ROMIG ENGINEERS, INC.
GEOTECHNICAL & ENVIRONMENTAL SERVICES

December 2, 2014
941-3A

Ms. Theresa Pan
P.O. Box 610910
San Jose, California 95161

RE: SUPPLEMENTAL RECOMMENDATIONS
PAN RESIDENCE AND SITE IMPROVEMENTS
1000 COUNTRY CLUB DRIVE
MILPITAS, CALIFORNIA

Dear Ms. Pan:

As requested, this letter was prepared to update our geotechnical report and present supplemental recommendations for the proposed site improvements and completion of construction of your residence located at 1000 Country Club Drive in Milpitas, California. As you know, we performed a geotechnical investigation for the design and construction of the residence and presented the results in our report, dated July 22, 2005. In addition, we performed a geotechnical review of the existing conditions of the site and partially constructed residence and presented our observations in our letter to you dated August 24, 2010. The scope of our geotechnical services for this project was presented in our agreement with you dated November 4, 2014.

PROJECT DESCRIPTION

The project consists of completing construction of your residence and construction of several additional site improvements at the referenced property. You plan to finish construction of the residence and associated site improvements at this time. We understand that the existing residence footprint will be altered at the at-grade area of the residence at the southwest corner, which may include additional foundation elements. The exterior stairwell to the basement located along the southeast side of the residence will be removed and backfilled. The site retaining walls and front entry porch, stairs, and walkway planned along the front of the residence and at the southeast side of the residence will be constructed and the driveway will be paved.

Additional improvements include installation of two 5,000 gallon steel water tanks southeast of the residence near an existing water tank. The tanks will be approximately 12 feet in diameter and 7.5 feet in height. We understand that the tanks will be supported on concrete slabs which will be constructed about 3 feet below grade in order to partially hide them.

In addition, a solar panel array is planned on a gently sloping area approximately 450 feet southeast of the residence in the expanded portion of the property. We understand that the solar panels will be supported on concrete piers extending about 6 feet below grade. Structural loads are expected to be relatively light as is typical for this type of construction.

PREVIOUS SITE INVESTIGATIONS

We performed a geotechnical investigation for design and construction of the residence and associated site improvements; the results were presented in our report dated July 22, 2005. The site investigation included advancing three exploratory borings to depths ranging between 15 to 20 feet. Our exploratory borings generally encountered approximately 4.5 to 6 feet of soft to very stiff sandy lean clay (including some surface fill) of low plasticity underlain by very severely weathered sandstone and claystone bedrock. Site development included extensive cuts and fills to create the building pad and driveway alignment. Due to the variable support conditions, our report recommended that the residence be supported on a pier and grade beam foundation bearing in weathered bedrock below the fill and native soil and on a structural mat at the basement level bearing in weathered bedrock. The approximate locations of the borings are shown on Figure 1 and the boring logs are attached.

The west portion of the site, including part of the proposed building area, is located within the State of California Alquist-Priolo Earthquake Fault Zone. The Seismic Hazard Zones Map of the Milpitas Quadrangle prepared by the California Geological Survey (2004) also indicates that portions of the site are located in an earthquake-induced landslide hazard zone. The previous report also discussed our review of the previous geotechnical report prepared by Engeotech, Inc., dated April 28, 2002, and an addendum to the Geologic Hazards Evaluation Letter prepared by John Coyle & Associates, Inc., dated September 30, 2002. Engeotech also reviewed the geologic conditions at the site and determined the potential for landsliding to occur at the site is low. Based on the information reviewed, Coyle judged the risk of seismically induced landsliding and fault rupture at the proposed building location is low.

Supplemental recommendations regarding new site retaining walls were presented in our letter dated November 2, 2005.

We performed a geotechnical review of the existing conditions of the site and partially constructed residence and presented our observations in our letter to you dated August 24, 2010. During our site reconnaissance, the residence had been partially constructed, including the foundations and floors, wood and steel framing, and roof. The driveway, patios, and exterior walkways were not constructed. The drainage system, such as roof downspouts, area drains, outfall facilities had not been installed.

SITE RECONNAISSANCE AND SOIL SAMPLING

On November 24, 2014, a member of our staff visited the property to observe current site conditions. The site was occupied by a multi-level, wood and steel frame residence that had a stucco or unfinished exterior. The residence had a basement level garage which daylighted along the northeast side. An unpaved driveway extended up from Country Club Drive to the garage level. The residence was constructed on a cut/fill building pad with moderate to steep slopes extending generally downward along the perimeter of the building pad.

As observed in 2010, the residence had been partially constructed with the foundations, wood and steel framing, and roof completed. The interior framing was exposed with no interior finishes completed. Where observed, the foundation appeared to be performing adequately. The exposed 2 to 5 foot high cut slopes along the front of the residence which were noted in 2010 remained and the front yard site walls had not been constructed. The cut slopes appeared to have remained relatively stable with some continued surface erosion and soil sloughing. We did not observe any indication of slope instability or adverse erosion along the slopes surrounding the building pad. The residence and site generally appeared to be in similar condition as observed during our previous investigation and site visit.

The property now also includes the large parcel to the southeast of the residence area as shown on Figure 1. The expanded area consists of gently to moderately sloping terrain covered by a heavy grown on native vegetation.

The soil conditions at the location of the proposed water tanks were investigated by sampling the surface soil. The soils were continuously sampled to a depth of approximately 31 inches using a hand auger. At the location of this shallow boring, we encountered very stiff to hard, moist, sandy lean clay of low plasticity. The location of the shallow boring is shown on Figure 1 and the boring log is attached.

EARTHQUAKE DESIGN PARAMETERS

The State of California currently requires that all buildings be designed in accordance with the seismic design provisions presented in the 2013 California Building Code and in ASCE 7-10, "Minimum Design Loads for Buildings and Other Structures." Based on site geologic conditions and on information from our subsurface exploration at the site, the site may be classified as Site Class C, very dense soil and soft rock, in accordance with Chapter 20 of ASCE 7-10. Spectral acceleration response parameters S_S and S_1, and site coefficients Fa and Fv, may be taken directly from the figures and tables in the 2013 California Building Code and in the lookup tables at the U.S.G.S. website based on the latitude and longitude of the site. For the site latitude (37.4543) and longitude (-121.8834) and Site Class C, SDs = 1.461g, and SD1 = 0.784g.

CONCLUSIONS AND UPDATED RECOMMENDATIONS

Based on the findings from our recent site visit, our July 22, 2005 geotechnical report and supplemental letters, and review of information in our files, it is our opinion that the conclusions and recommendations presented in our previous reports may be used for the completion of the residence construction and the proposed site improvements, except as modified/updated below.

In our opinion, where new foundations are needed to support the proposed alteration of the at-grade area of the residence, they may consist of a pier and grade beam foundation as presented in our July 22, 2005 geotechnical report. Construction of the previously planned site improvements such as site retaining walls, exterior flatwork and pavement, grading, and site drainage should follow as recommended in our previous report and supplemental retaining wall letter dated November 2, 2005.

The proposed solar array may be supported on a drilled pier foundation as recommended below. We understand that the proposed water tanks will be mounted on a structural slab constructed about 3 feet below grade. In our opinion, the water tanks may be supported on a structural slab bearing on stiff to very stiff native soil.

If differing conditions than anticipated are exposed during construction, our office should provide additional geotechnical recommendations for the project accordingly.

FOUNDATIONS

Drilled Piers for the Solar Array

In our opinion, the solar array may be supported on a drilled pier foundation. Piers should have a minimum diameter of 16-inches. From a geotechnical viewpoint, drilled piers should extend at least 6 feet below existing grade, however, the structural engineers requirements may result in a deeper pier depth. The piers may be designed for an allowable skin friction of 450 pounds per square foot for dead plus live loads, starting 2 feet below grade, with a one-third increase allowed when considering additional short-term wind or seismic loading. An allowable uplift skin friction of 350 pounds per square foot, starting 2 feet below grade, may be assumed for design. From a geotechnical viewpoint, piers should be reinforced in the vertical direction with the equivalent of at least four No. 4 bars. Piers should have a center-to-center spacing of at least three pier diameters.

Pier drilling should be observed by our representative to confirm that the pier holes extend the required minimum depth, expose the anticipated competent material, and are properly cleaned or all loose or soft soil and debris. The minimum pier depths recommended above may require adjustment if soft conditions are encountered during drilling.

Concrete should be placed in the pier excavations as soon as practical after drilling. Ground water seepage may be encountered during pier drilling and it is possible that ground water seepage could cause some sloughing or caving of the pier holes. If limited seepage of water were to occur, concrete would need to be placed in the pier holes by the tremie method or the water pumped from the pier excavation prior to concrete placement.

Lateral loads on the piers may be resisted by passive earth pressure based on an equivalent fluid pressure of 300 pounds per cubic foot acting on 1.5 times the projected area of the pier. Passive resistance of the upper 2 feet of the soil should be neglected.

Structural Slab for the Water Tanks

In our opinion, the proposed water tanks may be supported on a structural slab/mat foundation bearing in stiff native soil. In our opinion, the slab/mat should be designed to be more heavily reinforced than a conventional concrete slab and at least 6 inches in thickness in order to support the loads from the proposed water tanks.

The slab/mat may be designed for an average allowable bearing pressure of 2,000 pounds per square foot for combined dead plus live loads. These pressures may be increased by one-third for total loads including wind or seismic forces. These pressures are net values; the weight of the mat may be neglected in design. A modulus of subgrade reaction of 50 pounds per cubic inch may be assumed for the mat subgrade, if used for design.

If retaining walls are planned along the perimeter of the water tank excavation, if desired, the retaining walls may be supported on the slab/mat and the slab thickened as required by the structural engineer to support the wall loads.

The bottom of the slab/mat excavation should be cleaned of loose or soft soils. Our representative should observe the excavation to confirm that it exposes competent suitable material and to evaluate whether scarification and recompaction of the subgrade is needed. If competent and/or consistent soil conditions are not encountered across the excavation, some further excavation and supplemental recommendations likely will be required.

Lateral loads may be resisted by friction between the bottom of the slab/mat and the supporting subgrade. A coefficient of friction of 0.3 may be assumed. In addition to friction, lateral resistance may be provided by passive soil pressure acting against the sides of foundations cast neat in footing excavations. We recommend assuming an equivalent fluid pressure of 300 pounds per cubic foot for passive soil resistance, where appropriate. The upper foot of passive soil resistance should be neglected where soil adjacent to the footing will be landscaped or subject to softening from rainfall and/or surface water runoff.

Settlement

Thirty year differential movement due to static loads is not expected to exceed ¾-inch across the proposed solar array foundations and water tanks, provided they are designed and constructed as recommended.

RETAINING WALL RECOMMENDATIONS

Supplemental geotechnical recommendations for the project retaining walls are presented in the following section of this letter. The recommendations for lateral loads on walls, wall drainage, and backfill presented in our referenced report and letter may be used for the project except as modified herein. We expect that site retaining walls will be supported on a drilled pier foundation as previously recommended.

Seismic Loads on Retaining Walls

Based on the site peak ground acceleration (PGA), on Seed and Whitman (1970); Al Atik and Sitar (2010); and Lew et al. (2010); seismic loads on retaining walls that can yield may be simulated by a line load of $20H^2$ (in pounds per foot, where H is the wall height in feet). Seismic loads on walls that cannot yield may be subjected to a seismic load as high as about $27H^2$. This seismic surcharge line load should be assumed to act at 1/3H above the base of the wall (in addition to the active wall design pressure of 45 or 65 pounds per cubic foot previously recommended).

FOLLOW-UP GEOTECHNICAL SERVICES

To confirm that our recommendations are properly understood and implemented, we recommend that we be retained to 1) review the grading and foundation plans for conformance with our recommendations and 2) observe and test during earthwork and foundation construction.

We make no warranty, expressed or implied, except that our services are performed in accordance with geotechnical engineering principles generally accepted at this time and location.

Please call if you have any questions or comments concerning the conclusions and updated geotechnical recommendations for the project presented in this letter.

Very truly yours,

ROMIG ENGINEERS, INC.

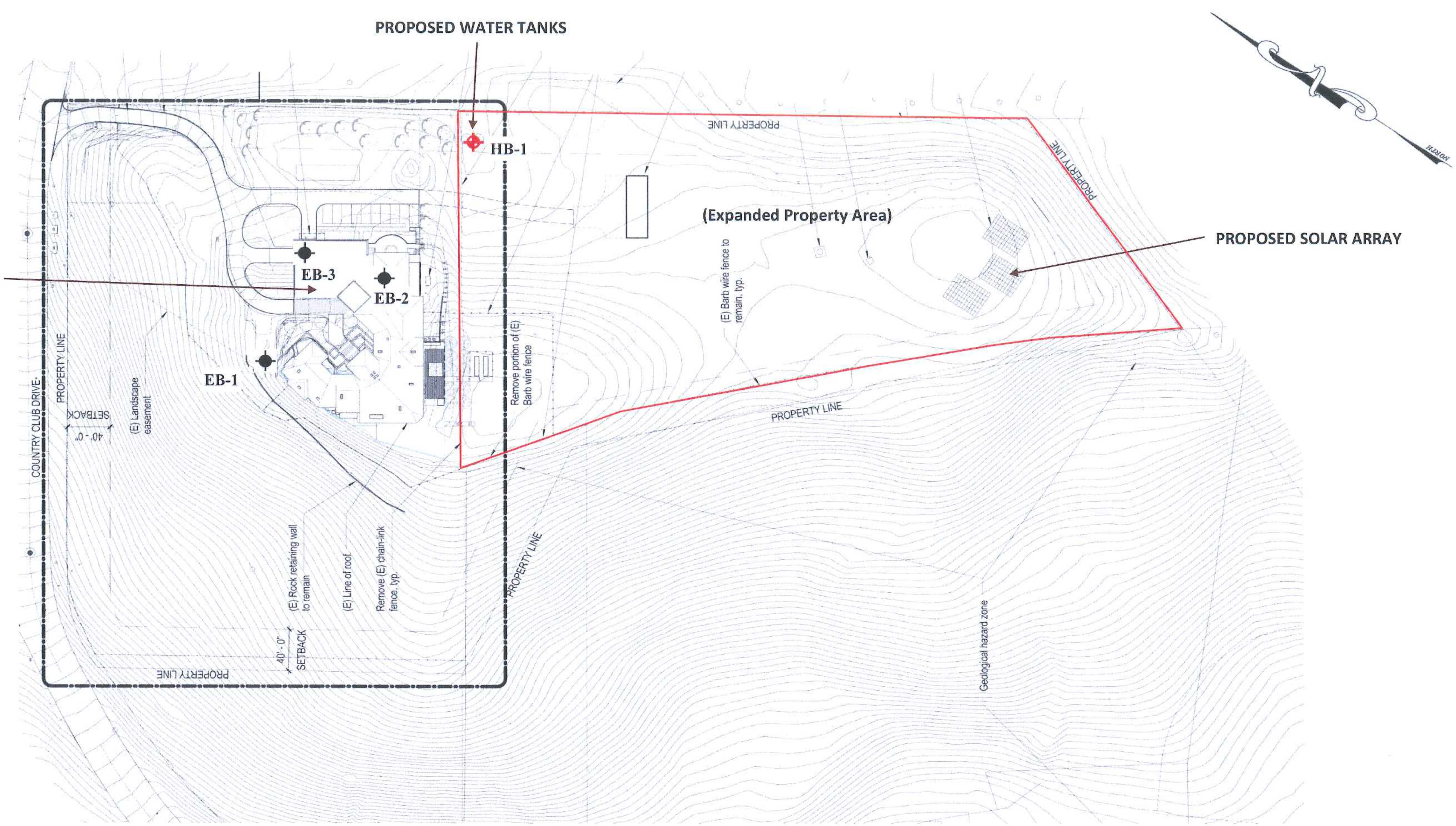
Tom W. Porter, P.E.

Glenn A. Romig, P.E., G.E.

Attachments: Figure 1 - Updated Site Plan
Key to Exploratory Boring Logs
Shallow Boring Log HB-1
Exploratory Boring Logs EB-1, EB-2, and EB-3

Copies: Addressee (1)
Pfau Long Architecture (3)
Attn: Ms. Meagan Dickemann
Mr. John Curry (via email)
Peoples Associates (via email)
Attn: Mr. Jeff Medeiros
Lea & Braze Engineering, Inc. (via email)
Attn: Mr. Pete Carlino

GAR:TWP:dr



LEGEND

HB-1 Approximate Location of Shallow Hand Sampling.

EB-3 Approximate Location of Exploratory Boring (Romig Engineers, Inc., 2005).

Approximate Scale: 1 inch = 100 feet.

Base is site plan provided by Pfau Long Architecture, 2014.

SITE PLAN
PAN RESIDENCE
MILPITAS, CALIFORNIA

FIGURE 1
DECEMBER 2014
PROJECT NO. 941-3A

ROMIG ENGINEERS, INC.

USCS SOIL CLASSIFICATION

PRIMARY DIVISIONS			SOIL TYPE	SECONDARY DIVISIONS
COARSE GRAINED SOILS (< 50 % Fines)	GRAVEL	CLEAN GRAVEL (< 5% Fines)	GW	Well graded gravel, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravel or gravel-sand mixtures, little or no fines.
		GRAVEL with FINES	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	SAND	CLEAN SAND (< 5% Fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SAND WITH FINES	SM	Silty sands, sand-silt mixtures, non-plastic fines.
			SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS (> 50 % Fines)	SILT AND CLAY Liquid limit < 50%		ML	Inorganic silts and very fine sands, with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, lean clays.
			OL	Organic silts and organic clays of low plasticity.
	SILT AND CLAY Liquid limit > 50%		MH	Inorganic silt, micaceous or diatomaceous fine sandy or silty soil.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.
BEDROCK			BR	Weathered bedrock.

RELATIVE DENSITY

SAND & GRAVEL	BLOWS/FOOT*
VERY LOOSE	0 to 4
LOOSE	4 to 10
MEDIUM DENSE	10 to 30
DENSE	30 to 50
VERY DENSE	OVER 50

CONSISTENCY

SILT & CLAY	STRENGTH^	BLOWS/FOOT*
VERY SOFT	0 to 0.25	0 to 2
SOFT	0.25 to 0.5	2 to 4
FIRM	0.5 to 1	4 to 8
STIFF	1 to 2	8 to 16
VERY STIFF	2 to 4	16 to 32
HARD	OVER 4	OVER 32

GRAIN SIZES

BOULDERS	COBBLES	GRAVEL		SAND			SILT & CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

12 " — 3" — 0.75" (SIEVE OPENINGS) — 4 — 10 — 40 — 200 (U.S. STANDARD SERIES SIEVE)

Classification is based on the Unified Soil Classification System; fines refer to soil passing a No. 200 sieve.

* Standard Penetration Test (SPT) resistance, using a 140 pound hammer falling 30 inches on a 2 inch O.D. split spoon sampler; blow counts not corrected for larger diameter samplers.

^ Unconfined Compressive strength in tons/sq. ft. as estimated by SPT resistance, field and laboratory tests, and/or visual observation.

KEY TO SAMPLERS

- Modified California Sampler (3-inch O.D.)
- Mid-size Sampler (2.5-inch O.D.)
- Standard Penetration Test Sampler (2-inch O.D.)

KEY TO EXPLORATORY BORING LOGS
PAN RESIDENCE
MILPITAS, CALIFORNIA

FIGURE A-1
DECEMBER 2014
PROJECT NO. 941-3A

DRILL TYPE: Hand Auger **LOGGED BY:** TWP

DEPTH TO GROUND WATER: Not Encountered. **SURFACE ELEVATION:** **DATE DRILLED:** 11/24/14

CLASSIFICATION AND DESCRIPTION	SOIL CONSISTENCY/ DENSITY or ROCK HARDNESS* (Figure A-2)	SOIL TYPE	SOIL SYMBOL	DEPTH (FEET)	SAMPLE INTERVAL	SPT RESISTANCE (Blows/ft)	WATER CONTENT (%)	SHEAR STRENGTH (TSF)*	UNCONFIN. COMP. (TSF)*
Brown, Sandy Lean Clay, moist, fine to medium sand, trace fine gravels, low plasticity.	Very Stiff to Hard	CL		0			17 14 12		
Bottom of Boring at 31 inches.				5					
				10					
Note: The stratification lines represent the approximate boundary between soil and rock types, the actual transition may be gradual. *Measured using Torvane and Pocket Penetrometer devices.				15					

SHALLOW BORING LOG HB-1
PAN RESIDENCE
MILPITAS, CALIFORNIA

BORING HB-1
DECEMBER 2014
PROJECT NO. 941-3A

DRILL TYPE: Track mounted CME-55 Drill with 4" Continuous Flight Auger. **LOGGED BY:** NWA

DEPTH TO GROUND WATER: Not Encountered. **SURFACE ELEVATION:** NA **DATE DRILLED:** 6/28/05

CLASSIFICATION AND DESCRIPTION	SOIL CONSISTENCY/ DENSITY or ROCK HARDNESS∗ (Figure A-2)	SOIL TYPE	SOIL SYMBOL	DEPTH (FEET)	SAMPLE INTERVAL	SPT RESISTANCE (Blows/ft)	WATER CONTENT (%)	SHEAR STRENGTH (TSF)*	UNCONFIN. COMP. (TSF)*
Fill: Light brown to medium brown, Sandy Clay, moist, fine to coarse sand, fine to coarse gravel, low plasticity.	Stiff	CL		0		9	6		
Medium brown, Sandy Clay, moist, fine to coarse sand, low plasticity, residual soil.	Stiff to Very Stiff	CL			■	21	5		
■ Liquid Limit = 28%, Plasticity Index = 11%.						30	6		
				5					
Light brown, Sandstone, moist, very severely weathered.	Soft∗	BR							
Resistance from 8 to 9.5 feet does not represent bedrock hardness due to slough at the bottom of the excavation during sampling.						13	6		
				10					
						65	6		
Note: The stratification lines represent the approximate boundary between soil and rock types, the actual transition may be gradual.				15					
*Measured using Torvane and Pocket Penetrometer devices.									
▲ Free Swell = 30%.					▲	27	5		
Bottom of Boring at 19 Feet.				20					

EXPLORATORY BORING LOG EB-1
MARTINEZ RESIDENCE
MILPITAS, CALIFORNIA

BORING EB-1
JULY 2005

DRILL TYPE: Track mounted CME-55 Drill with 4" Continuous Flight Auger. **LOGGED BY:** NWA

DEPTH TO GROUND WATER: Not Encountered. **SURFACE ELEVATION:** NA **DATE DRILLED:** 6/28/05

CLASSIFICATION AND DESCRIPTION	SOIL CONSISTENCY/ DENSITY or ROCK HARDNESS* (Figure A-2)	SOIL TYPE	SOIL SYMBOL	DEPTH (FEET)	SAMPLE INTERVAL	SPT RESISTANCE (Blows/ft)	WATER CONTENT (%)	SHEAR STRENGTH (TSF)*	UNCONFIN. COMP. (TSF)*
Light brown to medium brown, Sandy Clay, moist, fine to coarse sand, residual soil. Animal burrows 0 to 2 feet.	Soft to Stiff	CL		0		6	8		
						15	11		
				5		12	10		
Light brown, Sandstone, moist, very severely weathered. Resistance from 8 to 9.5 feet does not represent bedrock hardness due to slough at the bottom of the excavation during sampling.	Soft*	BR		10		15	11		
				15		23	13		
Note: The stratification lines represent the approximate boundary between soil and rock types, the actual transition may be gradual. *Measured using Torvane and Pocket Penetrometer devices.				20		56	12		
Bottom of Boring at 20 Feet.									

DRILL TYPE: Track mounted CME-55 Drill with 4" Continuous Flight Auger. **LOGGED BY:** NWA

DEPTH TO GROUND WATER: Not Encountered. **SURFACE ELEVATION:** NA **DATE DRILLED:** 6/28/05

CLASSIFICATION AND DESCRIPTION	SOIL CONSISTENCY/ DENSITY or ROCK HARDNESS* (Figure A-2)	SOIL TYPE	SOIL SYMBOL	DEPTH (FEET)	SAMPLE INTERVAL	SPT RESISTANCE (Blows/ft)	WATER CONTENT (%)	SHEAR STRENGTH (TSF)*	UNCONFIN. COMP. (TSF)*
Light brown to medium brown, Sandy Clay, moist, fine to coarse sand, residual soil.	Soft to Stiff	CL		0		5	15		
						6	14		
						27	15		
Light brown, Sandstone, moist, very severely weathered.	Soft*	BR		5					
Light brown, Claystone, moist, very severely weathered. ▲ Free Swell = 50%.	Soft*	BR		10	▲	35	10		
				15		51	11		
Bottom of Boring at 15 Feet.				20					

Note: The stratification lines represent the approximate boundary between soil and rock types, the actual transition may be gradual.

*Measured using Torvane and Pocket Penetrometer devices.

EXPLORATORY BORING LOG EB-3
MARTINEZ RESIDENCE
MILPITAS, CALIFORNIA

BORING EB-3
JULY 2005