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▶Geotechnical ▶Geoenvironmental ▶Special Inspection

August 16, 2016
BAGG Job No: RMCWA-01-01

RMC Water and Environment
2175 North California, Suite 315
Walnut Creek, CA 94596
Attention: Mr. Anthony Valdivia, PE

Geotechnical Data Report
West Bay Sanitary District
Recycled Water System
Sharon Heights Golf & Country Club
San Mateo, California

Dear Mr. Valdivia:

Transmitted herewith is our geotechnical data report concerning the construction of the proposed recycled water system and sanitary sewer pump station in San Mateo, California. The following report summarizes the results of our subsurface exploration and laboratory testing, which formed the basis of our conclusions, and presents our generalized recommendations related to the geotechnical engineering aspects of the proposed recycled water system and pump station improvements.

Thank you for the opportunity to perform these services. Please do not hesitate to contact us, should you have any questions or comments.

Very truly yours,
BAGG Engineers

Evan Wolf
Project Geologist

Anthony N. Lusich, PE, GE, F.ASCE
Senior Engineer

EW/TL
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GEOTECHNICAL DATA REPORT
West Bay Sanitary District
Recycled Water System
Sharon Heights Golf & Country Club
San Mateo, California

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BAGG ENGINEERS

Attached Plates:

GEOTECHNICAL DATA REPORT
West Bay Sanitary District
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San Mateo, California

1.0 INTRODUCTION

This report presents the results of our geotechnical engineering investigation performed to address the proposed construction of the proposed recycled water system and sanitary sewer pump station on Sand Hill Road in San Mateo, California. The attached Plate 1, Vicinity Map, shows the general location of the site; Plate 2, Site Plan, shows the existing site layout, proposed improvements and the boring location advanced by BAGG as part of this investigation.

This report is for an preliminary design level package, containing generalized opinions, conclusions and recommendations. This report provides comments on various geotechnical issues that should be considered for the project, but may not address all issues as would be appropriate. This information is being presented so that it may be used by the design engineer of record to prepare final deism opinions conclusions and recommendations. That investigation should address all issues as would be appropriate for final design.

2.0 SITE AND PROJECT DESCRIPTION

The proposed building area is located between Highway 280 to the southwest and an access road to the northeast. An artificial pond is located to the east. The overall gradient of the slope that descends from the building area to the pond is approximately 2:1 (horizontal to vertical). The native ground to the west appears to be approximately 35 feet below the top of the pond slope on the east side of the building area.

The sanitary sewer pump station will be located in the paved portion of a cul-de-sac located at the northeast terminus of the Sand Hill Road frontage Road being southwest of the intersection of Sand Hill Road and Oak Avenue.

It is our understanding that the proposed project will consist of constructing a new 0.5 mgd recycled water treatment facilities, wastewater pump station and approximately 10,600 LF of pipeline. The proposed treatment plant will be located adjacent to the southwest side of the Sharon Heights Golf & Country Club property. The proposed pump station will extend approximately 25 feet below the existing paved surface.

Structural loads are anticipated to be relatively light and grading will include minor cuts and fills.

3.0 PURPOSE AND SCOPE OF SERVICES

The purpose of our services was to obtain pertinent information regarding subsurface soil and groundwater conditions at the location of the proposed improvements. This was accomplished by advancing eight borings with a truck-mounted drill rig and a sampling tripod equipped with a cathead and rope to a maximum depth of 50 feet below the ground surface. Soil samples were obtained from the boring at 3- to 5-foot intervals, and a laboratory testing program was performed to evaluate the engineering characteristics of the collected soil samples. Information obtained from these tasks was used to perform engineering analysis required to develop generalized conclusions, opinions, and recommendations regarding:

- site seismicity, including appropriate soil profile type and parameters for seismic design per the 2013 Edition of the California Building Code (CBC),
- specific soil and groundwater conditions discovered by our boring, such as loose, expansive, saturated, or collapsible soils, that may require special mitigation or impose restrictions on the project, including the thickness and consistency of any fill soils encountered at the site,

- criteria for the support of the proposed structures, including allowable bearing pressures for both static and seismic conditions,
- criteria for design of temporary shoring and allowable excavation slopes,
- preliminary estimate of the static construction and post-construction total and differential settlements for the new improvements,
- design of flexible and rigid (PCC) pavements,
- general provisions for the control of surface and subsurface drainage

Based on our understanding of the project, the scope of our services consisted of the following specific tasks:

1. Researched and reviewed pertinent geotechnical and geological maps and reports relevant to the site and vicinity.
2. Marked the boring location at the site at least 72 hours in advance of the subsurface exploration, and notified Underground Service Alert to mark utility lines on or entering the site.
3. Obtained the required drilling permit from San Mateo County.
4. Drilled, logged, and sampled eight exploratory borings to a maximum depth of approximately 50 feet below the ground surface. The boring was drilled under the technical direction of one of our geologists, who also obtained relatively undisturbed samples of the native soils for visual classification and laboratory testing. Following the completion of the drilling, the boring was sealed with neat cement grout as required by San Mateo County.
5. Performed a laboratory testing program on the collected soil samples to evaluate the engineering characteristics of the subsurface soil which included determining the plasticity index, dry density, corrosivity, and in-situ moisture content of selected samples.
6. Based on information obtained from the above tasks, we performed engineering analyses oriented toward the above-described purpose of the investigation.
7. Prepared four copies of a report summarizing our findings and including a vicinity map, a site plan showing the approximate location of the exploratory boring, a vicinity geologic map, a regional fault map, the boring logs, the results of our laboratory testing, and our conclusions, opinions, and recommendations for design and construction of the project.

4.0 FIELD EXPLORATION AND LABORATORY TESTING

Subsurface conditions at the proposed wastewater treatment plant site were explored on June 2, 2016 by drilling four borings to depths between 14 and 29 feet (designated as Borings B-1 thru B-4) at the approximate locations shown on the attached Plate 2A, Site Plan.

Subsurface conditions at the proposed pump station site were explored on June 3, 2016 by drilling 2 borings to respective depths of approximately 15 and 50 feet below the existing ground surface (designated as Borings B-5 and B-6) at the approximate locations depicted on the attached Plate 2B, Site Plan.

The borings were advanced with a truck-mounted drilling rig equipped with hollow stem augers and a wireline attached to a 140-lb hammer. An additional subsurface exploration was conducted by means of continuous sampling with a sampling tripod equipped with a cathead and rope attached to a 140-lb hammer on June 20, 2016 to inspect for cultural remains in the vicinity of the proposed pump station site. The subsurface conditions in the vicinity of previously documented cultural remains near the site were explored by drilling 2 borings to depths of 12 feet below the existing ground surface (designated as Borings B-7 and B-8) at the approximate locations shown on the attached Plate 2B, Site Plan. One of our geologists technically directed the exploration, maintained continuous logs of the borings, and obtained disturbed bulk samples of the screened materials for laboratory testing and visual examination in accordance with the sampling method described on Plate 9, Key to Symbols.

The subsurface materials were visually classified in the field; the classifications were then checked by visual examination of samples in the laboratory. In addition to sample classification, the boring logs contain interpretation of where stratum changes or gradational changes occur between samples. The boring logs depict BAGG's interpretations of subsurface conditions only at the locations indicated on

Plates 2A and 2B, and only on the dates noted on the logs. The boring logs are intended for use only in conjunction with this report, and only for the purposes outlined by this report.

The graphical representation of the materials encountered in the borings, and the results of laboratory tests, as well as explanatory/illustrative data, are attached as follows.

- Plate 5, Unified Soil Classification System, illustrates the general features of the soil classification system used on the boring logs.

- Plate 6, Soil Terminology, lists and describes the soil engineering terms used on the boring logs.

- Plate 7, Rock Terminology, lists and describes the soil engineering terms used on the boring logs.

- Plate 8, Boring Log Notes, describes general and specific conditions that apply to the boring logs.

- Plate 9, Key to Symbols, describes various symbols used on the boring logs.

- Plates 10A thru 17, Boring Logs, describe the subsurface materials encountered, show the depths and blow counts for the samples, and summarize the results of the laboratory testing conducted on selected samples of the subsurface materials encountered in the borings.

- Plate 18, Corrosivity Test Summary, presents the results of soil corrosivity tests on a sample collected from the upper 5 feet of the proposed wastewater treatment facility site and a sample collected from the upper 7½ feet of the proposed pump station site.

The moisture content and dry density of several undisturbed samples were measured to aid in correlating their engineering properties. Additionally, Atterberg Limits tests were performed on a clayey sample of the site materials to help define the expansion characteristics and aid in the soil classification.

The results of our plasticity test, and moisture-density data are summarized on the boring logs, as well as the plates described above.

Additionally, two samples from the upper 5 to 7½ feet of the sites were sent to Cooper Testing Laboratory for corrosion analysis (see Plate 18).

5.0 GEOLOGY AND SEISMICITY

5.1 Regional Geology

A review of the "Geology of the Onshore Part of San Mateo County, California: Derived From the Digital Database Open-File 98-137" compiled by E.E. Brabb, R.W. Graymer, and D.L. Jones, 1998, indicates the surficial geology in the vicinity of the proposed wastewater treatment plant site consists of "Ladera Sandstone (upper (?) and middle Miocene)," described as:

> ***Tl*** - "Ladera Sandstone (upper (?) and middle Miocene): Medium- to light-gray to yellowish-gray and buff, fine-grained, poorly cemented sandstone and siltstone, with minor amounts of coarse-grained sandstone, yellow-brown dolomitic claystone, and white to light-gray porcelaneous shale and porcelanite. Fine-grained sandstone and siltstone comprise more than 90 percent of formation..."

A review of the above referenced geologic map compiled by E.E. Brabb, R.W. Graymer, and D.L. Jones, 1998, indicates the surficial geology in the vicinity of the proposed pump station site consists of "older alluvial fan deposits (Pleistocene)," described as:

> ***Qpoaf*** - "Older alluvial fan deposits (Pleistocene): Brown dense gravely and clayey sand or clayey gravel that fines upward to sandy clay. These deposits display various sorting qualities. All Qpoaf deposits can be related to modern stream courses. They are distinguished from younger alluvial fans and fluvial deposits by higher topographic position, greater degree of dissection, and stronger profile development. They are less permeable than younger deposits, and locally contain fresh water mollusks and extinct Pleistocene vertebrate fossils."

The Seismic Hazard Zone Report No. 111 for the Palo Alto 7.5-Minute Quadrangle, San Mateo and Santa Clara Counties, California (State of CA Department of Conservation), indicates the age of the surficial units in the in the vicinity of the proposed wastewater treatment plant site range from historic to Holocene and the age of the surficial units in the vicinity of the proposed pump station site are Holocene.

Plate 3, Regional Geologic Map, shows the mapped regional geologic setting of the site and vicinity.

5.2 Seismicity

The site and the San Francisco Bay Area lie within the Coast Ranges geomorphic province, a series of discontinuous northwest trending mountain ranges, ridges, and intervening valleys characterized by complex folding and faulting. These faults are in a zone that extends eastward from off the Pacific Coast through the San Francisco Bay area to the western side of the Great Valley. This region has one of the highest rates of seismic moment release per square mile of any urban area in the United States. It is emerging from the stress shadow of the 1906 San Francisco Earthquake and future large earthquakes are considered a certainty.

Three of the northwest-trending major earthquake faults that comprise the San Andreas fault system and extend through the Bay Area include the San Andreas Fault, the Hayward fault, and the Calaveras fault, respectively located approximately 3 km (1.9 miles) west-southwest, 26.6 km (16.5 miles) east-northeast, and 35.5 km (22 miles) east-northeast of the wastewater treatment facility site and approximately 5.8 km (3.6 miles) southwest, 23.8 km (14.8 miles) northeast, and 32.5 km (20.2 miles) east-northeast of the proposed pump station site. While the subject wastewater treatment facility and pump station sites are not within any of an Alquist-Priolo Earthquake Fault Zones designated by the California Geological Survey, the San Andreas and Hayward faults are believed to be the principal seismic hazards in this area because of their activity rates and proximity to the site. The Working Group on California Earthquake Probabilities (2013) has estimated that the probability for a major earthquake (M_W 6.7 or greater) within 30 years on the nearby Peninsula section of the San Andreas Fault is about 9 percent and about 33 percent for a similar earthquake located anywhere on the Northern San Andreas Fault. There is also a 32 percent chance a M_W 6.7 or greater will be located on the Hayward-Rodgers Creek fault. The Calaveras fault reportedly has a 25 percent probability of producing a magnitude 6.7 or greater earthquake within 30 years.

Other significant regional faults are of greater distance, or have lesser probabilities of a major earthquake in the next 30 years or so. Of particular importance are the Monte Vista-Shannon and San Gregorio faults, respectively located approximately 0.2 km (0.12 miles) northeast and 18 km (11.2 miles) west of the proposed wastewater treatment facility site and approximately 2.2 km (1.37 miles) southwest and 20.9 km (13 miles) west-southwest of the proposed pump station site. The Monte Vista-Shannon fault reportedly has a 1.4 percent probability and the San Gregorio Fault reportedly has a 5.4 percent probability for a magnitude 6.7 or greater in 30 years. In addition, the Pilarcitos fault, mapped approximately 4.7 km (2.9 miles) southwest of the proposed wastewater treatment facility site and approximately 7.35 km (4.57 miles) southwest of the proposed pump station site, reportedly has a 0.5 percent probability for producing a magnitude 6.7 or greater in 30 years.

The predominant seismic hazard at this site will be from shaking caused by a large earthquake. ABAG (Association of Bay Area Governments) has published earthquake intensity maps that indicate the scenario earthquake listed for the entire San Andreas Fault (1906-size earthquake) would produce a “violent” shaking intensity, and the Peninsula Segments of the San Andreas would produce a “very strong” shaking intensity at the proposed wastewater treatment facility site. A scenario earthquake listed for the entire San Andreas Fault (1906-size earthquake) would produce a "very strong" shaking intensity, and the Peninsula segments of the San Andreas Fault would produce a "very strong" shaking intensity at the proposed pump station site. The shaking resulting from a scenario earthquake on the Hayward fault will be “moderate” in nature at the proposed wastewater treatment facility site and proposed pump station site. The shaking resulting from a scenario earthquake on the Calaveras fault will be "moderate" in nature at the proposed wastewater treatment facility and pump station sites. The shaking resulting from a scenario earthquake on the San Gregorio fault will be "strong" in nature at the proposed wastewater treatment facility and pump station sites.

The distances to the major active faults from the project sites and the estimated probability of a $M_W \geq 6.7$ within 30 years for each fault are listed on the following Table 1.

Table 1

Significant Earthquake Scenarios

Fault	Approximate Distance from Treatment Facility Site (kilometers)[1]	Location with Respect to Site	Approximate Distance from Pump Station Site (kilometers)[1]	Location with Respect to Site	Probability of $M_W \geq 6.7$ within 30 Years[2]
San Andreas (Entire)	3.0	W-SW	5.8	SW	33%
San Andreas (Peninsula)	3.0	W-SW	5.8	SW	9%
Hayward	26.6	E-NE	23.8	NE	32%
Calaveras	35.5	E-NE	32.5	E-NE	25%
Monte Vista-Shannon	0.2	NE	2.2	SW	1.4%
San Gregorio	18	W	20.9	W-SW	5.4%
Pilarcitos	4.7	SW	7.35	SW	0.5%

[1]USGS Fault files - Google Earth

[2]Working Group on California Earthquake Probabilities, 2014.

The attached Plate 4, Regional Fault Map, depicts the major active fault locations with respect to the subject site.

6.0 SITE CONDITIONS

6.1 Surface Conditions

Three of the four borings (Borings B-1 thru B-3) at the proposed wastewater treatment facility site were drilled in relatively barren areas on the upper surface of the existing fill pile adjacent to the existing pond on the southwest portion of the Sharon Heights Golf & Country Club. The fourth boring (Boring B-4) at the proposed wastewater treatment facility site was drilled in a paved area surfaced with approximately 2-inches of asphaltic concrete within the south-central portion existing maintenance yard on the southwest portion of the Sharon Heights Golf & Country Club. The existing pavement in the area of the above noted boring is underlain by approximately 6-inches of aggregate base.

The borings in the vicinity of the proposed pump station site were drilled in landscape areas bordering the northern portion of Sand Hill Road and the west portion of Oak Avenue in Menlo Park, California. The landscape areas are vegetated with a variety of groundcover, shrubs and small to large trees. Pervasive roots and rootlets were encountered within the upper 2- to 3½ feet of the borings.

6.2 Subsurface Conditions

Borings B-1 thru B-3, drilled for this investigation on the existing fill pile at the proposed wastewater treatment facility site, encountered predominantly granular fill materials to depths of 19, 7 and 15 feet below the existing ground surface, respectively. The upper 3½ to 7 feet of the fill materials encountered are described as consisting of variably mottled dark gray, gray-brown, olive-brown and yellow-brown clayey sand to sandy clay that is loose to medium dense, moist, and contains varying percentages of fine to coarse sand, gravel, organics and man-made debris. Below depths of approximately 3½ to 7 feet, the fill materials encountered consisted of dark gray to gray-brown silty sand, clayey sand, sandy silt with clay and sandy clay that is described as loose to medium dense/very stiff, slightly moist to very moist, and primarily consists of fine to medium-grained sand with medium to high plasticity fines. In Boring B-1, a layer of plastic mesh was encountered at the base of the fill materials.

Boring B-4, drilled within the existing maintenance yard at the proposed wastewater treatment facility site encountered approximately 2¼ feet of fill materials described as consisting of Brown sandy clay that is medium stiff to stiff, moist and contains varying percentages of sand and man-made debris. A layer of woven fabric was encountered below the fill materials in Boring B-4. Underlying the woven fabric is an approximately 1 foot thick layer of gray clayey silt, interpreted to be colluvium deposited on the formerly sloping terrain in the vicinity of the boring.

Below the existing fill materials at the proposed wastewater treatment facility site, the borings encountered native soils consisting primarily of sandy clay to clayey sand that is described as yellow- to olive-brown, hard/dense, slightly moist to moist and contains varying percentages of fine-grained sand. The native soils described above are interpreted to correspond to the weathered portion of the underlying bedrock.

Bedrock in Borings B-1 thru B-4 drilled for this investigation was encountered at depths of approximately 22, 12, 18½, and 13½ feet, respectively. The bedrock materials encountered consisted of sandstone and siltstone of the Ladera Formation. The bedrock materials encountered are described as gray to yellow-brown, moderately weathered, very closely to closely fractured, firm, friable to weak, and consist predominantly of varying percentages of silt and fine-grained sand.

Borings B-5 thru B-8 drilled in the vicinity of the proposed wastewater pump station site encountered approximately 2¼ to 5 feet of fill materials described as consisting of silty sandy clay with gravel, sandy lean clay with gravel and clayey sand that is brown to yellow-brown, medium stiff/medium dense to stiff/dense, dry to moist, and contains varying percentages of fine to coarse sand and gravel. Pervasive roots and rootlets were encountered in the upper approximately 3½ feet.

Underlying the above described fill materials encountered in Borings B-5 thru B-8 are native soils described as consisting of sandy lean clay, silty clay, fat clay overlying silty sand, and clayey gravel with sand that are brown to dark gray, stiff/medium dense to very stiff/dense and moist to wet.

Boring B-6, drilled to a depth of 50 feet, encountered bedrock materials described as consisting of decomposed to moderately weathered claystone at a depth of approximately 16 feet below the existing ground surface.

For more information on the subsurface materials, we refer you to Plates 10A thru 17, Boring Logs

6.3 Groundwater

Groundwater was encountered in Borings B-1 and B-3 at depths of approximately 13 feet below the existing ground surface. Upon completion of the borings, the depth to groundwater in Borings B-1 and was measured to be approximately 17 feet below the existing ground surface. Due to the borings proximity to the existing pond at the proposed wastewater treatment facility site and the absence of groundwater in Borings B-2 and B-4, it is inferred that the groundwater encountered is related to seepage of the pond water.

Groundwater was not encountered in any of the borings drilled at the proposed wastewater pump station site. However, wet soils were encountered in Boring B-6 below a depth of approximately 10½ feet below the existing ground surface.

According to the Seismic Hazard Zone Report for the Palo Alto 7.5 Minute Quadrangle, San Mateo and Santa Clara Counties, California (California Department of Conservation Seismic Hazard Zone Report

111, dated 2006) the depth to the historically highest groundwater level recorded in the vicinity of the proposed wastewater treatment facility and pump station sites is greater than 30 feet.

It should be noted that groundwater levels typically fluctuate due to variations in rainfall, temperature, and other factors not evident at the time of exploration. Due to the interbedded and interfingering nature of alluvial sediments, it is also likely that fluctuations in the groundwater level and/or perched water conditions may occur across the site.

7.0 GEOHAZARD EVALUATION

7.1 CBC 2013 Site Characterization

Based on the boring data, the proposed wastewater treatment facility and pump station sites are designated as Class C (Very Dense Soil and Soft Rock) sites, with an average N value in the top 100 feet greater than 50 and an average undrained shear strength greater than 2,000 pounds per square feet (psf).

As part of the final geotechnical engineering investigation, it would be appropriate, using the site coordinates and the U.S. Seismic Design Maps by USGS Earthquake Hazards Program, to have earthquake ground motion parameters be computed in accordance with the 2013 California Building Code.

7.2 Liquefaction Potential

Soil liquefaction is a condition where saturated granular soils near the ground surface undergo a substantial loss of strength due to increased pore water pressure resulting from cyclic stress applications induced by earthquakes or other vibrations. In the process, the soil acquires mobility sufficient to permit both vertical and horizontal movements, if not confined. Soils most susceptible to liquefaction are loose, uniformly graded, fine-grained, sands, and loose silts with very low cohesion. It is generally acknowledged that the probability and consequences of liquefaction of soils at depths greater than approximately 50 feet below ground surface is generally very small. At the deeper depths, the greater overburden pressure and reduced level of shearing is usually sufficient to limit liquefaction.

Excessively loose granular soils were logged in Borings B-1 thru B-3, drilled on the existing fill pile at the proposed wastewater treatment facility site to depths of approximately 19, 7 and 15 feet, respectively. In addition, groundwater was encountered at depths of approximately 13 feet in Borings B-1 and B-3. According to the Seismic Hazard Zone Report for the Palo Alto 7.5 Minute Quadrangle, San Mateo and Santa Clara Counties, California (California Department of Conservation Seismic Hazard Zone Report 111, dated 2006), the subject site is not within an area with historical occurrence of liquefaction, or local geological, geotechnical and ground water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required. In addition, the Seismic Hazard Zone Report for the Palo Alto 7.5 Minute Quadrangle, San Mateo and Santa Clara Counties, California (California Department of Conservation Seismic Hazard Zone Report 111, dated 2006), indicates that the depth to the historically highest groundwater level recorded in the vicinity of the project site is greater than 30 feet.

Excessively loose granular soils were not logged in Borings B-5 thru B-8, drilled in the vicinity of the proposed wastewater pump station site. However, medium dense granular soils were encountered in the upper five feet in Borings B-7 and B-8 as well as at depths between 7 and 8½ feet in Borings B-5 thru B-7. Groundwater was not encountered in the borings drilled in the vicinity of the proposed wastewater pump station site. According to the Seismic Hazard Zone Report for the Palo Alto 7.5 Minute Quadrangle, San Mateo and Santa Clara Counties, California (California Department of Conservation Seismic Hazard Zone Report 111, dated 2006), the subject site is not within an area with historical occurrence of liquefaction, or local geological, geotechnical and ground water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required. In addition, the Seismic Hazard Zone Report for the Palo Alto 7.5

Minute Quadrangle, San Mateo and Santa Clara Counties, California (California Department of Conservation Seismic Hazard Zone Report 111, dated 2006), indicates that the depth to the historically highest groundwater level recorded in the vicinity of the project site is greater than 30 feet.

Due to the presence of loose to medium dense granular soils below the water level in the existing pond in the vicinity of the proposed wastewater treatment facility site, it is our opinion that the potential of the site materials at the boring locations for seismically-induced liquefaction is considered high. In addition, due the proximity of the proposed wastewater pump station site to San Francisquito Creek and the presence of medium dense granular soils at relatively shallow depths, it is our opinion that the site materials at the boring locations for seismically-induced liquefaction is considered moderate.

As part of the final geotechnical engineering investigation, it would be appropriate, to evaluate the potential effects of liquefaction on the proposed improvements.

7.3 Other Geologic Hazards

7.3.1 Potential for Fault-Related Ground Surface Rupture

The sites are not situated within an Alquist-Priolo Earthquake Fault Zone as established by the CGS around faults that are considered active (California Division of Mines and Geology, State of California Special Studies Zones, Palo Alto Quadrangle, Official Map, effective July 1, 1974). In addition, no known active faults cross the site or its immediate area. Therefore, it is our opinion that the potential for fault-related ground surface rupture at the site is minimal.

7.3.2 Potential for Lateral Spreading

The sites are not located within areas designated as being subject to liquefaction by the California Geological Survey (Seismic Hazard Zone Report of the Palo Alto 7.5-Minute quadrangle, Santa Clara County, California: California Geological Survey, Seismic Hazard Zone Report 111). However, due to the proximity of the proposed wastewater treatment facility site to the sloping portion of the existing fill pile and the presence of poorly consolidated sediments at the site, it is our opinion that the potential for lateral spreading to occur within the site limits is high. In addition, due to the proximity of the proposed wastewater pump station site to the north bank of San Francisquito Creek, it is our opinion that the potential for lateral spreading to occur within the site limits in low to moderate.

As part of the final geotechnical engineering investigation, it would be appropriate, to evaluate the potential effects of lateral spreading on the proposed improvements.

7.3.3 Potential for Slope Instability

The existing fill slope northeast of the proposed wastewater treatment facility area consists primarily of poorly consolidated granular fill materials and is therefore considered to present a significant potential slope instability hazard for the proposed wastewater treatment facility.

The site area in the immediate vicinity of the proposed wastewater pump station is essentially level, with gentle topographic relief. Therefore, the potential for slope instabilities to occur is considered low to nil.

Because of the significant potential slope instability hazard, it would be appropriate, as part of the final geotechnical engineering investigation, to evaluate the potential effects of slope instability on the proposed improvements.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 General

Based on the subsurface exploration conducted at the subject property, it is our opinion that the proposed project is feasible from a geotechnical engineering standpoint, provided the general recommendations presented in this report are followed during the performance of the future final geotechnical investigation.

8.2 Geotechnical and Seismic /Geologic Hazards

Soils in the project are generally fine grained. Although the laboratory tests indicate that these soils are of low plasticity, such soils, in general, have relatively low strengths, even when compacted. Portions of the project that rely on soil strength, such as bearing capacity, slab support, retaining wall pressures, allowable lateral resistances, and pavement support should include consideration of these soil characteristics.

There is a potential for settlement and differential settlement due to the presence of undocumented fill in the vicinity of the proposed treatment plant. such soils can be expected to be compressible when loaded and such settlement would undoubtedly cause severe damage to structures that are supported by such soils. Recommendations should be developed to mitigate the detrimental effects of these soils.

The site could experience violent ground shaking from future earthquakes during the anticipated lifetime of the project. The intensity of ground shaking will depend on the magnitude of earthquake, distance to epicenter, and response characteristics of the on-site soils. Structures, pipelines, and other improvements may be damaged by a nearby major seismic event.

Due to the potential for significant damage due to geologic hazards, consideration should be given to designing and constructing the improvements so that any damage will result in as little release of effluent as practical and so that the station will be put back into operation as soon as practical. Adherence to good engineering design and construction practices will help reduce the risk to damage. The California Building Code provides the minimum requirements of good engineering design and construction practices.

We recommend that as part of the final geotechnical engineering investigation, it would be appropriate, to have earthquake ground motion parameters be computed in accordance with the 2013 California Building Code.

It would be also be appropriate to evaluate the potential effects of liquefaction, lateral spreading, and slope instability on the proposed improvements.

Based on the results of our subsurface exploration, it is our opinion that the sanitary sewer pump station equipment can be supported on a conventional mat slab. Excavations for the pump station and for pipeline trench excavations should be designed and constructed so that they are safe.

Further recommendations for site grading, foundations, slabs-on-grade, flexible and rigid pavements, drainage, and utility trench backfill are presented in the following sections of the report.

When the final development plans are available, they should be reviewed by the design geotechnical engineer of record prior to construction to confirm that the intent of the final design recommendations are reflected in the plans, and to confirm that those recommendations properly address the proposed project in its final form.

8.3 Site Grading

It our understanding that site grading will include minimal changes in elevation. The grading procedures listed below should be followed in areas to receive fill, pavements, concrete slabs, or flatwork:

- The existing structures and the associated footings, slabs, pavements and utilities to be abandoned should be completely removed and disposed off-site.
- The removed AC pavement may be pulverized to a maximum size of two inches and reused as engineered fill.
- Temporary excavations deeper than 5 feet will either have to be sloped back in accordance with the requirements of State of California, Division of Industrial Safety or will have to be shored.
- The exposed surfaces should be scarified to depths of 8 inches, uniformly moisture conditioned to slightly above optimum moisture content and compacted to a minimum of 90 percent relative compaction, as determined by ASTM D1557. Further over-excavate, as necessary, any area still containing weak or unsuitable material, as determined in the field by the Geotechnical Engineer.
- Place fill on the prepared surfaces created by the above actions in uniformly moisture conditioned and compacted lifts not exceeding 8 inches in loose thickness. Rocks or cobbles larger than 3 inches in maximum dimensions should not be allowed to remain within the foundation areas, unless they can be crushed in-place by the construction equipment. Imported fill material should be compacted to a minimum of 90 percent relative compaction at slightly above optimum moisture content. On-site soils should be compacted as specified above.

The native soils are suitable for use as structural fill. Imported fill soils if needed, should be predominately granular in nature and should be free of organics, debris, or rocks over 3 inches in size, and should be approved by the Geotechnical Engineer before importing to the site. As a general guide of acceptance, imported soils should have a Plasticity Index less than 15, and an R-value of at least 20, and fines content between 15 and 60 percent. All aspects of site grading including clearing/stripping, demolition, building pad preparation, and placement of fills or backfills should be performed under the observation of the geotechnical engineer's field representatives.

It must be the Contractor’s responsibility to select equipment and procedures that will accomplish the grading as described above. The Contractor must also organize his work in such a manner that one of the design geotechnical engineer of record's field representatives can observe and test the grading operations, including clearing, excavation, compaction of fill and backfill, and compaction of subgrades.

8.4 Retaining Walls

Retaining walls should be designed to resist lateral earth pressures from adjoining natural materials and backfills. Walls supporting native materials should be designed to resist lateral pressures including hydrostatic pressures, seismic pressures and traffic surcharge loads should be added to the above pressures.

Retaining walls can be supported on an appropriate foundation system, including on shallow foundations or on drilled, cast-in-place, reinforced concrete piers and should be designed to facilitate drainage.

General backfill behind the walls, excluding drainage materials, should conform to the fill requirements included under the “Site Grading” section of this report.

8.5 Foundations

General recommendations for shallow foundations and drilled piers are presented below. Design criteria for these or for other foundation systems should be developed by the geotechnical engineer of record.

8.5.1 Conventional Shallow Footings

If subsurface earth materials are made to be appropriate for adequate support, structural loads may be satisfactorily supported upon conventional spread footing foundations. Recommendations for footings should include foundation depth, be sized using an allowable bearing pressure, and may, if deemed appropriate by the geotechnical engineer of record, be increased for short-term wind and seismic loads.

The bottom of footing excavations should be firm, clean, and free of any loose or yielding soils. To the extent possible, footings should be poured in neat excavations without the use of side forms. The soils exposed in the excavations should be kept moist to minimize sloughing before concrete placement. Concrete should be placed as soon as possible in the footing trenches because any unsupported trench walls exposing granular soils may cave due to the presence of cohesionless soils.

The geotechnical engineer of record may choose to account for lateral resistance obtained from friction acting on the bottom of the foundation, and from passive earth pressures acting on the sides of the footings that have been poured in neat excavations.

When excavating for the utility line placement adjacent to the proposed structures, building foundations must be protected from being undermined and damaged by the construction activities. Utility trenches located adjacent to new footings should be established above an imaginary plane projected downward at 1H:1V from the edge of the existing foundations.

8.5.2 Drilled Piers

Structures may be supported on drilled piers provided they are founded in stiff/dense alluvial soils. Recommendations for such foundations should include foundation depth, be sized using an appropriate load bearing resistance, and may increased for short-term wind and seismic loads.

The bottom of pier excavations should be firm, clean, and free of any loose or yielding soils. To the extent possible. The soils exposed in the excavations should be kept moist to minimize sloughing before concrete placement. Concrete should be placed as soon as possible in the footing excavations because any unsupported excavation walls exposing granular soils may cave due to the presence of cohesionless soils.

Lateral resistance might be recommended from passive earth pressures acting on the sides of the the piers that have been poured in neat excavations or cast and backfilled with compacted fill.

8.6 Settlement

If the soils are properly processed so that they are stable, we expect thta the geotechnical engineer of record would project settlement to be on the order of about 1 inch or less. Differential settlement would be expected to be about half this value.

8.7 Slabs-on-Grade and Exterior Flatwork

Any concrete slabs should be constructed on a well compacted and moisture conditioned soil subgrade. The slab should be reinforced as per the project Structural Engineer’s recommendations. The subgrade should be approved by the Geotechnical Engineer immediately before the slab is poured.

8.8 Drainage

The ground surface should be sloped to drain away from structures. Drainage swales should be incorporated into the grading plan, and designed to provide sufficient slope from the structures toward appropriate discharge points. Any area where surface run-off becomes concentrated should be provided with a catch basin that discharges the collected runoff in a manner that will not cause erosion. Surface and subsurface drainage facilities and catchment areas should be checked frequently and cleaned or maintained throughout the project life, as necessary.

8.9 Flexible Pavements

In general, the surficial soil conditions at the site consist of sandy clay. Based on the clay-rich nature of the near surface soils, for design purposes we have assumed a subgrade R-value of 30 to develop the preliminary pavement sections tabulated below.

Table 3
Flexible Pavement Sections
(Subgrade R-Value=30)

Pavement Component	**TI = 4.5**	
Asphaltic Concrete (AC) in inches	5	3
Class II Aggregate Base (R_{Min}=78) in inches	--	4
Total Thickness in inches	5	7

The above pavement sections were calculated using the procedure described in the CalTrans Highway Design Manual, Topic 604, December 20, 2004. The design pertains to a life expectancy for the pavements of 20 years.

All materials and construction procedures, including placement and compaction of pavement components, should be performed in conformance with the latest edition of the CalTrans Standard Specifications, except that compaction should be performed in accordance with ASTM Test Method D1557. The aggregate baserock and the asphalt concrete layers should be compacted to a minimum of

95 percent relative compaction while at moisture content that is a minimum of 3 percent above optimum.

8.10 Trench Backfill

Vertical trenches deeper than 5 feet will require temporary shoring. Where shoring is not used, the height of the vertical excavation should be reduced to 4 feet and the sides should be sloped or benched, in accordance with the State of California, Division of Industrial Safety requirements.

Trench backfill materials and compaction should conform to the requirements of the local agency; however, we recommend the following as a minimum:

- In general, soils used for trench backfill shall be free of debris, roots and other organic matter, debris, and rocks or lumps exceeding 4 inches in greatest dimension. The on-site soils can be used for trench backfill.
- Compaction shall be performed to a minimum of 90% relative compaction in accordance with ASTM D1557, at a moisture content recommended previously. In pavement areas, the upper 12 inches of the backfill (below the pavement subgrade) shall be compacted to 95% of the maximum dry density. Jetting shall not be allowed.

8.11 Plan Review

It is recommended that the geotechnical engineer of record be retained to review the final grading, foundation, and drainage plans. This review is to assess general suitability of the earthwork, foundation, and drainage recommendations contained in this report and to verify the appropriate implementation of our recommendations into the project plans and specifications.

8.12 Observation and Testing

It is recommended that the geotechnical engineer of record be retained to provide observation and testing services during site grading, excavation, backfilling, and foundation construction phases of work. This is intended to verify that the work in the field is performed as recommended and in accordance with the approved plans and specifications, as well as verify that subsurface conditions encountered during construction are similar to those anticipated during the design phase.

9.0 CLOSURE

This report has been prepared in accordance with generally-accepted engineering practices. The recommendations presented in this report are based on our understanding of the proposed construction as described herein, and upon the soil conditions encountered in the soil boring drilled for this investigation.

The conclusions and recommendations contained in this report are based on subsurface conditions revealed by eight soil borings and a review of available geotechnical and geologic literature pertaining to the project site. It is not uncommon for unanticipated conditions to be encountered during site grading and/or foundation installation and it is not possible for all such variations to be found by a field exploration program appropriate for this type of project.

Soil conditions and standards of practice can be expected to change with time. The comments, opinions, conclusions, and recommendations presented of this geotechnical data report are only valid for the proposed development as described herein and at the time that this report was prepared. If the proposed project is modified, our recommendations should be reviewed and approved or modified by this office in writing. Final comments, opinions, conclusions, and recommendations as appropriate.

The following references and plates are attached and complete this report:

Plate 1	Vicinity Map
Plate 2	Site Plan
Plate 3	Regional Geologic Map
Plate 4	Regional Fault Map
Plate 5	Unified Soil Classification System
Plate 6	Soil Terminology
Plate 7	Rock Terminology
Plate 8	Boring Log Notes
Plate 9	Key to Symbols
Plate 10	Boring Logs
Plate 11	Gradation Test Data
Plate 12	Plasticity Data
Plate 13	Consolidation Test Data

ASFE document titled "Important Information About Your Geotechnical Engineering Report"

9.0 REFERENCES

Brabb, E.E., Graymer, R.W., Jones, D.L., 1998, Geology of the Onshore Part of San Mateo, County California: A Digital Database, Open-File Report 98-137.

California Building Standard Commission, 2013 California Building Code, California Code of Regulations, Title 24, Part 2, Column 2 of 2.

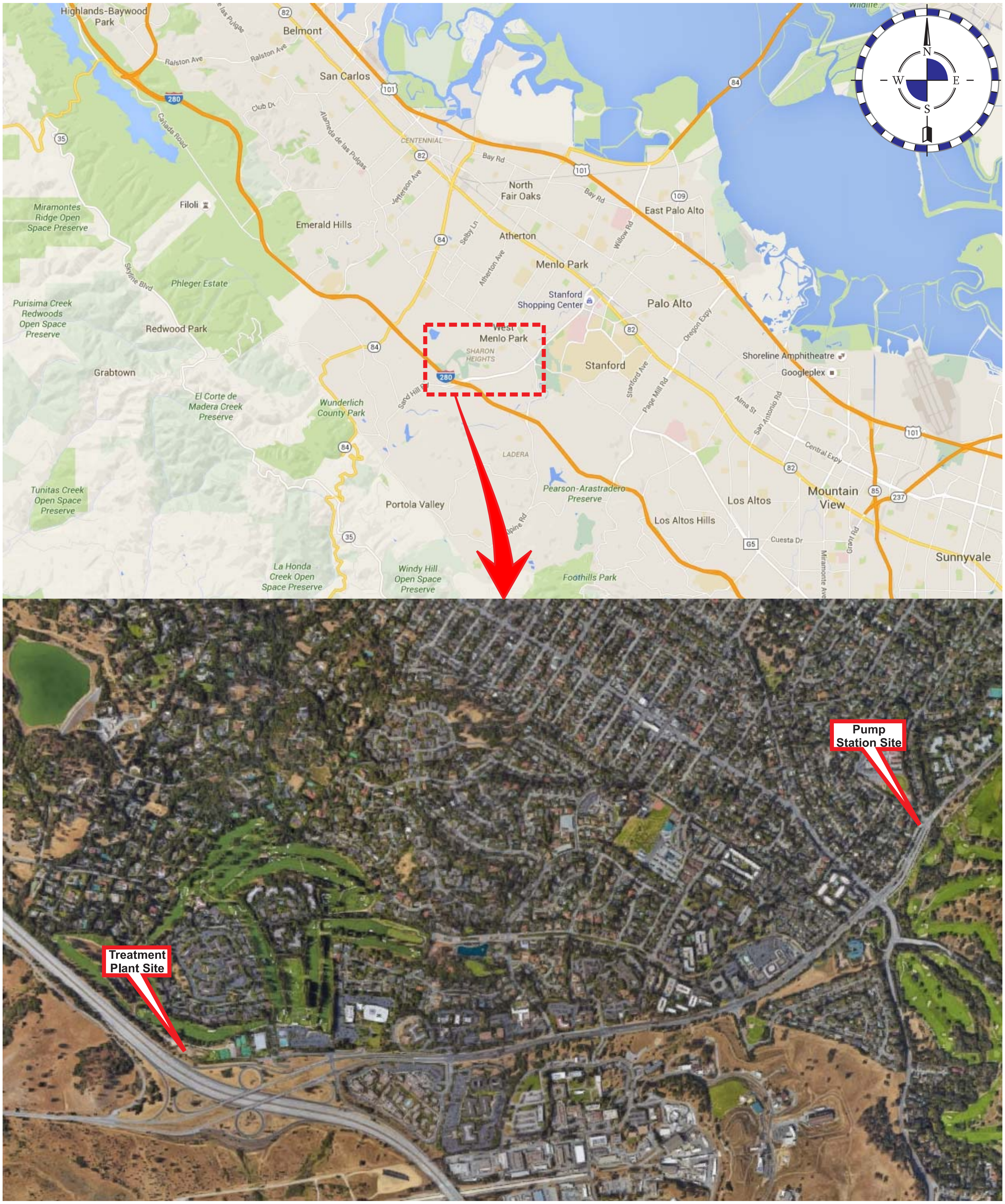
California Department of Conservation, Division of Mines and Geology, 2000, Digital Images of Official maps of Alquist-Priolo Earthquake Fault Zones of California, Central Coast Region.

Uniform California Earthquake Rupture Forecast (Version 3) (UCERF3): A New Earthquake Forecast for California's Complex Fault System (March 2015)

Field, E.H., Biasi, G.P., Bird, P., Dawson, T.E., Felzer, R.F., Jackson, D.D., Johnson, K.M., Jordon, T.H., Madden, C., Michael, A,J., Milner, K.R., Page, M.T., Parsons, T., Powers, P.M., Shaw, B.E., Thatcher, W.R., Weldon II, R.J., Zeng, Y, Long-Term Time-Dependent, Probabilities for Third Uniform California Earthquake Rupture Forecast (UCERF3), Bulletin of the Seismological Society of America, Vol. 105, No. 2A, pp. 511-543, April 2015.

Field, E.H., Biasi, G.P., Bird, P., Dawson, T.E., Felzer, R.F., Jackson, D.D., Johnson, K.M., Jordon, T.H., Madden, C., Michael, A,J., Milner, K.R., Page, M.T., Parsons, T., Powers, P.M., Shaw, B.E., Thatcher, W.R., Weldon II, R.J., Zeng, Y, Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3) –

The Time Dependent Model, Bulletin of the Seismological Society of America, Vol. 104, No. 3, pp. 1122-1180, June 2014.



Source: Google Maps

GEOTECHNICAL ENGINEERING INVESTIGATION WEST BAY SANITARY DISTRICT RECYCLED WATER SYSTEM MENLO PARK, CALIFORNIA	VICINITY MAP		
	DATE: JULY 2016	JOB NUMBER: RMCWA-01-01	PLATE 1

BAGG ENGINEERS

Base: Google Earth - accessed on July 13, 2016

GEOTECHNICAL ENGINEERING INVESTIGATION
WEST BAY SANITARY DISTRICT
RECYCLED WATER SYSTEM TREATMENT FACILITY
MENLO PARK, CALIFORNIA

BAGG ENGINEERS

SITE PLAN

JOB NO.	SCALE:	DATE	PLATE
RMCWA-01-01	1" ≈ 100'	JULY 2016	2A

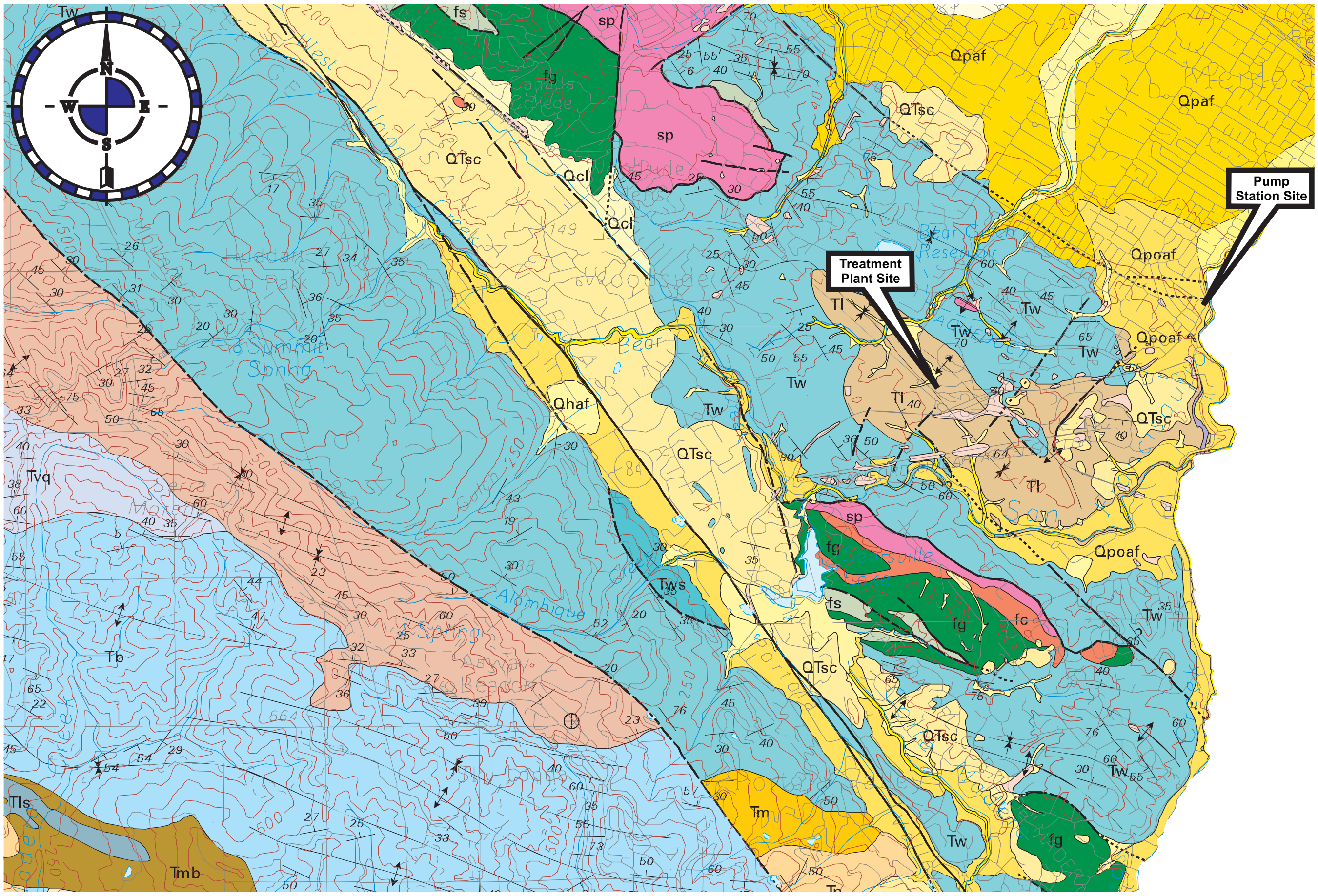
Base: Google Earth - accessed on July 13, 2016

GEOTECHNICAL ENGINEERING INVESTIGATION
WEST BAY SANITARY DISTRICT
RECYCLED WATER SYSTEM PUMP STATION
MENLO PARK, CALIFORNIA

BAGG ENGINEERS

SITE PLAN

JOB NO.	SCALE:	DATE	PLATE
RMCWA-01-01	1" ≈ 40'	JULY 2016	2B



LEGEND

Qpaf **Alluvial fan and fluvial deposits** (Pleistocene) – Brown dense gravely and clayey sand or clayey gravel that fines upward to sandy clay. These deposits display variable sorting and are located along most stream channels in the county. All Qpaf deposits can be related to modern stream courses. They are distinguished from younger alluvial fans and fluvial deposits by higher topographic position, greater degree of dissection, and stronger soil profile development. They are less permeable than Holocene deposits, and locally contain fresh water mollusks and extinct late Pleistocene vertebrate fossils. They are overlain by Holocene deposits on lower parts of the alluvial plain, and incised by channels that are partly filled with Holocene alluvium on higher parts of the alluvial plain. Maximum thickness is unknown but at least 50 m.

Qpoaf **Older Alluvial Fan Deposits** (Pleistocene) – Brown dense gravely and clayey sand or clayey gravel that fines upward to sandy clay. These deposits display various sorting qualities. All Qpoaf deposits can be related to modern stream courses. They are distinguished from younger alluvial fans and fluvial deposits by higher topographic position, greater degree of dissection, and stronger profile development. They are less permeable than younger deposits, and locally contain fresh-water mollusks and extinct Pleistocene vertebrate fossils.

QTsc **Santa Clara Formation** (lower Pleistocene and upper Pliocene) – Gray to red-brown poorly indurated conglomerate, sandstone, and mudstone in irregular and lenticular beds. Conglomerate consists mainly of subangular to subrounded cobbles in a sandy matrix but locally includes pebbles and boulders. Cobbles and pebbles are mainly chert, greenstone, and graywacke with some schist, serpentinite, and limestone.

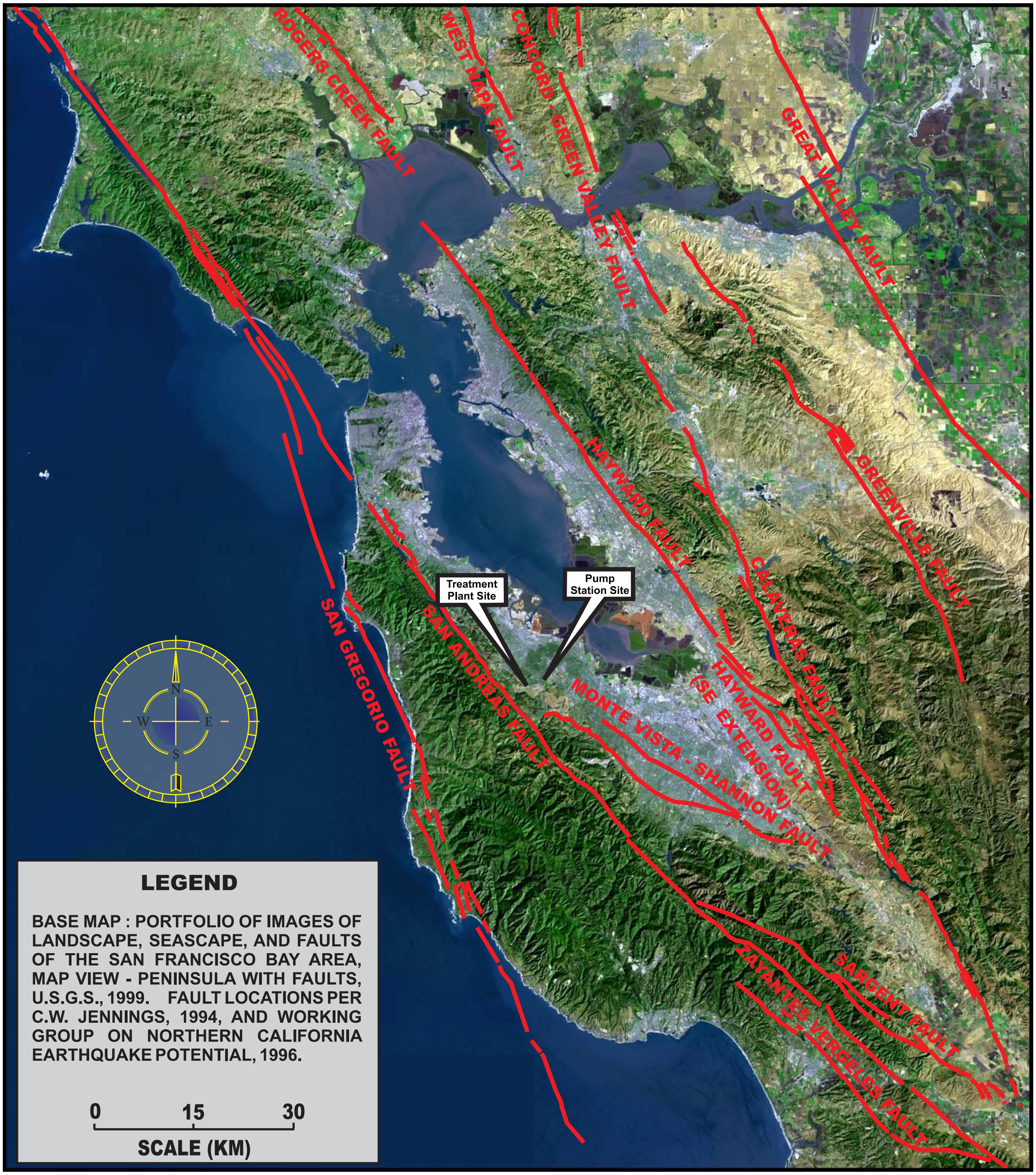
Tl **Ladera Sandstone** (upper (?) and middle Miocene) – Medium-to light-gray to yellowish-gray and buff, fine-grained, poorly cemented sandstone and siltstone, with minor amounts of coarse-grained sandstone, yellow-brown dolomitic claystone, and white to light-gray porcelaneous shale and porcelanite. Fine-grained sandstone and siltstone comprise more than 90 percent of formation. About 450 m thick.

Tw **Whiskey Hill Formation** (middle and lower Eocene) – Light-gray to buff coarse-grained arkosic sandstone, with light-gray to buff silty claystone, glauconitic sandstone, and tuffaceous siltstone. Sandstone beds constitute about 30 percent of map unit. Tuffaceous and silty claystone beds are expansive. Locally, sandstone beds are well cemented with calcite. In places within this map unit, sandstone and claystone beds are chaotically disturbed. This formation is as much as 900 m thick.

Reference: *Geology of the Onshore Part of San Mateo County, California*: Derived From the Digital Database Open-File 98-137, by E.E. Brabb, R.W. Graymer, and D.L. Jones, 1998.

GEOTECHNICAL ENGINEERING INVESTIGATION WEST BAY SANITARY DISTRICT RECYCLED WATER SYSTEM MENLO PARK, CALIFORNIA	**REGIONAL GEOLOGY MAP**		
	DATE: JULY 2016	JOB NUMBER: RMCWA-01-01	PLATE 3

BAGG ENGINEERS



GEOTECHNICAL ENGINEERING INVESTIGATION WEST BAY SANITARY DISTRICT RECYCLED WATER SYSTEM MENLO PARK, CALIFORNIA	REGIONAL FAULT MAP		
	DATE: JULY 2016	JOB NUMBER: RMCWA-01-01	PLATE 4

BAGG ENGINEERS

COARSE-GRAINED SOILS

LESS THAN 50% FINES*

GROUP SYMBOLS	ILLUSTRATIVE GROUP NAMES	MAJOR DIVISIONS
GW	Well graded gravel Well graded gravel with sand	**GRAVELS** More than half of coarse fraction is larger than No. 4 sieve size
GP	Poorly graded gravel Poorly graded gravel with sand	
GM	Silty gravel Silty gravel with sand	
GC	Clayey gravel Clayey gravel with sand	
SW	Well graded sand Well graded sand with gravel	**SANDS** More than half of coarse fraction is smaller than No. 4 sieve size
SP	Poorly graded sand Poorly graded sand with gravel	
SM	Silty sand Silty sand with gravel	
SC	Clayey sand Clayey sand with gravel	

NOTE: Coarse-grained soils receive dual symbols if:
(1) their fines are CL-ML (e.g. SC-SM or GC-GM) or
(2) they contain 5-12% fines (e.g. SW-SM, GP-GC, etc.)

FINE-GRAINED SOILS

MORE THAN 50% FINES*

GROUP SYMBOLS	ILLUSTRATIVE GROUP NAMES	MAJOR DIVISIONS
CL	Lean clay Sandy lean clay with gravel	**SILTS AND CLAYS** liquid limit less than 50
ML	Silt Sandy silt with gravel	
OL	Organic clay Sandy organic clay with gravel	
CH	Fat clay Sandy fat clay with gravel	**SILTS AND CLAYS** liquid limit more than 50
MH	Elastic silt Sandy elastic silt with gravel	
OH	Organic clay Sandy organic clay with gravel	
PT	Peat Highly organic silt	**HIGHLY ORGANIC SOIL**

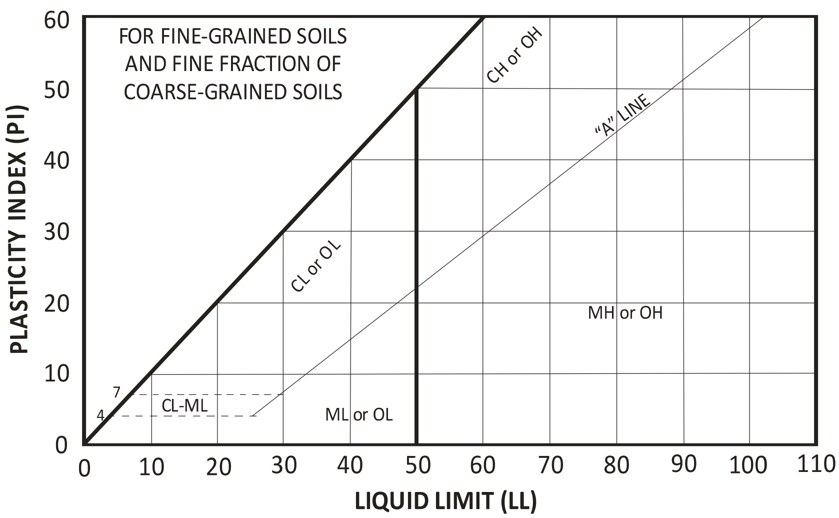
NOTE: Fine-grained soils receive dual symbols if their limits in the hatched zone on the Plasticity Chart(L-M)

SOIL SIZES

COMPONENT	SIZE RANGE
BOULDERS	ABOVE 12 in.
COBBLES	3 in. to 12 in.
GRAVEL	No. 4 to 3 in.
Coarse	¾ in to 3 in.
Fine	No. 4 to ¾ in.
SAND	No. 200 to No.4
Coarse	No. 10 to No. 4
Medium	No. 40 to No. 10
Fine	No. 200 to No. 40
*FINES:	BELOW No. 200

NOTE: Classification is based on the portion of a sample that passes the 3-inch sieve.

PLASTICITY CHART



Reference: ASTM D 2487-06, Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

GENERAL NOTES: The tables list 30 out of a possible 110 Group Names, all of which are assigned to unique proportions of constituent soils. Flow charts in ASTM D 2487-06 aid assignment of the Group Names. Some general rules for fine grained soils are: less than 15% sand or gravel is not mentioned; 15% to 25% sand or gravel is termed "with sand" or "with gravel", and 30% to 49% sand or gravel is termed "sandy" or "gravelly". Some general rules for coarse-grained soils are: uniformly-graded or gap-graded soils are "Poorly" graded (SP or GP); 15% or more sand or gravel is termed "with sand" or "with gravel", 15% to 25% clay and silt is termed clayey and silty and any cobbles or boulders are termed "with cobbles" or "with boulders".

UNIFIED SOIL CLASSIFICATION SYSTEM

SOIL TYPES (Ref 1)

Boulders: particles of rock that will not pass a 12-inch screen.
Cobbles: particles of rock that will pass a 12-inch screen, but not a 3-inch sieve.
Gravel: particles of rock that will pass a 3-inch sieve, but not a #4 sieve.
Sand: particles of rock that will pass a #4 sieve, but not a #200 sieve.
Silt: soil that will pass a #200 sieve, that is non-plastic or very slightly plastic, and that exhibits little or no strength when dry.
Clay: soil that will pass a #200 sieve, that can be made to exhibit plasticity (putty-like properties) within a range of water contents, and that exhibits considerable strength when dry.

MOISTURE AND DENSITY

Moisture Condition: an observational term; dry, moist, wet, or saturated.
Moisture Content: the weight of water in a sample divided by the weight of dry soil in the soil sample, expressed as a percentage.
Dry Density: the pounds of dry soil in a cubic foot of soil.

DESCRIPTORS OF CONSISTENCY (Ref 3)

Liquid Limit: the water content at which a soil that will pass a #40 sieve is on the boundary between exhibiting liquid and plastic characteristics. The consistency feels like soft butter.
Plastic Limit: the water content at which a soil that will pass a #40 sieve is on the boundary between exhibiting plastic and semi-solid characteristics. The consistency feels like stiff putty.
Plasticity Index: the difference between the liquid limit and the plastic limit, i.e. the range in water contents over which the soil is in a plastic state.

MEASURES OF CONSISTENCY OF COHESIVE SOILS (CLAYS) (Ref's 2 & 3)

Very Soft	N=0-1*	C=0-250 psf	Squeezes between fingers
Soft	N=2-4	C=250-500 psf	Easily molded by finger pressure
Medium Stiff	N=5-8	C=500-1000 psf	Molded by strong finger pressure
Stiff	N=9-15	C=1000-2000 psf	Dented by strong finger pressure
Very stiff	N=16-30	C=2000-4000 psf	Dented slightly by finger pressure
Hard	N>30	C>4000 psf	Dented slightly by a pencil point

*__N__=blows per foot in the Standard Penetration Test. In cohesive soils, with the 3-inch-diameter ring sampler, 140-pound weight, divide the blow count by 1.2 to get N (Ref 4).

MEASURES OF RELATIVE DENSITY OF GRANULAR SOILS (GRAVELS, SANDS, AND SILTS) (Ref's 2 & 3)

Very Loose	N=0-4**	RD=0-30	Easily push a ½-inch reinforcing rod by hand
Loose	N=5-10	RD=30-50	Push a ½-inch reinforcing rod by hand
Medium Dense	N=11-30	RD=50-70	Easily drive a ½-inch reinforcing rod
Dense	N=31-50	RD=70-90	Drive a ½-inch reinforcing rod 1 foot
Very Dense	N>50	RD=90-100	Drive a ½-inch reinforcing rod a few inches

**__N__=Blows per foot in the Standard Penetration Test. In granular soils, with the 3-inch-diameter ring sampler, 140-pound weight, divide the blow count by 2 to get N (Ref 4).

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Ref 1: ASTM Designation: D 2487-06, **Standard Classification of Soils for Engineering Purposes** (Unified Soil Classification System).

Ref 2: Terzaghi, Karl, and Peck, Ralph B., **Soil Mechanics in Engineering Practice,** John Wiley & Sons, New York, 2nd Ed., 1967, pp. 30, 341, and 347.

Ref 3: Sowers, George F., **Introductory Soil Mechanics and Foundations: Geotechnical Engineering,** Macmillan Publishing Company, New York, 4th Ed., 1979, pp. 80, 81, and 312.

Ref 4: Lowe, John III, and Zaccheo, Phillip F., **Subsurface Explorations and Sampling,** Chapter 1 in "Foundation Engineering Handbook," Hsai-Yang Fang, Editor, Van Nostrand Reinhold Company, New York, 2nd Ed, 1991, p. 39.

SOIL TERMINOLOGY

WEATHERING DESCRIPTORS

Fresh	No discoloration, not oxidized, no separation, hammer rings when crystalline rocks are struck.
Slight	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull, no visible separation, hammer rings when crystalline rocks are struck, body of rock not weakened.
Moderate	Discoloration extends from fractures, usually throughout; Fe-Mg materials are “rusty”, feldspar crystals are “cloudy”, all fractures are discolored or oxidized, partial separation of boundaries visible, texture generally preserved, hammer dose not ring when rock is struck, body of rock is slightly weakened.
Intense	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in situ disaggregation, all fracture surfaces are discolored or oxidized, surfaces friable, partial separation, texture altered by chemical disintegration, dull sound when struck with hammer, rock is significantly weakened.
Decomposed	Discolored or oxidized throughout, but resistant mineral such as quartz may be unaltered, all feldspars and Fe-Mg minerals are completely altered to clay, complete separation of grain boundaries, resembles a soil, partial or complete remnant of rock structure may be preserved, can be granulated by hand, resistant minerals such as quartz may be present as “stringers” or “dykes”.

BEDDING FOLIATION AND FRACTURE SPACING DESCRIPTORS

Millimeters	Feet	Bedding	Fracture Spacing
>10	<0.03	Laminated	Very Close
10-30	0.03-0.1	Very Thin	Very Close
30-100	0.1-0.3	Thin	Close
100-300	0.3-1	Moderate	Moderate
300-1000	1-3	Thick	Wide
1000-3000	3-10	Very Thick	Very Wide
>3000	>10	Massive	Extremely Wide

ROCK HARDNESS/STRENGTH DESCRIPTORS*

Extremely Hard	Core, fragment, or exposure cannot be scratched with knife or sharp pick; can only be chipped with repeated heavy hammer blows.
Very Hard	Cannot be scratched with knife or sharp pick. Core or fragment breaks with repeated heavy hammer blows.
Hard	Can be scratched with knife or sharp pick with difficulty (heavy pressure). Heavy hammer blow required to break specimen.
Moderately Hard	Can be scratched with knife or sharp pick with light or moderate pressure. Core or fragment breaks with moderate hammer blow.
Moderately Soft	Can be grooved $^{1}/_{16}$ inch (2mm) deep by knife or sharp pick with moderate or heavy pressure. Core fragment breaks with light hammer blow or heavy manual pressure.
Soft	Can be grooved or gouged easily by knife or sharp pick with light pressure, can be scratched with fingernail. Breaks wit light to moderate manual pressure.
Very Soft	Can be readily indented, grooved, or gouged with fingernail, or carved with a knife. Breaks with light manual pressure.
*Note:	Although “sharp pick” is included in those definitions, descriptions of ability to be scratched, grooved, or gouged by a knife is the preferred criteria.

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"Engineering Geology Field Manual, Second Edition, Volume 1, by U.S. Department of Interior, Bureau of Reclamation, 1998

ROCK TERMINOLOGY

GENERAL NOTES FOR BORING LOGS:

The boring logs are intended for use only in conjunction with the text, and for only the purposes the text outlines for our services. The Plate "Soil Terminology" defines common terms used on the boring logs.

The plate "Unified Soil Classification System," illustrates the method used to classify the soils. The soils were visually classified in the field; the classifications were modified by visual examination of samples in the laboratory, supported, where indicated on the logs, by tests of liquid limit, plasticity index, and/or gradation. In addition to the interpretations for sample classification, there are interpretations of where stratum changes occur between samples, where gradational changes substantively occur, and where minor changes within a stratum are significant enough to log.

There may be variations in subsurface conditions between borings. Soil characteristics change with variations in moisture content, with exchange of ions, with loosening and densifying, and for other reasons. Groundwater levels change with seasons, with pumping, from leaks, and for other reasons. Thus boring logs depict interpretations of subsurface conditions only at the locations indicated, and only on the date(s) noted.

SPECIAL FIELD NOTES FOR THIS REPORT:

1. Borings B-1 thru B-6 were drilled on June 2 and June 3, 2016, with a truck-mounted drilling rig using hollow stem augers. Borings B-7 and B-8 were continuously sampled on June 20, 2016 with a sampling tripod equipped with a cathead and rope attached to a 140 pound hammer. The borings were sealed with cement immediately after the last soil sample was collected.

2. The boring locations were approximately located by using a tape measure and/or pacing from known points on the site, as shown on Plates 2A and 2B, Site Plan.

3. The soils' Group Names [e.g. SANDY LEAN CLAY] and Group Symbols [e.g. (CL)] were determined or estimated per ASTM D 2487-06, Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System, see Plate 5). Other soil engineering terms used on the boring log are defined on Plate 6, Soil Terminology.

4. The "Blow Count" Column on the boring logs indicates the number of blows required to drive the sampler below the bottom of the boring, and the blow counts given are for each 6 inches of sampler penetration. The samples from the boring were driven with a 140-pound hammer.

5. Groundwater was encountered in the borings drilled for this investigation as indicated in the boring logs.

BORING LOG NOTES

BVGG ENGINEERS

KEY TO SYMBOLS

Symbol Description

Strata symbols

- Clayey sand
- Silty and clayey sand
- Silty sand
- Sandy Lean Clay
- Sandstone
- Borderline sandy lean clay to clayey sand
- Siltstone
- Sandy fat clay
- Variable sand and silt mix
- Silty sand with gravel
- Sandstone/Siltstone
- Paving
- Aggregate Base

Symbol Description

- Borderline lean clay to clayey silt
- Sandy lean clay with gravel
- Lean clay with sand
- Clayey gravel with sand
- Claystone
- Borderline lean clay to clayey silt
- High plasticity (fat) clay

Misc. Symbols

- Water first encountered during drilling
- Water level at completion of boring
- Boring continues

Soil Samplers

- Modified California Sampler: 2.375" ID by 3" OD, split-barrel sampler driven w/ 140-pound hammer falling 30 inches
- Standard Penetration Test: 1 3/8" ID by 2" OD, split-spoon sampler driven with 140-pound hammer falling 30" (ASTM D 1586-99)

KEY TO SYMBOLS

Symbol	Description
Line Types	
______	Denotes a sudden, or well identified strata change
_ _ _	Denotes a gradual, or poorly identified strata change
Laboratory Data	
bgs	Below the existing ground surface
AC	Asphaltic Concrete
AB	Aggregate Baserock
DSX	Direct shear test performed on a sample at an artificially increased moisture content (ASTM D2166).
DS	Direct shear test performed on a sample at natural moisture content (ASTM D2166).
LL	Liquid Limit (ASTM D4318).
PI	Plasticity Index (ASTM D4318).
NAT	Natural water content.
%Gravel	Percent of material that is retained on a #4 sieve (ASTM D1140).
%Sand	Percent of material that passes through a #4 sieve but retained on a #200 sieve (ASTM D1140).
%Fines	Percent of material that passes through a #200 sieve (ASTM D1140).
Corrosion pkg D	Corrosion tests including: 100% Saturated Resistivity (ASTM G57) pH (ASTM G51) Chloride (ASTM D4327) Sulfate (ASTM D4327) Redox Potential (ASTM G200)

BORING LOG

Boring No. B-1

BAGG ENGINEERS

JOB NAME: West Bay Sanitary District Recycled Water System
JOB NO.: RMCWA-01-01
CLIENT: RMC Water and Environment
DATE DRILLED: June 2, 2016
LOCATION: Sharon Heights Golf & Country Club, Menlo Park, CA
ELEVATION: 299±feet
DRILLER: Exploration Geoservices, Inc.
LOGGED BY: EW
DRILL METHOD: Truck Mounted Drilling Rig - 8" Diam. Hollow Stem Augers
CHECKED BY:

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0	3 6 8	SC	CLAYEY SAND: Mottled gray-brown, olive- brown and yellow-brown, loose, moist, fine to medium sand, trace coarse sand, trace gravel, contains organics and man-made debris	Fill
						4	3 4 5	SM/ SC	VARIABLE CLAYEY AND SILTY SAND: Dark- gray, loose, moist, fine to medium sand, contains organic debris	
						8	3 6 10	SM	SILTY SAND: Gray-brown, medium dense, slightly moist, fine to medium sand, trace to few organics	
						12	3 4 4	SC	CLAYEY SAND: Dark gray with trace blue gray mottling, loose, very moist, trace to few organics ...increased organic content	
						16	25 50/4"		...Plastic mesh	
						20		CL	SANDY CLAY: Yellow-brown with trace olive-brown mottling, hard, slightly moist, fine-grained sand	Intensely Weathered Bedrock
						24	50/2" 50/5"	ROCK	SANDSTONE: Gray, moderately weathered, closely fractured, firm, friable to weak, thickly bedded to massive,	

BORING LOG

Boring No. B-1
Page 2 of 2

JOB NAME: West Bay Sanitary District Recycled Water System *JOB NO.:* RMCWA-01-01

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						28	50/3"		fine-grained sand, slightly clayey	
						32			The boring was terminated at approximately 28¾ feet below the existing ground surface (bgs). Groundwater was encountered at approximately 13 feet bgs and was measured at approximately 17 bgs upon completion of the boring. Immediately after the last sample was retrieved, the borehole was backfilled with neat cement grout.	
						36				
						40				
						44				
						48				
						52				

BORING LOG

Boring No. B-2

JOB NAME: West Bay Sanitary District Recycled Water System
CLIENT: RMC Water and Environment
LOCATION: Sharon Heights Golf & Country Club, Menlo Park, CA
DRILLER: Exploration Geoservices, Inc.
DRILL METHOD: Truck Mounted Drilling Rig - 8" Diam. Hollow Stem Augers

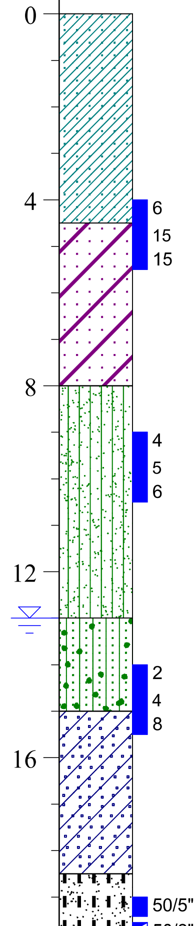
JOB NO.: RMCWA-01-01
DATE DRILLED: June 2, 2016
ELEVATION: 297± feet
LOGGED BY: EW
CHECKED BY:

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0 4	6 7 10 6 7 10	SC	CLAYEY SAND: Mottled dark gray, yellow brown and olive-brown, medium dense, moist, fine to medium sand, trace coarse-grained sand and gravel, trace organic debris, medium plasticity fines ...gray to olive-gray	Fill Corrosion Pkg D
						8	50/6"	CL/ SC	BORDERLINE SANDY CLAY/CLAYEY SAND: Yellow-brown, hard/dense, slightly moist, fine sand	Intensely Weathered Bedrock
						12 16	24 50/3" 50/5"	ROCK	SILTSTONE: Gray with orange-brown and yellow-brown oxidation, moderately weathered, very closely to closely fractured, firm, friable to weak, thickly bedded to massive, trace to few fine sand, slightly clayey	Hard drilling
						20 24			The boring was terminated at approximately 19 feet below the existing ground surface. Groundwater was not encountered in the boring. Immediately after the last sample was retrieved, the borehole was backfilled with neat cement grout.	

BORING LOG

Boring No. B-3
Page 1 of 2

JOB NAME: West Bay Sanitary District Recycled Water System
JOB NO.: RMCWA-01-01
CLIENT: RMC Water and Environment
DATE DRILLED: June 2, 2016
LOCATION: Sharon Heights Golf & Country Club, Menlo Park, CA
ELEVATION: 297½± feet
DRILLER: Exploration Geoservices, Inc.
LOGGED BY: EW
DRILL METHOD: Truck Mounted Drilling Rig - 8" Diam. Hollow Stem Augers
CHECKED BY:



Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0		CL/ SC	BORDERLINE CLAYEY SAND/SANDY CLAY: Yellow-brown to olive-brown, slightly moist, fine sand, trace medium to coarse sand, trace gravel, medium to high plasticity fines	Fill
						4	6, 15, 15	CH	SANDY CLAY: Dark gray, very stiff, moist, fine sand, trace medium to coarse sand, medium to high plasticity fines, contains thin layers of clayey sand	
						8	4, 5, 6	SM/ ML	SANDY SILT WITH CLAY: Dark gray, loose, moist, fine to medium sand, trace to few organics, low plasticity fines	
						12	2, 4, 8	SM	SILTY SAND: Dark gray, loose, very moist, fine to medium sand	
						16		CL	SANDY CLAY: Moittled dark gray and olive-gray, stiff, moist to very moist, fine sand	Intensely Weathered Bedrock
						20	50/5", 50/2"	ROCK	SANDY SILTSTONE: Gray, moderately weathered, firm, friable, fine sand	
						24			The boring was terminated at approximately 19.7 feet below the existing ground surface. Groundwater was encountered at approximately 13 feet below the existing ground surface. Immediately after the last	

BORING LOG

Boring No. B-3

JOB NAME: West Bay Sanitary District Recycled Water System *JOB NO.:* RMCWA-01-01

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
									sample was retrieved, the borehole was backfilled with neat cement grout.	
						28				
						32				
						36				
						40				
						44				
						48				
						52				

BVGG ENGINEERS

BORING LOG

Boring No. B-4

JOB NAME: West Bay Sanitary District Recycled Water System
JOB NO.: RMCWA-01-01
CLIENT: RMC Water and Environment
DATE DRILLED: June 2, 2016
LOCATION: Sharon Heights Golf & Country Club, Menlo Park, CA
ELEVATION: 267± feet
DRILLER: Exploration Geoservices, Inc.
LOGGED BY: EW
DRILL METHOD: Truck Mounted Drilling Rig - 8" Diam. Hollow Stem Augers
CHECKED BY:

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0			Pavement - 2" AC, 6" AB	
								CL	SANDY CLAY: Brown, moist, fine sand, trace medium to coarse sand, contains brick fragments	Fill
							5 11 12	CL/ML	...mesh fabric	Native
						4	10 17 23		CLAYEY SILT: Gray, medium dense, moist, trace fine sand	
									SANDY CLAY: Olive-brown with orange-brown oxidation, hard, moist	
						8	8 10 16		...Olive-brown and yellow-brown	Intensely Weathered Bedrock
						12				
							50/4"	ROCK	SILTSTONE: Yellow-brown, moderately weathered, firm, friable, trace fine sand, slightly clayey	
						16			The boring was terminated at approximately 13.8 feet below the existing ground surface. Groundwater was not encountered in the boring. Immediately after the last sample was retrieved, the borehole was backfilled with neat cement grout.	
						20				
						24				

BORING LOG

Boring No. B-5

JOB NAME: West Bay Sanitary District Recycled Water System
CLIENT: RMC Water and Environment
LOCATION: Sand Hill Road and Oak Avenue, Menlo Park, CA
DRILLER: Exploration Geoservices, Inc.
DRILL METHOD: Truck Mounted Drilling Rig - 8" Diam. Hollow Stem Augers
JOB NO.: RMCWA-01-01
DATE DRILLED: June 3, 2016
ELEVATION: 119± feet
LOGGED BY: JKT
CHECKED BY:

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0		CL	SILTY SANDY CLAY WITH GRAVEL: Brown, dry to moist, medium stiff to stiff, contains roots, rootlets and organic debris	Fill
							5 7 8	CL		
							5 5 5	CL	SANDY LEAN CLAY: Dark brown, moist, medium stiff to stiff, contains roots, rootlets and organic debris	Native
						4	5 7 6		SANDY LEAN CLAY: Brown, moist, stiff, fine sand	
						8	5 7 5			
								SM	SILTY SAND: Brown, moist, well-graded sand, trace fine gravel	
							15 30 48	GC	CLAYEY GRAVEL: Brown and gray, moist, well-graded subrounded gravels, trace subrounded cobbles up to 4"	
						12	10 22 40			
						16			The boring was terminated at approximately 15 feet below the existing ground surface. Groundwater was not encountered in the boring. Immediately after the last sample was retrieved, the borehole was backfilled with neat cement grout and capped with native soils.	
						20				
						24				

BORING LOG

Boring No. B-6

JOB NAME: West Bay Sanitary District Recycled Water System
JOB NO.: RMCWA-01-01
CLIENT: RMC Water and Environment
DATE DRILLED: June 3, 2016
LOCATION: Sand Hill Road and Oak Avenue, Menlo Park, CA
ELEVATION: 119± feet
DRILLER: Exploration Geoservices, Inc.
LOGGED BY: JKT
DRILL METHOD: Truck Mounted Drilling Rig - 8" Diam. Hollow Stem Augers
CHECKED BY:

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0	5 7 7	CL	SANDY LEAN CLAY WITH GRAVEL: Light brown, dry to moist, medium stiff to stiff, contains roots, rootlets, and organic debris	Fill
								CL	SANDY LEAN CLAY: Dark brown, moist, stiff, fine sand, contains roots, rootlets, and organic debris	Native
						4	6 7 6	CL	SANDY LEAN CLAY: Brown, moist, stiff, fine to medium sand ... 4" cobble encountered	Corrosion Pkg D
						8	5 8 14	SM	SILTY SAND: Brown, moist, medium dense, fine sand	
						12	25 43	GC	CLAYEY GRAVEL WITH SAND: Reddish-brown and gray, moist to wet, dense, gravel up to 3"	
						16	39 50/5"	ROCK	CLAYSTONE: dark reddish-brown, decomposed, very soft	
						20				
						24	28 30 35		... gray, intensely weathered, moderately soft	

BORING LOG

Boring No. B-6

JOB NAME: West Bay Sanitary District Recycled Water System *JOB NO.:* RMCWA-01-01

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						28				
							13 23 25			
						32			... moderate to intensely weathered, moderately soft to moderately hard	
							23 28 35			
						36				
							22 40 45			
						40				
						44	10 21 36			
									... moderately soft	
						48				
							14 31 37			
						52			The boring was terminated at approximately 50 feet below the existing ground surface. Groundwater was not	

BORING LOG

JOB NAME: West Bay Sanitary District Recycled Water System *JOB NO.:* RMCWA-01-01

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
									encountered in the boring. Immediately after the last sample was retrieved, the borehole was backfilled with neat cement grout and capped with native soils.	
						56				
						60				
						64				
						68				
						72				
						76				
						80				

BVGG ENGINEERS

BORING LOG

JOB NAME: West Bay Sanitary District Recycled Water System
CLIENT: RMC Water and Environment
LOCATION: Sand Hill Road and Oak Avenue, Menlo Park, CA
DRILLER: Access Soil Drilling, Inc.
DRILL METHOD: Minuteman - 3½" Solid Flight Augers

JOB NO.: RMCWA-01-01
DATE DRILLED: June 20, 2016
ELEVATION: 121± feet
LOGGED BY: EW
CHECKED BY:

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0	7, 14, 15	SC	CLAYEY SAND: Brown to yellow-brown, medium dense to dense, slightly moist, fine sand, few to little medium to coarse sand, few fine gravel, trace roots and rootlets	Fill
							21, 22, 24			
						4	18, 15	SC	CLAYEY SAND: Yellow-brown to reddish-brown, medium dense, moist, well graded sand, trace rootlets	Native
							15, 11, 12	CL-ML	SILTY CLAY: Dark gray, very stiff, moist, trace fine sand	
						8	16, 12, 13, 21	SM	SILTY SAND: Brown, medium dense, slightly moist, fine sand	
							18, 19, 20		...few medium sand, trace coarse sand, trace fine gravel	
						12			The boring was terminated at approximately 12 feet below the existing ground surface. Groundwater was not encountered in the boring. Immediately after the last sample was retrieved, the borehole was backfilled with neat cement grout.	
						16				
						20				
						24				

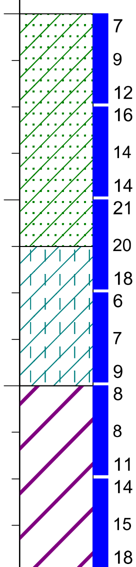
BORING LOG

Boring No. B-8
Page 1 of 1

JOB NAME: West Bay Sanitary District Recycled Water System
CLIENT: RMC Water and Environment
LOCATION: Sand Hill Road and Oak Avenue, Menlo Park, CA
DRILLER: Access Soil Drilling, Inc.
DRILL METHOD: Minuteman - $3\frac{1}{2}$" Solid Flight Augers

JOB NO.: RMCWA-01-01
DATE DRILLED: June 20, 2016
ELEVATION: 123± feet
LOGGED BY: EW
CHECKED BY:

Type of Strength Test	Test Surcharge Pressure, psf	Test Water Content, %	Shear Strength, psf	In-Situ Water Content, %	In-Situ Dry Unit Weight, pcf	Depth, ft.	Soil Symbols, Samplers and Blow Counts	USCS	Description	Remarks
						0	7, 9, 12, 16, 14, 14, 21, 20, 18	SC	CLAYEY SAND: Brown to yellow-brown, medium dense, slightly moist, well graded sand, few gravel	Fill
						4	6, 7, 9	CL-ML	SILTY CLAY: Dark gray, slightly moist, few fine sand, trace medium to coarse sand, trace gravel	Native
						8	8, 8, 11, 14, 15, 18	CH	FAT CLAY: Dark brown, very stiff, moist, trace to few fine sand ...increased sand content with depth, few fine sand, trace medium to coarse sand, trace gravel	
						12			The boring was terminated at approximately 12 feet below the existing ground surface. Groundwater was not encountered in the boring. Immediately after the last sample was retrieved, the borehole was backfilled with neat cement grout.	
						16				
						20				
						24				



Corrosivity Tests Summary

CTL #: 011-753 Date: 6/17/2016 Tested By: PJ Checked: PJ
Client: BAGG Project: Recycled Water System Proj. No: RMCWA-01-01
Remarks:

Sample Location or ID			Resistivity @ 15.5 °C (Ohm-cm)			Chloride	Sulfate		pH	ORP		Sulfide	Moisture	Soil Visual Description
			As Rec.	Min	Sat.	mg/kg	mg/kg	%		(Redox)		Qualitative	At Test	
						Dry Wt.	Dry Wt.	Dry Wt.		E_H (mv)	At Test	by Lead	%	
Boring	Sample, No.	Depth, ft.	ASTM G57	Cal 643	ASTM G57	ASTM D4327	ASTM D4327	ASTM D4327	ASTM G51	ASTM G200	Temp °C	Acetate Paper	ASTM D2216	
B-2	2	4.5	5,265	-	1,271	28	437	0.0437	7.5	405	22	-	17.3	Dark Gray Sandy SILT
B-6	2	7	3,805	-	3,816	<2	9	0.0009	7.3	463	22	-	19.4	Olive Brown Silty SAND

GEOTECHNICAL ENGINEERING INVESTIGATION
WEST BAY SANITARY DISTRICT
RECYCLED WATER SYSTEM
MENLO PARK, CALIFORNIA

CORROSIVITY TEST SUMMARY

DATE JULY 2016 | JOB NUMBER RMCWA-01-01 | PLATE 18