GEOTECHNICAL INVESTIGATION

On

PROPOSED RESIDENTIAL DEVELOPMENT

At

730 & 760 Diana Avenue
Morgan Hill, California

For
Diana Avenue Investors, LLC

By
Quantum Geotechnical, Inc.

Project No. K053.G
March 26, 2024

QUANTUM GEOTECHNICAL INC.

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Mr. Josh Vrotsos
Director of Acquisitions
Diana Avenue Investors, LLC
385 Woodview Avenue, Suite 100
Morgan Hill, CA 95037

Subject: Proposed Residential Development
730 & 760 Diana Avenue, Morgan Hill, California
GEOTECHNICAL INVESTIGATION

Dear Mr. Vrotsos:

In accordance with your authorization, ***Quantum Geotechnical, Inc.,*** has investigated the geotechnical conditions at the subject site located in Morgan Hill, California

Our findings indicate that development of the site for the proposed new residential development is feasible provided the recommendations of this report are carefully followed and are incorporated into the project plans and specifications.

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

Sincerely,
Quantum Geotechnical, Inc.

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

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GEOTECHNICAL INVESTIGATION

PURPOSE AND SCOPE

The purpose of our investigation for the proposed new residential subdivision located off Diana Avenue in Morgan Hill, California, was to determine the surface and subsurface soil conditions at the subject site. Based on the results of the investigation, criteria were established for the grading of the site, the design of foundations for the proposed development, and the construction of other related facilities on the property.

Our investigation included the following:

a. Field reconnaissance by the Senior Geologist.
b. Determine the general seismicity of the site in accordance with the 2022 CBC.
c. Advancing a total of three soil borings.
d. Laboratory testing of soil samples.
e. Analysis of the data and formulation of conclusions and recommendations; and
f. Preparation of this written report.

PROPOSED DEVELOPMENT

It is our understanding that the proposed project consists of developing the site for the construction of 23 single family residences and associated improvements. Based on a review of the Preliminary Grading and Drainage Plan by BKF Engineers, February 9, 2024, grading is anticipated to be minor cuts and fills of the order of 1 foot. In order to manage on-site stormwater, two bio-retention basins two large subsurface stormwater storage and infiltration chambers, and several curbside stormwater planters are planned. The excavations for the chambers are planned to be approximately up 10 feet deep. An EVA road is planned along the northern end of the eastern portion of the site. The EVA road is to be designed to support a 75,000 pound fire truck, and the road surfacing is to consist of asphaltic concrete, concrete or other approved surface. The residence structures are expected to be one to two stories in height and will be founded on a post-tensioned slab foundation system.

SITE LOCATION AND DESCRIPTION

The site is located in the central part of Morgan Hill, west of Highway 101, as shown on the Site Vicinity Map, Figure 1, attached to Appendix A.

The site measures approximately 3.05 acres in size and sits on nearly level terrain. The front of the property along Diana Avenue, includes a two-story home and garage, small in-law unit and shed, while the rest of the property is undeveloped and covered by annual grasses with a few medium-sized trees. The site is surrounded by perimeter fencing and there is a fence and gate between the front portion of the parcel and the undeveloped portion in the rear. The ground surface of the site is uneven and is sparsely covered with grass and a few trees and shrubs.

GENERAL GEOLOGIC CONDITIONS

The site is within the Coast Ranges Geomorphic Province of California. Throughout the Cenozoic Era, the western part of California has been affected by tectonic forces associated with lateral or transform plate motion between the North American and Pacific crustal plates, which has produced a complex system of northwest-trending faults - the San Andreas, Hayward, and Calaveras Fault systems being the most prominent within the Bay Area region and adjacent areas. Uplift, erosion and subsequent re-deposition of sedimentary rocks within this province have been driven primarily by the northwest-southeast directed strike-slip movement of the tectonic plates and the associated northeast oriented compressional stress. The northwest-trending coastal mountain ranges are the result of an orogeny believed to have been occurring since the Pleistocene epoch (approximately 2-3 million years before present).

The California Geologic Survey (CGS) has evaluated this portion of Morgan Hill for Seismic Hazards. According to the CGS report (2004) for the USGS 7.5-Minute Morgan Hill Quadrangle the site is not located within any liquefaction hazard zone, landslide hazard zone or fault rupture hazard zone.

Geologic maps show the site covered by Latest Pleistocene-age alluvial fan deposits (Qpf). These deposits consist of sands and gravel that are poorly to moderately sorted and may be medium dense to dense. The seismic hazard zone report (CGS, 2004) indicates the historically high groundwater table is expected to occur at depths of 30 to 40 feet below the existing ground surface. The Association of Bay Area Governments (ABAG) also assesses the site as having a low liquefaction potential and

relatively thick soils subject to potentially very strong seismic shaking in the event of a large nearby earthquake.

The nearest active faults to the site are the Calaveras Fault located approximately 3.0 miles northeast of the site, the Sargent fault approximately 8.2 miles to the southwest, and the San Andreas fault approximately 10.1 miles southwest of the site as approximately indicated on Figure 2, “Regional Fault Map”, attached to Appendix A. Our review indicates that there are no known active faults crossing the site and the site is not mapped within a State of California Earthquake Fault Zone.

INVESTIGATION

The subsurface exploration program was performed on October 24, 2023, and included a reconnaissance of the site and drilling of three borings as shown on Figure 3, "Site Plan". The borings were drilled to depths ranging from 25 to 35 feet below the existing ground surface.

The stratification of the soils and descriptions are shown on the respective “Logs of Borings”, and are included in Appendix A.

The drilling was performed by Exploration Geoservices Inc. of San Jose, California using a truck-mounted Mobil B61 drill rig advancing hollow stem augers. Disturbed samples of the in-situ soil were collected with a standard penetration test (SPT) sampler and a modified California split spoon sampler with 2.5-inch inside diameter. The samples were driven into the ground with a downhole hammer, whereby a 140-pound hammer was dropped 30-inches and the blow counts recorded to advance the sampler the final foot written on the logs, except if more than 50 blows were required to advance at least 6-inches the displacement for 50 blows was recorded.

The subsurface conditions encountered in the borings were continuously logged in the field during drilling operations in accordance with ASTM D2488 (Visual Manual Procedure), including graphic representations of the encountered materials, the depths at which samples were obtained, and the laboratory tests performed. Classifications of the soils in accordance with ASTM D2487 (Unified Soils Classification System) were verified through the laboratory testing program completed.

Laboratory testing was conducted for Atterberg Limits, moisture, dry density, gradation analysis, and corrosivity in accordance with the applicable ASTM Standards. The data received from the lab are presented on the boring logs, and the corrosivity test results are presented in Appendix A.

SUBSURFACE CONDITIONS

The subsurface conditions encountered in the three borings were found to be generally consistent. The subsurface conditions essentially consisted of a shallow layer of very stiff sandy silt with gravel at the surface that extended to depths of 3 to 3.5 feet. Underlying this layer, we encountered medium dense to very dense, silty, clayey gravel and sand layers with a few cobbles that extended to the maximum depth explored of 36.5 feet. The surface silt layer is non expansive (PI values of 6 and 8).

Groundwater was not encountered in the borings at the time of our exploration. Fluctuations in the groundwater table may occur due to seasonal rainfall changes and drought patterns.

A more thorough description and stratification of the soil conditions are presented on the respective "Logs of Test Borings" in Appendix A.

2022 CBC SEISMIC DESIGN CRITERIA

The potential damaging effects of regional earthquake activity should be considered in the design of structures. The seismic design should be in accordance with Chapter 16 of the 2022 California Building Code (CBC). The 2022 CBC utilizes the design procedures outlined in the ASCE 7-16 Standard. Using the criteria in Chapter 20 of ASCE 7-16, the site is classified as Site Class D. The seismic design parameters have been developed using the online "Seismic Design Maps" tool by the Structural Engineering Association (SEA) and Office of Statewide Health Planning and Development (OSHPD) and a site location based on longitude and latitude. The parameters generated for the subject site for a latitude 37.15567° N and longitude -121.67582° W, are presented in the following Table 1.

According to Section 11.4.8 of ASCE 7-16, a ground motion hazard analysis shall be performed when the coefficient S_1 has a value greater than or equal to 0.2 for Site Class D and E sites. A ground motion hazard analysis is excepted if the C_s value is determined by equation 12.8-2 of ASCE 7-16. This is to be determined by the structural engineer. In the event that the calculated C_s values do not trigger a ground motion hazard analysis, the following parameters may be used.

Table 1
2022 CBC Seismic Design Criteria

Seismic Parameter	Coefficient	Value
Site Class – Stiff Soil		D
Peak Ground Acceleration (Site Modified)	PGA_M	0.773
Mapped MCE Spectral Acceleration at Short-Period 0.2 secs	S_s	1.685
Mapped MCE Spectral Acceleration at a Period of 1.0s	S_1	0.616
Adjusted MCE, 5% Damped Spectral Response Acceleration at Short Period of 0.2s	S_{MS}	1.685
Adjusted MCE, 5% Damped Spectral Response Acceleration at Period of 1.0s	S_{M1}	1.047
Design 5% Damped Spectral Response Acceleration at Short Period of 0.2s for Occupancy Category I/II/III	S_{DS}	1.123
Design 5% Damped Spectral Response Acceleration at Period of 1.0s for Occupancy Category I/II/III	S_{D1}	0.698

LIQUEFACTION POTENTIAL EVALUATION

Liquefaction occurs primarily in relatively loose, saturated, cohesionless soils. Under earthquake stresses, these soils become “quick”, lose their strength and become incapable of supporting the weight of the overlying soils or structures. The data used for evaluating liquefaction potential of the subsurface soils consisted of the penetration resistance, the soil gradation, the relative density of the materials, and the groundwater level.

Groundwater was not encountered within the depth explored of 36.5 feet. The historic high groundwater level evaluated by CGS (2004) is estimated to be 35 feet deep.

Based on the deep depth to groundwater and presence of very dense pleistocene age granular deposits, it is our opinion that the potential for liquefaction is nil. There are isolated zones of medium dense clayey gravel and clayey sand, that may be subject to some settlement associated with dynamic compaction of the dry granular soil. We estimate that less than 1 inch of dynamic compaction may occur, and we recommend that a differential settlement of 0.5 inches over a horizontal distance of 100 feet be incorporated into the design of foundations and gravity utilities.

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

GENERAL

1. From a geotechnical point of view, the site is suitable for the construction of the proposed residential development provided the recommendations presented in this report are incorporated into the project plans and specifications.

2. The most prominent geotechnical feature of the site as encountered in the borings is the presence of near surface gravelly soil. The underground contractor must be made aware of this condition and review the borings to evaluate the stability of trenching activities.

DEMOLITION

3. Prior to any grading, demolition of the existing structures on the site should be completed. Demolition should include the complete removal of all surface and subsurface structures. In addition, all known underground structures must be located on the grading plans so that proper removal may be carried out, and all excavations are left open for proper backfilling. It is vital that Quantum Geotechnical Inc., intermittently observe the removal of subsurface structures and excavations, and be notified in ample time to ensure that no subsurface structures or excavations are covered. If Quantum Geotechnical Inc., is not contacted to observe the demolition and removal of subsurface structures, further backhoe exploratory investigation will need to be performed prior to the commencement of grading.

4. Excavations made by the removal of the structures and grubbing of trees may create disturbed/loose areas, and where this occurs the loose material should be excavated and replaced as engineered fill, or if it is less than 1 foot in thickness, can be compacted in place, prior to placing fill. We recommend that excavations greater than 1 foot deep be left open by the demolition contractor for backfill in accordance with the requirements for engineered fill. The removal of underground structures should be done under the observation of the Soil Engineer to verify adequacy of the removal and that subsoils are left in proper condition for placement as engineered fills. Any soil exposed by the removal operations which are deemed soft or unsuitable by the Soil Engineer, shall be excavated as uncompacted fill and be removed as required by the Soil Engineer during grading. Any resulting excavations should be properly backfilled with engineered fill under the observation of the Soil Engineer. It is important that

Quantum Geotechnical Inc., be present during removal activities to verify that all excavations created by removal of subsurface structures are left open and located on a grading plan. If any excavations are loosely backfilled without our knowledge and these excavations are not located and backfilled during grading, future settlement of these loosely filled excavations could occur and may cause damage to structures and improvements.

GRADING

5. The grading requirements presented herein are an integral part of the grading specifications presented in Appendix B of this report and should be considered as such.

6. The site contains vegetation cover and stripping of vegetation and topsoil may be required. Vegetation conditions may be different at the time of grading, and the extent of any stripping, mowing or discing as part of site preparation, will be revaluated at the time of grading. Any strippings will be stockpiled in an approved area that is unaffected by grading operations until their future use. Organically contaminated soil material may be utilized in landscape areas located outside the building footprint.

7. After site preparation, the top 8 inches of exposed ground should be scarified and compacted to a degree of relative compaction of at least 90% at 2 percent above optimum moisture content as determined by ASTM D1557-12 Laboratory Test Procedure.

8. The site may be brought to the desired finished grades by placing engineered fill in lifts of 8 inches in uncompacted thickness and compacting to a minimum relative compaction of 90% at 2 percent above optimum moisture content as determined by ASTM D1557-12 Laboratory Test Procedure.

9. All soils encountered during our investigation except those within the top few inches of predominantly organic material, are suitable for use as engineered fill when placed and compacted at the recommended moisture content and provided it does not contain any debris.

10. If import soil is needed, it should preferably be similar to the on-site, non-expansive silty and gravelly soil material. Import soil should be free of organic matter, contain no rocks or lumps larger than three inches in greatest dimension, have a plasticity index less than 12, and similar corrosion results to

the on site material. The import fill material must be approved by the geotechnical engineer prior to use at the site. The grading contractor should provide samples of the proposed import fill material should be submitted to the geotechnical engineer for compliance testing at least one week prior to delivering to the site, or provide suitable documentation from the source site. In addition, the grading contractor should provide analytical test results or other suitable environmental documentation indicating the imported fill is free of hazardous materials.

SURFACE DRAINAGE

11. All finish grades should be provided with a positive gradient to an adequate discharge point in order to provide rapid removal of surface water runoff away from all foundations. No ponding of water should be allowed on the pad or adjacent to the foundations. Surface drainage must be designed by the project Civil Engineer and maintained by the property owners at all times. The pad should be graded in a manner that surface flow is to a controlled discharge system.

12. Lot slopes and drainage must be provided by the project Civil Engineer to remove all storm water from the pad and to minimize storm and/or irrigation water from seeping beneath the structures. Should surface water be allowed to seep under the structure, foundation movement resulting in structural cracking and damage will occur. Where possible, finished grades around the perimeter of the structures should be compacted and should be sloped at a minimum 2% gradient away from the exterior foundation. Surface drainage requirements constructed by the builder should be maintained during landscaping. In particular, the creation of planter areas confined on all sides by concrete walkways or decks and the residence foundation is not desirable since any surface water due to rain or irrigation becomes trapped in the planter area with no outlet. If such a landscape feature is necessary, surface area drains in the planter area or a subdrain along the foundation perimeter must be installed.

13. Continuous roof gutters are recommended and should be connected to solid pipes that discharge into the storm drain system. From a geotechnical and maintenance point of view it is undesirable to discharge roof water adjacent building foundations because of the possibility of water ponding for sustained periods of time.

BIO-FILTRATION FACILITIES

14. Based on a review of the improvement plans, two bio-retention basins, two large subsurface stormwater storage and infiltration chambers, and several curbside stormwater planters are planned to manage on-site stormwater. The excavations for the chambers are planned to be approximately up 10 feet deep and are designed to infiltrate and store stormwater. Specific details of the type of system to be used are unknown at this time. The bio-retention basin excavations will be approximately 3 to 4 feet in depth.

15. One stormwater chamber is located approximately 10 feet from the perimeter of the house on Lot 12, and the perimeter front footing for this residence will need to be deepened to prevent additional loading on the chamber and also to mitigate the potential loss of lateral support of the structure if the chamber was to require any maintenance in the future. The other stormwater chamber is located in front of Lots 15 and 16 approximately 25 feet away from the residence perimeters, and no foundation deepening is required.

16. Typically, the bio-filtration basins consist of an 18 to 24 inch layer of sandy loam over 12 inches of permeable gravel material. The top of the bio-filtration area is typically approximately 1 foot below pad grade, therefore, the base of the bio-filtration basins could be up to approximately 4 feet below pad grade.

17. No bio-retention basins will be located closer than 5 feet of any residence buildings, and therefore no special foundation requirements such as thickened edges to provide lateral capacity are needed. However, the eastern fence line of Lot 23 appears to be located very close to the top of a basin side slope. The fence post footings typically extend to a depth of 2 feet, and this depth of post footing is insufficient to provide lateral resistance from a non-cohesive soil slope, and should be deepened. Where this occurs, we recommend the fence post footings extend at least 4 feet below pad grade. If at least 2 feet of flat area is present between the fence post and basin side slopes, no deepening of fence post footings is required.

18. Where bio-filtration areas are located closer than 3 feet of street pavements, a deepened curb footing is required. Where bio-filtration areas are located closer than 1 foot of street pavements, such as those curbside stormwater planters, because pavements do not have a positive connection to a

deepened curb/footing, the deepened curb/footing may need to be designed as a retaining wall rigid enough to create minimal lateral deflections and mitigate the potential for separation of the pavement from the gutter pan.

19. Where bio-filtration areas are located closer than 2 feet of hardscape areas, a deepened edge footing is required. The deepened edge should extend at least 1 foot below the subgrade. Where the bio-filtration area is immediately adjacent the hardscape, the deepened edge is to extend at least 3 inches below the base of the bio-filtration system.

SOIL CORROSIVITY

20. In order to evaluate the corrosion potential of the near surface soil toward concrete and buried metal pipe, a sample of the gravelly soil within the upper 5 feet from Test pit TP-2, was collected and tested for resistivity, soluble chloride, soluble sulfate, and pH. The actual test results are attached, and the results of the testing are summarized as follows;

Resistivity	18,000 Ohm-cm
Chloride	None Detected
Sulfate	Non Detected
pH	6.66

21. Many factors contribute to the corrosion potential. The most important factor with respect to corrosion potential toward buried metal pipes and fittings is soil resistivity, and the most important factor with respect to corrosion potential toward concrete is the sulfate content.

22. Based on the above results, the near surface soil is very mildly corrosive to buried metal pipe and fittings. We recommend that a corrosion engineer be consulted to provide specific corrosion protection measures. Further, the sulfate exposure to concrete is negligible, and no special cements are required.

FOUNDATIONS

23. The proposed residential structures may be satisfactorily supported on a post-tensioned slab foundation.

Post Tensioned Slab on Grade

24. Post-tensioned slabs should be a minimum 10 inches in thickness and are typically designed using the design method presented in the Post-Tensioning Institute, Standard Requirements for Design and Analysis of Shallow Post-Tensioned Concrete Foundations on Expansive Soils (PTI DC10.5-12), 2012. This design method pertains mainly to clayey soil sites, however, post-tensioned slabs on non-expansive soil could be designed assuming very low plasticity soil properties. Using the relevant climatic parameters and assumed low plasticity soil properties, the recommended geotechnical criteria for use in the design of the post-tensioned slabs is as follows;

	Swelling Mode	
	Center Lift	Edge Lift
Edge Moisture Variation Distance (e_m)	9.0 feet	5.1 feet
Differential Soil Movement (y_m)	0.59 inches	1.09 inches

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25. The maximum allowable bearing pressure at the base of the slab and for localized thickened footings should not exceed 2,000 p.s.f. for dead plus sustained live loads. As indicated earlier, one stormwater chamber is located approximately 10 feet from the perimeter of the house on Lot 12, and the perimeter front footing for this residence will need to be deepened to prevent additional loading on the chamber and also to mitigate the potential loss of lateral support of the structure if the chamber was to require any maintenance in the future. The depth of the footing will depend on the actual lateral extent of the excavation for the chamber and its distance to the residence perimeter. At this time for budgeting purposes, we anticipate the footing will be between 2 to 3 feet deep below pad grade.

General Construction Requirements for Post-Tensioned Slab

26. Prior to construction of the slab, the slab subgrade should be observed by the Soil Engineer to verify that all under-slab utility trenches greater than 18 inches in width have been properly backfilled

and compacted, and that no loose or soft soils are present on the slab subgrade.

27. The slab subgrade is anticipated to be non-expansive silty material and therefore does not require soaking prior to foundation construction.

28. The four (4) inch (minimum thickness) layer of gravel typically placed to provide a capillary break beneath concrete slab-on-grade floors may be omitted beneath the monolithically poured post-tensioned slab foundations provided that the slabs are at least 10 inches thick as recommended above. If it is desired to use a 4 inch layer or thinner of gravel section, the gravel should consist of broken stone, crushed or uncrushed gravel, quarry waste, or a combination thereof. The aggregate shall be free from deleterious substances. It shall be of such quality that the absorption of water in a saturated dry condition does not exceed 3% of the oven dry weight of the sample. The material shall be ¾" minus material with no more than 3% passing the #200 sieve, as specified in Appendix C.

29. A moisture vapor retarder/barrier is recommended beneath all slabs-on-grade that will be covered by moisture-sensitive flooring materials such as vinyl, linoleum, wood, carpet, rubber, rubber-backed carpet, tile, impermeable floor coatings, adhesives, or where moisture-sensitive equipment, products, or environments will exist. We recommend that design and construction of the moisture vapor retarder/barrier conform to Section 1805 of the 2013 CBC and relevant sections of American Concrete Institute (ACI) guidance documents 302.1R-04, 302.2R-06 and 360R-10.

30. The moisture vapor retarder/barrier can be placed above the 4 inches of gravel or directly on the soil subgrade and should consist of a minimum 15 mils Class A vapor retarder membrane, such as Stego® Wrap, and have a maximum perm rating of 0.3 in accordance with ASTM E 1745. Seams in the moisture vapor retarder/barrier should be overlapped no less than 6 inches or in accordance with the manufacturer's recommendations. Joints and penetrations should be sealed with the manufacturer's recommended adhesives, pressure-sensitive tape, or both. The contractor must avoid damaging or puncturing the moisture vapor retarder/barrier and repair any punctures with additional polyethylene properly lapped and sealed. The installation of the vapor retarder membrane must be in conformance with ASTM E1643.

31. It is our understanding that the preferred post-tensioned slab section is to consist of a post-tensioned slab with concrete having a water/cement ratio of no greater than 0.45, over a 15 mil vapor retarder membrane underlain by soil subgrade. This is acceptable from a geotechnical point of view.

32. Any exterior concrete flatwork such as steps, patios, or sidewalks should be designed independently of the slab, and expansion joints should be provided between the flatwork and the structural unit.

MISCELLANEOUS CONCRETE FLATWORK

33. Miscellaneous flatwork, driveways, and walkways may be designed with a minimum thickness of 4.0 inches. Control joints should be constructed to create squares or rectangles with a maximum spacing of 15 feet on large slab areas. Walkways should be separated from foundations with a thick expansion joint filler. Control joints should be constructed into walkways at a maximum of 5 feet spacing.

RETAINING WALLS

34. Retaining walls less than 4 feet high may be expected and should be designed to resist lateral pressures exerted from a media having an equivalent fluid weight as follows:

Active Condition	=	45 p.c.f. for horizontal backslope
At-rest Condition	=	60 p.c.f.
Passive Condition	=	275 p.c.f.
Coefficient of Friction	=	0.35

35. For a non-horizontal backslope, the active condition equivalent fluid weight can be increased by 1.5 p.c.f. for each 2 degree rise in slope from the horizontal.

36. Active conditions occur when the top of the wall is free to move outward. At-rest conditions apply when the top of wall is restrained from any movement.

37. It should be noted that the effects of any surcharge, traffic or compaction loads behind the walls must be accounted for in the design of the walls.

38. The above criteria are based on fully drained conditions. If drained conditions are not possible, then the hydrostatic pressure must be included in the design of the wall. An additional linear distribution of hydrostatic pressure of 63 p.c.f. should be adopted, in this case.

39. In order to achieve fully-drained conditions, a drainage filter blanket should be placed behind the wall. The blanket should be a minimum of 12 inches thick and should extend the full height of the wall to within 12 inches of the surface. If the excavated area behind the wall exceeds 12 inches, the entire excavated space behind the 12-inch blanket should consist of compacted engineered fill or blanket material. The drainage blanket material may consist of either granular crushed rock and drain pipe fully encapsulated in geotextile filter fabric or Class II permeable material that meets CalTrans Specification, Section 68, with drainage pipe but without fabric. A 4-inch perforated drain pipe should be installed in the bottom of the drainage blanket and should be underlain by at least 4 inches of filter type material. A 12-inch cap of clayey soil material should be placed over the drainage blanket. All back drains should be outlet to suitable drainage devices. Retaining wall less than 3 feet in height could be provided with backdrains or weep holes, if desired.

40. As an alternate to the 12-inch drainage blanket, a pre-fabricated strip drain (such as Miradrain) may be used between the wall and retained soil. In this case, the wall must be designed to resist an additional lateral hydrostatic pressure of 30 p.c.f.

41. Piping with adequate gradient shall be provided to discharge water that collects behind the walls to an adequately controlled discharge system away from the structure foundation.

42. It is recommended that the retaining walls or soundwalls be founded on a spread footing or pier foundation system. Spread and pier footing design criteria are given below.

RETAINING WALL/SOUNDWALL FOUNDATION - SPREAD FOOTINGS

43. Spread footings should have a minimum depth of eighteen (18) inches below lowest adjacent pad grade (i.e., trenching depth) for soil subgrade. At this depth, the recommended design bearing pressure for continuous footings should not exceed 2,500 p.s.f. due to dead plus sustained live loads and 3,300 p.s.f. due to all loads which include wind and seismic.

44. To accommodate lateral loads, the passive resistance of the foundation soil can be utilized. The passive soil pressures can be assumed to act against the front face of the footing below a depth of one foot below the ground surface. It is recommended that a passive pressure equivalent to that of a fluid weighing 275 p.c.f. be used. The weight of the soil above the footing can be used in the

frictional calculations. For design purposes, an allowable friction coefficient of 0.35 can be assumed at the base of the spread footing.

RETAINING WALL/SOUNDWALL FOUNDATION - PIER FOOTINGS

45. The piers should be designed on the basis of skin friction acting between the soil and the pier. For the sandy and gravelly soils at the site, an allowable skin friction value of 150 p.s.f. can be used for combined dead and live loads, below a depth of 1 feet. This value can be increased by one-third for total loads which include wind or seismic forces. The size, depth and spacing of the piers is to be determined by the structural engineer.

46. To resist lateral loads, the passive resistance of the soil can be used. The soil passive pressures can be assumed to act against the lateral projected area twice the pier diameter. It is recommended that a passive pressure equivalent to that of a fluid weighing 275 p.c.f be used below 1 foot of final pad grade.

47. It is noted that the piers will be drilled through gravelly soil. Although the soil is dense and should remain stable during drilling, if the pier excavations are left open for several days, some caving or sloughing of the pier holes may occur. We recommend that any piers be poured within no more than three days after drilling.

ASPHALTIC CONCRETE PAVEMENT AREAS

48. R-value tests were not performed as part of this investigation, as the soil expected at subgrade level is not known and depends on the planned grading. Assuming the subgrade material will consist of the on-site surficial sandy silt material, we will assume an R-value of 10 for preliminary design. However, the final pavement section design will be based on collecting actual subgrade samples during construction.

49. Based on an R-Value of 10, the following flexible pavement sections are recommended. It is noted that the City of Morgan Hill's minimum pavement section is 4 inches asphaltic concrete (AC) over 8 inches Class II aggregate base (AB).

Traffic Index	AC (inches)	Class II[1] AB (inches)
4.5	4.0	8.0
5.0	4.0	8.0
5.5	4.0	9.0
6.0	4.0	11.0
7.0	4.0	14.5

Notes: [1]Minimum R-Value = 78
R-Value = Resistance Value
All Layers in compacted thickness to Cal-Trans Standard Specifications

50. After underground facilities have been placed in the areas to receive pavement and removal of excess material has been completed, the upper 6 inches of the sub-grade soil shall be scarified, moisture conditioned, and compacted to a minimum relative compaction of 95% in accordance with the grading recommendations specified in this report.

51. All aggregate base material placed subsequently should be compacted to a minimum relative compaction of 95% based on the ASTM Test Procedure of D1557-12 (latest edition). The construction of the pavement areas should conform to the requirements set forth by the latest Standard Specifications of the Department of Transportations of the State of California and/or City of Morgan Hill, Department of Public Works.

52. If planter areas are provided within or immediately adjacent to the pavement areas, or if permeable pavers are used for some areas of pavement, provisions should be made to control irrigation and surface water from entering the pavement subgrade. Water entering the pavement section at subgrade level, which does not have a means for discharge, could cause softening of this zone and lead to pavement failure. We recommend that for areas of permeable pavers, the subgrade be graded to a low point where a subdrain is constructed to discharge any accumulated water.

EVA ROAD

53. An EVA road is planned along the northern end of the eastern portion of the site. The EVA road is to be designed to support a 75,000 pound fire truck, and the road surfacing is to consist of asphaltic concrete, concrete or other approved surface. Pervious pavement areas will be utilized for the access lane into the project. We understand that a final pavement surface has not been determined, however we will provide recommendations for a pervious pavement and a pavement consisting of aggregate base. For an asphaltic concrete surface, please refer to the previous section titled "Asphaltic Concrete Pavement Areas"

54. Pervious Pavement: We recommend that the section consist of 3⅛" paver over 2" No. 8 aggregate, over 4" No. 57 aggregate, over 8" No. 2 aggregate on subgrade compacted to 95% relative compaction.

55. Full Aggregate Base Section: The evaluation of a pavement section supporting a fire truck can be accomplished by using stress distribution methods based on tire pressure. Based on a maximum tire pressure of 100 psi for emergency vehicles such as fire trucks regardless of weight, the applied bearing pressure at subgrade level for a total aggregate base section of 10 inches is approximately 3,000 psf. The estimated allowable bearing pressure for a silt subgrade compacted to 95% relative compaction is in excess of 3,000 psf.

56. It is important to note, is that pervious pavers and aggregate base are permeable and will allow water from rain to flow through the section and pond at the subgrade. If the subgrade is flat and there is no way for the water to leave, then there exists the potential for the subgrade soil to soften and cause ruts when travelled by a fire truck. We therefore recommend that the subgrade be sloped to a low point and then collected by a sub-drain pipe and discharged into the storm drain system, to minimize or prevent water from ponding on the subgrade.

UTILITY TRENCHES

57. Applicable safety standards require that trenches in excess of 5 feet must be properly shored or that the walls of the trench slope back to provide safety for installation of lines. If trench wall sloping is

performed, the inclination should vary with the soil type. The underground contractor should request an opinion from the Soil Engineer as to the type of soil and the resulting inclination.

58. With respect to state-of-the-art construction or local requirements, utility lines are generally bedded with granular materials. These materials can convey surface or subsurface water beneath the structures. It is, therefore, recommended that all utility trenches which possess the potential to transport water be sealed with a compacted impervious cohesive soil material or lean concrete where the trench enters/exits the building perimeter.

59. Utility trenches extending underneath all traffic areas must be backfilled with native or approved import material and compacted to a relative compaction of 90% to within 6 inches of the subgrade. The upper 6 inches should be compacted to 95% relative compaction in accordance with Laboratory Test Procedure ASTM D1557 (latest edition). Backfilling and compaction of these trenches must meet the requirements set forth by the City of Morgan Hill, Department of Public Works. Utility trenches within landscape areas may be compacted to a relative compaction of 85%.

PROJECT REVIEW AND CONSTRUCTION MONITORING

60. All grading and foundation plans for the development must be reviewed by the Soil Engineer prior to contract bidding or submitted to governmental agencies so that plans are reconciled with soil conditions and sufficient time is allowed for suitable mitigative measures to be incorporated into the final grading specifications.

61. ***Quantum Geotechnical, Inc.*** should be notified at least two working days prior to site clearing, grading, and/or foundation operations on the property. This will give the Soil Engineer ample time to discuss the problems that may be encountered in the field and coordinate the work with the contractor.

62. Field observation and testing during the demolition and/or foundation operations must be provided by representatives of ***Quantum Geotechnical, Inc.*** to enable them to form an opinion regarding the adequacy of the site preparation, the acceptability of fill materials, and the extent to which the earthwork construction and the degree of compaction comply with the specification requirements. Any work related to the grading and/or foundation operations performed without the full knowledge and under the direct observation of the Soil Engineer will render the recommendations of this report invalid.

This does not imply full-time observation. The degree of observation and frequency of testing services would depend on the construction methods and schedule, and the item of work.

REFERENCES

1. California Geological Survey. 2004. “Seismic Hazard Zone Report for the Morgan Hill 7.5-Minute Quadrangle, Santa Clara County, California”. Seismic Hazard Zone Report 096.

2. Graymer, R.W., Moring, B.C., Saucedo, G.J., Wentworth, C.M., Brabb, E.E., and Knudsen, K.L. 2006. “Geologic Map of the San Francisco Bay Region”. U.S. Geological Survey. Scientific Investigations Map 2918.

3. U.S. Geological Survey and California Geological Survey. 2006. "Quaternary fault and fold database for the United States". from USGS web site: http//earthquakes.usgs.gov/regional/qfaults/.

4. Structural Engineers Association and Office of Statewide Health Planning and Development. 2021. “Seismic Design Maps”. Accessed from web site: https://seismicmaps.org/.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. It should be noted that it is the responsibility of the owner or his representative to notify ***Quantum Geotechnical, Inc.,*** in writing, a minimum of two working days before any clearing, grading, or foundation excavations can commence at the site.

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

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

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

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

APPENDIX A

Figure 1, Site Vicinity and Map

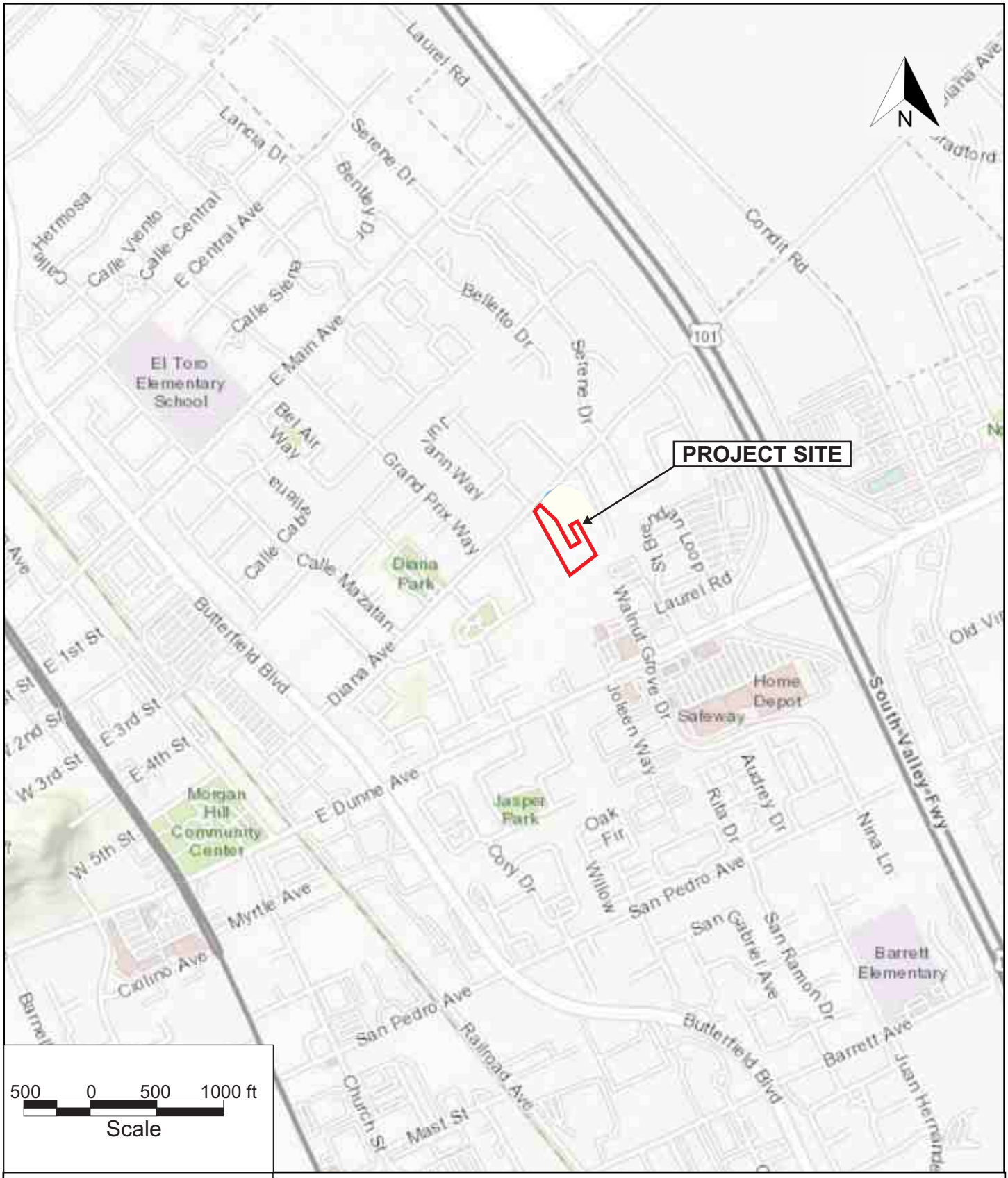
Figure 2, Regional Fault Map

Figure 3, Site Plan

Logs of Test Borings B-1 to B-2

Key to Log Boring

Corrosivity Test Results

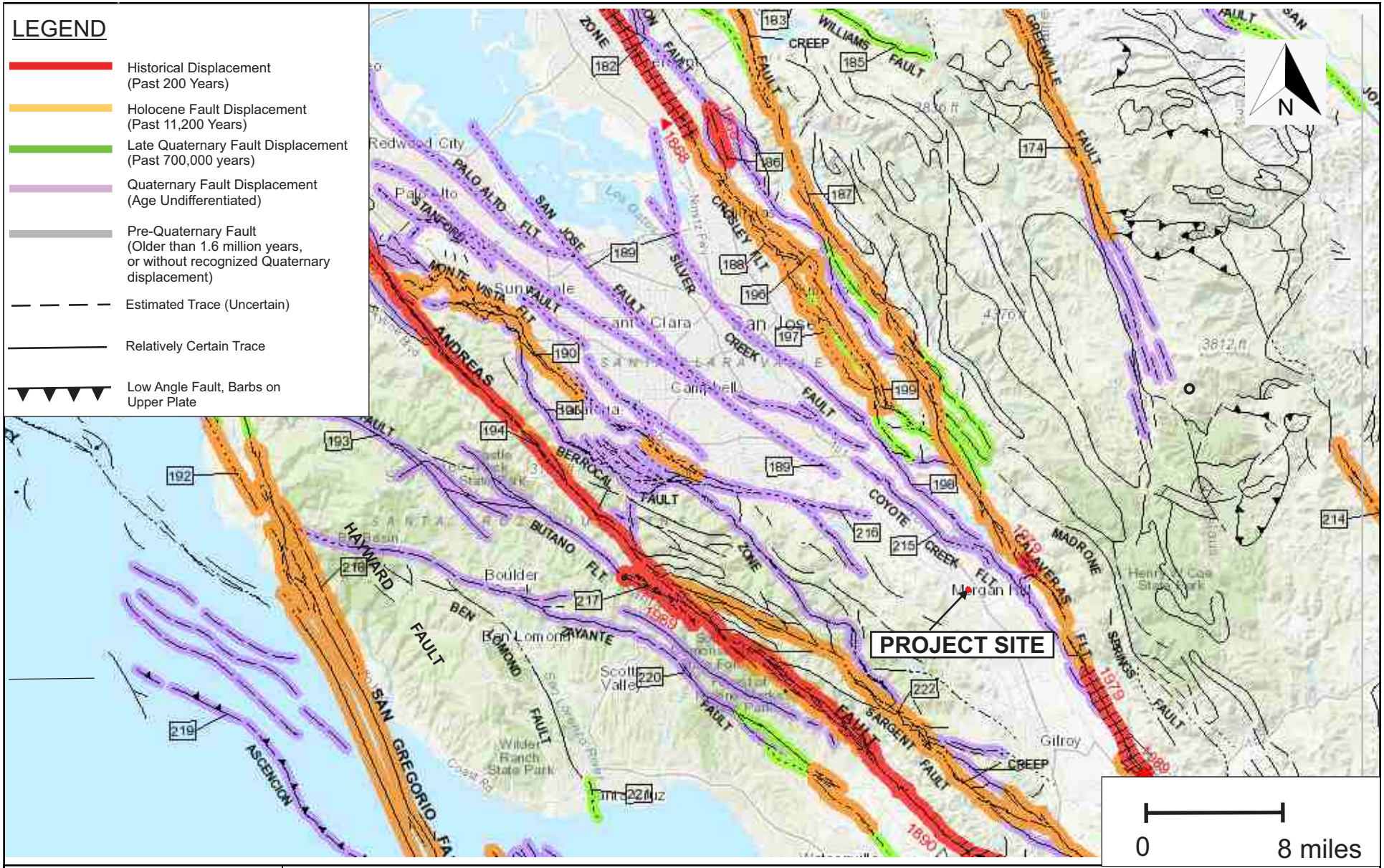


SITE VICINITY MAP

QUANTUM GEOTECHNICAL INC.

Geotechnical Investigation
Proposed Development
730 Diana Avenue, Morgan Hill CA

Project No.	Figure No.
K053.G	1

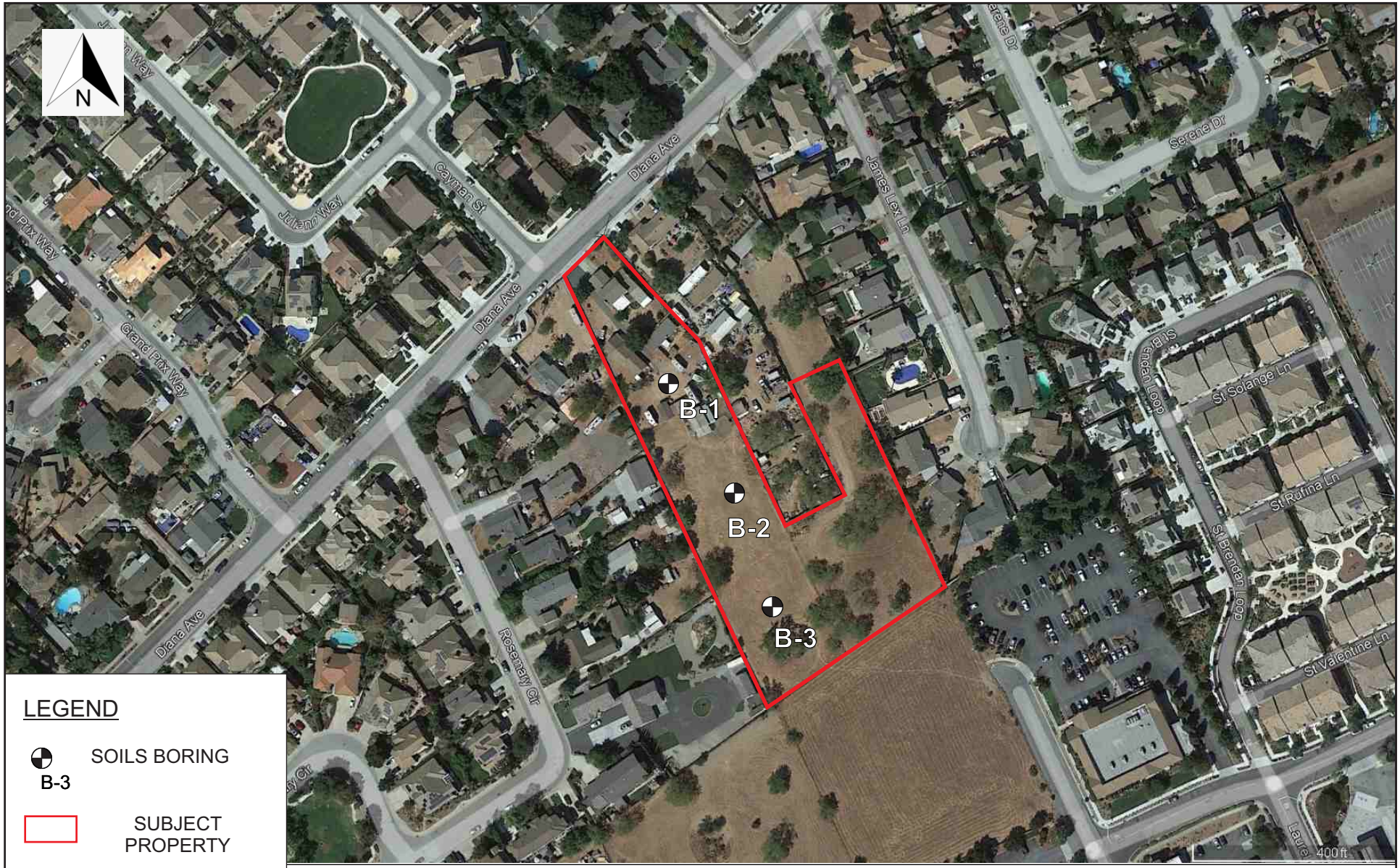


REGIONAL FAULT MAP

QUANTUM GEOTECHNICAL INC.

Geotechnical Investigation
Proposed Development
730 Diana Avenue, Morgan Hill CA

Project No.	Drawn By	Figure No.
K053.G	JF	2



LEGEND

B-3 SOILS BORING

SUBJECT PROPERTY

SITE PLAN

100 0 100 200 ft
Scale

QUANTUM GEOTECHNICAL INC.

Geotechnical Investigation
Proposed Development
730 Diana Avenue, Morgan Hill CA

Project No.	Drawn By	Figure No.
K053.G	JF	3

Project: **730 Diana Avenue** Project Location: **Morgan Hill, California** Project Number: **K053.G**	Log of Boring B-1 **Sheet 1 of 1**	**Quantum Geotechnical Inc.** 1110 Burnett Avenue., Ste. B Concord, CA, 94520

Date(s) Drilled **10/24/2023**	Logged By **JF**	Checked By
Drilling Method **Hollow Stem**	Drill Bit Size/Type **8" O.D.**	Total Depth of Borehole **26.5 feet bgs**
Drill Rig Type **Mobil B-61**	Drilling Contractor **EGI**	Approximate Surface Elevation
Groundwater Level and Date Measured **Dry**	Sampling Method(s) **Modified California, SPT**	Hammer Data **Auto**
Borehole Backfill **Cuttings**	Location **See Site Plan**	

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	0				ML		Sandy Silt with Gravel (ML) - reddish-brown, dry, very stiff, little fine and coarse rounded to subangular gravel and cobbles to 4" size						
			1	19				4.3			21	5	
					GC		Clayey Gravel and Sand (GC) - mottled brown and yellow-brown, moist, medium dense, mostly fine subrounded gravel to about 1" size [PLEISTOCENE ALLUVIAL TERRACE]						
	5		2	38				8.2	118.0	16			
					SC		Clayey Sand and Gravel (SC) - brown, moist, dense, fine to coarse sand, little fine and coarse subrounded gravel and cobbles to about 4-inch size, est. 30% clay fines						
			3	34									
	10												
			4	41				10.5	116.7				
	15												
	20		5	35									
							mottled brown and yellow, low to moderate plasticity clay, fine to coarse sand, little fine subrounded gravel						
	25		6	39				9.3					
							Bottom of Boring at 26.5 feet below the existing ground surface (bgs). Hole stayed dry. Backfilled with cuttings.						
	30												

Project: **730 Diana Avenue** Project Location: **Morgan Hill, California** Project Number: **K053.G**	Log of Boring B-2 **Sheet 1 of 2**	**Quantum Geotechnical Inc.** 1110 Burnett Avenue., Ste. B Concord, CA, 94520

Date(s) Drilled **10/24/2023**	Logged By **JF**	Checked By
Drilling Method **Hollow Stem**	Drill Bit Size/Type **8" O.D.**	Total Depth of Borehole **36.5 feet bgs**
Drill Rig Type **Mobil B-61**	Drilling Contractor **EGI**	Approximate Surface Elevation
Groundwater Level and Date Measured **Dry**	Sampling Method(s) **Modified California, SPT**	Hammer Data **Auto**
Borehole Backfill **Cuttings**	Location **See Site Plan**	

Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
0				ML		Sandy Silt with Gravel (ML) - reddish-brown, dry, very stiff, little fine and coarse rounded to subangular gravel and cobbles to 4" size						
		1	56				4.5	126.2				
				GM		Silty Gravel and Sand (GM) - grayish-brown, dry, very dense, mostly fine sand, fine and coarse subrounded gravel and cobbles to about 6" size [PLEISTOCENE ALLUVIAL TERRACE]						
5		2	74				4.4					
				GC		Clayey Gravel and Sand (GC) - olive-brown and black with red and yellow stains, moist, dense, little clay, fine and coarse subrounded gravel and cobbles to about 4-inch size, est. 30% clay fines						
10		3	72				5.3	105.5				
15						- few yellow stains						
		4	41									
20												
25		5	64				10.8					
30												

Project: **730 Diana Avenue**
Project Location: **Morgan Hill, California**
Project Number: **K053.G**

Log of Boring B-2
Sheet 2 of 2

Quantum Geotechnical Inc.
1110 Burnett Avenue., Ste. B
Concord, CA, 94520

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
	30												
	35		6	65									
							Bottom of Boring at 36.5 feet below the existing ground surface (bgs). Hole stayed dry. Backfilled with cuttings.						
	40												
	45												
	50												
	55												
	60												
	65												

Project: **730 Diana Avenue** Project Location: **Morgan Hill, California** Project Number: **K053.G**	Log of Boring B-3 **Sheet 1 of 1**	**Quantum Geotechnical Inc.** 1110 Burnett Avenue., Ste. B Concord, CA, 94520

Date(s) Drilled **10/24/2023**	Logged By **JF**	Checked By
Drilling Method **Hollow Stem**	Drill Bit Size/Type **8" O.D.**	Total Depth of Borehole **26.5 feet bgs**
Drill Rig Type **Mobil B-61**	Drilling Contractor **EGI**	Approximate Surface Elevation
Groundwater Level and Date Measured **Dry**	Sampling Method(s) **Grab, Modified California, SPT**	Hammer Data **Auto**
Borehole Backfill **Cuttings**	Location **See Site Plan**	

Depth (feet)	Sample Type	Sample Number	Sampling Resistance, blows/ft	Material Type	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Percent Fines	LL, %	PI, %	UC, ksf
0				ML	Sandy Silt with Gravel (ML) - reddish-brown, dry, very stiff, little fine and coarse rounded to subangular gravel and cobbles to 4" size						
		1	32			3.1		15	21	6	
				GM	Silty Clayey Gravel and Sand (GC-GM) - reddish-brown, dry, very dense, fine to coarse sand, fine and coarse subrounded gravel and cobbles to about 6" size [PLEISTOCENE ALLUVIAL TERRACE]						
		2	90			5.9					
5		3									
				GC	Clayey Gravel and Sand (GC) - olive-brown and black with white stains, moist, dense, little clay, fine and coarse subrounded gravel and cobbles to about 4-inch size, est. 30% clay fines						
		4	34			7.7					
10											
15					- black organic layer with charcoal 15'4" to 15'6"						
		5	29								
					- increased drilling resistance						
20					- becomes very dense, red spots						
		6	75			9.0	127.7				
25											
		7	58								
					Bottom of Boring at 26.5 feet below the existing ground surface (bgs). Hole stayed dry. Backfilled with cuttings.						
30											

Project: **730 Diana Avenue** Project Location: **Morgan Hill, California** Project Number: **K053.G**	Key to Log of Boring **Sheet 1 of 1**	**Quantum Geotechnical Inc.** 1110 Burnett Avenue., Ste. B Concord, CA, 94520

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

COLUMN DESCRIPTIONS

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

FIELD AND LABORATORY TEST ABBREVIATIONS

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

MATERIAL GRAPHIC SYMBOLS

Clayey GRAVEL (GC)
Silty GRAVEL (GM)
SILT, SILT w/SAND, SANDY SILT (ML)
Clayey SAND (SC)

TYPICAL SAMPLER GRAPHIC SYMBOLS

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

OTHER GRAPHIC SYMBOLS

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

GENERAL NOTES

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

Figure B-1

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

Client: Quantum Geotechnical
Client's Project No.: K053.G
Client's Project Name: 730 Diana Avenue, Morgan Hill, CA
Date Sampled: 24-Oct-2023
Date Received: 26-Oct-2023
Matrix: Soil
Authorization: Signed Chain of Custody

Date of Report: 31-Oct-2023

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Resistivity (As Received) (ohms-cm)	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
2310055-001	B-2 @ 2.5'	-	6.66	-	18,000	-	N.D.	N.D.

Method:	ASTM D1498	ASTM D4972	ASTM G57	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	-	-	50	15	15
Date Analyzed:	-	27-Oct-2023	-	27-Oct-2023	-	27-Oct-2023	27-Oct-2023

Julia Clauson
Chemist

* Results Reported on "As Received" Basis
N.D. - None Detected

Quality Control Summary - All laboratory quality control parameters were found to be within established limits

APPENDIX B

The Grading Specification

Guide Specifications for Rock Under Floor Slabs

THE GRADING SPECIFICATIONS
on
Proposed Residential Development
730 and 760 Diana Avenue
Morgan Hill, California

1. General Description

1.1 These specifications have been prepared for the grading and site development of the subject residential development. ***Quantum Geotechnical Inc.***, hereinafter described as the Soil Engineer, should be consulted prior to any site work connected with site development to ensure compliance with these specifications.

1.2 The Soil Engineer should be notified at least two working days prior to any site clearing or grading operations on the property in order to observe the stripping of organically contaminated material and to coordinate the work with the grading contractor in the field.

1.3 This item shall consist of all clearing or grubbing, preparation of land to be filled, filling of the land, spreading, compaction and control of fill, and all subsidiary work necessary to complete the grading of the filled areas to conform with the lines, grades, and slopes as shown on the accepted plans. The Soil Engineer is not responsible for determining line, grade elevations, or slope gradients. The property owner, or his representative, shall designate the person or organizations who will be responsible for these items of work.

1.4 The contents of these specifications shall be integrated with the soil report of which they are a part, therefore, they shall not be used as a self-contained document.

2. Tests

The standard test used to define maximum densities of all compaction work shall be the ASTM D1557-12 Laboratory Test Procedure. All densities shall be expressed as a relative compaction in terms of the maximum dry density obtained in the laboratory by the foregoing standard procedure.

3. Clearing, Grubbing, and Preparing Areas To Be Filled

3.1 If encountered, all vegetable matter, trees, root systems, shrubs, debris, and organic topsoil shall be removed from all structural areas and areas to receive fill.

3.2 If encountered, any soil deemed soft or unsuitable by the Soil Engineer shall be removed. Any existing debris or excessively wet soils shall be excavated and removed as required by the Soil Engineer during grading.

3.3 All underground structures shall be removed from the site such as old foundations, abandoned pipe lines, septic tanks, and leach fields.

3.4 The final stripped excavation shall be approved by the Soil Engineer during construction and before further grading is started.

3.5 After the site has been cleared, stripped, excavated to the surface designated to receive fill, and scarified, it shall be disked or bladed until it is uniform and free from large clods. The native subgrade soils shall be moisture conditioned and compacted to the requirements as specified in the grading section of this report. Fill can then be placed to provide the desired finished grades. The contractor shall obtain the Soil Engineer's approval of subgrade compaction before any fill is placed.

4. Materials

4.1 All fill material shall be approved by the Soil Engineer. The material shall be a soil or soil-rock mixture which is free from organic matter or other deleterious substances. The fill material shall not contain rocks or lumps over 6 inches in greatest dimension and not more than 15% larger than 2-1/2 inches. Materials from the site below the stripping depth are suitable for use in fills provided the above requirements are met.

4.2 Materials existing on the site are suitable for use as compacted engineered fill after the removal of all debris and organic material. All fill soils shall be approved by the Soil Engineer in the field.

4.3 Should import material be required, it should be approved by the soil Engineer before it is brought to the site.

5. Placing, Spreading, and Compacting Fill Material

5.1 The fill materials shall be placed in uniform lifts of not more than 8 inches in uncompacted thickness. Each layer shall be spread evenly and shall be thoroughly blade mixed during the spreading to obtain uniformity of material in each layer. Before compaction begins, the fill shall be brought to a water content that will permit proper compaction by either (a) aerating the material if it is too wet, or (b) spraying the material with water if it is too dry.

5.2 After each layer has been placed, mixed, and spread evenly, either import material or native material shall be compacted to a relative compaction designated for engineered fill.

5.3 Compaction shall be by footed rollers or other types of acceptable compacting rollers. Rollers shall be of such design that they will be able to compact the fill to the specified density. Rolling shall be accomplished while the fill material is within the specified moisture content range. Rolling of each layer shall be continuous over its entire area and the roller shall make sufficient trips to ensure that the required density has been obtained. No ponding or jetting shall be permitted.

5.4 Field density tests shall be made in each compacted layer by the Soil Engineer in accordance with Laboratory Test Procedure ASTM D1556-15 or D6938-10. When footed rollers are used for compaction, the density tests shall be taken in the compacted material below the surface disturbed by the roller. When these tests indicate that the compaction requirements on any layer of fill, or portion thereof, has not been met, the particular layer, or portion thereof, shall be reworked until the compaction requirements have been met.

5.5 No soil shall be placed or compacted during periods of rain nor on ground which contains free water. Soil which has been soaked and wetted by rain or any other cause shall not be compacted until completely drained and until the moisture content is within the limits hereinbefore described or approved by the Soil Engineer. Approval by the Soil Engineer shall be obtained prior to continuing the grading operations.

6. Pavement

6.1 The proposed subgrade under pavement sections, native soil, and/or fill shall be compacted to a minimum relative compaction of 95% at 2% above optimum moisture content for a depth of 12 inches.

6.2 All aggregate base material placed subsequently should also be compacted to a minimum relative compaction of 95% based on the ASTM Test Procedure D1557-12. The construction of the pavement in the parking and traffic areas should conform to the requirements set forth by the latest Standard Specifications of the Department of Transportation of the State of California and/or City of Morgan Hill, Department of Public Works.

6.3 It is recommended that soils at the proposed subgrade level be tested for a pavement design after the preliminary grading is completed and the soils at the site design subgrade levels are known.

7. Utility Trench Backfill

7.1 The utility trenches extending under concrete slabs-on-grade shall be backfilled with native on-site soils or approved import materials and compacted to the requirements pertaining to the adjacent soil. No ponding or jetting will be permitted.

7.2 Utility trenches extending under all pavement areas shall be backfilled with native or approved import material and properly compacted to meet the requirements set forth by the City of Morgan Hill, Department of Public Works.*

7.3 Where any opening is made under or through the perimeter foundations for such items as utility lines and trenches, the openings must be resealed so that they are watertight to prevent the possible entrance of outside irrigation or rain water into the underneath portion of the structures.

8. Subsurface Line Removal

8.1 The methods of removal will be designated by the Soil Engineer in the field depending on the depth and location of the line. One of the following methods will be used.

8.2 Remove the pipe and fill and compact the soil in the trench according to the applicable portions of sections pertaining to compaction and utility backfill.

8.3 The pipe shall be crushed in the trench. The trench shall then be filled and compacted according to the applicable portions of Section 5.

8.4 Cap the ends of the line with concrete to prevent entrance of water. The length of the cap shall not be less than 5 feet. The concrete mix shall have a minimum shrinkage.

9. Unusual Conditions

9.1 In the event that any unusual conditions not covered by the special provisions are encountered during the grading operations, the Soil Engineer shall be immediately notified for additional recommendations.

10. General Requirements

Dust Control

10.1 The contractor shall conduct all grading operations in such a manner as to preclude windblown dirt and dust and related damage to neighboring properties. The means of dust control shall be left to the discretion of the contractor and he shall assume liability for claims related to windblown material.

GUIDE SPECIFICATIONS FOR ROCK UNDER FLOOR SLABS

Definition

Graded gravel or crushed rock for use under slabs-on-grade shall consist of a minimum thickness of mineral aggregate placed in accordance with these specifications and in conformance with the dimensions shown on the plans. The minimum thickness is specified in the accompanying report.

Material

The mineral aggregate shall consist of broken stone, crushed or uncrushed gravel, quarry waste, or a combination thereof. The aggregate shall be free from deleterious substances. It shall be of such quality that the absorption of water in a saturated dry condition does not exceed 3% of the oven dry weight of the sample.

Gradation

The mineral aggregate shall be of such size that the percentage composition by dry weight, as determined by laboratory sieves (U.S. Sieves) will conform to the following gradation:

Sieve Size	Percentage Passing
¾''	90-100
No. 4	25-60
No. 8	18-45
No. 200	0-3

Placing

Subgrade, upon which gravel or crushed rock is to be placed, shall be prepared as outlined in the accompanying soil report.