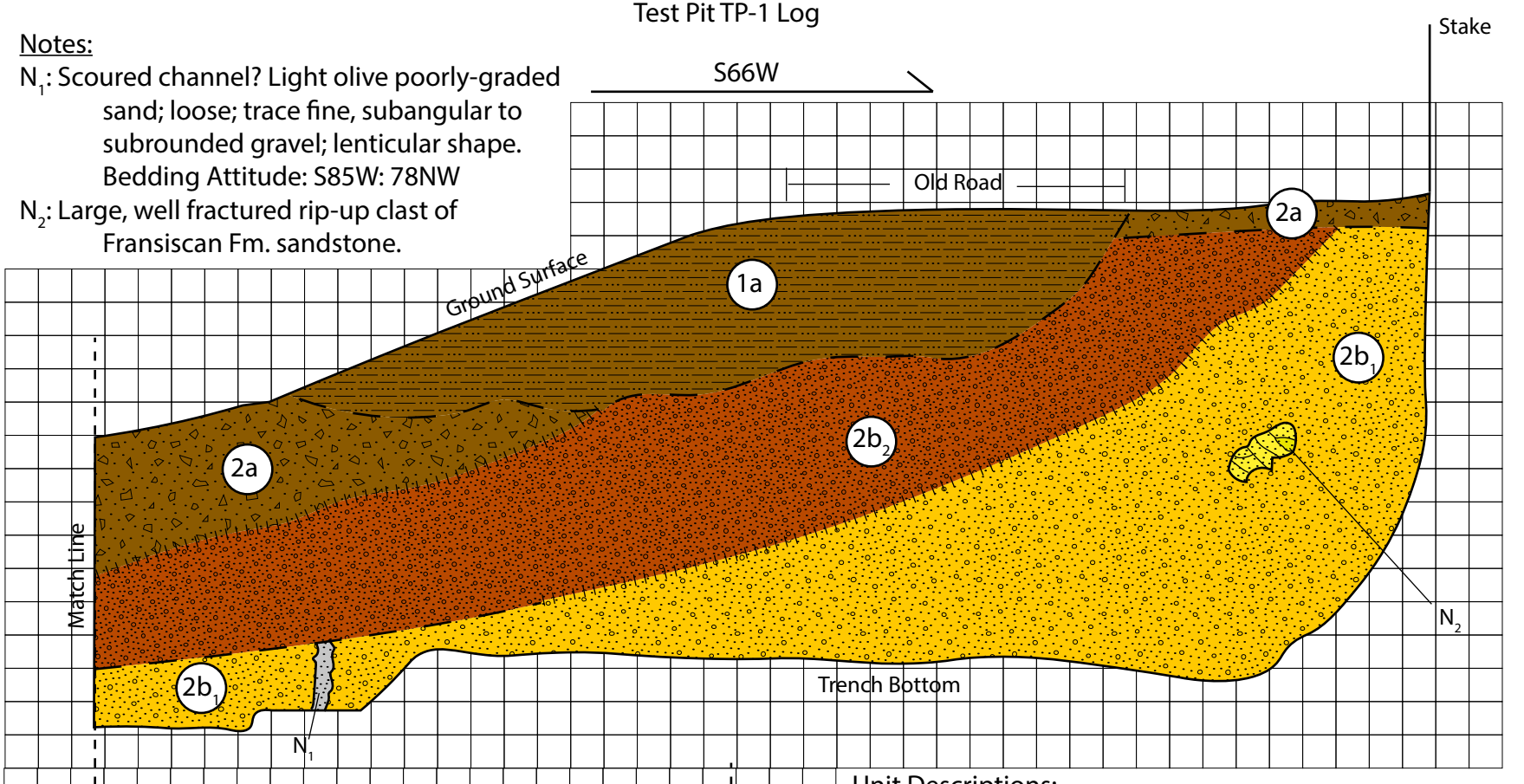
E041.G

Test Pit TP-1 Log

Notes:

N_1: Scoured channel? Light olive poorly-graded sand; loose; trace fine, subangular to subrounded gravel; lenticular shape. Bedding Attitude: S85W: 78NW

N_2: Large, well fractured rip-up clast of Fransiscan Fm. sandstone.



Unit Descriptions:

1a: Sandy SILT (ML) - Dark greyish brown; dry; loose; hard; very fine sand; trace fine, angular gravel. [FILL]

2a: Sandy SILT (ML) - Dark olive brown; dry; hard; very fine sand; trace fine to coarse, angular gravel. [Colluvium]

$2b_1$: Clayey SAND (SC) Conglomerate - Dark brown to purple matrix embedding reddish and yellow brown subrounded, fine sandstone gravel; dry; hard. [Santa Clara Fm.]

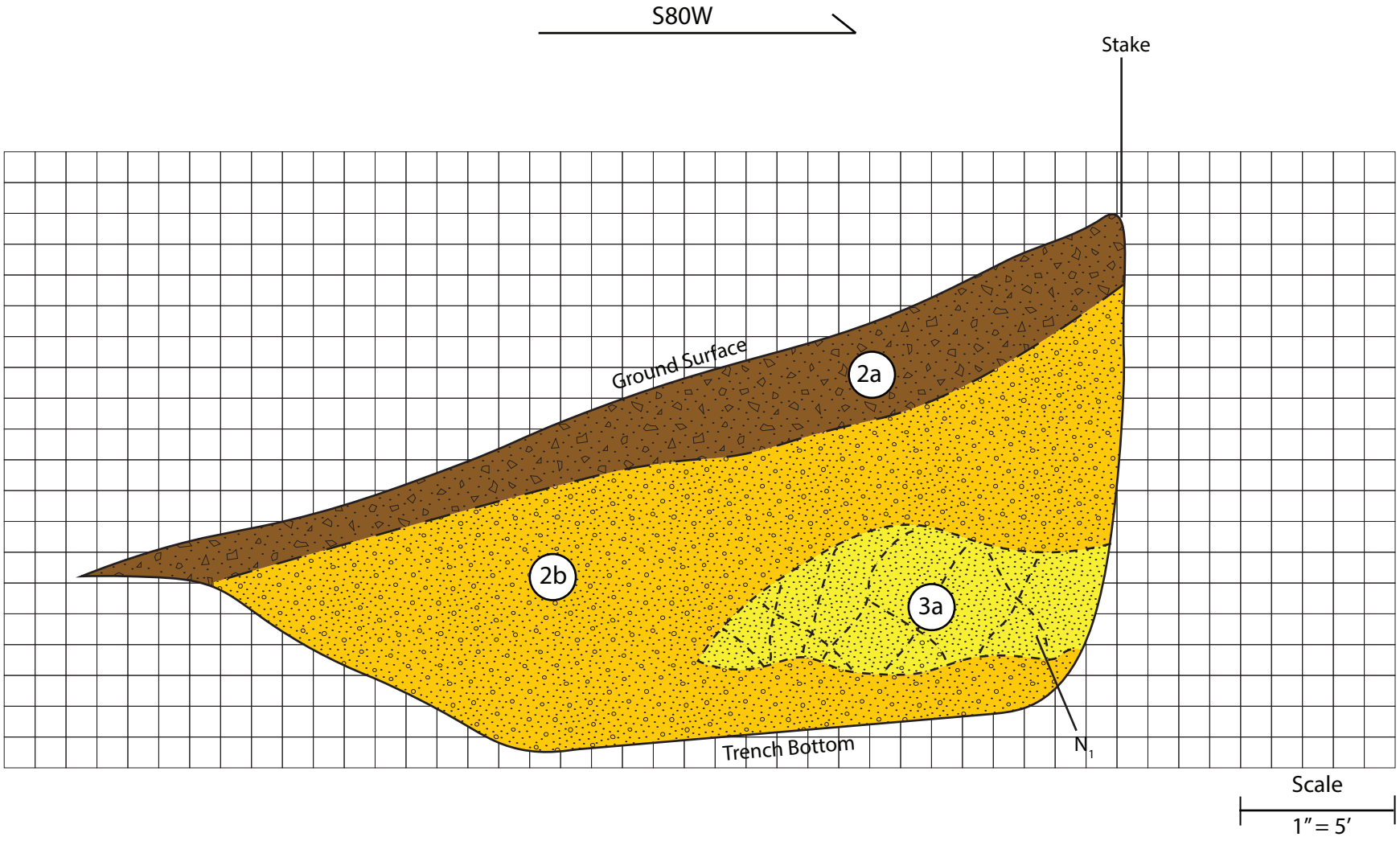
$2b_2$ - As with $2b_1$; increase in subangular gravel; color change to reddish brown. [Santa Clara Fm.]

Scale

1" = 5'

E041.G

Test Pit TP-2 Log



Notes:

N_1: Chaotically fractured sandstone block that toppled into channel. Many voids; blocks held in place loosely.

Unit Descriptions:

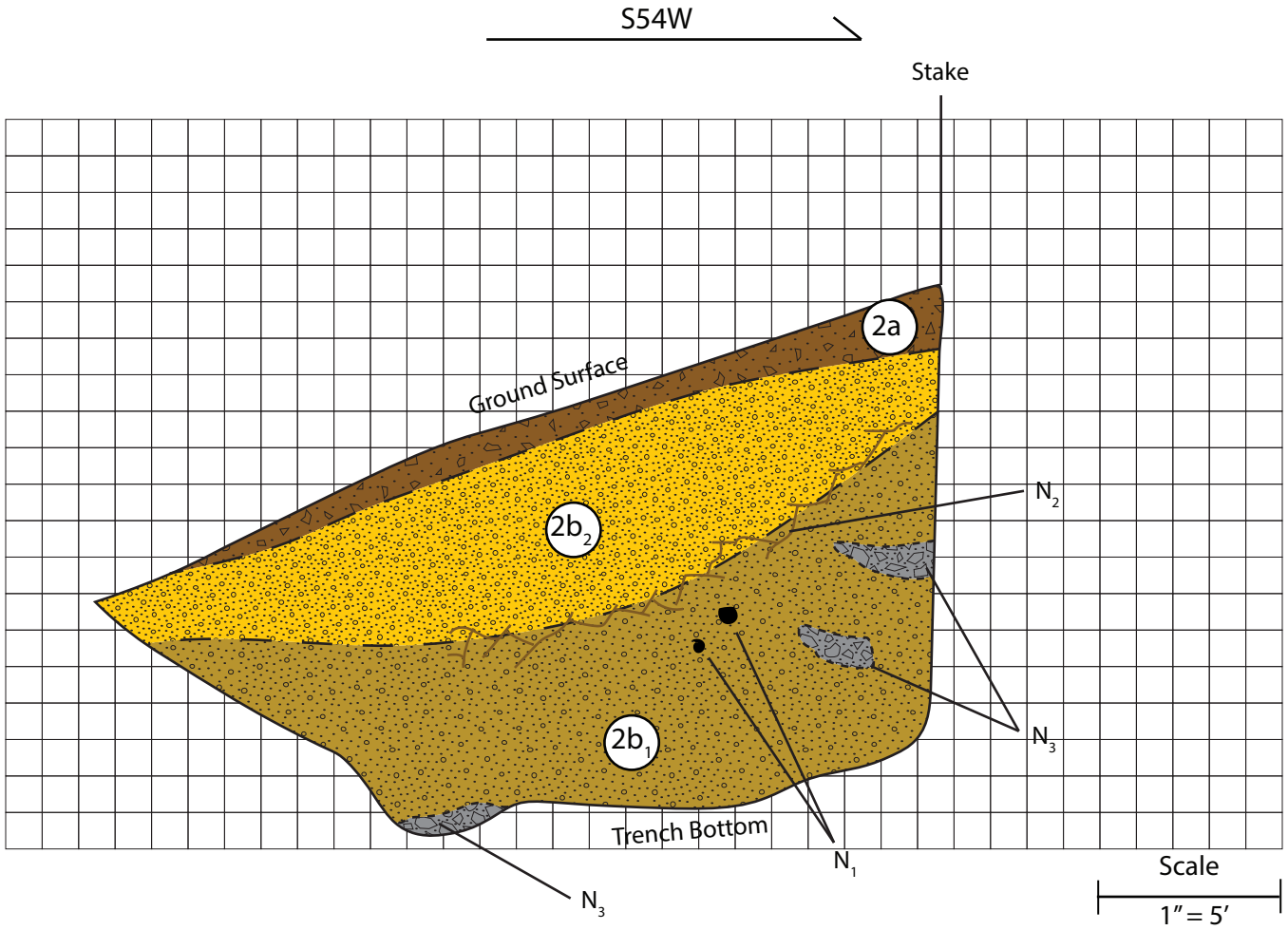
2a: Sandy SILT (ML) - Dark olive brown; dry; hard; very fine sand; trace coarse to fine subangular gravel. [Colluvium]

2b: Sandy CLAY (CL-SC) - Yellow brown to dark purple brown; dry; hard; very fine sand; trace subrounded sandy gravel conglomerate embedded in clayey matrix. [Santa Clara Fm.]

3a: Sandstone - Yellow brown; dry; hard; fine to medium grained; well indurated; chaotic fracturing; abundant voids. [Franciscan Fm.]

E041.G

Test Pit TP-3 Log



Unit Descriptions:

2a: Sandy SILT (ML) - Dark olive brown; dry; very stiff; fine sand; many large, angular blocks of fine grained sandstone. [Colluvium]

$2b_1$: Lean CLAY Conglomerate (CL) - Dark reddish to olive brown; slightly moist; hard; minor coarse to fine, subrounded gravel. [Santa Clara Fm.]

$2b_2$: Sandy CLAY Conglomerate (CL) - Light yellow brown; dry; hard; abundant subangular blocks of sandstone to 4 in. [Santa Clara Fm.]

Notes:

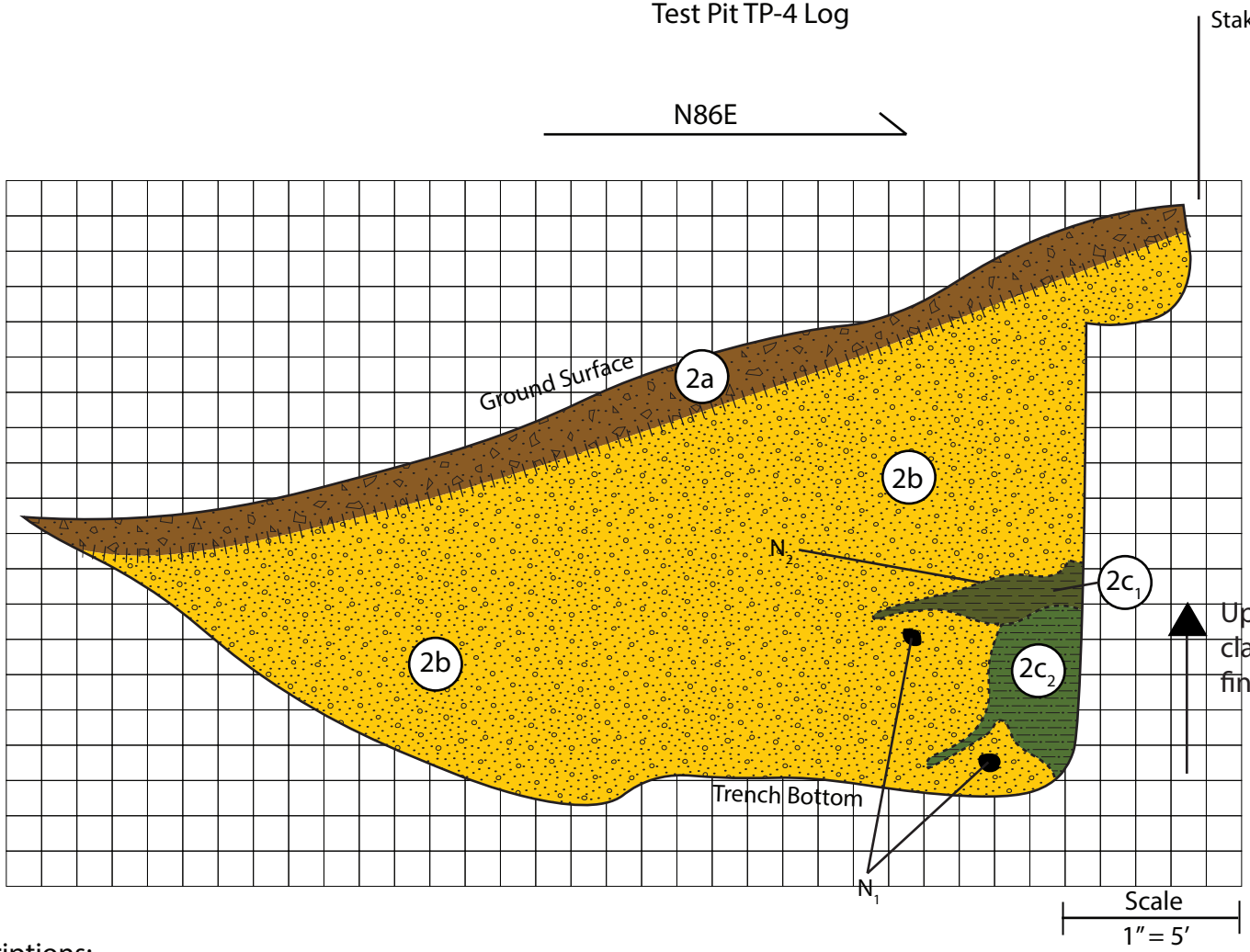
N_1: Rounded rip-up clasts of Mn oxidized sandstone.

N_2: Tree root system defines contact between 2b units.
Bedding Attitude - N40E: 24NW.

N_3: Subhorizontal gravel channels.

E041.G

Test Pit TP-4 Log



Unit Descriptions:

2a: Sandy SILT (ML) - Dark olive brown; dry; very stiff; fine sand; many large, angular blocks of fine grained sandstone. [Colluvium]

2b: Clayey SAND Conglomerate (SC) - Reddish to yellow brown; dry; hard; medium sand; fine and trace coarse rounded gravel [Santa Clara Fm.]

$2c_1$: Claystone - Dark greyish brown; dry; hard; blocky; trace fine, rounded gravel; many surfaces and shrinkage cracks; highly plastic. [Santa Clara Fm.]

$2c_2$: Claystone to Sandy CLAY (CL) - Light olive to greenish brown; dry; hard trace rounded gravel; trace fine sand; minor shrinkage cracks; medium plasticity. [Santa Clara Fm.]

Notes:

N_1: Rounded rip-up clasts of Mn oxidized claystone embedded with coarse, rounded gravels.

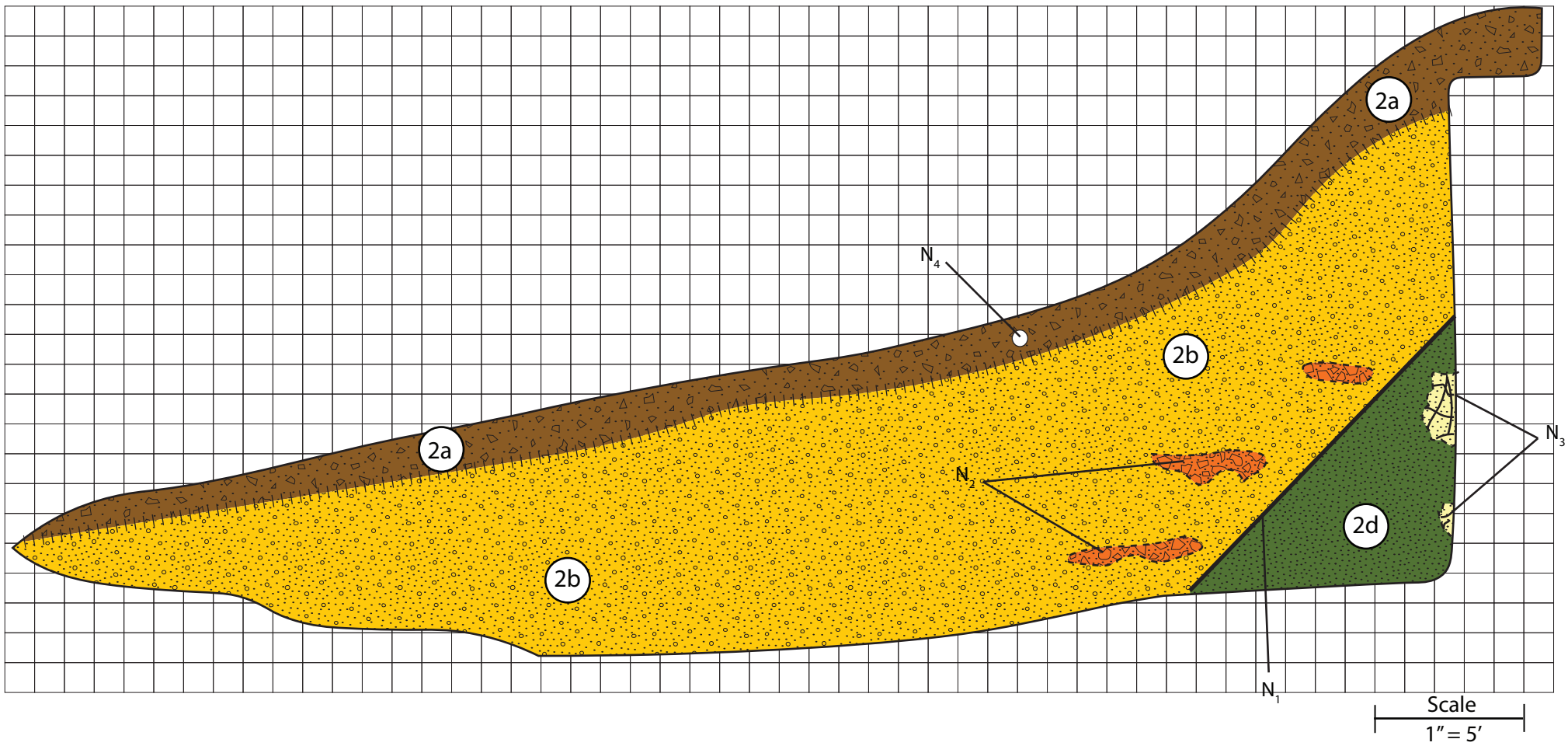
N_2: Contact between 2b and 2c is scoured. No surfaces or striae were observed.

E041.G

Test Pit TP-5 Log

Stake

S82E



Unit Descriptions:

2a: Sandy SILT (ML) - Dark olive brown; dry; very stiff; fine sand; many large, angular blocks of fine grained sandstone. [Colluvium]

2b: Clayey SAND Conglomerate (SC) - Reddish to yellow brown; dry; hard; medium sand; fine and trace coarse rounded gravel; abundant clusters of $CaCO_3$ nodules. [Santa Clara Fm.]

2d: Sandstone - Light olive to greenish brown; dry; hard; fine sand; very poorly indurated; highly fractured. [Santa Clara Fm.]

Notes:

N_1: Shear Attitude: S39W: 49NW. Well polished surface; subtle striae and $CaCO_3$ nodules elongated downdip, at approximately N19W.

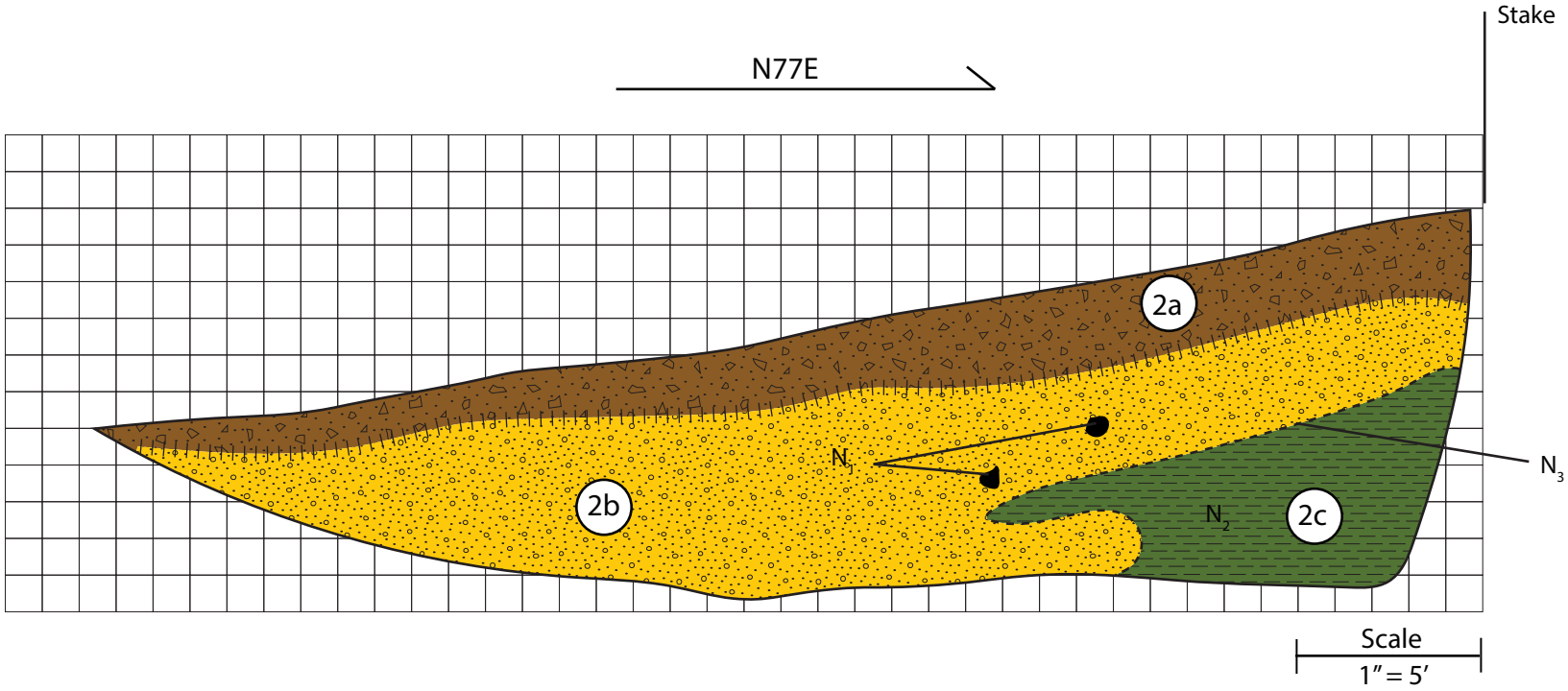
N_2: Subhorizontal, highly oxidized gravel lenses.

N_3: Large boulders of Franciscan Fm. sandstone; highly fractured; very highly weathered; well indurated.

N_4: 2 inch water service main embedded in colluvium.

E041.G

Test Pit TP-6 Log



Unit Descriptions:

2a: Sandy CLAY (CL) - Dark brown; dry; stiff; fine sand; trace subangular gravel. [Colluvium]

2b: Clayey SAND Conglomerate (SC) - Dark brown to light orange brown; dry; very stiff; medium sand; minor, subrounded gravel. [Santa Clara Fm.]

2c: Claystone - Dark greenish brown; slightly moist; hard; blocky; trace fine, rounded gravel; many surfaces and shrinkage cracks; highly plastic. [Santa Clara Fm.]

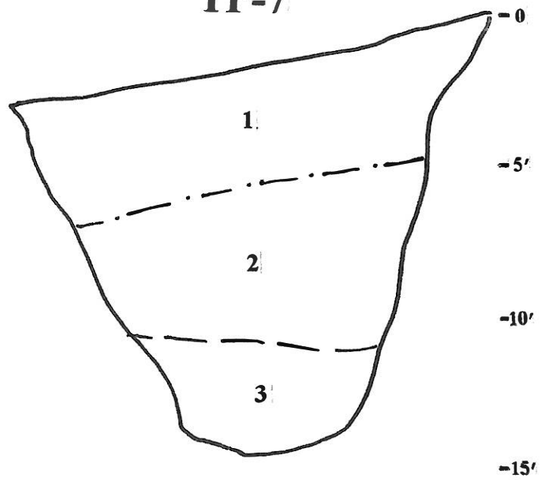
Notes:

N_1: Rounded rip-up clasts of highly weathered, purple brown, clayey sand with fine, rounded gravel.

N_2: Many surfaces identified in claystone. Surface attitudes had widely varing trends, indicating high shrink/ swell potential of claystone.

N_3: Contact between 2b and 2c is scoured, non planar. No sidentifying surfaces or striae were observed.

TP-7



Test Pit TP-7 Explanation (Scale: 1"=5')

Residual soil/Colluvium

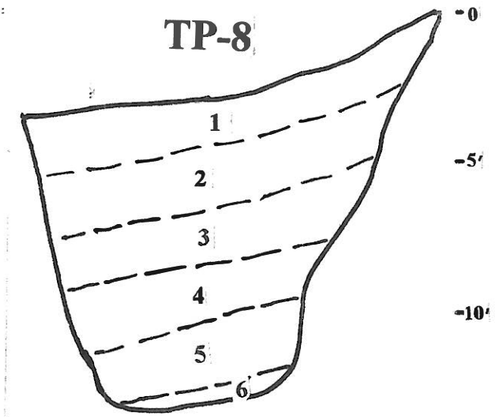
Unit 1: fat CLAY: V. Dark olive brown; sl. moist; easy to excavate, expansion cracks throughout

Unit 2: lean CLAY: Med. yellow brown; damp; stiff to very stiff (pp = 2.5tsf), moderately difficult to excavate.

Santa Clara Formation (Arastradero facies)

Unit 3: Claystone: Med. gray, damp, hard (pp = 4.0tsf), moderately difficult to excavate,

TP-8



Test Pit TP-8 Explanation (Scale: 1"=5')

Residual soil/Colluvium

Unit 1: sandy CLAY w/ gravel: V. Dark gray brown; sl. moist, firm (easy to excavate)

Unit 2: clayey SAND w/Gravel: Dark yellow brown; damp; loose.

Santa Clara Formation (Arastradero facies)

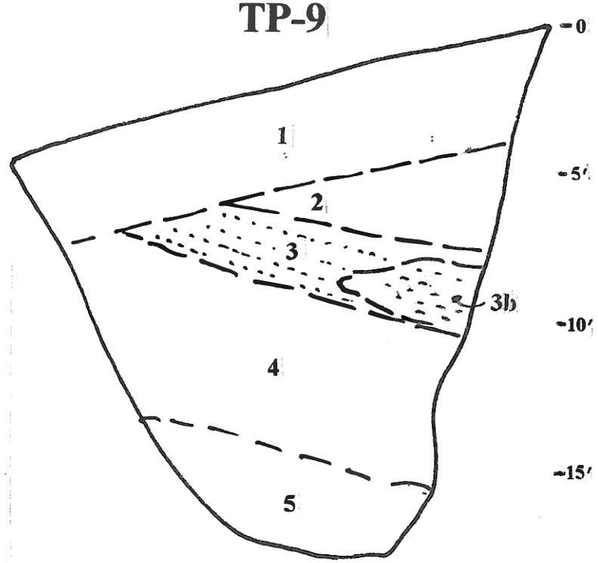
Unit 3: sandy CLAY w/ gravel: Lt. yellowish brown; sl. moist, firm to stiff

Unit 4: sandy CLAY: Med. gray, damp, hard (pp = 4.0tsf), moderately difficult to excavate.

Unit 5: sandy Claystone: Med. reddish brown, damp, hard (pp = 4.0tsf), moderately consolidated.

Unit 6: Conglomerate: variegated reddish brown and yellowish brown, damp, very dense, moderately consolidated.

TP-9



Test Pit TP-9 Explanation (Scale: 1"=5')

Residual soil/Colluvium

Unit 1: sandy CLAY w/ gravel: V. Dark gray brown; sl. moist, firm (easy to excavate)

Santa Clara Formation (Arastradero facies)

Unit 2: Claystone: dark gray brown; sl. moist, very stiff, unit contains freshwater mollusc shells flattened within bedding planes

Unit 3: Claystone: Strong reddish brown, damp, hard (pp = 4.0tsf), moderately difficult to excavate, pervasively fractured, thin bedded to laminated.

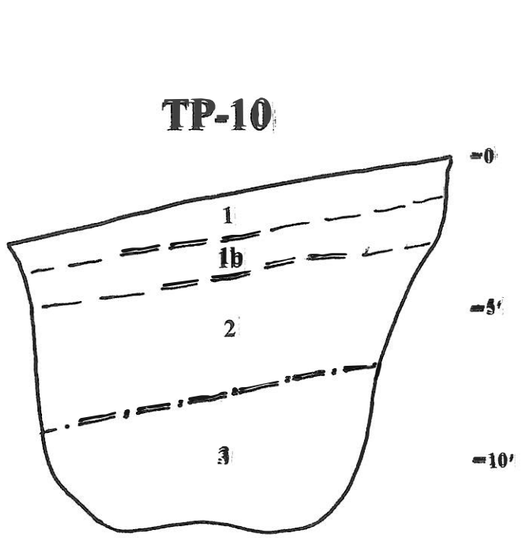
Unit 3b: sandy Siltstone: black, damp, hard (pp = 4.0tsf), moderately consolidated. unit contains freshwater mollusc shells flattened within bedding planes and gastropods

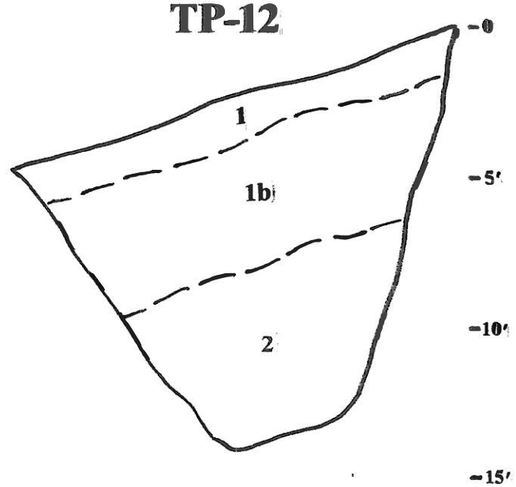
Unit 4: Claystone: medium gray brown, damp, hard (pp = 4.0tsf), moderately difficult to excavate

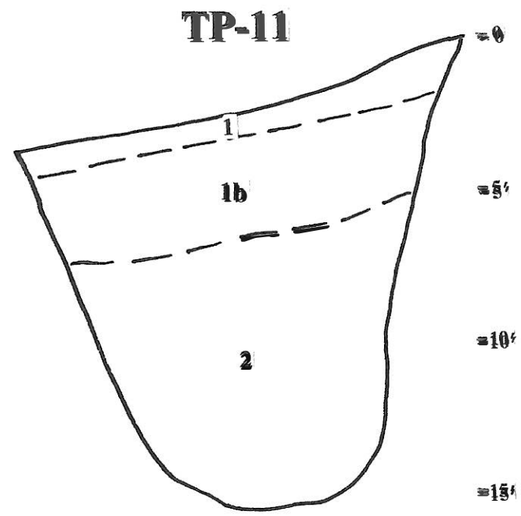
Unit 5: Claystone: dark blue gray, damp, firm to v. stiff (pp = 1.5 – 2.5 tsf), relatively easy to excavate, contains freshwater molluscs.

TP-9 Notes

N1 = bedding: N4°W/31NE







Test Pit TP-10 Explanation (Scale: 1"=5')

Residual soil/Colluvium

Unit 1: sandy CLAY: V. Dark gray brown; sl. moist, firm (easy to excavate)

Unit 1b: sandy CLAY: Med. gray brown; sl. moist, firm (easy to excavate)

Santa Clara Formation (Arastradero facies)

Unit 2: sandy Siltstone: med yellow brown; damp, very stiff, pervasively fractured, moderately difficult to excavate.

Unit 3: silty fine Sandstone: med. yellow brown, damp, very dense, moderately difficult to excavate, pervasively fractured, massive.

Test Pit TP-11 Explanation (Scale: 1"=5')

Residual soil/Colluvium

Unit 1: clayey SAND: V. Dark brown; moist, medium dense (easy to excavate)

Unit 1b: sandy CLAY: Med. gray brown; sl. moist, firm (easy to excavate)

Santa Clara Formation (Arastradero facies)

Unit 2: silty fine Sandstone: med. yellow brown, damp, very dense, moderately difficult to excavate, pervasively fractured, massive.

Test Pit TP-12 Explanation (Scale: 1"=5')

Residual soil/Colluvium

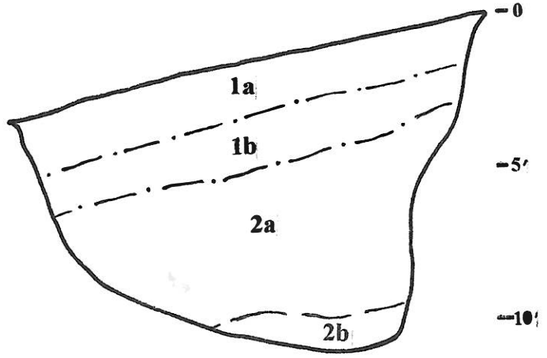
Unit 1: sandy CLAY: V. Dark gray brown; moist, firm (easy to excavate)

Unit 1b: sandy CLAY: Med. yellow brown; sl. moist, firm (easy to excavate)

Santa Clara Formation (Arastradero facies)

Unit 2: pebble Conglomerate (silty SAND): med. yellow brown, damp, dense, moderately difficult to excavate, pervasively fractured.

TP-13



Test Pit TP-13 Explanation (Scale: 1"=5')

Residual soil/Colluvium

Unit 1a: Lean CLAY: Dark olive brown; damp, firm (easy to excavate)

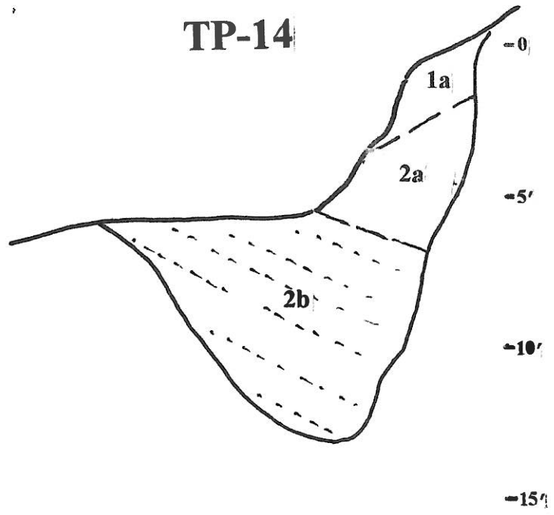
Unit 1b: Lean CLAY: Med. olive brown; sl. moist, firm (easy to excavate)

Santa Clara Formation (Arastradero facies)

Unit 2a: Claystone: dark gray brown, damp, hard (p.p. > 4.0 tsf), moderately difficult to excavate, pervasively fractured, spheroidal weathering

Unit 2b: Sandstone: lt. yellow brown, damp, very dense, moderately difficult to excavate, pervasively fractured, some clay.

TP-14



Test Pit TP-14 Explanation (Scale: 1"=5')

Residual soil/Colluvium

Unit 1a: Lean CLAY: Dark brown; damp, firm (easy to excavate)

Santa Clara Formation (Arastradero facies)

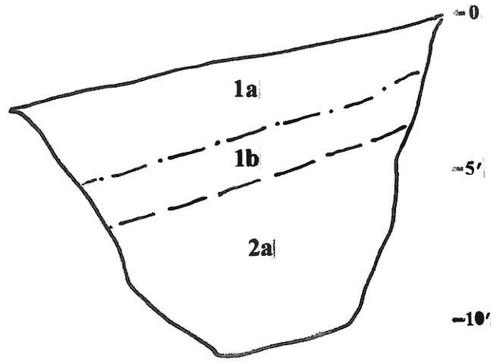
Unit 2a: Conglomerate: lt brown and med. gray, damp, medium dense, moderately difficult to excavate, with subrounded fine to coarse gravel

Unit 2b: Conglomerate: lt brown and med. gray, sl. moist, very dense (p.p. > 4.0 tsf), moderately difficult to excavate, with subrounded fine to coarse gravel

TP-14 Notes

N1 = bedding: N19°W/26SW

TP-15



Test Pit TP-15 Explanation (Scale: 1"=5')

Residual soil/Colluvium

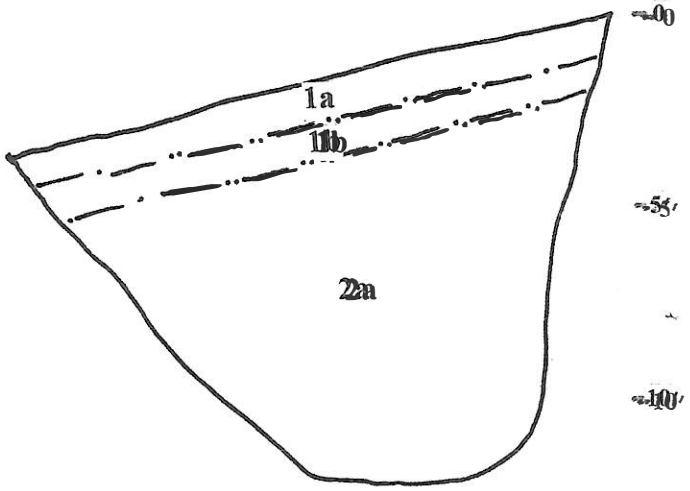
Unit 1a: Lean CLAY: Dark brown; damp, firm (easy to excavate)

Unit 1b: Lean CLAY: Med. brown; damp, stiff (easy to excavate)

Santa Clara Formation (Arastradero facies)

Unit 2a: Claystone: dark olive brown and dark gray, damp, hard (p.p. > 4.0 tsf), moderately difficult to excavate, fractured, spheroidal weathering

TP-16



Test Pit TP-16 Explanation (Scale: 1"=5')

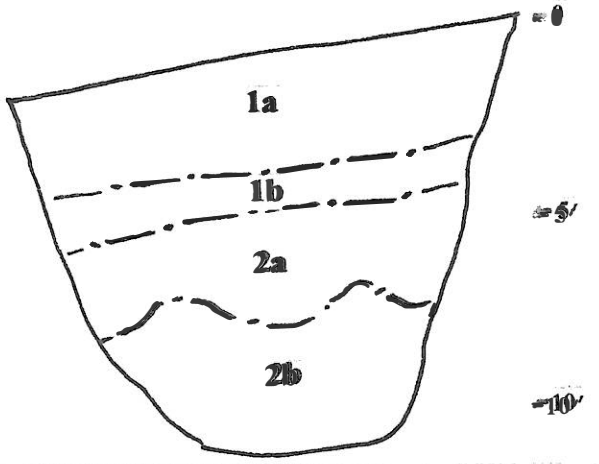
Residual soil/Colluvium

Unit 1a: Clayey SAND: Dark gray brown; damp, firm (easy to excavate)
Unit 1b: Sandy CLAY: Gray brown; damp, firm to stiff (easy to excavate)

Santa Clara Formation (Arastradero facies)

Unit 2a: sandy Claystone: dark olive brown and med gray, damp, very stiff to hard (p.p. > 3.0 tsf), moderately difficult to excavate, fractured, discontinuous surfaces throughout (highly expansive), spheroidal weathering

TP-17



Test Pit TP-17 Explanation (Scale: 1"=5')

Residual soil/Colluvium

Unit 1a: Sandy CLAY: Dark gray brown; damp, firm (easy to excavate)
Unit 1b: Sandy CLAY: Gray brown; sl. moist, firm to stiff (easy to excavate)

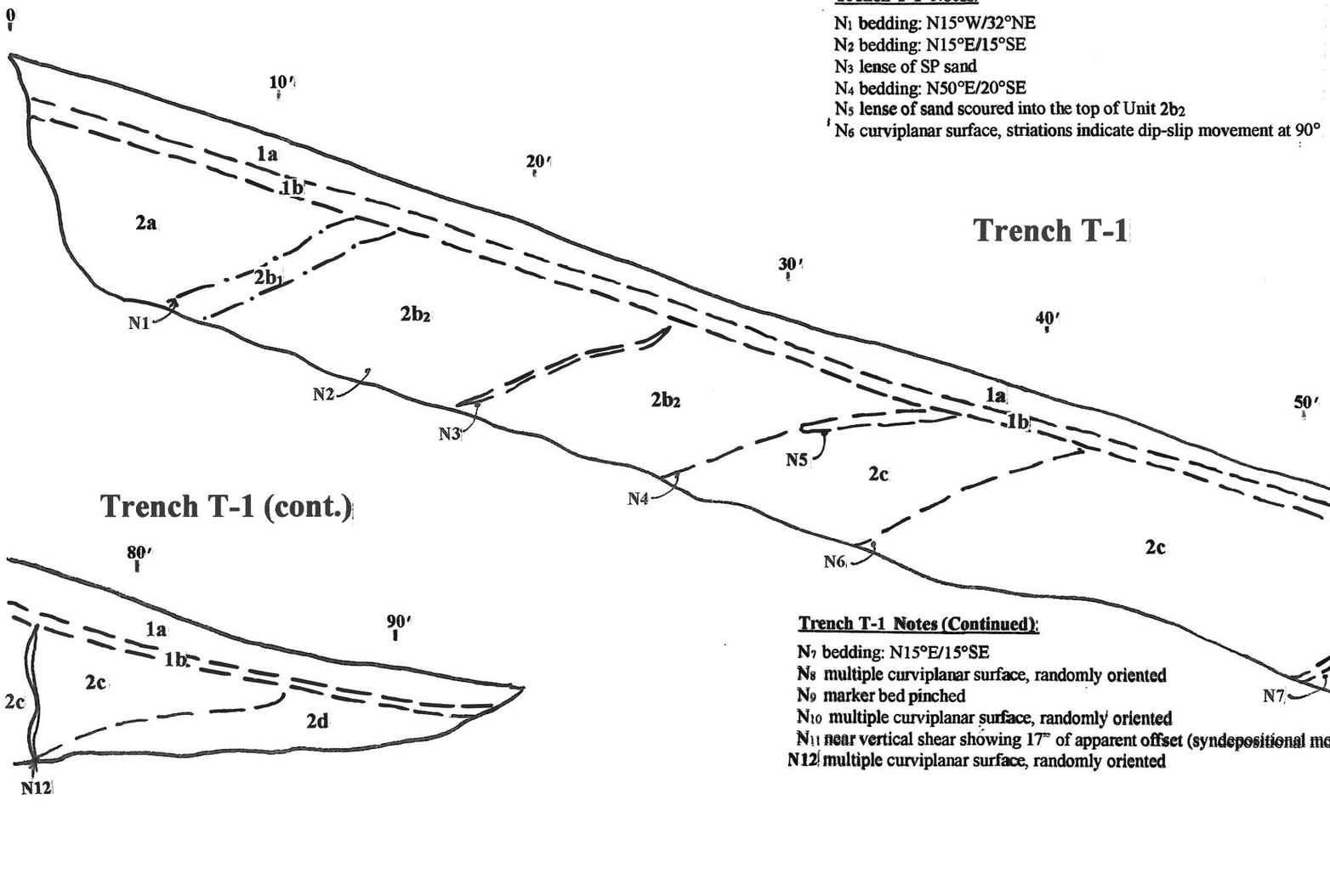
Santa Clara Formation (Arastradero facies)

Unit 2a: clayey Sandstone: med yellow brown, damp, medium dense, relatively easy to excavate

Unit 2b: Sandstone: med yellow brown, damp, very dense, moderately difficult to excavate

QUANTUM GEOTECHNICAL, INC.		Project No. Proj. No. E0411G	Drawn by:	

Trench T-1



Trench T-1 Notes:

N_1 bedding: N15°W/32°NE
N_2 bedding: N15°E/15°SE
N_3 lense of SP sand
N_4 bedding: N50°E/20°SE
N_5 lense of sand scoured into the top of Unit $2b_2$
N_6 curviplanar surface, striations indicate dip-slip movement at 90°

Trench T-1 Notes (Continued):

N_7 bedding: N15°E/15°SE
N_8 multiple curviplanar surface, randomly oriented
N_9 marker bed pinched
N_{10} multiple curviplanar surface, randomly oriented
N_{11} near vertical shear showing 17" of apparent offset (syndepositional movement)
N12 multiple curviplanar surface, randomly oriented

Trench T-1 Explanation (Scale: 1″ = 5′)

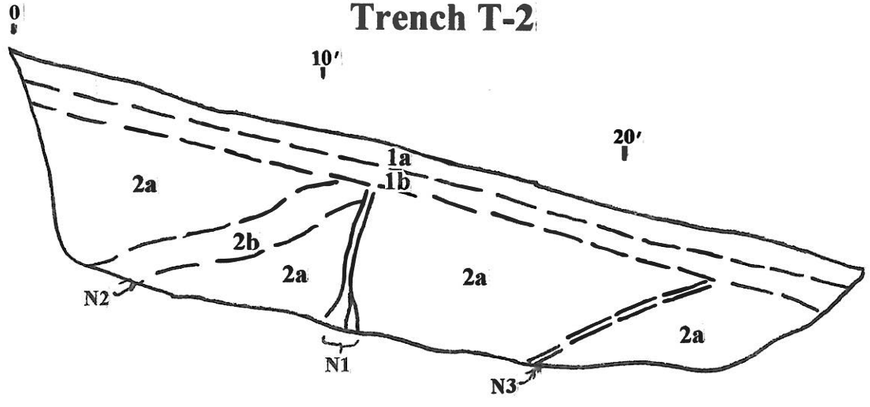
Colluvium

Unit 1a:	Fat CLAY: v. dark gray-brown, damp, very stiff to hard, blocky, extensive expansion cracks
Unit 1b:	Fat silty CLAY: dark olive brown, damp, hard, blocky w/ prismatic peds, caliche precipitant locally

Santa Clara Formation (Arastradero facies)

Unit 2a:	Claystone: Med. gray, damp, hard (pp = 4.0tsf), moderately difficult to excavate
Unit $2b_1$:	Silty Sandstone (fine-grained): yellowish gray, damp, semi-consolidated, moderately difficult to pervasively fractured, jointed
Unit $2b_2$:	Sandstone (fine-grained): medium gray brown, damp, semi-consolidated, moderately difficult to pervasively fractured, jointed
Unit 2c:	Claystone: Dark olive, damp, very stiff (pp = 2.5.tsf), moderately difficult to excavate, massive, spheroidal weathering
Unit 2d:	Claystone: gray, damp, very stiff (pp = 2.5.tsf), moderately difficult to excavate, massive

Trench T-2



Trench T-2 Explanation (Scale: 1″ = 5′)

Colluvium

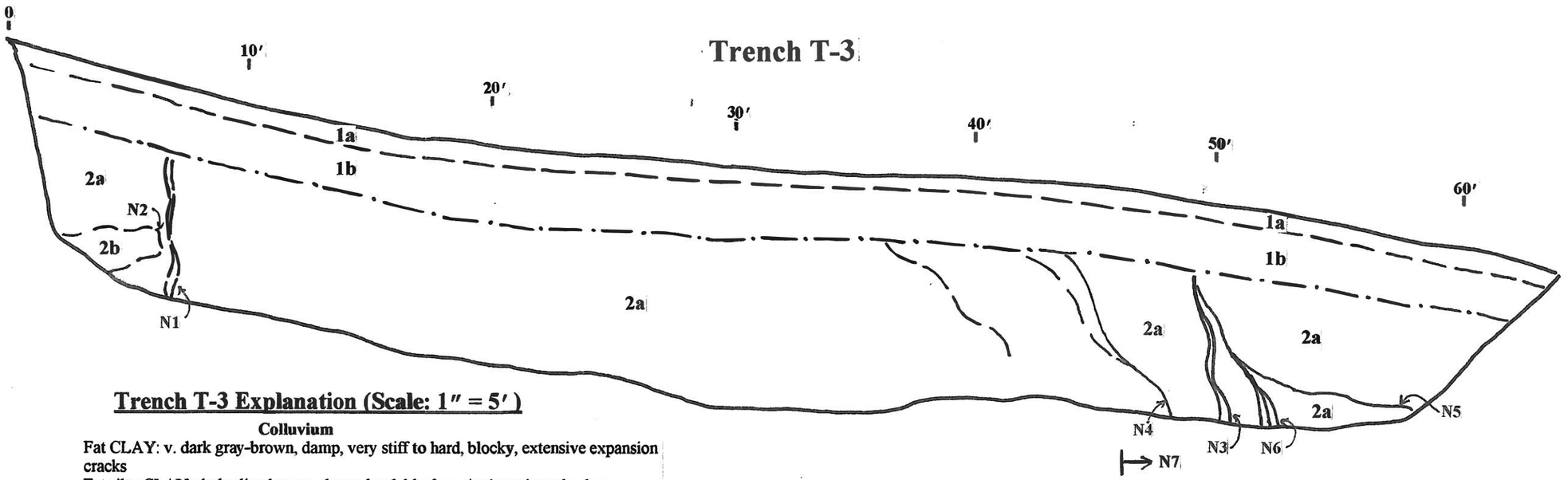
Unit 1a:	Fat CLAY: v. dark gray-brown, damp, very stiff to hard, blocky, extensive expansion cracks
Unit 1b:	Fat silty CLAY: dark olive brown, damp, hard, blocky w/ prismatic peds, caliche precipitant locally

Santa Clara Formation (Arastradero facies)

Unit 2a:	Siltstone: Lt. gray, damp, very stiff (pp = 2.7tsf), blocky, fractured, close spacing, moderately difficult to excavate
Unit $2b_1$:	Silty Sandstone (fine-grained): yellowish gray, damp, dense to very dense (semi-consolidated), fractured, close spacing, moderately difficult to excavate

Trench T-2 Notes:

N_1 shear clay: N25°E/86°SE, 2.5" wide zone of anastomosing surfaces, rake = 80°
N_2 bedding: N16°W/18°NE
N_3 Marker bed



Trench T-3 Explanation (Scale: 1″ = 5′)

Colluvium

Unit 1a: Fat CLAY: v. dark gray-brown, damp, very stiff to hard, blocky, extensive expansion cracks

Unit 1b: Fat silty CLAY: dark olive brown, damp, hard, blocky w/ prismatic peds, deep desiccation cracks, caliche precipitant locally

Santa Clara Formation (Arastradero facies)

Unit 2a: Claystone w/ fine sand: Dark gray, damp, hard (pp = 4.0tsf), moderately difficult to excavate

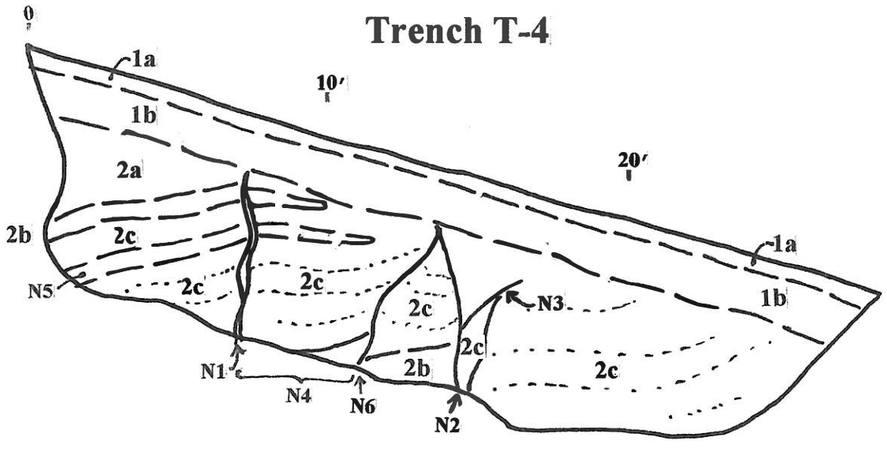
Unit 2b: Clayey Sandstone (fine-grained): olive, damp, hard, semi-consolidated, moderately difficult to pervasively fractured, mottled w/ orange

Trench T-3 Notes:

N_1 curviplanar surface: N34°W with striations plunging down-sip
N_2 pinched lense of clayey fine sand
N_3 tight zone of shearing
N_4 curviplanar surface
N_5 curviplanar surface
N_6 tight zone of shearing, projects N10°E across trench
N_7 all units becoming more moist west of this point

Trench T-4 Notes:

N_1 subtle shearing
N_2 soft clayey seam, truncates 2b on back wall (Fault)
N_3 curviplanar surface
N_4 warping of bedding within 2c
N_5 Bedding: N°50E/19°SE
N_6 truncated 2b on back wall. (Fault) oriented N5°E/70°SE



Trench T-4 Explanation (Scale: 1″ = 5′)

Colluvium

Unit 1a: Fat CLAY: v. dark gray-brown, damp, very stiff to hard, blocky, extensive expansion cracks

Unit 1b: Fat silty CLAY: dark olive brown, damp, hard, blocky w/ prismatic peds, deep desiccation cracks, caliche precipitant locally

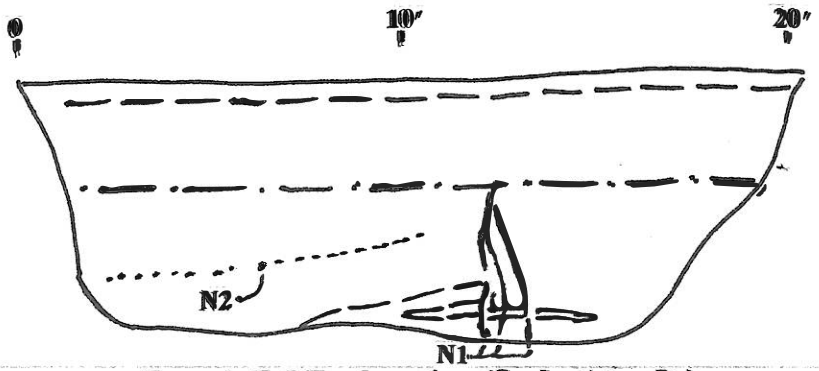
Santa Clara Formation (Arastradero facies)

Unit 2a: Claystone w/ silt: Olive brown, damp, very stiff (pp = 3.0 tsf), spheroidal weathering, moderately difficult to excavate

Unit 2b: Sandstone (fine-grained): lt. yellow-brown, damp, very dense, laminated, semi-consolidated, moderately difficult to excavate, pervasively fractured

Unit 2c: Claystone: Dark gray, damp, very stiff (pp = 3.0 tsf), laminated, moderately difficult to excavate, spheroidal weathering

Trench T-5



Trench T-5 Explanation (Scale: 1″ = 5′)

Colluvium

Unit 1a: Fat CLAY: v. dark gray-brown, damp, very stiff to hard, blocky, extensive expansion cracks
Unit 1b: Fat silty CLAY: dark olive brown, damp, hard, blocky w/ prismatic peds, deep desiccation cracks, caliche precipitant locally

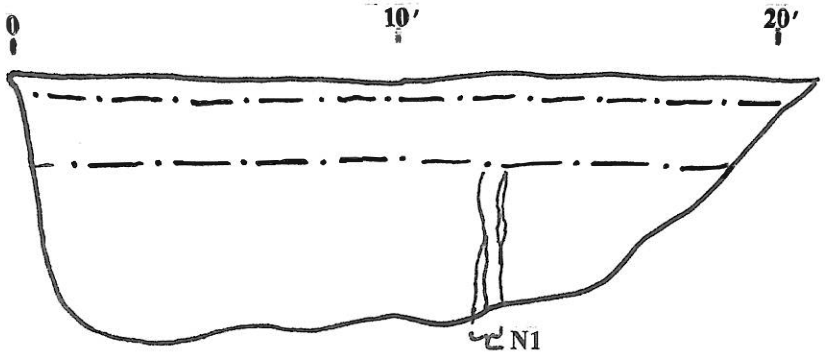
Santa Clara Formation (Arastradero facies)

Unit 2a: Sandy Claystone: very dk gray- brown, damp, hard (pp = 3.5 tsf), moderately difficult to excavate
Unit 2b: clayey Sand with gravel (Conglomerate): Med. yellow-brown, damp, very dense, semi-consolidated, moderately difficult to excavate, gravels are fine to medium, subrounded
Unit 2c: Claystone: Dark gray-brown, damp, very stiff (pp = 3.0 tsf), laminated, moderately difficult to excavate, fossiliferous (molluscs)
Unit $2c_1$: Gravelly Sand w/ clay: thin lense

Trench T-5 Notes:

N_1 sheared clay seam (1.5" thick). Unit $2c_1$ down 4 inches on west
N_2 gentle dip of bedding into hillside (to the east)

Trench T-7



Trench T-7 Explanation (Scale: 1″ = 5′)

Colluvium

Unit 1a: Fat CLAY: v. dark gray-brown, damp, very stiff to hard, blocky, extensive expansion cracks
Unit 1b: Fat silty CLAY: dark olive brown, damp, hard, blocky w/ prismatic peds, deep desiccation cracks, caliche precipitant locally

Santa Clara Formation (Arastradero facies)

Unit 2a: Claystone: very dk gray-brown, damp, hard (pp = 3.5 tsf), moderately difficult to excavate, expansion cracks throughout

Trench T-7 Notes:

N_1 multiple anastomosing surfaces (fault)

Proj. No. E041.G

Trench T-6 Explanation (Scale: 1″ = 5′)

Colluvium

Unit 1a: Fat CLAY: dark gray-brown, damp, very stiff, blocky, extensive expansion cracks

Unit 1b: Fat silty CLAY: dark yellow brown, damp, hard, blocky w/ prismatic peds, deep desiccation cracks

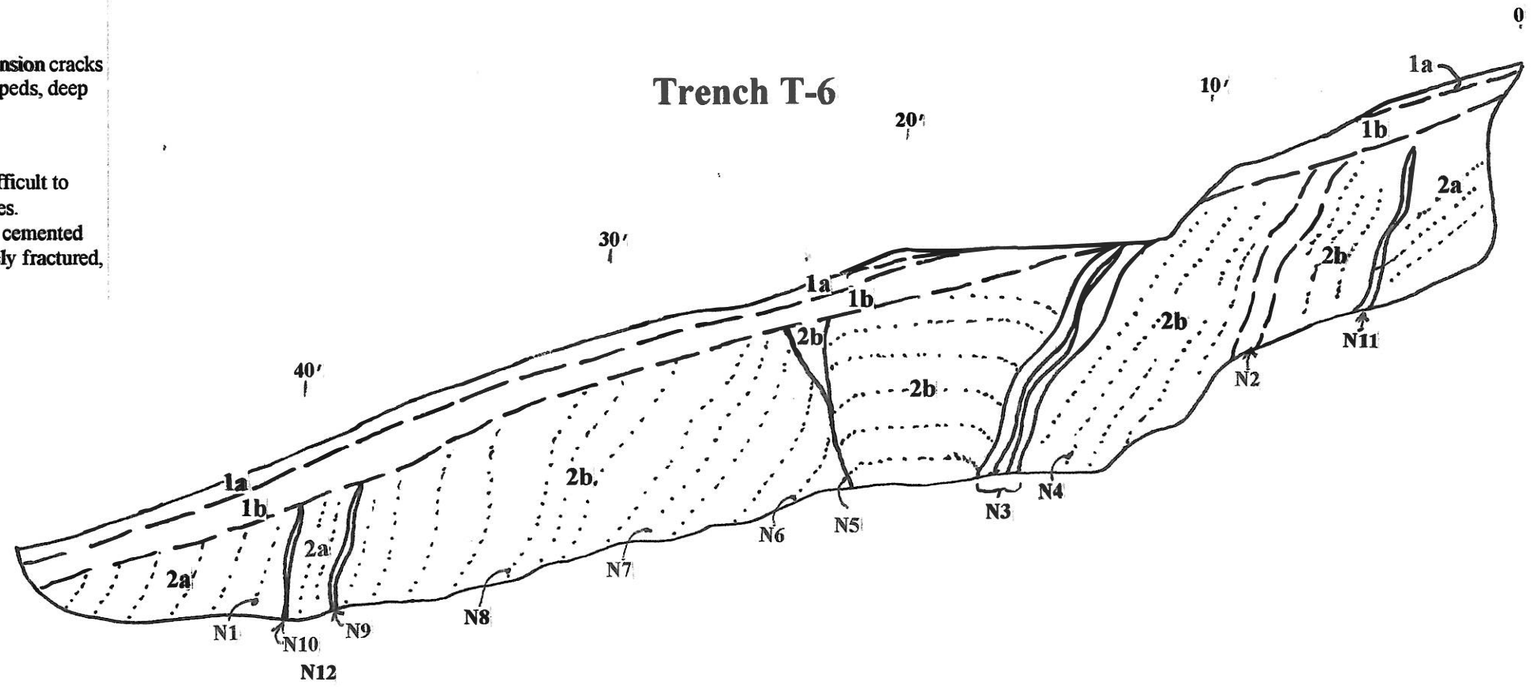
Santa Clara Formation (Arastradero facies)

Unit 2a: Claystone: Dark gray, sl. moist, very stiff (pp = 2.7tsf), moderately difficult to Excavate, fossiliferous with flattened clam shells within bedding planes.

Unit 2b: Sandstone (fine-grained): lt yellow-brown, damp, very dense, slightly cemented locally, semi-consolidated, moderately difficult to excavate, pervasively fractured, jointed

Notes:

N_1 thin bedding: N34°W/54°NE
N_2 zone of crushing within $2c_1$
N_3 laminations N34°W/83°NE
N_4 ½" to 2" thick soft clay seam w/ striated surfaces N40°W/74°NE, sheared fabric is 14 inches wide
N_5 slight contortion of bedding in 2b
N_6 joint set with slickened surfaces
N_7 all units becoming more moist west of this point
N_8 thin bedding: N12°W/39°NE
N_9 3" – 4" thick fault gouge (N48°W/74°NE) bounded by surfaces, striations are 90° down dip
N_{10} bedding plane fault slip
N_{11} zone of crushing within 2a: N42°W/85°NE
N_{12} Thin bedding N74°E/54°SE



Trench T-8 Explanation (Scale: 1″ = 5′)

Colluvium

Unit 1a: sandy SILT: pale yellow-brown, damp, loose

Unit 1b: Silty CLAY: pale yellow brown, damp, stiff, porous

Santa Clara Formation (Arastradero facies)

Unit 2a: Sandstone (fine-grained): lt yellow-brown, damp, very dense to hard, moderately-consolidated, moderately difficult to excavate, pervasively fractured, jointed

Unit 2b: silty SAND w/ gravel (Conglomerate): lt reddish brown, damp, very dense, moderately consolidated, moderately difficult to excavate, gravel is med to coarse, subrounded

Unit 2c: Shale: lt reddish brown and gray-brown, damp, hard, moderately consolidated, moderately difficult to excavate, thin bedding and laminations convoluted locally

Unit 2d: silty SAND w/ gravel (Conglomerate): lt reddish brown to strong brown, damp, very dense to hard, moderately consolidated, moderately difficult to difficult excavate, gravel is med to coarse, subrounded

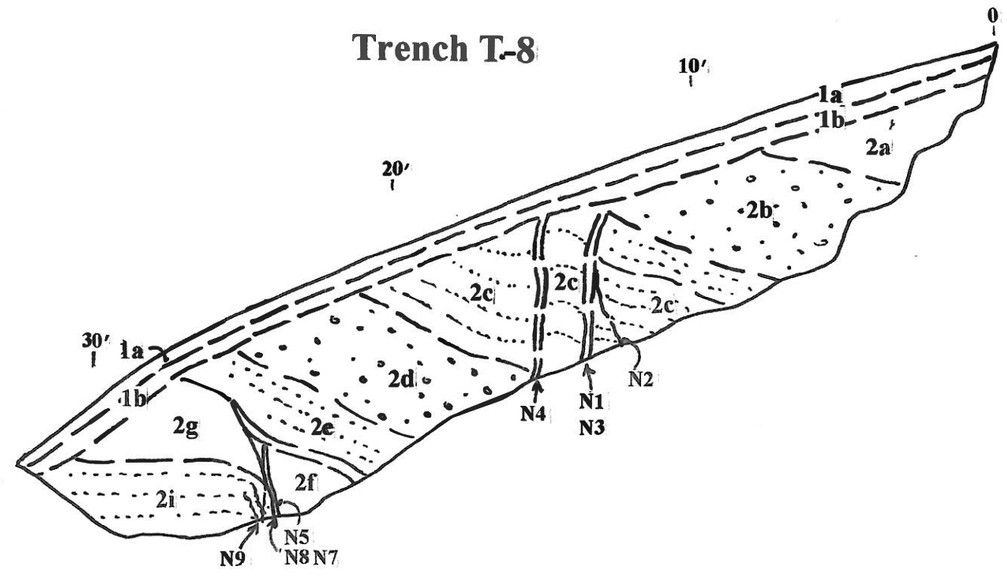
Unit 2e: Shale: lt reddish brown and gray-brown, damp, hard, moderately consolidated, moderately difficult to excavate, thin bedding and laminations convoluted locally

Unit 2f: Claystone: dark gray-brown, damp, hard, semi-consolidated, moderately difficult to excavate, well developed peds

Unit 2g: Sandstone (fine-grained): lt yellow-brown, damp, hard, moderately-consolidated, moderately difficult to difficult to excavate, jointed

Unit 2h: Silty Sand (fine-grained): pale yellow-brown, damp, very dense, moderately-consolidated, moderately difficult to excavate

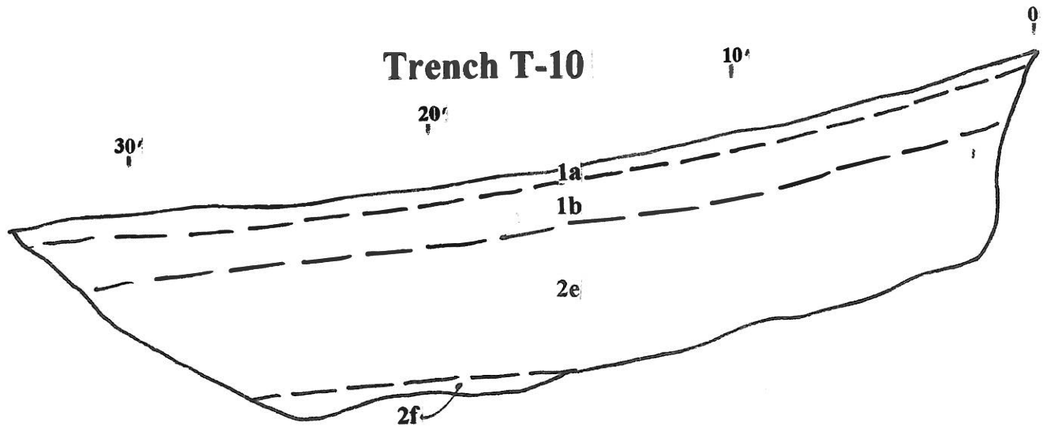
Unit 2i: silty SAND w/ gravel (Conglomerate): lt yellowish brown, damp, very dense, moderately to well consolidated, moderately difficult to excavate, gravel is med to coarse, subrounded



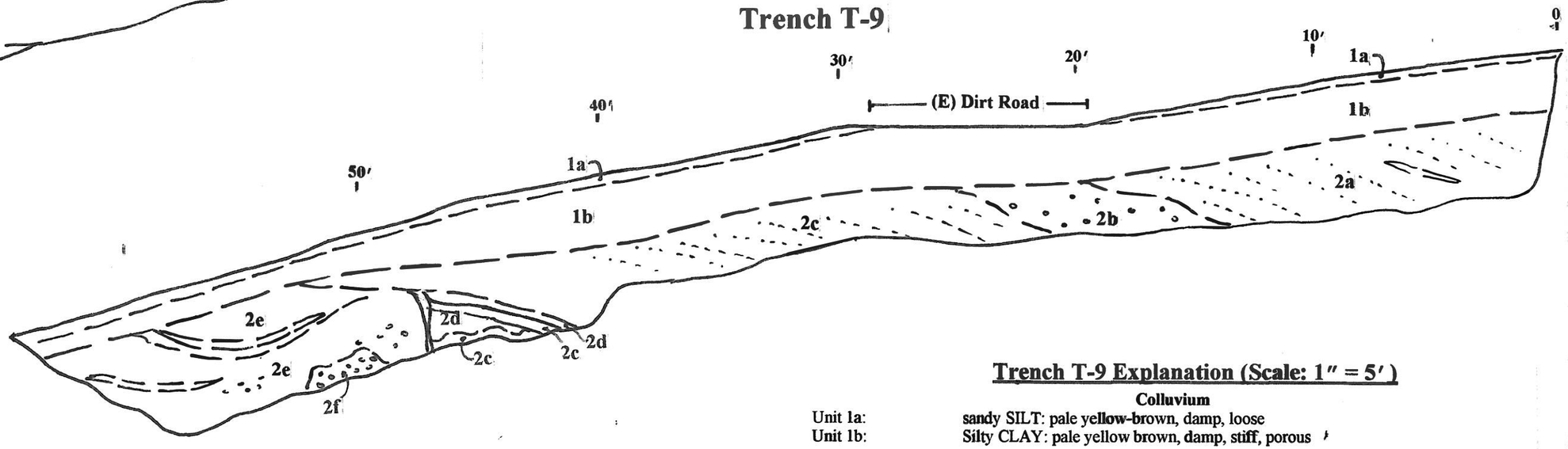
Notes: T-8

N_1 infilled fracture 1.75" wide, relative up on east
N_2 shear
N_3 fracture N32°W/82°SW
N_4 infilled fracture 1" to 2" wide
N_5 planar contact
N_6 marker bed is truncated by shear surface, relative offset is up on east
N_7 abrupt surface N57°W/55°SW
N_8 plunge direction on surface is 85° downdip
N_9 surface similar to N_7

Trench T-10



Trench T-9



Trench T-10 Explanation (Scale: 1″ = 5′)

Colluvium

Unit 1a: sandy SILT: pale yellow-brown, damp, loose
Unit 1b: Silty CLAY: pale yellow brown, damp, stiff, porous

Santa Clara Formation (Arastradero facies)

Unit 2e: Shale: lt reddish brown and gray-brown, damp, hard, moderately consolidated, moderately difficult to excavate, thin bedding and laminations convoluted locally
Unit 2f: Claystone: dark gray-brown, damp, hard, semi-consolidated, moderately difficult to excavate, well developed peds

Trench T-9 Explanation (Scale: 1″ = 5′)

Colluvium

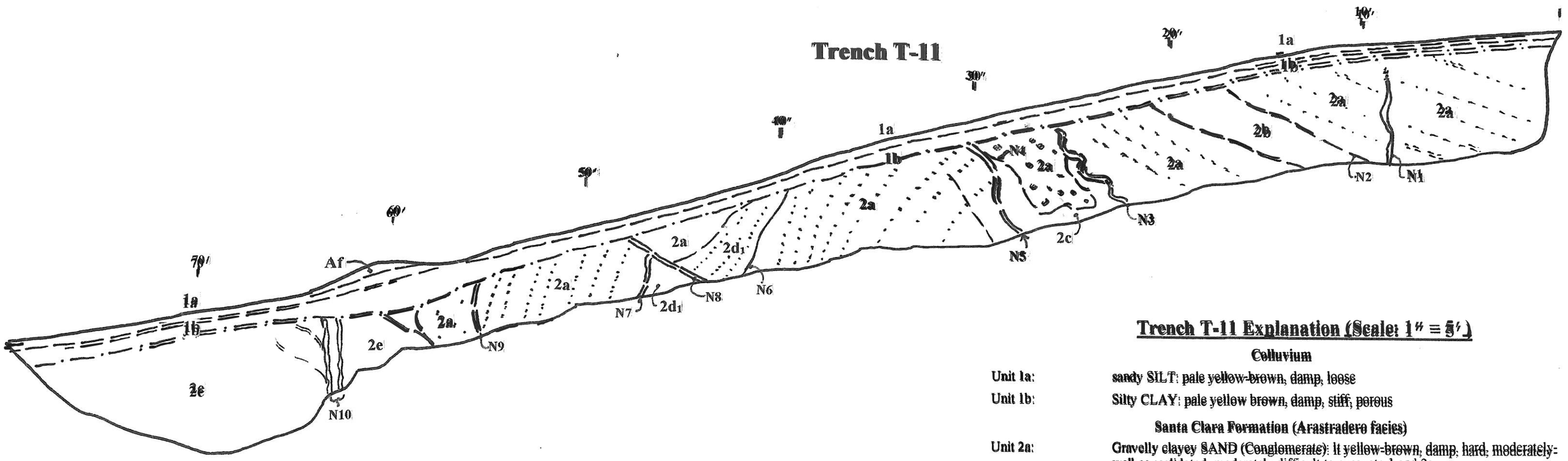
Unit 1a: sandy SILT: pale yellow-brown, damp, loose
Unit 1b: Silty CLAY: pale yellow brown, damp, stiff, porous

Santa Clara Formation (Arastradero facies)

Unit 2a$_1$: Fat CLAY (Paleosol): dark yellow brown, damp, very stiff
Unit 2a: Gravelly sandy CLAY (Conglomerate): yellow brown and orange, damp, very stiff, moderately consolidated, moderately difficult to excavate
Unit 2b: Clayey SAND with abundant gravel (Conglomerate): lt. yellow brown, dry, very dense, moderately consolidated, moderately difficult to excavate, gravel is fine to coarse, subangular
Unit 2c: Gravelly sandy CLAY (Conglomerate): med. yellow brown, dry, hard, moderately consolidated, moderately difficult to excavate
Unit 2d: Claystone: dark gray brown, dry, hard, moderately consolidated, moderately difficult to excavate
Unit 2e: Clayey Gravel (Conglomerate): pale gray, dry, very dense to hard, moderately consolidated, moderately difficult to excavate, gravel is fine and angular
Unit 2f: Silty Gravel (Conglomerate): very pale brown, dry, very dense, moderately consolidated, moderately difficult to excavate, gravel is fine to medium and subangular

Notes:

N$_1$ 1a/1b represent old slope wash deposits
N$_2$ 1b does not have distinct horizons (massive)
N$_3$ faulted contact (crushing) between 2c/2d is N49°W/51°SW (relative up on east)
feature does not appear to break unit 2c but slight warping



Trench T-11 Explanation (Scale: 1" = 5')

Colluvium

Unit 1a: sandy SILT: pale yellow-brown, damp, loose

Unit 1b: Silty CLAY: pale yellow brown, damp, stiff, porous

Santa Clara Formation (Arastradero facies)

Unit 2a: Gravelly clayey SAND (Conglomerate): lt yellow-brown, damp, hard, moderately-well consolidated, moderately difficult to excavate 1 and 2a

Unit 2b: Sandstone (lense): med. yellow brown, dry, hard, moderately well consolidated, moderately difficult to difficult to excavate, thin bedded

Unit 2c: Claystone: Very dark gray-brown, damp, very stiff, moderately consolidated, moderately difficult to excavate

Unit 2d: Sandstone and Shale (Interbeded): lt pale brown to med. yellow, damp, very dense to hard, moderately consolidated, moderately difficult to difficult excavate

Unit 2d1: Sandstone: lt pale brown, dry, very dense to hard, moderately consolidated, moderately difficult to difficult excavate, thin to medium bedded

Unit 2e: Claystone: Very dark brown, damp, very stiff to hard, moderately consolidated, moderately difficult to excavate, prolific expansion cracks throughout

Trench T-1 Notes:

N1 fracture

N2 bedding contact: N39°W/32°SW

N3 contact: N43°W/61°SW (somewhat distorted)

N4 planar shear of 2a against 2a

N5 N53°W/35°SW, fault projected across trench

N6 planar surface has distorted bedding

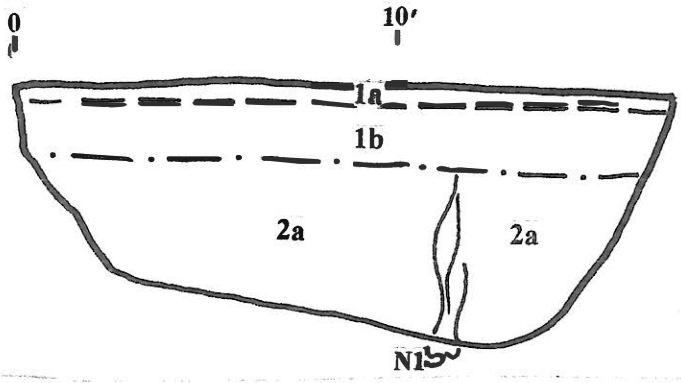
N7 Planar sheared contact N48°W/85°NE

N8 N63°W/39°SW planar surface which offsets units 2d1 and 2a (relative up on east)

N9 open fracture at top, closes at bottom of trench

N10 two subparallel curviplanar surfaces N27°W/84°SW (across trench)

Trench T-12



Trench T-12 Explanation (Scale: 1" = 5')

Colluvium

Unit 1a: Fat CLAY: v. dark gray-brown, damp, very stiff to hard, blocky, extensive expansion cracks

Unit 1b: Fat silty CLAY: dark olive brown, damp, hard, blocky w/ prismatic peds, deep desiccation cracks, caliche precipitant locally

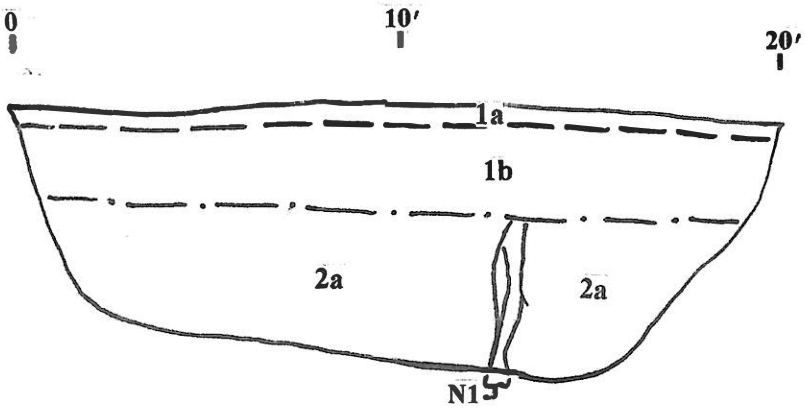
Santa Clara Formation (Arastradero facies)

Unit 2a: Claystone: very dk gray-brown, damp, hard (pp = 3.5 tsf), moderately difficult to excavate, expansion cracks throughout

Notes:

N_1 multiple anastomosing surfaces (fault)

Trench T-13



Trench T-13 Explanation (Scale: 1" = 5')

Colluvium

Unit 1a: Fat CLAY: v. dark gray-brown, damp, very stiff to hard, blocky, extensive expansion cracks

Unit 1b: Fat silty CLAY: dark olive brown, damp, hard, blocky w/ prismatic peds, deep desiccation cracks, caliche precipitant locally

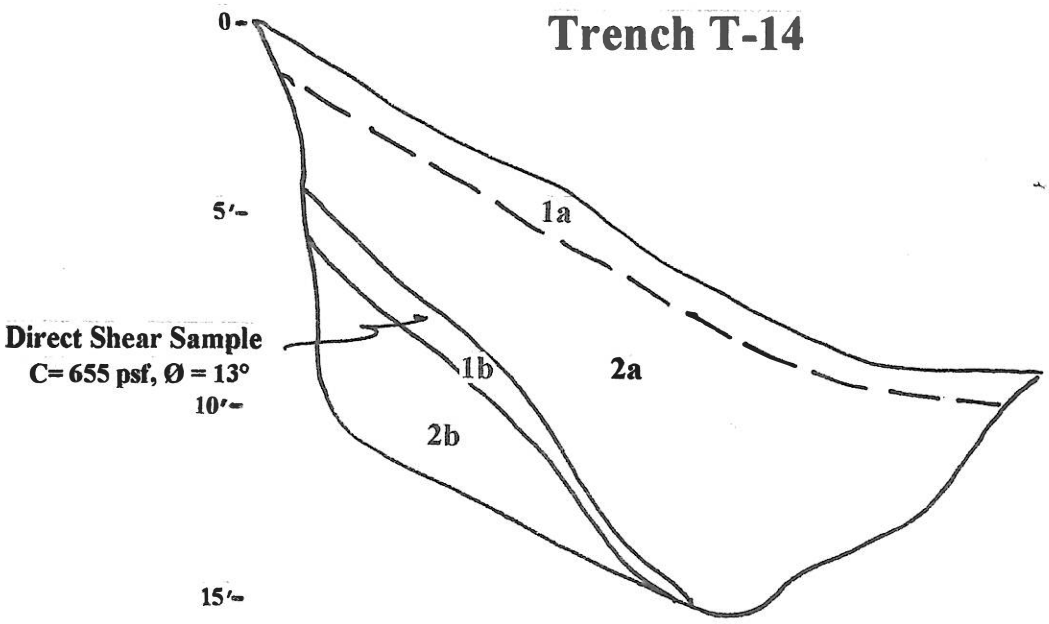
Santa Clara Formation (Arastradero facies)

Unit 2a: Claystone: very dk gray-brown, damp, hard (pp = 3.5 tsf), moderately difficult to excavate, expansion cracks throughout

Notes:

N_1 multiple subparallel surfaces (fault)

Trench T-14



Trench T-14 Explanation (Scale: 1"=5')

Residual soil/Colluvium

Unit 1a: clayey SILT: Dark olive brown; damp, firm (easy to excavate)

Unit 1b: silty CLAY: Dark olive brown; damp, firm (easy to excavate). Landslide basal shear material

Santa Clara Formation (Arastradero facies)

Unit 2a: Clayey SAND (Conglomerate): Med. brown; damp, medium dense (easy to excavate) Old slide debris (displaced formational material)

Unit 2b: Sandstone: medium yellow brown, damp, medium dense, relatively easy to excavate, fractured,

Notes:

N_1 Ols basal shear material
(direct shear: C = 655 tsf, ø = 13°)

QUANTUM GEOTECHNICAL, INC.				
		Project No. Proj. E041.G	Drawn by:	

Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-1 **Sheet 1 of 2**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119

Date(s) Drilled **6/22/15**	Logged By **CSH**	Checked By
Drilling Method **Hollow Stem / Rock Coring**	Drill Bit Size/Type **8-inch O.D.**	Total Depth of Borehole **45 feet bgs**
Drill Rig Type **CME 55**	Drilling Contractor **Britton Exploration**	Approximate Surface Elevation
Groundwater Level and Date Measured **None Encountered**	Sampling Method(s) **California, Modified California, Pitcher, SPT**	Hammer Data **Auto**
Borehole Backfill	Location **See Site Plan, Lot 6**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	0				Claystone		Claystone: olive						
							Straight Drilling to 15' (no sampling).						
	5												
					Claystone		- change to dark gray						
	10												
	15		1-1	37	Claystone		Claystone: dark blue-gray, damp, very stiff, possible CaCo3 veining						
			1-2	43									
			1-3	57									
				41	Siltstone		dark gray						
	20		1-4	50 5"									
					Siltstone		Silty Sandstone: very dark gray, damp, very dense						
			5	70			- bedding w/ 12 to 18 deg., strike N25W, dip 12 to 18 deg NE (into slope)						
	25				Claystone		Claystone: similar to above						
					Sandstone		Sandstone: very dark gray, medium dense (weak?), damp						
					Claystone		Claystone: sheared						
	30												

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Project: **Masson Estates**
Project Location: **14831 Pierce Road, Saratoga**
Project Number: **E041.G**

Log of Boring B-1
Sheet 2 of 2

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Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	30				Claystone		Claystone/Siltstone: interbedded, dipping 14 deg. into slope						
	35			23 50 5.5"			Siltstone/Claystone: 40 degree dipping contact into the slope						
	40				Siltstone		Siltstone: very dark grayish-brown						
	45				Sandstone		Sandstone: medium gray, full recovery, Strike N55degreesWest, dipping 8 deg NE Bottom of Boring at 45 ft. No groundwater was encountered.						
	50												
	55												
	60												
	65												

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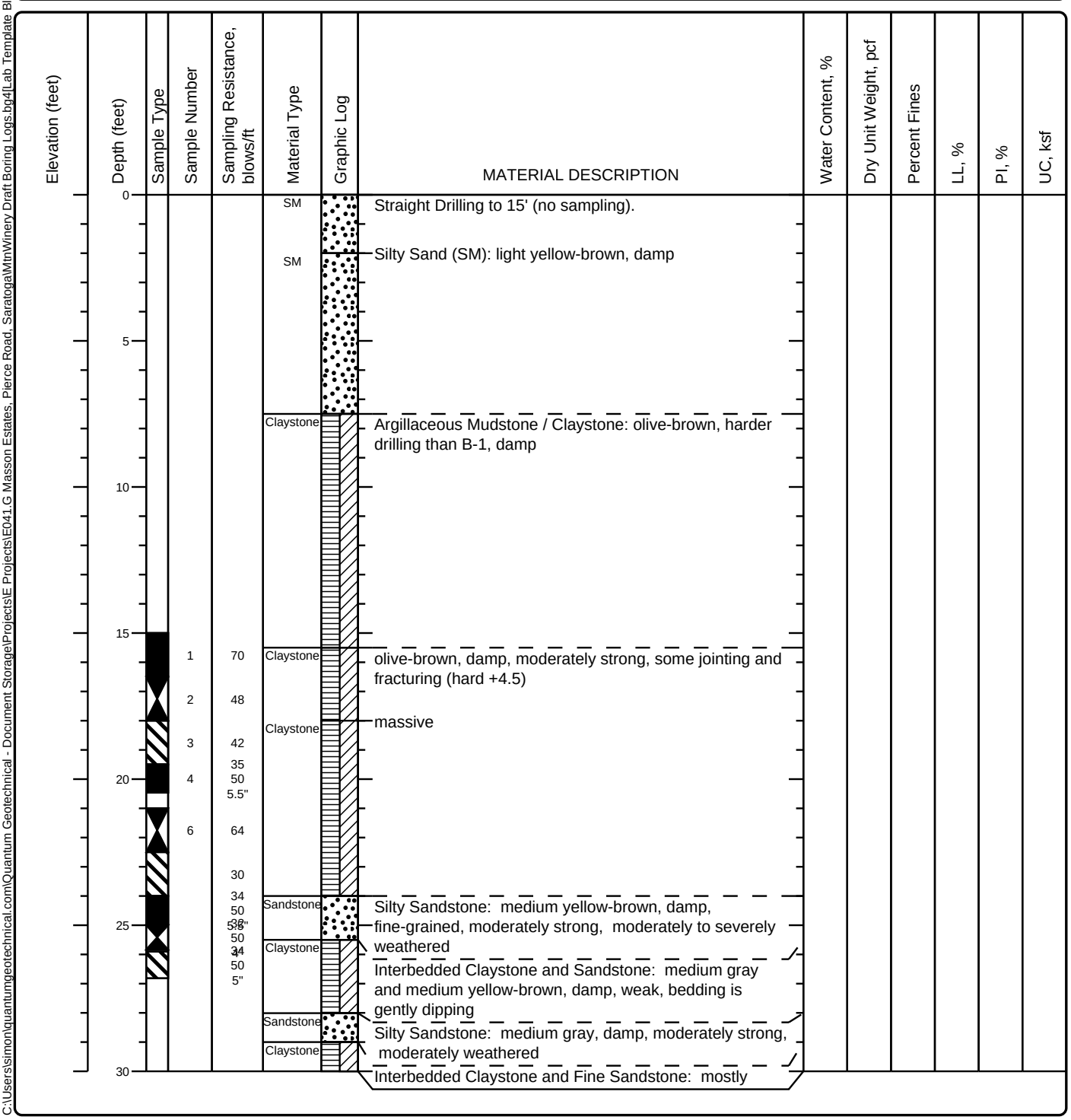
Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-2 **Sheet 1 of 2**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119

Date(s) Drilled **6/22/15**	Logged By **CSH**	Checked By
Drilling Method **Hollow Stem / Rock Coring**	Drill Bit Size/Type **8-inch O.D.**	Total Depth of Borehole **37.5 feet bgs**
Drill Rig Type **CME 55**	Drilling Contractor **Britton Exploration**	Approximate Surface Elevation
Groundwater Level and Date Measured **None Encountered**	Sampling Method(s) **California, Modified California, SPT**	Hammer Data **Auto**
Borehole Backfill	Location **See Site Plan, Lot 2**	



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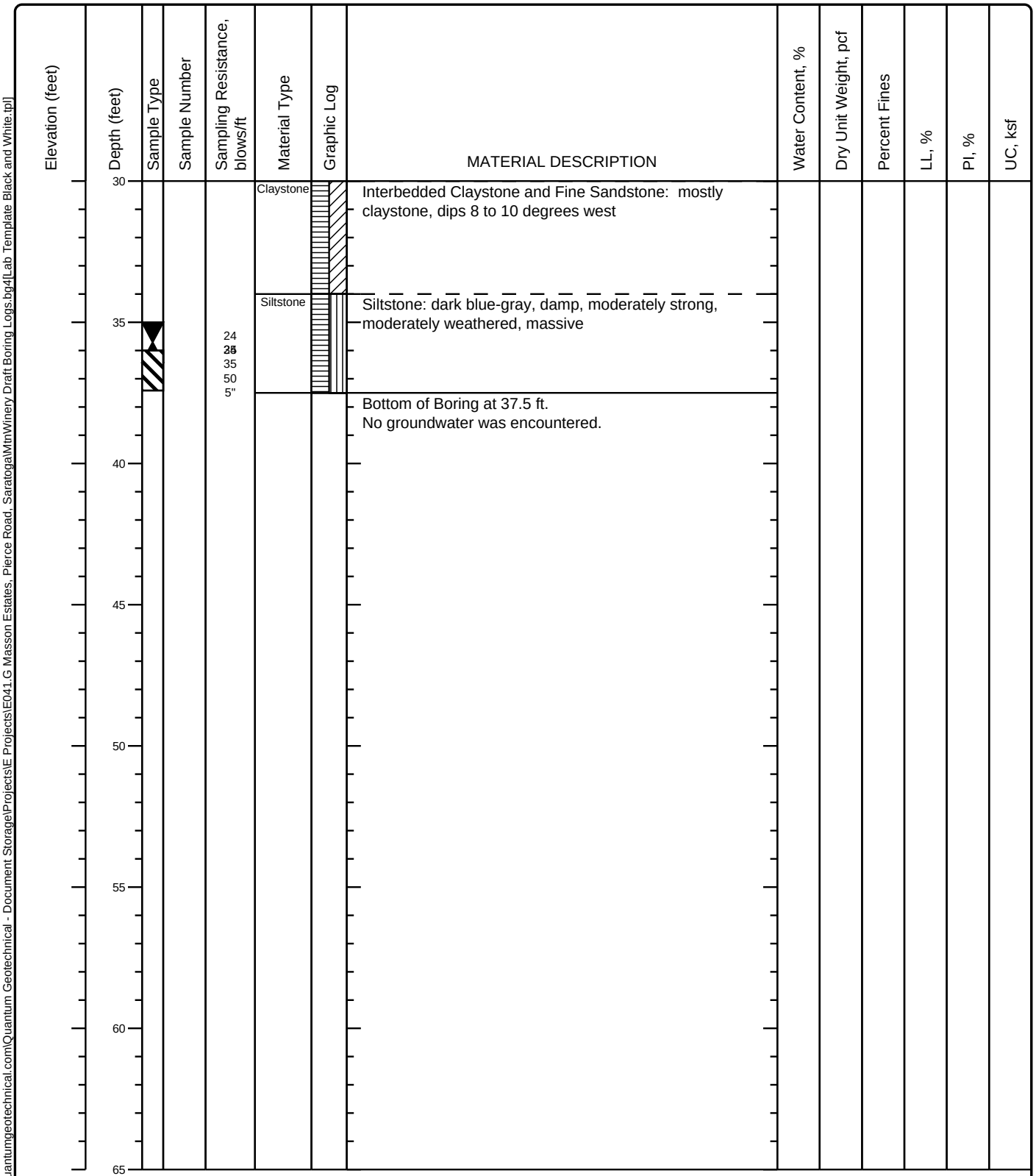
Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-2 **Sheet 2 of 2**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119



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Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-3 **Sheet 1 of 2**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119

Date(s) Drilled **6/22/15**	Logged By **CSH**	Checked By
Drilling Method **Hollow Stem / Rock Coring**	Drill Bit Size/Type **8-inch O.D.**	Total Depth of Borehole **35.5 feet bgs**
Drill Rig Type **CME 55**	Drilling Contractor **Britton Exploration**	Approximate Surface Elevation
Groundwater Level and Date Measured **None Encountered**	Sampling Method(s) **California, Modified California, SPT**	Hammer Data **Auto**
Borehole Backfill	Location **See Site Plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	0				Claystone		Straight Drilling to 7' (no sampling).						
							Claystone: olive-gray (cuttings)						
							[Drilling on bench next to nose of ridge.] - relatively easy drilling						
	5						- increased drilling resistance						
			1	28	Claystone		Claystone: greenish-gray, damp, weak, locally fractured and sheared						
			2	29									
	10		3	27			sheared with grooves on surfaces, PP +4.5 tsf						
			4	27			- bedding has apparent 12 to 14 deg dip (PP = +4.5 tsf)						
			5	26									
	15		6	42									
			7	45	Claystone		Decomposed to Clayey Silt w/ Sand (ML): orange-brown, some medium to coarse sand within						
			8	16	ML		Sandy Silt (ML) - olive-green, damp, medium stiff (very weak/decomposed rock)						
				16	Siltstone		Siltstone: moderately strong (PP +4.5 tsf)						
	20		9	50 5.5"	Claystone		Claystone: dark greenish-gray, damp, weak, massive, jointed and sheared						
			10	58									
			11	46									
			12	43			orange-brown staining on joint surfaces, pervasively fractured, somewhat rough surfaces						
	25		13	62									
			124	43									
			14	46									
	30		15	29	Sandstone		Silty Sandstone: blue-gray, damp, medium dense						

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Project: **Masson Estates**
Project Location: **14831 Pierce Road, Saratoga**
Project Number: **E041.G**

Log of Boring B-3
Sheet 2 of 2

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Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	30		15	29	Siltstone		Sandy Siltstone: similar to sandstone, but finer grained						
			16	41									
			17	45									
	35		18	78	Claystone		Claystone: dark blue-gray, damp, weak, typically massive, rare jointing or shearing						
							Bottom of Boring at 35.5 ft. No groundwater was encountered.						
	40												
	45												
	50												
	55												
	60												
	65												

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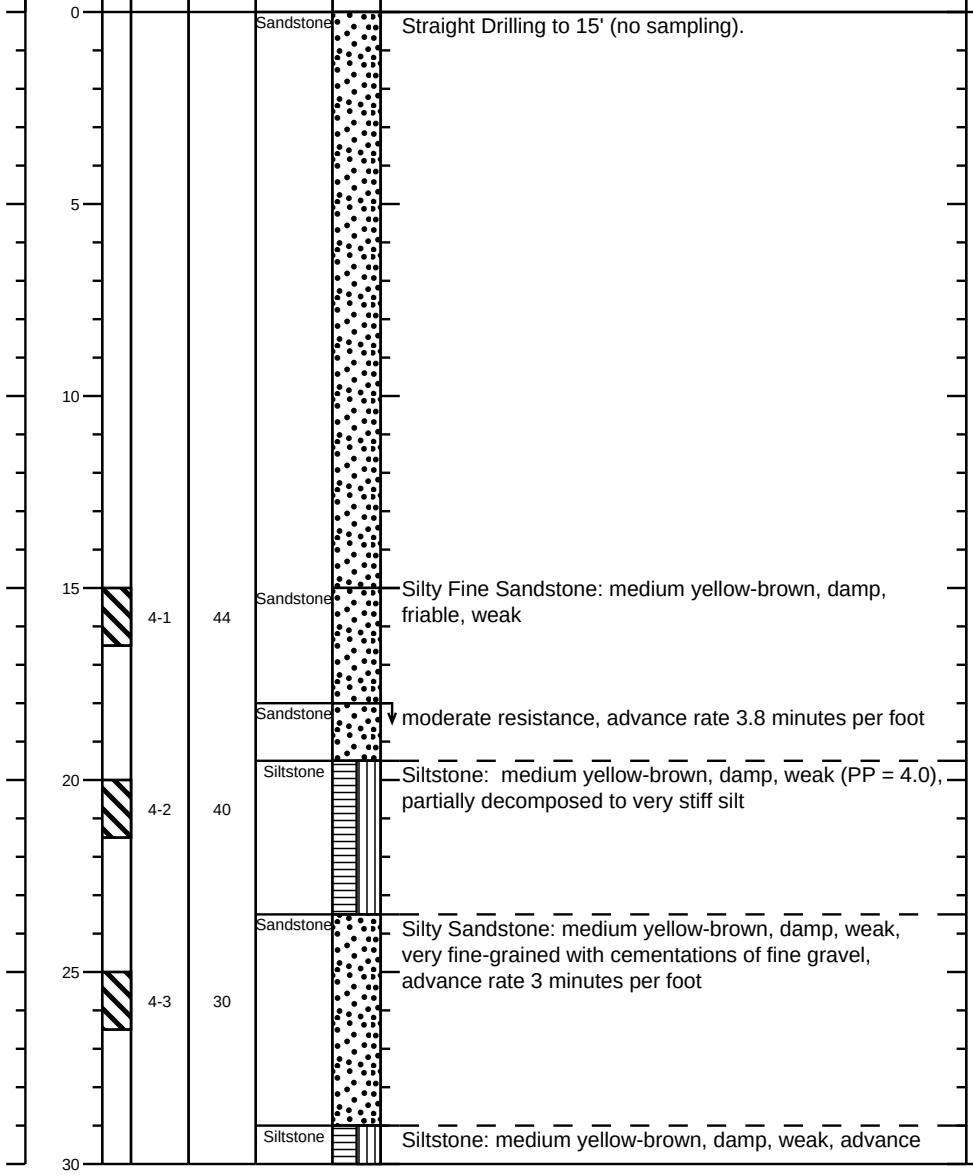
Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-4 **Sheet 1 of 2**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119

Date(s) Drilled **6/23/19**	Logged By **CSH**	Checked By
Drilling Method **Solid Flight**	Drill Bit Size/Type	Total Depth of Borehole **48 feet bgs**
Drill Rig Type	Drilling Contractor	Approximate Surface Elevation
Groundwater Level and Date Measured **None Encountered**	Sampling Method(s) **Modified California, SPT**	Hammer Data **Auto**
Borehole Backfill	Location **See Site Plan, Lot 11 (Upper)**	



Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf

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Project: **Masson Estates**
Project Location: **14831 Pierce Road, Saratoga**
Project Number: **E041.G**

Log of Boring B-4
Sheet 2 of 2

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Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	30		4-4	28	Siltstone		Siltstone: medium yellow-brown, damp, weak, advance rate 3 minutes per foot						
	35		4-5	41	Sandstone		Silty Sandstone: light yellow-brown, damp, some fine gravel, weak, advance rate is 3.5 minutes per foot						
	40		4-6	26			Sandstone continues: weak, very fine-grained						
	45		4-7	32									
			4-8	37									
	50						Bottom of Boring at 48 ft. No groundwater was encountered.						
	55												
	60												
	65												

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Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-5 **Sheet 1 of 2**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119

Date(s) Drilled **6/24/15**	Logged By **DT**	Checked By
Drilling Method **Solid Flight**	Drill Bit Size/Type	Total Depth of Borehole **48 feet bgs**
Drill Rig Type **CME 55**	Drilling Contractor **Britton Exploration**	Approximate Surface Elevation
Groundwater Level and Date Measured **None Encountered**	Sampling Method(s) **SPT**	Hammer Data **Auto**
Borehole Backfill	Location **See Site Plan, Lot 10 (Bldg Site 51)**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	0				CL		Silty CLAY (CL), brown, dry, medium stiff, trace pebbles of claystone						
							Straight Drilling to 15' (no sampling).						
	5												
	10												
					Claystone		Claystone: dark brown, dry, weak, highly weathered, mottled w/ iron stains						
	15		5-1	66									
							- change to dark gray, increased iron stains						
	20		5-2	38 50 5"			- trace caliche mineralization						
	25		5-3	42 50 3"									
	30												

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Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-5 **Sheet 2 of 2**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	30		5-4	38 50 4"	Claystone		Claystone continues: dark gray w/ iron stains						
	35		5-5	38 50 4"									
	40		5-6	27 50 6"			- apparent shear zone						
	45		5-7	41									
	50						Bottom of Boring at 47.5 ft. No groundwater was encountered.						
	55												
	60												
	65												

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Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-6 **Sheet 1 of 2**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119

Date(s) Drilled **6/24/15**	Logged By **DT**	Checked By
Drilling Method **Solid Flight**	Drill Bit Size/Type	Total Depth of Borehole **46.5 feet bgs**
Drill Rig Type **CME 55**	Drilling Contractor **Britton Exploration**	Approximate Surface Elevation
Groundwater Level and Date Measured **None Encountered**	Sampling Method(s) **SPT**	Hammer Data **Auto**
Borehole Backfill	Location **See Site Plan, Lot 8**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	0				ML		Sandy SILT (ML), light brown, dry, medium stiff, fine sand, trace gravel						
							Straight Drilling to 20' (no sampling).						
	5												
	10												
	15												
	20		6-1	27 50 6"	Siltstone		Siltstone: light brown, dry, weak, weathered, trace iron stains						
			6-2	50									
			6-3	50 6"									
	25		6-4	80 27									
			6-5	50 4"			Conglomerate: light brown to dark gray with purple manganese stains, apparently medium dense, loose sandstone clasts mixed with hard to soft siltstone [Santa Clara Formation]						
			6-6	85									
			6-7	91									
	30												

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Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-6 **Sheet 2 of 2**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	30		6-8	53			Conglomerate: light brown to dark gray with purple manganese stains, apparently medium dense, loose sandstone clasts mixed with hard to soft siltstone [Santa Clara Formation]						
			6-9	45									
	35		6-10	34									
	40		6-11	35			- at 41.5 ft color change to dark gray with mottled light brown sandstone						
	45		6-12	30									
							Bottom of Boring at 46.5 ft. No groundwater was encountered.						
	50												
	55												
	60												
	65												

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Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-7 **Sheet 1 of 2**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119

Date(s) Drilled **6/25/15**	Logged By **DT**	Checked By
Drilling Method **Solid Flight**	Drill Bit Size/Type	Total Depth of Borehole **44.5 feet bgs**
Drill Rig Type **CME 55**	Drilling Contractor **Britton Exploration**	Approximate Surface Elevation
Groundwater Level and Date Measured **None Encountered**	Sampling Method(s) **California, Modified California, SPT**	Hammer Data **Auto**
Borehole Backfill	Location **See Site Plan, Lot 11**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	0				CL		Silty CLAY (CL), grayish-brown, dry, medium stif						
	5				Claystone		Claystone: dark grayish-brown, dry, weak, soft rock, highly weathered						
	10				Siltstone		Siltstone: light brown, dry, weak, soft rock, highly weathered, iron staining						
	15		7-1	59			- multiple fracture planes visible in shoe of sampler						
			7-2	51									
	20		7-3	40	Sandstone		Sandstone: light brown, dry, soft rock, medium to fine rounded sand, soft rock						
					Claystone		Claystone: dark brown to dark gray, dry, soft rock, highly weathered, iron staining						
	25		7-4	30 50 5"	Sandstone		Sandstone: olive-brown, dry, sugary fine rounded sand, medium dense, iron stains, very fine structure visible						
			7-5	69	Siltstone		Siltstone: dark grayish-brown, soft rock, visible fine structure						
	30												

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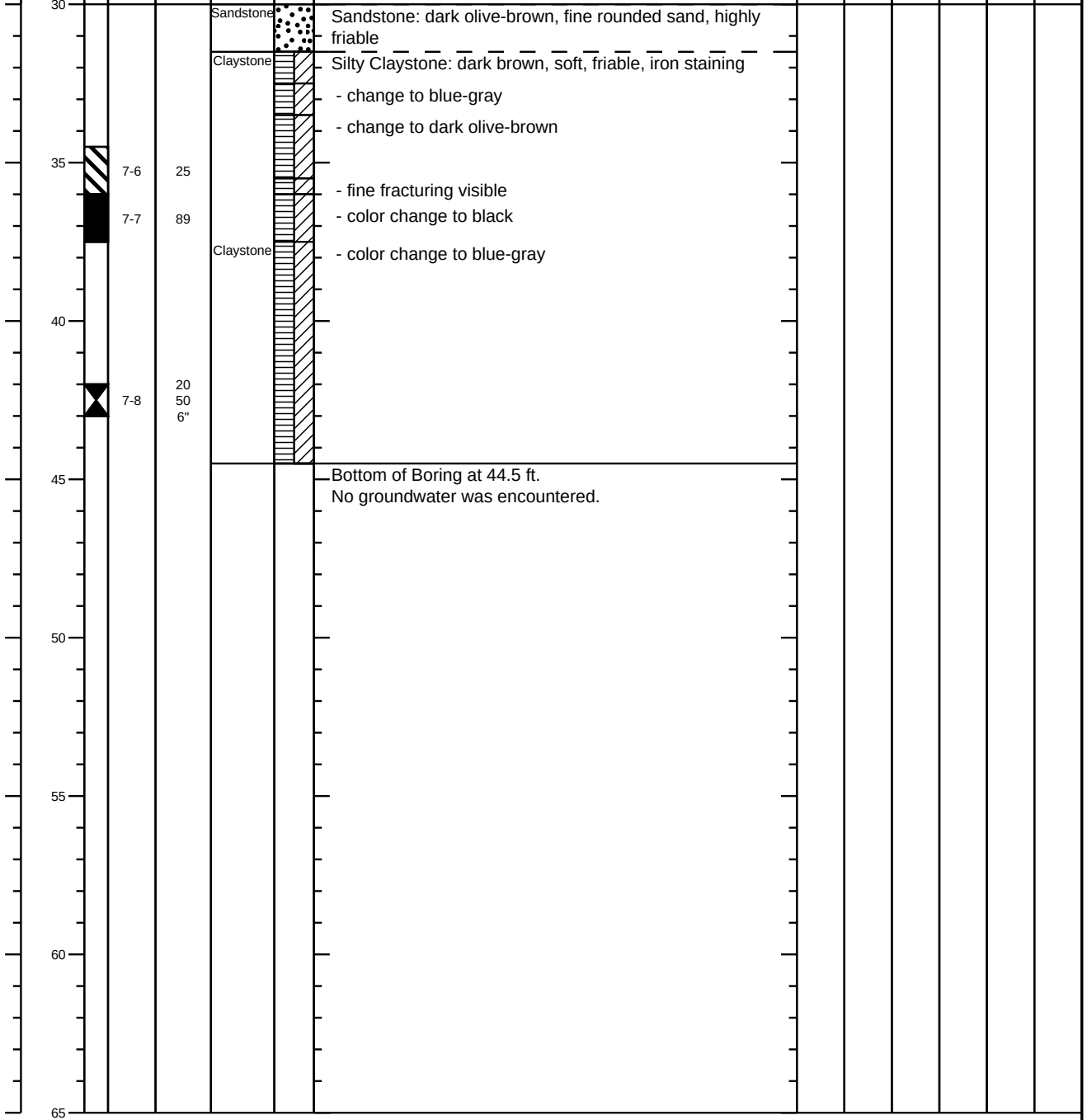
Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-7 **Sheet 2 of 2**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119



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Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-8 **Sheet 1 of 2**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119

Date(s) Drilled **9/13/23**	Logged By **JF**	Checked By
Drilling Method **Solid Flight**	Drill Bit Size/Type	Total Depth of Borehole **35.8 feet bgs**
Drill Rig Type **Soil Ranger (CME 45)**	Drilling Contractor **West Coast Exploration**	Approximate Surface Elevation
Groundwater Level and Date Measured **None Encountered**	Sampling Method(s) **Modified California, SPT**	Hammer Data **Cathead and Rope**
Borehole Backfill	Location **See Site Plan, Lot 11**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	0		8-1	43	SC		Clayey SAND (SC), yellowish-brown, damp, medium dense, fine sand, low to moderate plasticity clay fines [COLLUVIUM]						
	5		8-2	41	CL		Sandy CLAY (CL) - olive-brown, slightly moist (damp), stiff [WX. CLAYSTONE/RESIDUAL SOILS]						
	10		8-3	30 50 5"	Claystone		CLAYSTONE: olive-brown with reddish-yellow stains, moderately soft, weak, highly weathered, few subangular clasts [Qsc]						
			8-4	67	Siltstone		SILTSTONE: light olive-brown, damp, weak, soft rock, highly weathered, iron staining						
	15		8-5	30 50 6"			- moderately hard, sandstone clasts in siltstone matrix						
	20												
					Sandstone		SANDSTONE: light olive-brown with yellow-brown stains, pale grey veins, dry, moderately soft rock, medium to fine rounded sand						
	25		8-6	38 50 6"									
	30												

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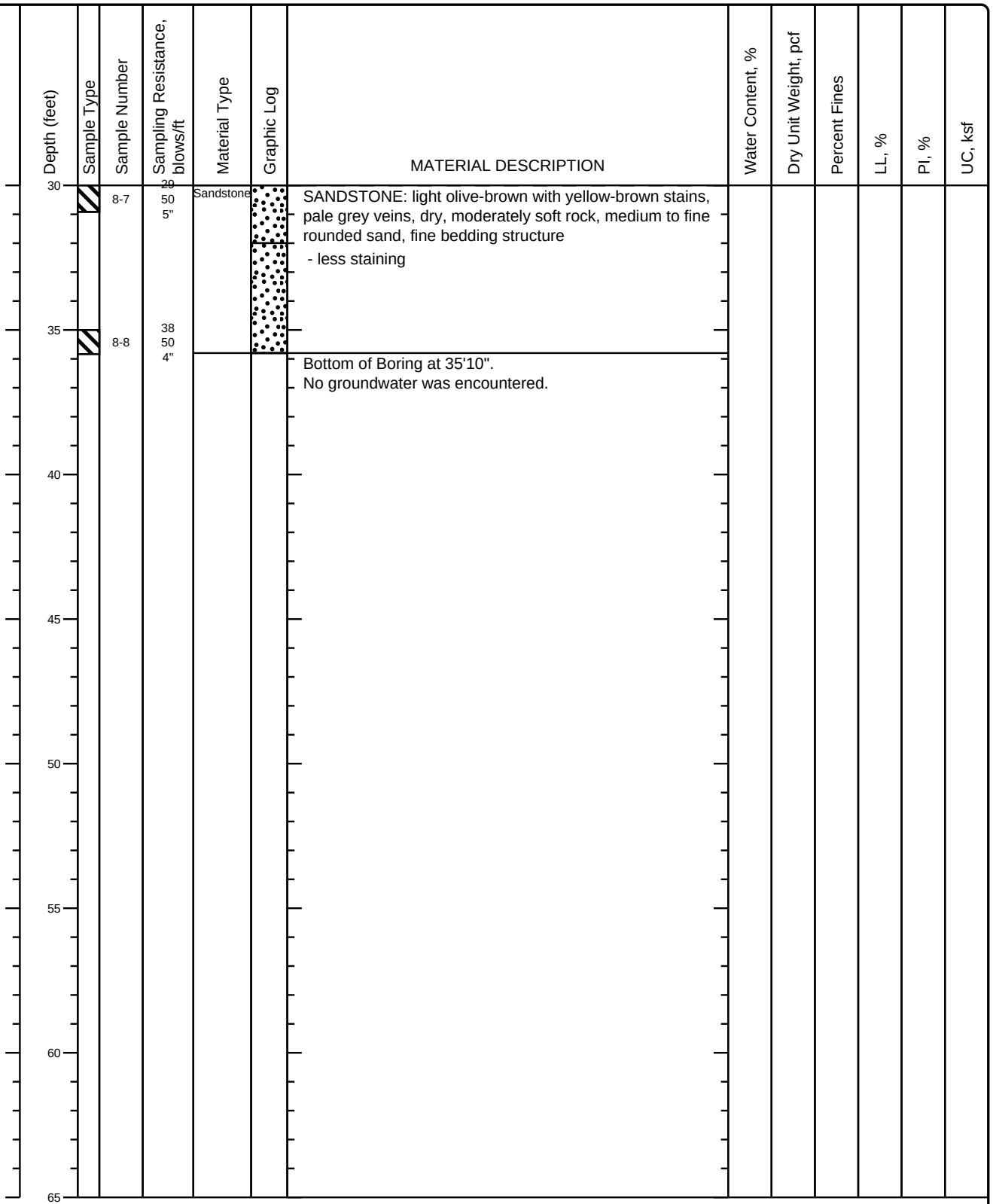
Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-8 **Sheet 2 of 2**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119



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Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-9 **Sheet 1 of 2**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119

Date(s) Drilled **9/12/23**	Logged By **JF**	Checked By
Drilling Method **Solid Flight**	Drill Bit Size/Type	Total Depth of Borehole **31.25 feet bgs**
Drill Rig Type **Soil Ranger (CME 45)**	Drilling Contractor **West Coast Exploration**	Approximate Surface Elevation
Groundwater Level and Date Measured **None Encountered**	Sampling Method(s) **Modified California, SPT**	Hammer Data **Auto**
Borehole Backfill	Location **See Site Plan, Lot 11**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	0		9-1	62	CH		Silty Fat CLAY (CH), dark gray, slightly moist (damp), hard, trace organics, highly plastic with deep expansion cracks [COLLUVIUM]						
					CL		Sandy CLAY (CL) - patchy gray and yellowish-brown, slightly moist, very stiff						
	5		9-2	52	Claystone		Sandy CLAY (CL): patchy gray and yellowish-brown, very stiff [RESIDUAL SOILS]						
			9-3	22 50 5"	Shale		SHALE: dark gray, angular cleavage and fissile, moderately soft, uniform texture, appears only lightly weathered						
	10		9-4	21 48 50 3"									
			9-5	50 6"									
	15												
	20		9-6	38 50 5"			- SHALE continues: dark gray, angular cleavage and fissile, moderately soft, uniform texture, appears only lightly weathered; typical drill rate is 1.5 to 2 minutes per foot						
	25												
	30												

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Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-9 **Sheet 2 of 2**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	30		9-7	50			- SHALE continues: dark gray, angular cleavage and fissile, moderately soft, uniform texture, appears only lightly weathered; typical drill rate is 2 minutes per foot						
			9-8	6" 49			Bottom of Boring at 31.25 ft.						
				50 3"			No groundwater was encountered.						
	35												
	40												
	45												
	50												
	55												
	60												
	65												

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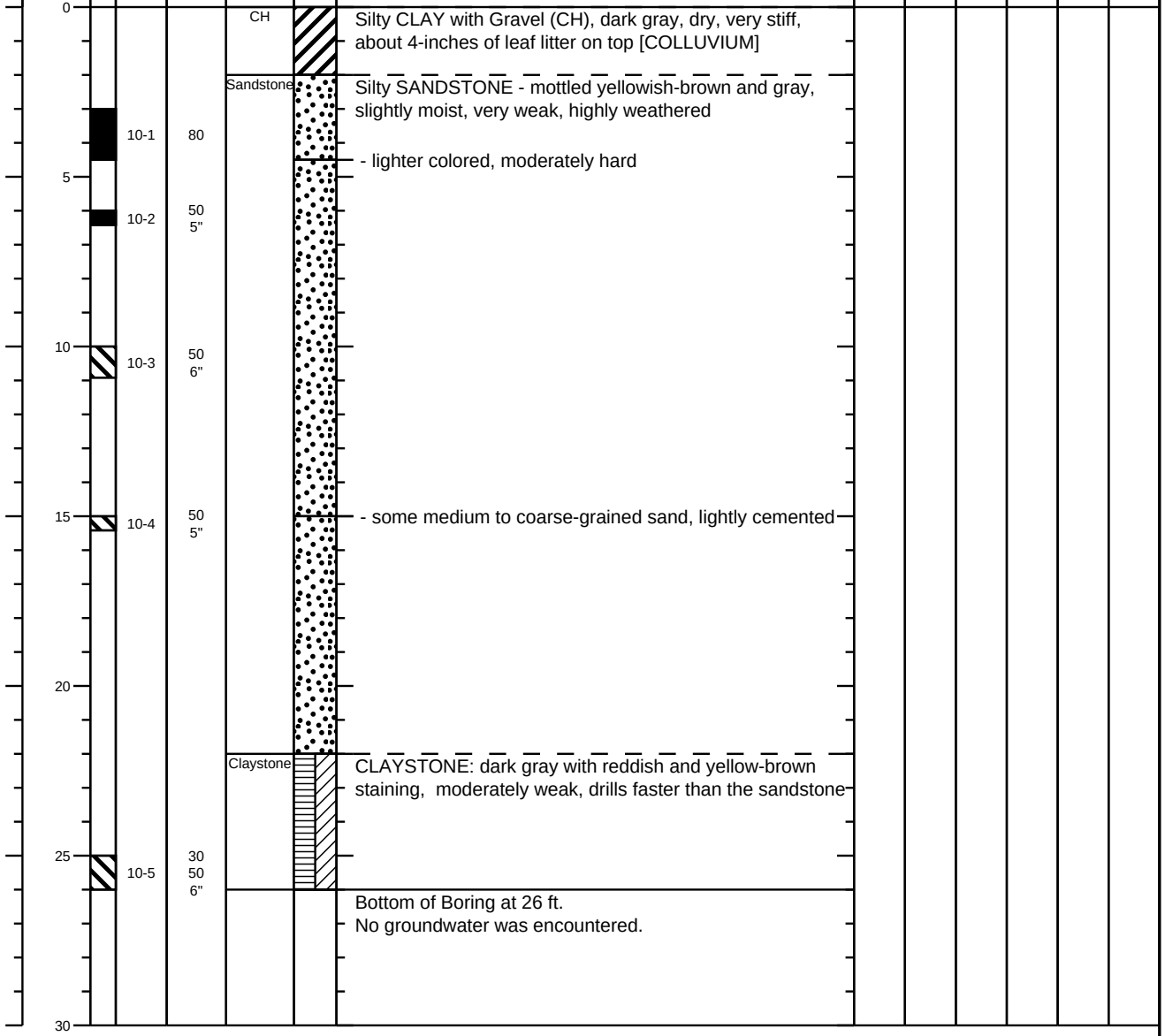
Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-10 **Sheet 1 of 1**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119

Date(s) Drilled **9/13/23**	Logged By **JF**	Checked By
Drilling Method **Solid Flight**	Drill Bit Size/Type	Total Depth of Borehole **26 feet bgs**
Drill Rig Type **Soil Ranger (CME 45)**	Drilling Contractor **West Coast Exploration**	Approximate Surface Elevation
Groundwater Level and Date Measured **None Encountered**	Sampling Method(s) **Modified California, SPT**	Hammer Data **Cathead and Rope**
Borehole Backfill	Location **See Site Plan**	



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Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-11 **Sheet 1 of 1**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119

Date(s) Drilled **9/20/23**	Logged By **JF**	Checked By
Drilling Method **Solid Flight**	Drill Bit Size/Type **6"**	Total Depth of Borehole **30 feet bgs**
Drill Rig Type **Track Mounted CME 55**	Drilling Contractor **Britton Exploration**	Approximate Surface Elevation
Groundwater Level and Date Measured **None Encountered**	Sampling Method(s) **Modified California, SPT**	Hammer Data **Automatic Trip**
Borehole Backfill	Location **See Site Plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	0				CH		Silty CLAY (CH), gray, dry, very stiff [COLLUVIUM]						
			11-1	9			- change to moist, medium stiff (firm), dark gray, few gravel						
					CL-CH		Sandy CLAY (CL-CH) - dark gray, moist, medium stiff, few white stains, few gravel						
	5		11-2	16									
			11-3	53	Claystone		CLAYSTONE - dark gray with reddish-brown mottles, damp, very stiff, few white stains, very weak or soft rock						
	10		11-4	62									
	15		11-4	87	Claystone		- change to hard, apparently weak rock, less weathered, reddish-brown veins, very finely bedded or laminated layers of clay						
	20												
			11-6	50 6"			- slightly weathered, dark gray, shaley cleavage, drilling indicates uniform and relatively soft, but moderately strong rock						
	25												
			11-7	65									
	30						Bottom of Boring at 30 ft.						

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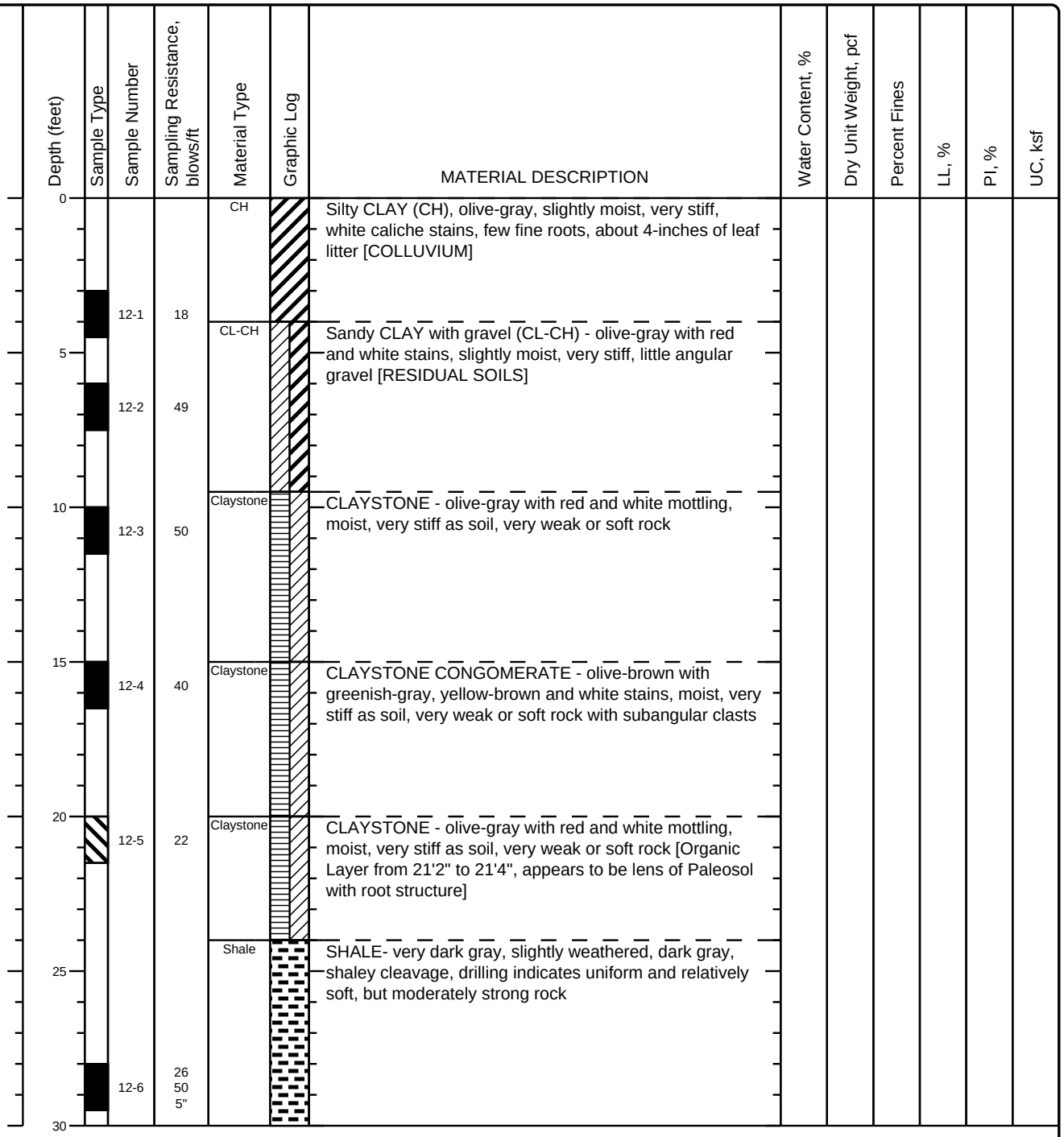
Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-12 **Sheet 1 of 2**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119

Date(s) Drilled **9/20/23**	Logged By **JF**	Checked By
Drilling Method **Solid Flight**	Drill Bit Size/Type **6"**	Total Depth of Borehole **35.5 feet bgs**
Drill Rig Type **Track Mounted CME 55**	Drilling Contractor **Britton Exploration**	Approximate Surface Elevation
Groundwater Level and Date Measured **None Encountered**	Sampling Method(s) **Modified California, SPT**	Hammer Data **Automatic Trip**
Borehole Backfill	Location **See Site Plan**	



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Project: **Masson Estates**
Project Location: **14831 Pierce Road, Saratoga**
Project Number: **E041.G**

Log of Boring B-12
Sheet 2 of 2

Quantum Geotechnical Inc.
6288 San Ignacio Ave., Ste. B
San Jose, Ca, 95119

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	30				Siltstone		SILTSTONE- blue-gray, slightly moist, appears moderately strong, silt and very fine-grained sand with clay binder						
	35		12-7	85			Bottom of Boring at 35.5 ft. No groundwater was encountered.						
	40												
	45												
	50												
	55												
	60												
	65												

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Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-13 **Sheet 1 of 1**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119

Date(s) Drilled **9/20/23**	Logged By **JF**	Checked By
Drilling Method **Solid Flight**	Drill Bit Size/Type **6"**	Total Depth of Borehole **26.5 feet bgs**
Drill Rig Type **Track Mounted CME 55**	Drilling Contractor **Britton Exploration**	Approximate Surface Elevation
Groundwater Level and Date Measured **None Encountered**	Sampling Method(s) **Modified California, SPT**	Hammer Data **Automatic Trip**
Borehole Backfill	Location **See Site Plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	0				SM-SC		SILTY, CLAYEY SAND (SC-SM), yellowish-brown, dry, loose, fine to medium sand, little silt and clay, slightly plastic, few gravel						
			13-1	16									
	5		13-2	36	CL		Sandy CLAY (CL), yellowish-brown, dry, very stiff loose, fine to medium sand, low plasticity clay, little angular gravel						
					Claystone		CLAYSTONE - light olive-brown, slightly moist, very stiff, faint bedding and rock fabric, soft drilling indicating very weak or soft rock						
	10		13-3	43									
	15		13-4	63			- harder rock, gray, angular cleavage in the clay						
	20		13-5	80	Siltstone		SILTSTONE - light olive-brown with yellow-brown and greenish-gray mottling, moderately weathered, moderately weak						
	25		13-6	84									
							Bottom of Boring at 26.5 ft. No groundwater was encountered.						
	30												

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Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Log of Boring B-12A **Sheet 1 of 1**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119

Date(s) Drilled **9/20/23**	Logged By **JF**	Checked By
Drilling Method **Solid Flight**	Drill Bit Size/Type **6"**	Total Depth of Borehole **22.5 feet bgs**
Drill Rig Type **Track Mounted CME 55**	Drilling Contractor **Britton Exploration**	Approximate Surface Elevation
Groundwater Level and Date Measured **None Encountered**	Sampling Method(s) **Modified California, SPT**	Hammer Data **Automatic Trip**
Borehole Backfill	Location **See Site Plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	0						Straight Drilled to 19.5 feet to investigate weak organic layer [3 feet west of B-12]						
	5												
	10												
	15												
	20		12A-1	33			CLAYSTONE - olive-gray with red and white mottling, moist, very stiff as soil, very weak or soft rock, not able to identify angular unconformity or organic layer identified in B-12						
			12A-2	21									
	25						Bottom of Boring at 22.5 ft. No groundwater was encountered.						
	30												

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Project: **Masson Estates** Project Location: **14831 Pierce Road, Saratoga** Project Number: **E041.G**	Key to Log of Boring **Sheet 1 of 1**	**Quantum Geotechnical Inc.** 6288 San Ignacio Ave., Ste. B San Jose, Ca, 95119

1 Elevation (feet)	2 Depth (feet)	3 Sample Type	4 Sample Number	5 Sampling Resistance, blows/ft	6 Material Type	7 Graphic Log	8 MATERIAL DESCRIPTION	9 Water Content, %	10 Dry Unit Weight, pcf	11 Percent Fines	12 LL, %	13 PI, %	14 UC, ksf

COLUMN DESCRIPTIONS

1 Elevation (feet): Elevation (MSL, feet).
2 Depth (feet): Depth in feet below the ground surface.
3 Sample Type: Type of soil sample collected at the depth interval shown.
4 Sample Number: Sample identification number.
5 Sampling Resistance, blows/ft: Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the hammer identified on the boring log.
6 Material Type: Type of material encountered.
7 Graphic Log: Graphic depiction of the subsurface material encountered.
8 MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
9 Water Content, %: Water content of the soil sample, expressed as percentage of dry weight of sample.
10 Dry Unit Weight, pcf: Dry weight per unit volume of soil sample measured in laboratory, in pounds per cubic foot.
11 Percent Fines: The percent fines (soil passing the No. 200 Sieve) in the sample. WA indicates a Wash Sieve, SA indicates a Sieve Analysis.
12 LL, %: Liquid Limit, expressed as a water content.
13 PI, %: Plasticity Index, expressed as a water content.
14 UC, ksf: Unconfined compressive strength, in kips per square foot.

FIELD AND LABORATORY TEST ABBREVIATIONS

CHEM: Chemical tests to assess corrosivity
COMP: Compaction test
CONS: One-dimensional consolidation test
LL: Liquid Limit, percent
PI: Plasticity Index, percent
SA: Sieve analysis (percent passing No. 200 Sieve)
UC: Unconfined compressive strength test, Qu, in ksf
WA: Wash sieve (percent passing No. 200 Sieve)

MATERIAL GRAPHIC SYMBOLS

- Fat CLAY, CLAY w/SAND, SANDY CLAY (CH)
- Lean CLAY, CLAY w/SAND, SANDY CLAY (CL)
- Lean-Fat CLAY, CLAY w/SAND, SANDY CLAY (CL-CH)
- Claystone
- Conglomerate
- SILT, SILT w/SAND, SANDY SILT (ML)
- Sandstone
- Clayey SAND (SC)
- Shale
- Siltstone
- Silty SAND (SM)
- Silty to Clayey SAND (SM-SC)

TYPICAL SAMPLER GRAPHIC SYMBOLS

- Auger sampler
- Bulk Sample
- 3-inch-OD California w/ brass rings
- CME Sampler
- Grab Sample
- 2.5-inch-OD Modified California w/ brass liners
- Pitcher Sample
- 2-inch-OD unlined split spoon (SPT)
- Shelby Tube (Thin-walled, fixed head)

OTHER GRAPHIC SYMBOLS

- Water level (at time of drilling, ATD)
- Water level (after waiting, AW)
- Minor change in material properties within a stratum
- Inferred/gradational contact between strata
- Queried contact between strata

GENERAL NOTES

1: Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive, and actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2: Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

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Figure B-1

APPENDIX C

Direct Shear Test Test Result

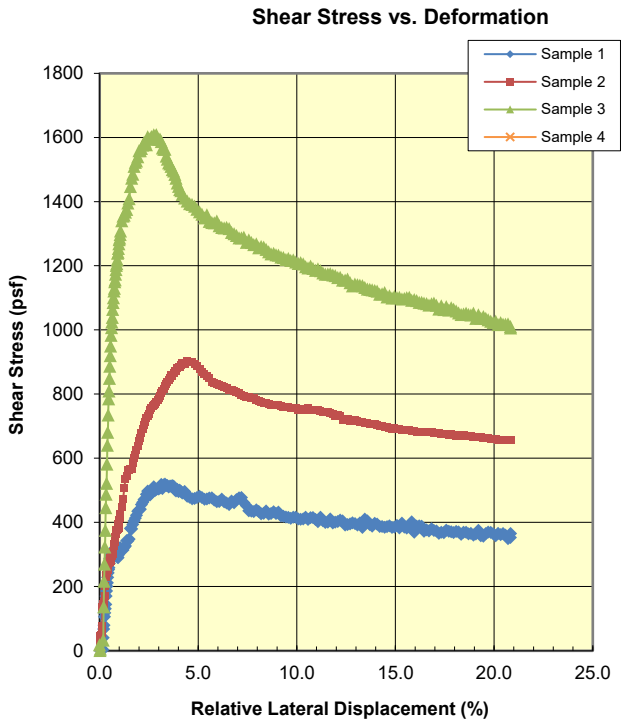
Unconfined Compression Test Result

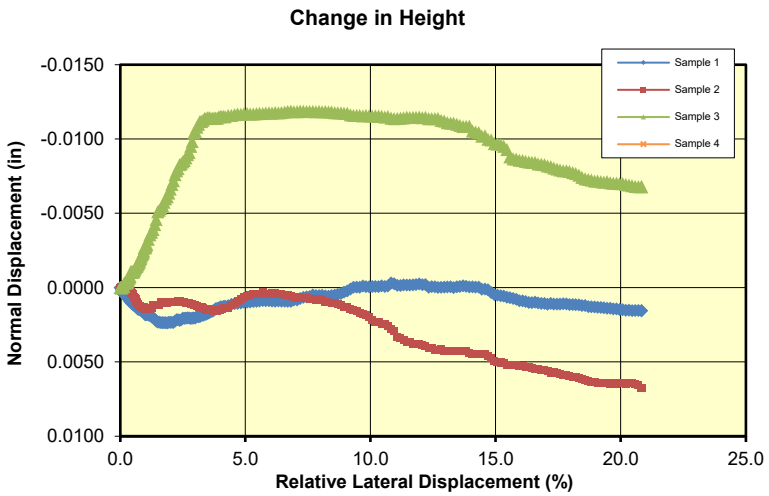
Consolidated Drained Direct Shear (ASTM D3080)

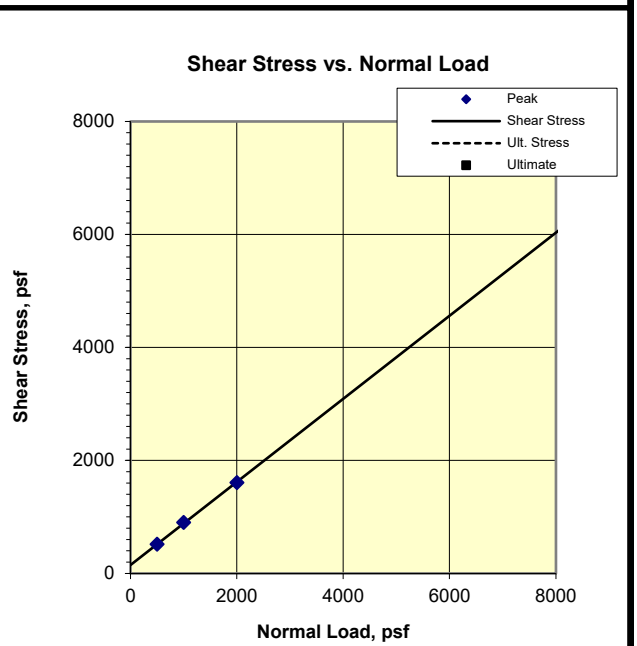
CTL Job #:	970-095	Project #:	E041.G	By:	MD
Client:	Quantum Geotechnical	Date:	10/26/2023	Checked:	PJ
Project Name:	Chateau Masson	Remolding Info:			

Specimen Data				
	1	2	3	4
Boring:	B-8	B-8	B-8	
Sample:	2	2	2	
Depth (ft):	5	5	5	
Visual Description:	Olive Brown Fat CLAY w/ Weathered Claystone	Olive Brown Fat CLAY w/ Weathered Claystone	Olive Brown Fat CLAY w/ Weathered Claystone	
Normal Load (psf)	500	1000	2000	
Dry Mass of Specimen (g)	117.4	118.1	123.8	
Initial Height (in)	1.00	1.00	1.00	
Initial Diameter (in)	2.40	2.40	2.40	
Initial Void Ratio	0.737	0.727	0.647	
Initial Moisture (%)	17.3	17.7	18.6	
Initial Wet Density (pcf)	116.0	117.0	123.7	
Initial Dry Density (pcf)	98.9	99.4	104.3	
Initial Saturation (%)	64.6	66.8	79.3	
ΔHeight Consol (in)	-0.0162	-0.0118	-0.0149	
At Test Void Ratio	0.765	0.747	0.671	
At Test Moisture (%)	27.7	27.0	23.8	
At Test Wet Density (pcf)	124.2	124.8	127.2	
At Test Dry Density (pcf)	97.3	98.3	102.7	
At Test Saturation (%)	99.6	99.3	97.6	
Strain Rate (%/min)	0.01	0.01	0.01	
Strengths Picked at	Peak	Peak	Peak	
Shear Stress (psf)	519	903	1609	
ΔHeight (in) at Peak	0.0019	0.0012	-0.0098	
Ultimate Stress (psf)				

Phi (deg)	36.3	Ult. Phi (deg)	
Cohesion (psf)	150	Ult. Cohesion (psf)	







Remarks:

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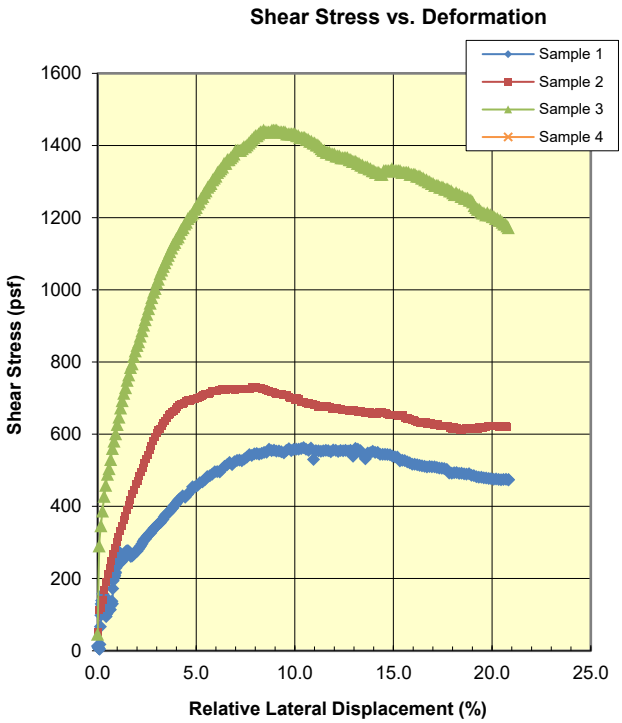
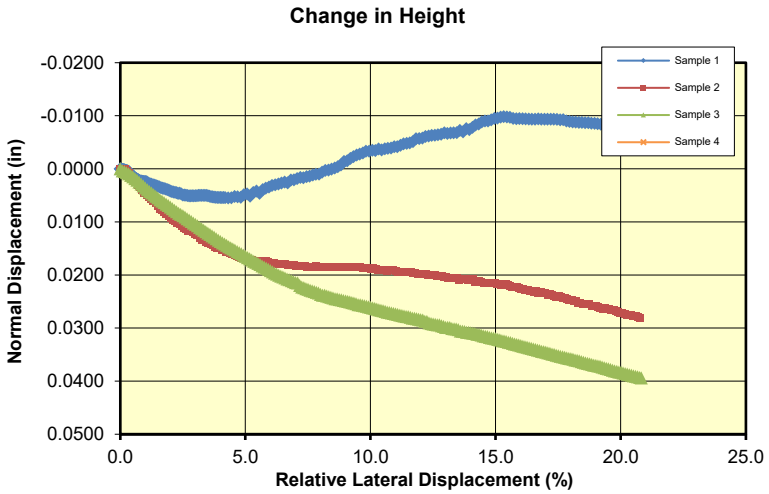
Consolidated Drained Direct Shear (ASTM D3080)

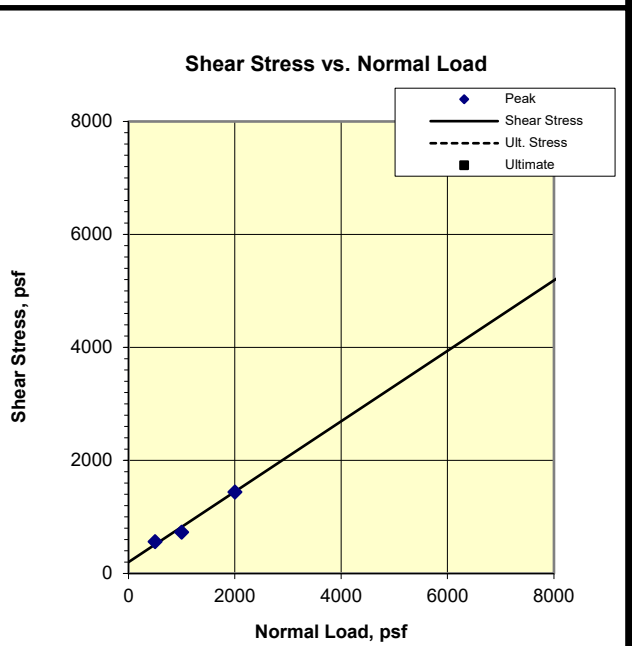
CTL Job #:	970-095	Project #:	E041.G	By:	MD
Client:	Quantum Geotechnical	Date:	10/23/2023	Checked:	PJ
Project Name:	Chateau Masson	Remolding Info:			

Specimen Data				
	1	2	3	4
Boring:	B-11	B-11	B-11	
Sample:	2	2	2	
Depth (ft):	5	5	5	
Visual Description:	Gray CLAY w/ claystone	Gray CLAY w/ claystone	Gray CLAY w/ claystone	
Normal Load (psf)	500	1000	2000	
Dry Mass of Specimen (g)	109.2	105.7	107.6	
Initial Height (in)	1.00	1.00	1.00	
Initial Diameter (in)	2.40	2.40	2.40	
Initial Void Ratio	0.833	0.893	0.860	
Initial Moisture (%)	22.3	21.9	22.0	
Initial Wet Density (pcf)	112.5	108.5	110.6	
Initial Dry Density (pcf)	92.0	89.0	90.6	
Initial Saturation (%)	72.4	66.2	69.1	
ΔHeight Consol (in)	-0.0065	0.0095	0.0291	
At Test Void Ratio	0.845	0.875	0.806	
At Test Moisture (%)	31.1	31.2	29.7	
At Test Wet Density (pcf)	119.8	117.9	121.1	
At Test Dry Density (pcf)	91.4	89.9	93.4	
At Test Saturation (%)	99.5	96.2	99.6	
Strain Rate (%/min)	0.01	0.01	0.01	
Strengths Picked at	Peak	Peak	Peak	
Shear Stress (psf)	563	731	1442	
ΔHeight (in) at Peak	-0.0036	0.0184	0.0242	
Ultimate Stress (psf)				

Phi (deg)	31.9	Ult. Phi (deg)	
Cohesion (psf)	200	Ult. Cohesion (psf)	







Remarks:

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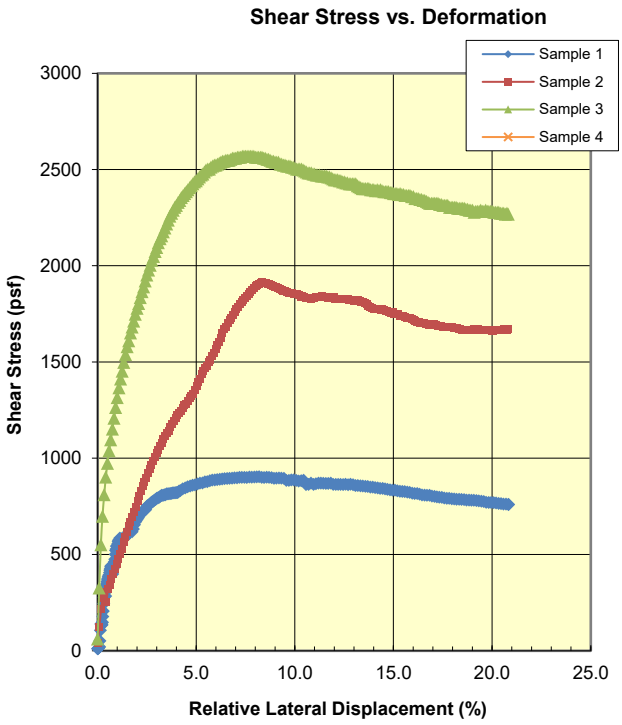
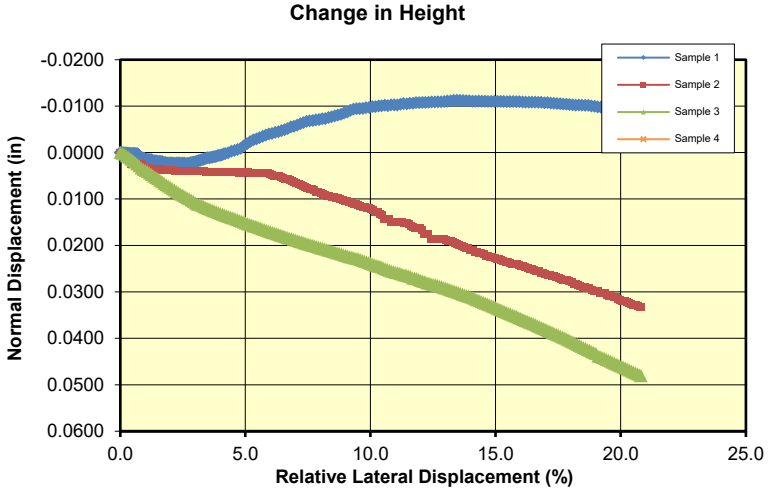
Consolidated Drained Direct Shear (ASTM D3080)

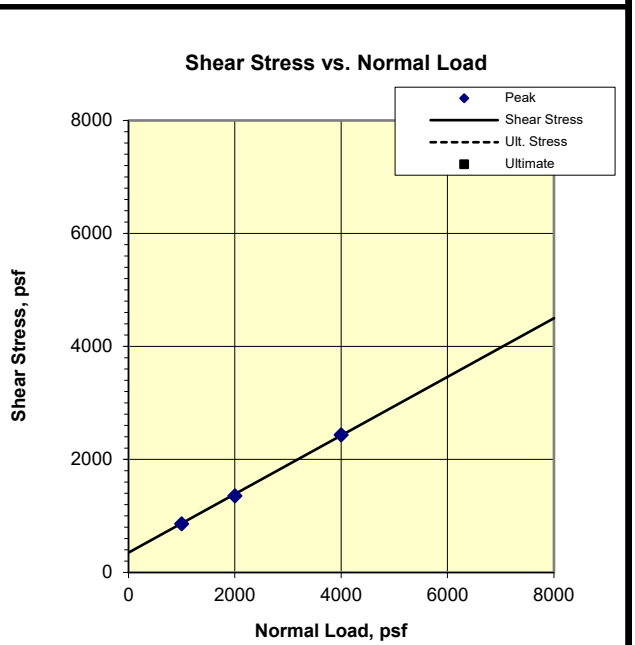
CTL Job #:	970-095	Project #:	E041G	By:	MD
Client:	Quantum Geotechnical	Date:	10/24/2023	Checked:	PJ
Project Name:	Chateau Masson	Remolding Info:			

Specimen Data				
	1	2	3	4
Boring:	B-11	B-11	B-11	
Sample:	4	4	4	
Depth (ft):	11	11	11	
Visual Description:	Olive Gray CLAY	Olive Gray CLAY	Olive Gray CLAY	
Normal Load (psf)	1000	2000	4000	
Dry Mass of Specimen (g)	110.0	114.0	113.1	
Initial Height (in)	1.00	1.00	1.00	
Initial Diameter (in)	2.40	2.40	2.40	
Initial Void Ratio	0.853	0.788	0.803	
Initial Moisture (%)	24.0	23.8	21.5	
Initial Wet Density (pcf)	114.9	118.8	115.7	
Initial Dry Density (pcf)	92.6	96.0	95.2	
Initial Saturation (%)	77.3	82.9	73.7	
ΔHeight Consol (in)	-0.0254	-0.0116	0.0091	
At Test Void Ratio	0.900	0.809	0.787	
At Test Moisture (%)	32.5	29.4	28.2	
At Test Wet Density (pcf)	119.7	122.8	123.1	
At Test Dry Density (pcf)	90.3	94.9	96.1	
At Test Saturation (%)	99.1	99.8	98.4	
Strain Rate (%/min)	0.01	0.01	0.01	
Strengths Picked at	5%	5%	5%	
Shear Stress (psf)	862	1357	2436	
ΔHeight (in) at 5%	-0.0015	0.0042	0.0149	
Ultimate Stress (psf)				

Phi (deg)	27.4	Ult. Phi (deg)	
Cohesion (psf)	350	Ult. Cohesion (psf)	







Remarks:

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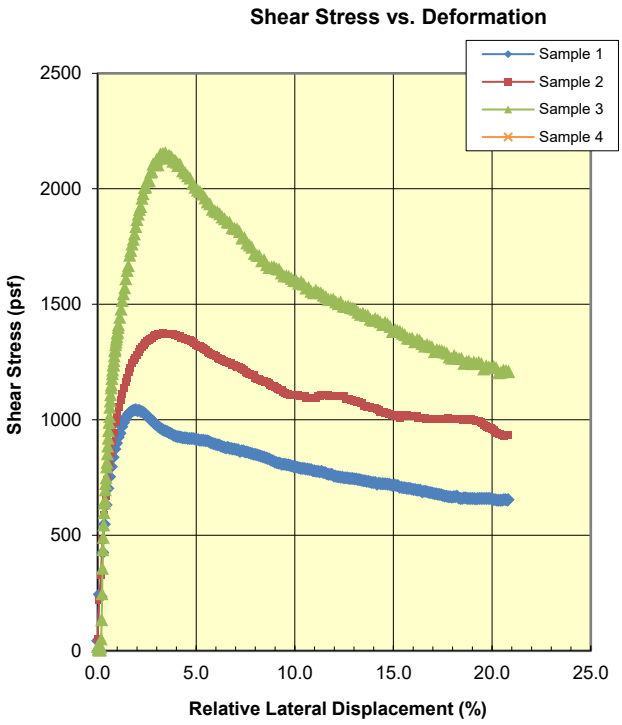
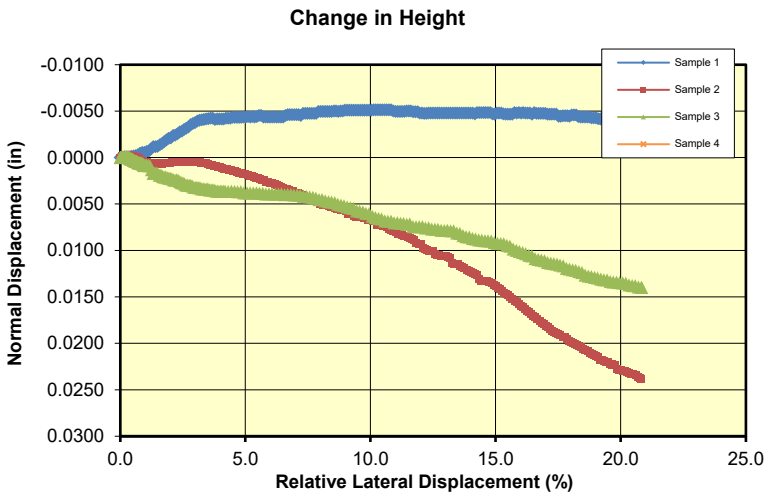
Consolidated Drained Direct Shear (ASTM D3080)

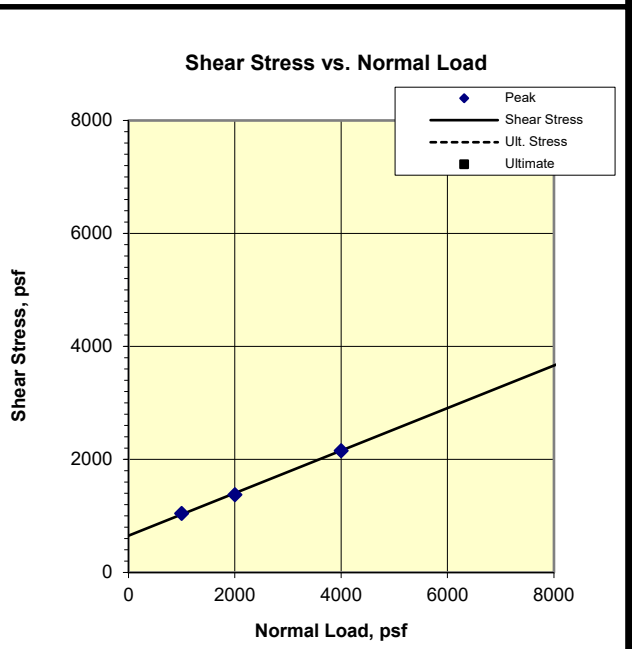
CTL Job #:	970-095	Project #:	E041G	By:	MD
Client:	Quantum Geotechnical	Date:	10/26/2023	Checked:	PJ
Project Name:	Chateau Masson	Remolding Info:			

Specimen Data				
	1	2	3	4
Boring:	B-12A	B-12A	B-12A	
Sample:	1B	1B	1B	
Depth (ft):	20.5	20.5	20.5	
Visual Description:	Gray CLAY w/ Claystone	Gray CLAY w/ Claystone	Gray CLAY w/ Claystone	
Normal Load (psf)	1000	2000	4000	
Dry Mass of Specimen (g)	105.6	106.6	106.8	
Initial Height (in)	1.00	1.00	1.00	
Initial Diameter (in)	2.40	2.40	2.40	
Initial Void Ratio	0.930	0.913	0.909	
Initial Moisture (%)	31.3	30.5	31.2	
Initial Wet Density (pcf)	116.8	117.1	118.0	
Initial Dry Density (pcf)	88.9	89.7	90.0	
Initial Saturation (%)	92.6	92.0	94.3	
ΔHeight Consol (in)	-0.0310	-0.0184	-0.0047	
At Test Void Ratio	0.990	0.948	0.917	
At Test Moisture (%)	35.9	34.2	32.9	
At Test Wet Density (pcf)	117.2	118.2	119.0	
At Test Dry Density (pcf)	86.3	88.1	89.5	
At Test Saturation (%)	99.6	99.2	98.7	
Strain Rate (%/min)	0.01	0.01	0.01	
Strengths Picked at	Peak	Peak	Peak	
Shear Stress (psf)	1044	1376	2156	
ΔHeight (in) at Peak	-0.0021	0.0006	0.0034	
Ultimate Stress (psf)				

Phi (deg)	20.6	Ult. Phi (deg)	
Cohesion (psf)	650	Ult. Cohesion (psf)	







Remarks:

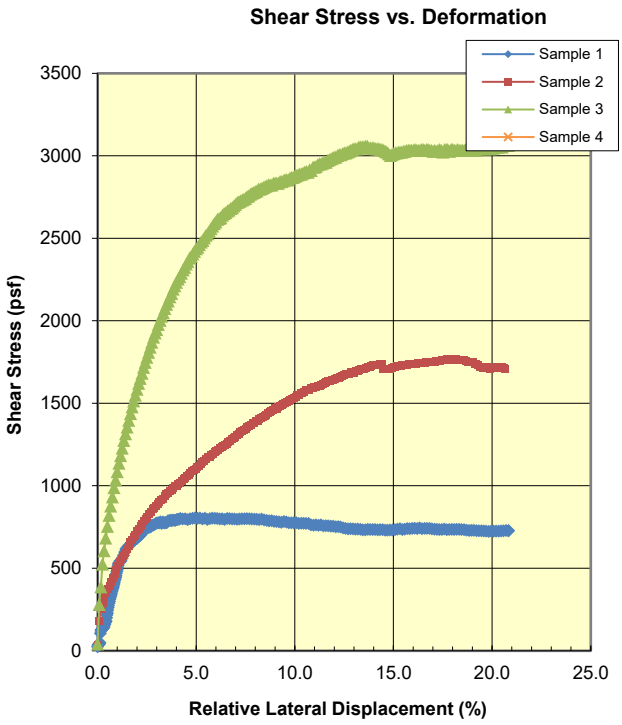
©

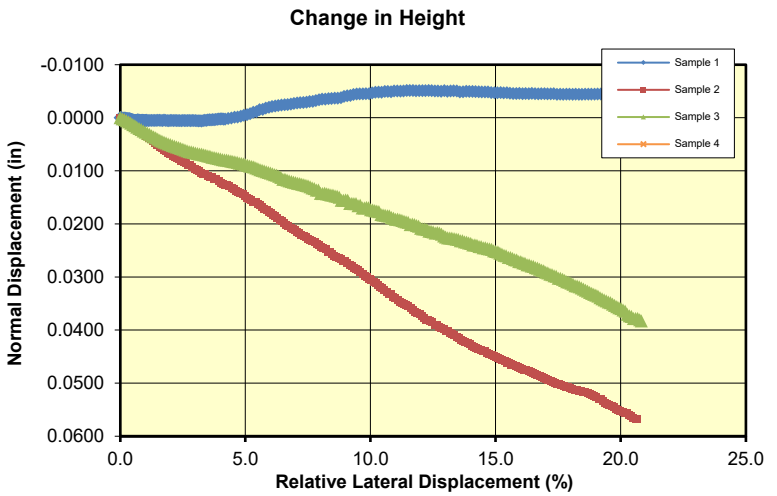
Consolidated Drained Direct Shear (ASTM D3080)

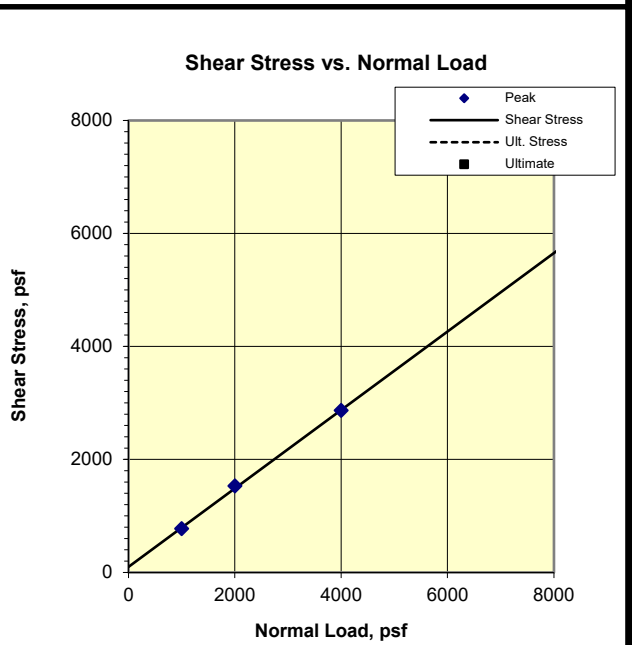
CTL Job #:	970-095	Project #:	E041.G	By:	MD
Client:	Quantum Geotechnical	Date:	10/30/2023	Checked:	PJ
Project Name:	Chateau Masson	Remolding Info:			

Specimen Data				
	1	2	3	4
Boring:	B-13	B-13	B-13	
Sample:	3	3	3	
Depth (ft):	11	11	11	
Visual Description:	Olive Brown CLAY w/ chunks of Weathered Claystone	Olive Brown CLAY w/ chunks of Weathered Claystone	Olive Brown CLAY w/ chunks of Weathered Claystone	
Normal Load (psf)	1000	2000	4000	
Dry Mass of Specimen (g)	115.0	110.5	116.9	
Initial Height (in)	1.00	1.00	1.00	
Initial Diameter (in)	2.40	2.42	2.40	
Initial Void Ratio	0.740	0.841	0.712	
Initial Moisture (%)	21.7	21.5	22.1	
Initial Wet Density (pcf)	117.9	111.2	120.2	
Initial Dry Density (pcf)	96.9	91.5	98.4	
Initial Saturation (%)	79.2	69.0	83.6	
ΔHeight Consol (in)	-0.0067	0.0310	0.0091	
At Test Void Ratio	0.752	0.784	0.697	
At Test Moisture (%)	27.2	27.7	25.7	
At Test Wet Density (pcf)	122.4	120.7	124.8	
At Test Dry Density (pcf)	96.2	94.5	99.4	
At Test Saturation (%)	97.7	95.5	99.4	
Strain Rate (%/min)	0.01	0.01	0.01	
Strengths Picked at	10%	10%	10%	
Shear Stress (psf)	775	1532	2870	
ΔHeight (in) at 10%	-0.0045	0.0305	0.0169	
Ultimate Stress (psf)				

Phi (deg)	34.8	Ult. Phi (deg)	
Cohesion (psf)	100	Ult. Cohesion (psf)	







Remarks:

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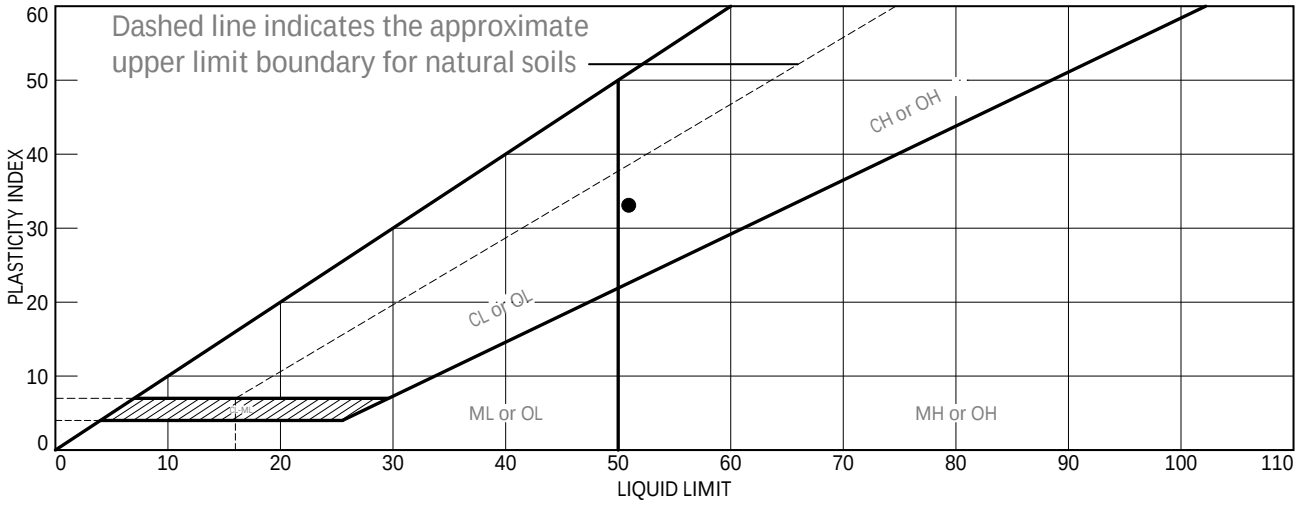
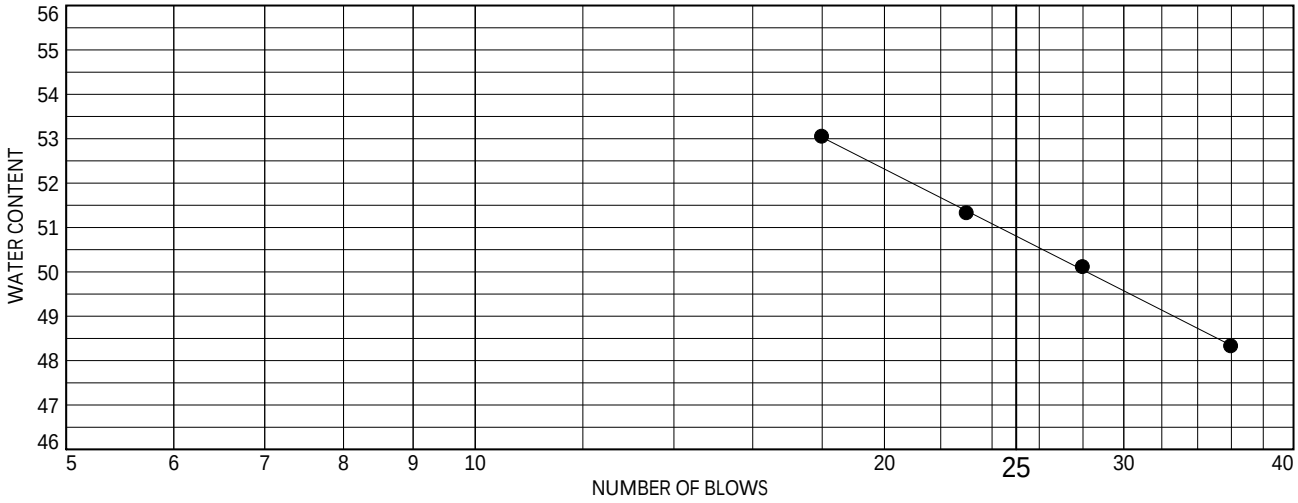
LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Olive Brown Fat CLAY w/ Weathered Claystone	51	18	33			

Project No. 970-095 Client: Quantum Geotechnical

Project: Chateau Masson - E041G

●Source of Sample: B-8 Depth: 5' Sample Number: 2

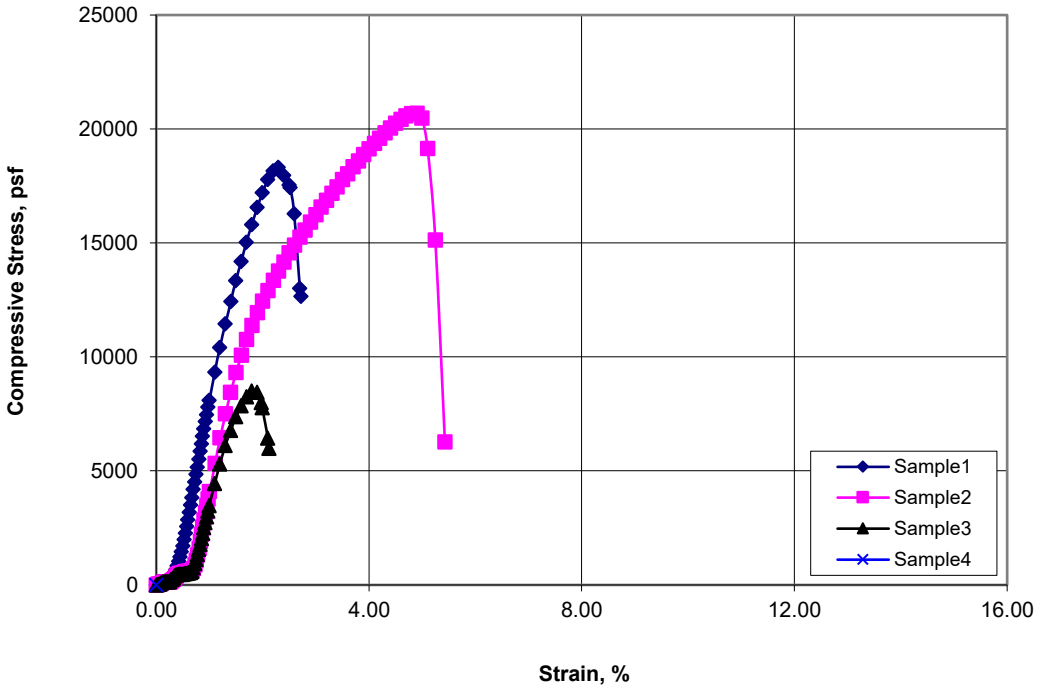
Remarks:

COOPER TESTING LABORATORY

Figure

Unconfined Compressive Strength

ASTM D2166



Sample No.:	1	2	3	4	
Unconfined Compressive Strength, psf	18318	20692	8502		
Unconfined Compressive Strength, psi	127.2	143.7	59.0		
Undrained Shear Strength, psf	9159	10346	4251		
Failure Strain, %	2.3	4.9	1.8		
Strain Rate, % per minute	1.0	1.0	1.0		
Strain Rate, inches/minute	0.05	0.05	0.05		
Moisture Content, %	12.8	16.3	26.6		
Dry Density, pcf	115.5	114.4	97.0		
Saturation, %	74.9	93.0	97.5		
Void Ratio	0.460	0.474	0.738		
Specimen Diameter, inches	2.400	2.400	2.380		
Specimen Height, inches	4.94	4.97	4.97		
Height to Diameter Ratio	2.1	2.1	2.1		
Assumed Specific Gravity	2.70	2.70	2.70		

Sample Location

	Boring	Sample	Depth, ft.	Soil Description
1	B-8	3	10	Brown CLAY w/ Sand, trace Gravel
2	B-8	5	18.5	Olive Brown CLAY w/ Sand
3	B-12	4	16	Dark Olive Brown CLAY w/ Sand
4				

Job No.:	970-095	**Type of Sample**	Undisturbed
Client:	Quantum Geotechnical		
Project:	E041.G		
Date:	10/20/2023 **By:** MD/RU		

Remarks:

COOPER TESTING LABORATORY

Saturated Direct Shear

Project Name:	Chateau Masson
Project #:	12268 (E041.G)
Sample #:	Sample A
Description:	Olive Gray CLAY
Tested By:	MA/OM
Date Tested:	10/12/2023

Test Number	1	2	3	4
Normal Pressure (PSF)	500	1000	1500	2000
Max Shear Stress	25.3	44.2	31.1	37.3
Shear Stress (PSF)	790.1		969.8	1164.7
* Indicates Points Used for Graph	*	1380.1	*	*

Equation of Trendline	
Intercept	Slope
655.19	0.2397
*Manually Enter from Trendline Equation	
C (PSF)	PHI
655	13

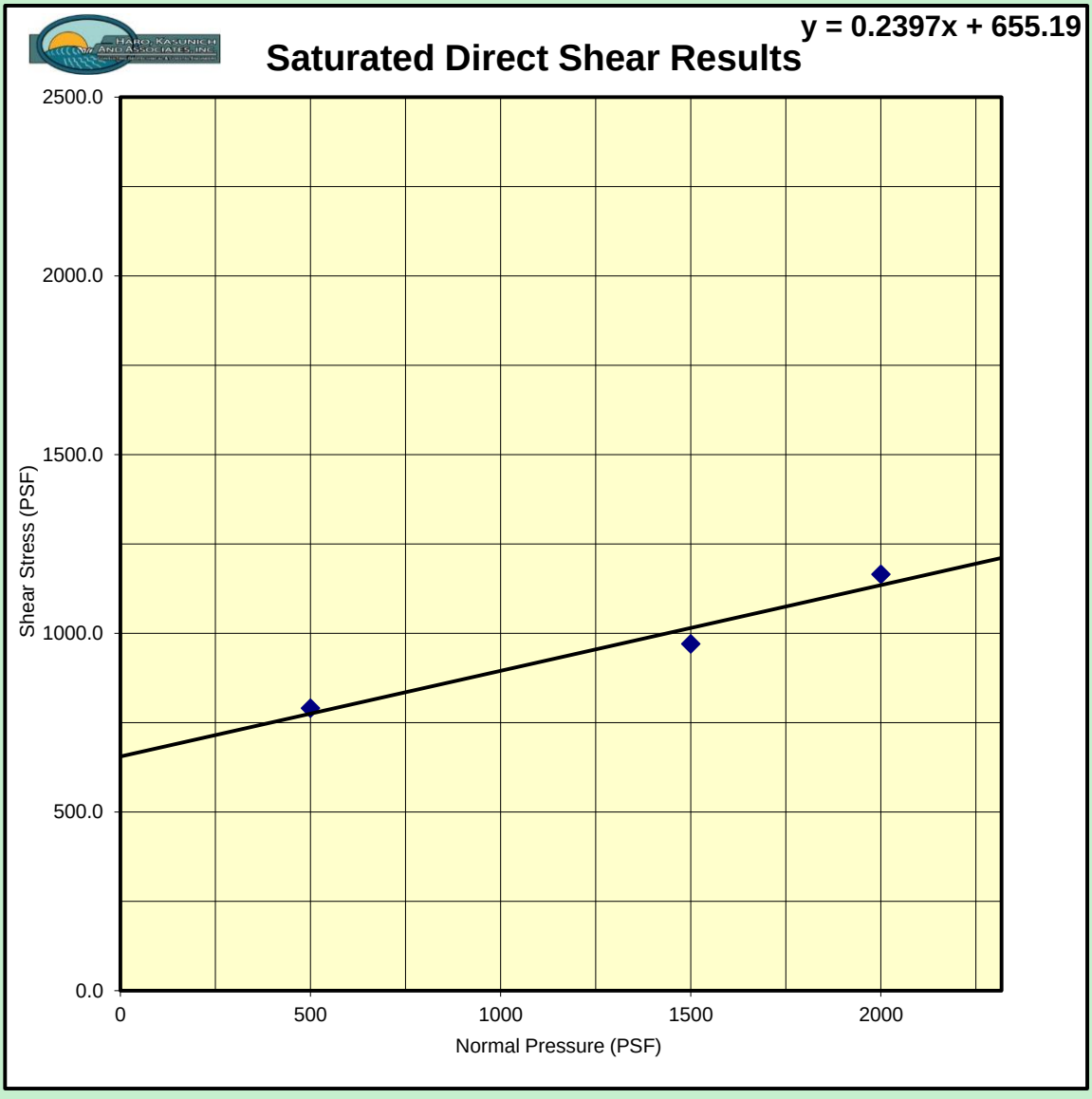
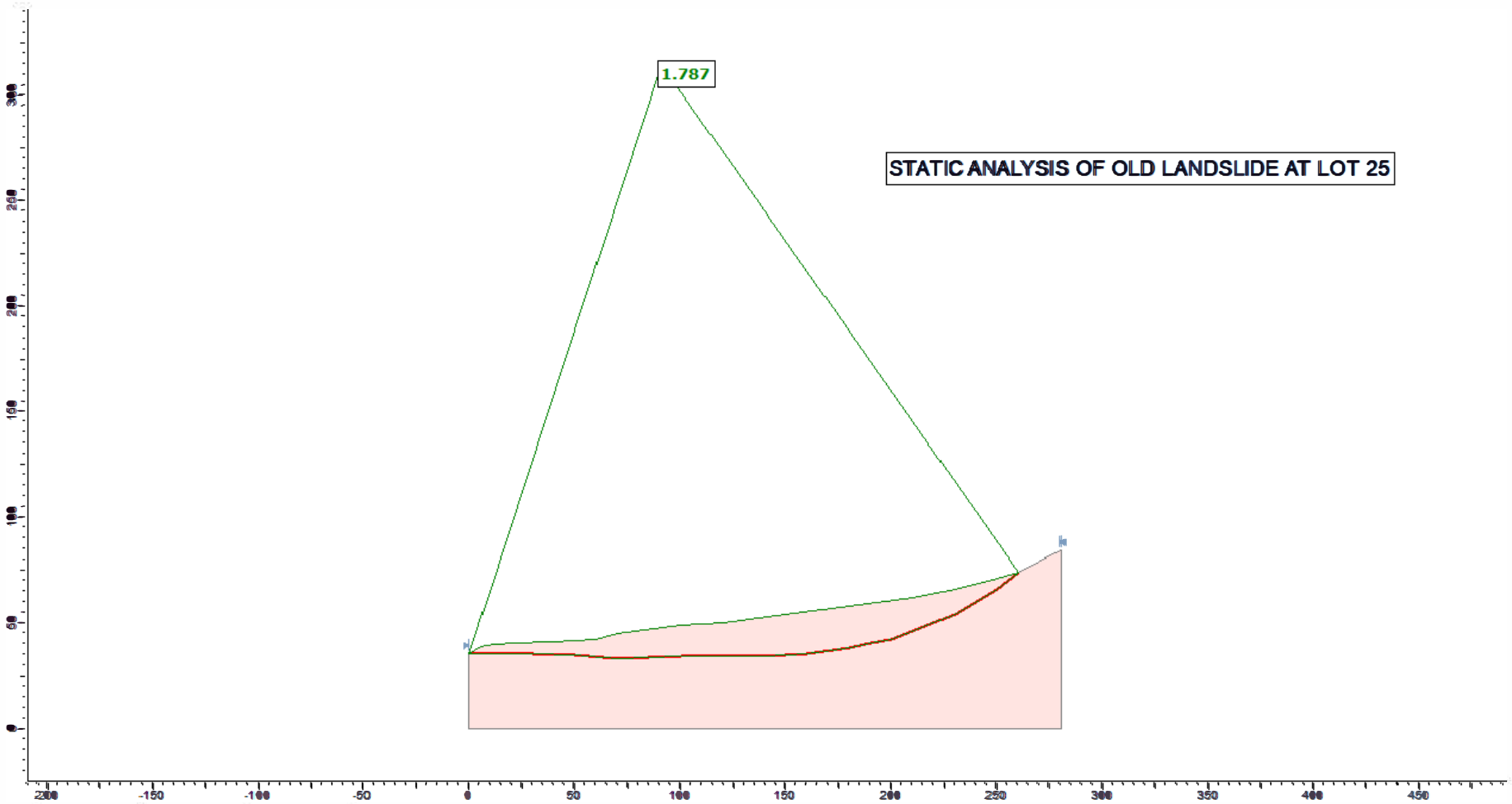
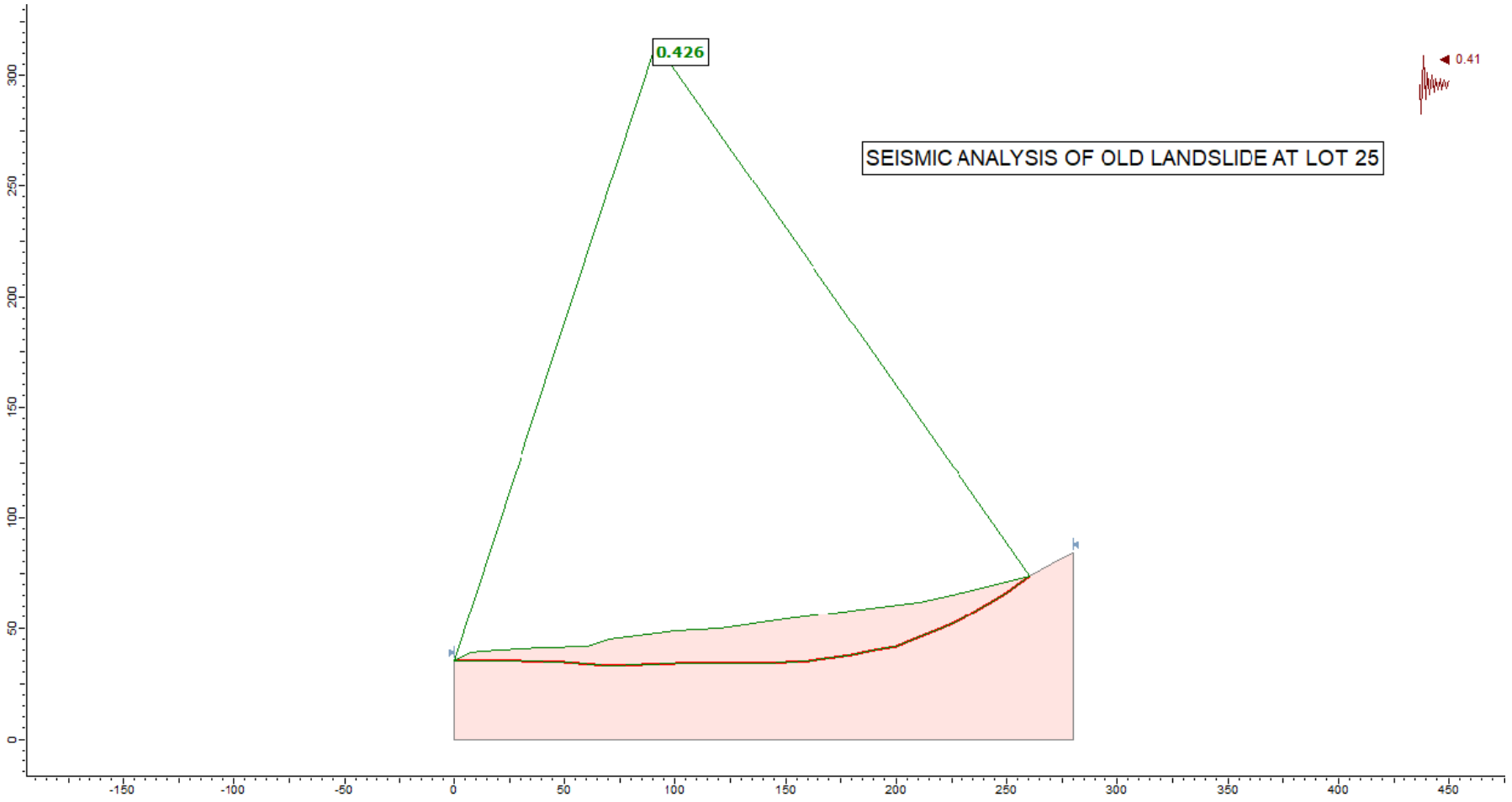


Figure No.

APPENDIX D

Slope Stability Analysis Results


1.787
STATIC ANALYSIS OF OLD LANDSLIDE AT LOT 25
300
250
200
150
100
50
0
-200
-150
-100
-50
0
50
100
150
200
250
300
350
400
450


0.426
0.41
SEISMIC ANALYSIS OF OLD LANDSLIDE AT LOT 25
300
250
200
150
100
50
0
-150
-100
-50
0
50
100
150
200
250
300
350
400
450

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E.2 - Supplemental Geologic and Geotechnical Peer Review Memorandum

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CITY of SARATOGA
13777 FRUITVALE AVENUE • SARATOGA, CALIFORNIA 95070
(408) 867-3438

MEMORANDUM

TO: Chris Riordan, Senior Planner DATE: July 12, 2024

FROM: Cotton, Shires & Associates, Inc., City Geotechnical Consultant

SUBJECT: **Supplemental Geologic and Geotechnical Peer Review (S6283A)**
RE: Chateau Masson, 25-Lot Subdivision
GEO23-0037
APN 503-46-005 (Pierce Road)

At your request, we have completed a supplemental geologic and geotechnical peer review of the subject application using:

- Response to Consultant's Peer Review (letter) prepared by Quantum Geotechnical, Inc., dated June 21, 2024;
- Geologic and Geotechnical Feasibility Evaluation (report) prepared by Quantum Geotechnical, Inc., dated December 11, 2023;
- Tentative Map (19 sheets) prepared by Hanna-Brunetti, Inc., dated June, 2024; and
- Architectural Drawings (135 sheets) prepared by Dahlin Group Architecture, dated December 20, 2023.

In addition to the above referenced documents, we have reviewed pertinent technical maps and documents from our office files.

DISCUSSION

We understand the applicant proposes to subdivide the 75.45-acre subject property, resulting in twenty-five parcels. In addition to the proposed twenty-five lots the applicant proposes to construct an approximately 1,600 foot long emergency access road. Additional proposed improvements include 2,300 feet of new roadways and eight surface water detention ponds. Estimates of project grading include 18,985 cubic yards of cut and 18,156 cubic yards of fill.

The property is not located within a California Geological Survey liquefaction hazard zone, but is located within a California Geological Survey earthquake-induced landslide hazard zone. The project is not located within a State designated Alquist Priolo/ Fault Rupture zone, however portions of the property are located within a "Pf" zone on the City Ground Movement Potential Map. A "Pf" zone is defined as a zone of potential primary surface fault rupture.

We previously performed a peer review of the referenced Geologic and Geotechnical Feasibility Evaluation and provided comments in our memorandum dated January 16, 2024. We refer to the January 16, 2024 memorandum for a description of the site conditions and exploration completed during the Geologic and Geotechnical Feasibility Evaluation.

RECENT INVESTIGATION

The Project Engineering Geologist completed an exploratory fault trench in the vicinity of the proposed Lot 19. The Consultant logged indications of faulting associated with the "Central Fault Zone" identified in their previous Geologic and Geotechnical Feasibility Evaluation. In addition, the Consultant performed a reconnaissance of the proposed emergency access road alignment. The Consultant also identified slope wash debris on the slopes along the alignment of the proposed emergency access road. The Consultant did not indicate that any other geologic hazards were identified during their investigation.

RESPONSE TO REVIEW COMMENTS

In our January 16, 2024 peer review memorandum we provided several comments for the Project Geologist and Geotechnical Consultant to address. In the following section we provide our original comment followed by the substantive portion of the Consultant's response (in italics).

a. The Consultant should evaluate the proposed fault setback on Lot 18 and provide additional data that justifies the reduced (25-foot) setback. If additional data is not available the Consultant should consider performing additional subsurface investigation (trenching) in this area or increasing the proposed setback distance.

…we conducted an additional fault trench on Lot 19 (Trench T-15) which exposed the "Central Fault Zone.

We staked the fault in the field and it was later professionally surveyed in the field. We have provided the civil engineer with a fault setback (25 feet) and they have depicted the building envelope on Lot 19 in accordance with that setback.

b. The Consultant should provide a recommended setback from the primary (western) trace of the Berrocal Fault.

The nearest explorations to the projected west fault trace (TP-1, TP-14) did not encountered the fault and those explorations suggest the fault is well over 25 feet (the fault setback) from the nearby building pads. We have plotted a fault setback equal to 25 feet from the fault along the footwall side of the fault

(see attached updated Site Geologic Map). We have varied our setback line along that particular fault allowing for more certainty in the fault location near our exploratory locations and less certainty between our explorations.

c. The Consultant should evaluate the mapped old landslide located on Lots 1 through 8 and provide a conclusion as to the severity of this hazard (i.e. low, moderate, or high). If the Consultant concludes that the hazard posed by the landslide is anything other than "low" the Consultant should provide recommendations for mitigation.

We previously conducted a slope stability analysis of the landslide for the adjacent property (Project No. J069.G Geologic/Geotechnical Investigation/APN 503-72-036, Saratoga May 16, 2023 Quantum Geotechnical, Inc.) which was reviewed by Cotton, Shires and Associates (CSA) in 2023. Our discussion contained within that report is repeated below:

The following is excerpted from our report for the Goel parcel ("Parcel 1"): Our site reconnaissance and review of Lidar Hillshade technology covering the area indicates that the old landslide mass shown on the city's GMP map as extending into the western portion of Parcel 1 is very subtle in terms of geomorphic expression at the ground surface and has been deeply dissected by drainages within Parcel 1. We agree that this is a dormant landslide that may have initiated in the earlier portion of the Holocene or perhaps the late Pleistocene and has been weathering in place and eroding to the extent that it is only geomorphically expressed subtly. We detected no distinct soil contact or density contrast within our explorations (i.e., B-1, B-2 or B-4) that would suggest the presence of a basal shear surface. Additionally, our more recent test pits that were excavated within the development areas did not reveal any evidence of past landsliding (shears, surfaces or other geologic relationships) or presence of landslide deposits. We infer that the eastern lateral contact of the Ols slide debris is located further to the west nearer to Pierce Road, between the building pad and the road as generally shown on the Site Geologic Map and Cross Section A-A' (Appendix A). Nevertheless, the relatively low angle of the projected basal shear, the low slope position of this feature and the minimal relief across the toe are (toe located west of the subject site) suggests that is it unlikely to reactivate in the design life of the structures proposed for the subject site. Our slope stability analysis shows that the natural slope located just above the proposed development is stable under static and pseudostatic conditions (see Slope Stability Analysis).

d. The Consultant should evaluate the temporary construction condition of the over-excavated landslide debris on Lot 25 and evaluate the impact to the stability of the mapped old landslide located on Lots 1 through 8.

The old landslide materials that will be exposed in the excavation of the buttress fill will consist of siltstone and sandstone bedrock material. We encountered a basal shear plane for this landslide within two of our exploratory excavations (TP-5 and T-14). We infer that the larger landslide (designated "Qls") would have a relatively flat basal shear, and reactivation of a large mass uphill is considered unlikely. It is our opinion, that given the relatively short time (less than 2 weeks) the excavation would be potentially open, these materials would remain stable during the subexcavation and recompaction process.

e. The Consultant should complete slope stability analysis to confirm that a row of shear pins on Lot 25 will provide the anticipated stabilization and increase the seismic Factor of Safety to 1.0, or greater.

Our slope stability analysis figure is included in Appendix C. The proposed mitigation for the building pad on Lot 25 is included in Appendix C.

f. The Consultant should evaluate the proposed emergency access route identifying any geologic and geotechnical hazards and provide, as necessary, recommendations for mitigation. The Applicant should understand that depending on the nature of any geologic or geotechnical hazards identified additional subsurface exploration may be necessary in order to evaluate proposed mitigation measures.

We did reconnoiter the path of the road and, based on exposures within some of the gullies, determined that up to several feet of slope wash deposits occurs on the slope in this area. These slope wash deposits represent quarry waste (a mixture of gravel and sand) that was originally generated by the quarry operations over the decades and which subsequently were pushed over the edge by equipment and washed down the slope during sheet wash events. Our cross section H-H' shows the projected subsurface relationships in this area. When the roadway receives initial rough grading our firm will provide inspections to determine the depth of the loose slope wash soil and provide recommendations for the depths of fill buttress keyways along the roadway.

g. The Consultant should discuss anticipated future subsurface investigations, including investigations for the proposed bridge abutments.

Once the emergency roadway is rough graded, we will be able to access the gully crossings for exploratory equipment where we can perform exploratory borings at the proposed bridge abutment locations.

CONCLUSIONS AND RECOMMENDED ACTION

The proposed subdivision will result in lots that are constrained by surface fault rupture hazards, mapped landslide hazards, potential debris flow hazards, highly expansive soil, and anticipated strong seismic ground shaking. The Project Geotechnical Consultant has completed a geologic and geotechnical feasibility investigation, excavated a supplemental exploratory fault trench and provided responses to our previous peer review comments. The Consultant has addressed our concerns regarding fault setback recommendations (review comments 1a and 1b). The Consultant concluded, in a report prepared for an adjacent property, that the old landslide located on Lots 1 through 8 is *"…unlikely to reactivate…"* (review comment 1c). In addition, the Consultant concluded that the old landslide debris "…*would remain stable…"* during the temporary construction condition (estimated at less than 2 weeks) of the over-excavated landslide debris on Lot 25 (review comment 1d). The Consultant has performed a slope stability analysis of the post-mitigation condition of Lot 25 and concluded that the Factor of Safety will be 1.0 or greater (review comment 1). The slope stability analysis output files were not provided, consequently, we were not able to review or comment on the slope stability analysis.

The Consultant performed a geologic reconnaissance of the proposed emergency access route and did not identify/discuss any geologic hazards in their response to review comment 1f. We note that the Consultant indicated that their interpretation of the distribution of subsurface materials in the vicinity of the proposed emergency access road is presented on cross section H-H', however this cross section was not included in their report or response to review comments letter. The Consultant also noted that supplemental exploratory drilling can be performed at proposed bridge locations following rough grading of the emergency access route.

The Consultant has provided responses to our previous peer review comments and we have no further objections to approval of geotechnical clearance for the proposed tentative map application with the following conditions:

1. **Design Level Geotechnical Investigations: -** The applicant's Geotechnical Consultant should perform design level geotechnical investigations to develop geotechnical design criteria and recommendations for the geologic hazard mitigation concepts and infrastructure (roads, bridges) associated with the development of the proposed subdivision. In addition, the Consultant should perform design level geotechnical investigations to develop geotechnical design criteria and recommendations specific to each of the proposed Lots prior to development.

   The Design Level Geotechnical Investigations should be organized by the Project Geotechnical Consultant in reports addressing the specific proposed improvements and be submitted to the City for review by the City's Geotechnical Consultant, prior to approval of geotechnical clearance for building permit applications.

LIMITATIONS

This supplemental geologic and geotechnical peer review has been performed to provide technical advice to assist the City in its discretionary permit decisions. Our services have been limited to review of the documents previously identified and a visual review of the property. Our opinions and conclusions are made in accordance with generally accepted principles and practices of the geotechnical profession. This warranty is in lieu of all other warranties, either expressed or implied.

DTS:AM

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