ANTIOCH
CALIFORNIA
OPPORTUNITY LIVES HERE

ADDENDUM NO. 2

TO
CONTRACT DOCUMENTS
FOR
COUNTRY HILLS DRIVE SOUNDWALL REPLACEMENT
in
ANTIOCH, CALIFORNIA
P.W. 561-3

ISSUED
January 5, 2024

This Addendum No. 2 must be signed by the bidder and attached to the CONTRACT PROPOSAL PACKAGE for consideration by the City. The City reserves the right to disregard any proposal, which does not include this Addendum. The City may waive this requirement at its sole discretion.

<u>SEE ATTACHED ADDENDUM ITEMS</u>

Prepared By: ______________________
Scott Buenting, P.E.

REGISTERED PROFESSIONAL ENGINEER
SCOTT BUENTING
No. 67422
Exp: 12/31/24
CIVIL
STATE OF CALIFORNIA

BIDDER'S CERTIFICATION

I acknowledge receipt of this Addendum No. 2 and accept all conditions contained herein.

______________________ ______________________
Bidder **By:**

ADDENDUM NO. 2

to
CONTRACT DOCUMENTS
for
COUNTRY HILLS DRIVE SOUNDWALL REPLACEMENT
in
ANTIOCH, CALIFORNIA
P.W. 561-3

Issued January 5, 2024

1) The first paragraph of the “Notice Inviting Bids” is modified to state the following:

“NOTICE IS HEREBY GIVEN THAT sealed bids will be received by the Office of the City Clerk of the City of Antioch at Antioch City Hall located at 200 “H” Street Antioch, California 94509, until 2:00 p.m., January 23, 2024, at which time bids will be publicly opened and read in the City Council Chambers located at 200 “H” Street Antioch, California 94509”

2) The sixth paragraph of the “Notice Inviting Bids” is modified to state the following:

“Bid forms shall be securely sealed in a suitable envelope marked with the name and address of the Bidder, and marked in capital letters on the front and back of the envelope as follows:

Country Hills Drive Soundwall Replacement
In
Antioch, California
P.W. 561-3

January 23, 2024
(Name and Address of Bidder)”

3) The first paragraph of Division A, Section A-1, Bid Opening and Award is modified to state the following:

“Sealed proposals will be received by the Office of the City Clerk, City Hall, located at 200 “H” Street Antioch, California, until 2:00 p.m., January 23, 2024, publicly opened and read in the City Council Chambers located at 200 “H” Street at 2:00 p.m., on January 23, 2024.”

4) The attached “Schedule of Bid Prices Revision 1” shall be submitted in lieu of the “Schedule of Bid Prices”.

5) The attached Geotechnical Investigation, dated December 29, 2022, by Miller Pacific Engineering Group is included in the project contract documents.

Title: Country Hills Drive Soundwall Replacement
in Antioch, CA (P.W. 561-3)

Bids to be received by 2:00 PM
January 23, 2024
Office of the City Clerk,
City Hall, Antioch, CA

SCHEDULE OF BID PRICES
REVISION 1

Item No.	Unit	Quantity	Description	Unit Price	Extended Amount
1.	LS	1	Mobilization, Demobilization and Final Cleanup, complete in place for the lump sum price	$	$
2.	LS	1	Storm Water Pollution Control Program, complete in place for the lump sum price	$	$
3.	LS	1	Erosion Control, complete in place for the lump sum price	$	$
4.	LS	1	Construction Signage, complete in place for the lump sum price	$	$
5.	LS	1	Temporary Protection Fence with Privacy Fabric, complete in place for the lump sum price	$	$
6.	LS	1	Traffic Control System, complete in place for the lump sum price	$	$
7.	LS	1	Clearing and Grubbing, complete in place for the lump sum price	$	$
8.	LS	1	Construction Surveying, complete in place for the lump sum price		
9.	EA	13	Tree and Stump Removal, complete in place for unit price per each	$	$
10.	LS	1	Earthwork, complete in place for the lump sum price	$	$
11.	LS	1	Remove Existing Concrete Wall and Foundation, complete in place for the lump sum price	$	$

Item No.	Unit	Quantity	Description	Unit Price	Extended Amount
12.	LF	96	Property Fence Removal and Replacement, complete in place for the unit price per lineal foot	$	$
13.	LF	675	Soundwall, Footing and Cast-in-Drilled Holes Piles, complete in place for the unit price per lineal foot	$	$
14.	CY	50	Structural Backfill, complete in place for the unit price per cubic yard	$	$
15.	LS	1	As-Built Redlined Plans, complete in place for the lump sum price	$	$
			TOTAL BID PRICE		$

TOTAL BID PRICE:____
(Written in Words)

All costs associated with the work required in the Plans and Specifications must be included in the bid items. This certifies that the prices in the proposal include all work as shown in the Plans and Specifications necessary to complete the work, in place and in full working order.

____
Signature of Bidder

____
Company Name Printed

MPEG
MILLER PACIFIC
ENGINEERING GROUP

GEOTECHNICAL INVESTIGATION
NEW SOUNDWALL
COUNTRY HILLS DRIVE
ANTIOCH, CALIFORNIA

December 29, 2022

Project 1465.107

Prepared for:
Bellecci & Associates, Inc.
2290 Diamond Blvd, Suite 100
Concord, California 94520

Attn: Mr. Robert Broestl, P.E.

CERTIFICATION

This document is an instrument of service, prepared by or under the direction of the undersigned professionals, in accordance with the current ordinary standard of care. The service specifically excludes the investigation of radon, asbestos, toxic mold and other biological pollutants, and other hazardous materials. The document is for the sole use of the client and consultants on this project. Use by third parties or others is expressly prohibited without written permission. If the project changes, or more than two years have passed since issuance of this report, the findings and recommendations must be reviewed by the undersigned.

MILLER PACIFIC ENGINEERING GROUP
(a California corporation)

MICHAEL JEWETT
No. 2610
EXP. 01/31/25

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GE 2786
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MILLER PACIFIC
ENGINEERING GROUP

GEOTECHNICAL INVESTIGATION
NEW SOUNDWALL
COUNTRY HILLS DRIVE
ANTIOCH, CALIFORNIA

TABLE OF CONTENTS

1.0 INTRODUCTION....................1
2.0 PROJECT DESCRIPTION....................1
3.0 SITE CONDITIONS....................1
  3.1 Regional Geology....................2
  3.2 Surface Conditions....................2
  3.3 Subsurface Exploration and Laboratory Testing....................2
  3.4 Subsurface Conditions....................2
  3.5 Seismicity....................3
    3.5.1 Historic Fault Activity....................3
    3.5.2 Probability of Future Earthquakes....................3
4.0 GEOLOGIC HAZARDS EVALUATION....................4
  4.1 Seismic Shaking....................4
  4.2 Liquefaction and Related Hazards....................5
  4.3 Erosion....................5
  4.4 Expansive Soil....................5
  4.5 Settlement/Subsidence....................6
5.0 CONCLUSIONS AND RECOMMENDATIONS....................6
  5.1 Seismic Design....................6
  5.2 Site Preparation and Grading....................7
    5.2.1 Site Preparation....................7
    5.2.2. Excavations....................8
    5.2.3 Fill Materials....................8
    5.2.4 Compaction....................8
  5.3 Foundation Design....................8
  5.4 Site Drainage....................9
6.0 SUPPLEMENTAL GEOTECHNICAL SERVICES....................10
7.0 LIMITATIONS....................10
8.0 LIST OF REFERENCES....................11

FIGURES

Site Location Map .... Figure 1
Site Plan 2
Regional Geologic Map 3
Active Fault Map 4
Historic Earthquake Map 5

APPENDIX A – SUBSURFACE EXPLORATION AND LABORATORY TESTING

Soil Classification Chart .... Figure A-1
Boring Logs .... A-2 through A-4
Plasticity Index Test Results A-5

1.0 INTRODUCTION

This report summarizes Miller Pacific Engineering Group's (MPEG) Geotechnical Investigation for the planned soundwall replacement along a portion of Country Hills Drive in Antioch, California. The new portion of soundwall is approximately 675 feet long and located between Valley Way and Ridgeview Drive. A Site Location Map is shown on Figure 1. Our services have been provided in accordance with our Agreement dated October 21, 2022.

The purpose of our Investigation is to provide geotechnical recommendations and design criteria to aid in the design and construction of the new soundwall section. The scope of our Investigation is described in our proposal letter dated September 28, 2022 and includes the following:

- Review of available regional geologic mapping and geotechnical background information;
- Detailed site reconnaissance to observe and document existing conditions;
- Subsurface exploration with two soil borings and geotechnical laboratory testing of recovered samples;
- Evaluation of relevant geologic hazards and development of conceptual mitigation recommendations;
- Development of geotechnical recommendations and design criteria for the project; and
- Preparation of this Geotechnical Investigation Report.

Issuance of this report completes our Phase 1 scope of services. Future phases of work are expected to include supplemental consultation and geotechnical plan review (Phase 2), and geotechnical observation and testing during construction (Phase 3).

2.0 PROJECT DESCRIPTION

Based on preliminary plans (Bellecci, 2022), and as shown on the Site Plan, Figure 2, the project generally consists of replacing about 675-linear feet of existing soundwall with a new 8-foot-tall Concrete Masonry Unit (CMU) soundwall along the south side of Country Hills Drive, between Valley Way and Ridgeview Drive. Plans indicate the wall will be supported on a series of 16-inch diameter concrete pier foundation elements. Ancillary improvements are expected to be limited to minor restoration of access routes and existing landscaping.

3.0 SITE CONDITIONS

Contra Costa County straddles the boundary between the Coast Ranges geomorphic province to the west and the Central Valley province to the east. The regional basement rock consists of sedimentary, igneous, and metamorphic rock of the Jurassic-Cretaceous age (65-190 million years ago) Franciscan Complex and marine sedimentary strata of the Great Valley Sequence, which is of similar age. Within central and northern California, the Franciscan and Great Valley rocks are locally overlain by a variety of late Cretaceous and Tertiary-age sedimentary and volcanic rocks which have been deformed by episodes of folding and faulting. The youngest geologic units in the region are Quaternary-age (last 1.8 million years) sedimentary deposits. These unconsolidated deposits partially fill many of the valleys of the region. Valleys between the ridges, including the Great Valley, are filled with Quaternary alluvium on fans and flood plains.

3.1 Regional Geology

The project site lies at the western margin of the Central Valley geomorphic province, on the lower northeastern foot of Mount Diablo. As shown on Figure 3, regional geologic mapping (Graymer, Jones, and Brabb, 1994) indicates the site lies near a contact between sedimentary bedrock of the Teritary-age Markley Formation and alluvium of Quaternary age. Markley formation bedrock generally consists of interbedded marine sandstone, siltstone, and claystone, while alluvium consists of unconsolidated clay, silt, sand, and gravel deposited in basins and stream channels or on floodplains and terraces.

3.2 Surface Conditions

We performed a site reconnaissance on December 1, 2022 to observe conditions at the project site. The project site is located along the south side of Country Hills Drive in a residential area of Antioch, California. The site is generally level, with surface elevations at approximately +140-feet. The existing soundwall is constructed of columns on 12-foot centers connected with either pre-cast or cast-in-place concrete panels.

The wall exhibits severe distress including spalling, cracking, and differential heave/vertical offsets. Where exposed as a result of concrete spalling, vertical rebar exhibits severe corrosion, and it appears minimal concrete cover was provided during construction. We did not observe any evidence of horizontal reinforcement where vertical rebar was exposed. The landscape area between the wall and Country Hills Drive is vegetated with scattered shrubs, minor ground cover, and mature trees, and several stumps and root balls are also evident.

3.3 Subsurface Exploration and Laboratory Testing

We explored subsurface conditions in the general vicinity of the planned improvements on December 1st, 2022 with two soil borings drilled at the approximate locations shown on Figure 2. Our borings were drilled to maximum explored depths between about 11.5- and 10.5-feet below the ground surface. Soil borings were performed under the supervision of our Geologist, who examined and logged materials encountered and collected samples at select intervals for laboratory testing. Brief descriptions of the terms and methodology used in classifying earth materials are shown on the attached Soil and Rock Classification Charts, Figures A-1 and A-2, respectively. The exploratory boring logs are summarized on Figures A-2 thorough A-4.

Laboratory testing of select soil samples included determination of moisture content, dry density, unconfined compressive strength, and Plasticity Index in general accordance with applicable ASTM standards. The results of the moisture content, dry density, unconfined compressive strength, and Plasticity Index tests are presented on the Boring Logs, Figures A-2 through A-4. Additionally, the results of our Plasticity Index test are presented on Figure A-5. The subsurface exploration and laboratory testing program is discussed in further detail in Appendix A.

3.4 Subsurface Conditions

Our subsurface exploration generally confirms the regionally-mapped geologic conditions. Boring 1 is underlain by alternating layers of stiff, high plasticity clays and soft, low plasticity sandy clay to the full depth explored. Boring 2 encountered approximately 6 feet of very stiff, low to medium plasticity clay with sand underlain by completely weathered claystone bedrock.

Groundwater was not encountered during our drilling. Because the borings were not left open for an extended period of time, a stabilized depth to groundwater was likely not observed. However, groundwater levels typically fluctuate seasonally, with higher levels expected during the wet winter months.

3.5 Seismicity

The project site is located within a seismically active region that includes the Central and Northern Coast Mountain Ranges. Several active faults are present in the area including the Hayward and Contra Costa Shear Faults, among others. An "active" fault is defined as one that shows displacement within the last 11,000 years and, therefore, is considered more likely to generate a future earthquake than a fault that shows no evidence of recent rupture. The California Geologic Survey has mapped various active and inactive faults in the region (CDMG, 1972 and 2000). These faults are shown in relation to the project site on the attached Active Fault Map, Figure 4. The Great Valley 05 – Pittsburg Kirby Hills Fault is the nearest known active fault and is located approximately 9.5-kilometers (5.9-miles) northwest of the site (Google Earth, 2022).

3.5.1 Historic Fault Activity

Numerous earthquakes have occurred in the region within historic times. Earthquakes (magnitude 2.0 and greater) that have occurred in the San Francisco Bay Area since 1985 have been plotted on a map shown on Figure 5.

3.5.2 Probability of Future Earthquakes

The site will likely experience moderate to strong ground shaking from future earthquakes originating on any of several active faults in the San Francisco Bay region. The historical records do not directly indicate either the maximum credible earthquake or the probability of such a future event. To evaluate earthquake probabilities in California, the USGS has assembled a group of researchers into the "Working Group on California Earthquake Probabilities" (USGS 2003, 2008; Field, et al 2015) to estimate the probabilities of earthquakes on active faults. These studies have been published cooperatively by the USGS, CGS, and Southern California Earthquake Center (SCEC) as the Uniform California Earthquake Rupture Forecast, Versions 1, 2, and 3.

In these studies, potential seismic sources were analyzed considering fault geometry, geologic slip rates, geodetic strain rates, historic activity, micro-seismicity, and other factors to arrive at estimates of earthquakes of various magnitudes on a variety of faults in California. The 2018 study specifically analyzed fault sources and earthquake probabilities for the seven major regional fault systems in the Bay Area region, and the entire state of California and updated some of the analytical methods and models. The most recent 2016 study (UCERF3) further expanded the database of faults considered and allowed for consideration of multi-fault ruptures, among other improvements.

Conclusions from the most recent UCERF3 and USGS' 2016 Fact Sheet (Aagard et al, 2016) indicate there is a 72% chance of an M>6.7 earthquake in the San Francisco Bay Region between 2014 and 2043. The highest probability of an M>6.7 earthquake on any of the active faults in the San Francisco Bay region by 2043 is assigned to the Hayward/Rodgers Creek Fault system, located approximately 41.5-kilometers southwest of the site, at 33%. Additional studies by the USGS regarding the probability of large earthquakes in the Bay Area are ongoing. These current evaluations include data from additional active faults and updated geological data.

4.0 GEOLOGIC HAZARDS EVALUATION

The principal geologic hazards which could potentially affect the project site are strong seismic shaking from future earthquakes in the San Francisco Bay Region and expansive soils. Other hazards, such as fault surface rupture, tsunami inundation, settlement, and others, are not considered significant at the site. More detailed discussion of each geologic hazard considered, their anticipated impacts, and recommended conceptual mitigation measures are discussed below.

4.1 Seismic Shaking

The site will likely experience seismic ground shaking from future earthquakes in the San Francisco Bay Area. Earthquakes along several active faults in the region, as shown on Figure 4, could cause moderate to strong ground shaking at the site.

Deterministic Seismic Hazard Analysis (DSHA) predicts the intensity of earthquake ground motions by analyzing the characteristics of nearby faults, distance to the faults and rupture zones, earthquake magnitudes, earthquake durations, faulting mechanisms, and site-specific geologic conditions. Empirical relations (Abrahamson, Silva & Kamai, Boore; Stewart, Seyhan & Atkinson; Campbell & Borzognia; and Chiou & Youngs, (2014)) for the stiff soil subsurface conditions were utilized to provide approximate estimates of median peak site accelerations. A summary of the principal active faults affecting the site, their closest distance, moment magnitude of characteristic earthquake, probable median accelerations and plus one standard deviation (+1σ), peak ground accelerations (PGA) for earthquakes on faults near the site are shown in Table A.

TABLE A
DETERMINISTIC PEAK GROUND ACCELERATION
New Soundwall
Country Hills Drive
Antioch, California

Fault	Fault Distance[1]	Moment Magnitude[1]	Median PGA[1,2,3,4]	+1σ PGA[4]
Great Valley 05 - Pittsburg	9.5 km	6.6	0.24 g	0.44 g
Great Valley 06 - Midland	10.0 km	6.8	0.25 g	0.46 g
Greenville (Clayton Section)	11.5 km	6.9	0.24 g	0.42 g

Reference:
1. Values estimated using Google Earth KML Files showing Quaternary Faults & Folds in the US obtained from USGS website (Accessed December 15, 2022).
2. Values obtained from USGS Earthquake Scenario Map (BSSE 2014) (Accessed December 15, 2022).
3. Abrahamson, Silva and Kamai (2014)
4. Boore, Stewart, Seyhan and Atkinson (2014)
5. Campbell and Borzognia (2014)
6. Chiou and Youngs (2014)
7. Values determined using V_{S30} = 260 m/s, for Site Class "D".

The potential for strong seismic shaking at the project site is high. Due to their close proximity and historic rates of activity, the Great Valley (Pittsburg and Midland sections) and Greenville Fault Zones present the highest potential for strong ground shaking. The most significant adverse impact associated with strong seismic shaking is potential damage to structures and improvements.

Evaluation:	*Less than significant with special engineering measures.*
Recommendations:	*Minimum special engineering measures should include designing the structures and foundations in accordance with the most recent version of the California Building Code (2022). Recommended seismic coefficients are provided in Section 5.2 of this report.*

4.2 Liquefaction and Related Hazards

Liquefaction refers to the sudden, temporary loss of soil shear strength during strong ground shaking. Liquefaction-related phenomena include liquefaction-induced settlement, flow failure, and lateral spreading. These phenomena can occur where there are saturated, loose, granular deposits.

The project site is not mapped (CGS, 2022) within a liquefaction zone, and subsurface conditions generally consist of clayey soils over relatively shallow weathered bedrock. Therefore, liquefaction does not pose a significant risk of damage to the new wall.

Evaluation:	*No significant impact.*
Recommendations:	*No special engineering measures are required.*

4.3 Erosion

Sandy soils on moderate slopes or clayey soils on steep slopes are susceptible to erosion when exposed to concentrated water runoff. The site is essentially level and underlain by clayey soils, and we judge the potential for significant erosion is relatively low. However, the project Civil Engineer should design site grades to allow for positive drainage away from structures and avoid ponding of water.

Evaluation:	*Less than significant with special engineering measures.*
Recommendations:	*The project Civil Engineer should evaluate local flooding potential and design site grades to promote positive drainage away from the wall and reduce the risk of ponding. At a minimum, erosion control measures during and following construction should be implemented in accordance with the current guidelines of the California Stormwater Quality Association's Best Management Practice Handbook (2019) or similar local standards.*

4.4 Expansive Soil

Expansive soils will shrink and swell with fluctuations in moisture content and are capable of exerting significant expansion pressures on building foundations, interior floor slabs, and exterior flatwork. Distress from expansive soil movement can include cracking of brittle wall coverings (stucco, plaster, drywall, etc.), racked door and/or window frames, and uneven floors and cracked slabs. Flatwork, pavements, and concrete slabs-on-grade are particularly vulnerable to distress due to their low bearing pressures.

The results of our laboratory testing indicate that the near-surface soils are of medium to high plasticity, which is generally correlative with similar expansive potential, as illustrated on Figure A-5. Additionally, vertical offsets and differential heave/settlement affecting the existing wall are consistent with expansive soil effects. We judge the risk of damage due to expansive soils is high.

Evaluation:	*Less than significant with special engineering measures.*
Recommendations:	*The new soundwall should be designed to resist uplift pressures associated with expansive soils and tree roots or should utilize void boxes or a similar product to reduce the risk of damage. Geotechnical recommendations and criteria for soundwall foundation design are provided in Section 5.2 of this report.*

4.5 Settlement/Subsidence

Significant settlement can occur when new loads are applied to soft compressible clays (i.e., Bay Mud) or compression of loose granular soils. The site is underlain by medium-stiff to stiff clayey soils over relatively shallow weathered bedrock. Therefore, the risk of settlement is generally low.

Evaluation:	*No significant impact.*
Recommendations:	*No special engineering measures are required.*

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on our observations it appears the existing soundwall distress is a result of uplift pressures exerted by expansive soils and/or significant tree root growth under the soundwall. Additionally, the lack of concrete cover over the vertical steel reinforcement and the lack of horizontal reinforcement likely further reduced the strength of the soundwall, resulting in a structure more prone to damage from uplift forces.

Based on our experience with similar projects in the East Bay area, we conclude that the site is suitable for the planned new soundwall from a geotechnical standpoint. Primary geotechnical issues to be considered during project design, in addition to providing adequate seismic design and uniform foundation support for the new soundwall, will include providing adequate mitigation for expansive soil and tree root uplift pressures. More specific discussion and recommendations addressing these, and other geotechnical design considerations are presented in the following sections.

5.1 Seismic Design

The project site is located in a seismically active area. Therefore, structures should be designed in conformance to the seismic provisions of the most recent (2019) California Building Code (CBC). However, since the goal of the building code is protection of life safety, some structural damage may still occur during strong ground shaking. Based our subsurface exploration, we judge that the site should be considered "Site Class D" ("Stiff Soil" conditions).

Since the S_1 value is greater than 0.20 g a site-specific ground motion analysis should be performed per the procedures outlined in ASCE 7-16. However, per ASCE 7-16 Section 11.4.8, "a site-specific analysis is not required for structures located on sites classified as "Site Class D" if the seismic response coefficient, C_s, is determined by Equation 12.8-2 (ASCE 7-16) for all values of T and the value of S_{ai} is determine by Equation 15.7-7 (ASCE 7-16) for all values of T_i and the value of the parameter S_{D1} is replaced with $1.5S_{D1}$ in Equation 15.7-10 (ASCE 7-16) and Equation 15.7-11 (ASCE 7-16).

TABLE B
ASCE 7-16 SEISMIC PARAMETERS
New Soundwall
Country Hills Drive
Antioch, California

Factor Name	Coefficient	ASCE 7-16 Site Specific Value
Site Class[1]	$S_{A,B,C,D,E,\text{ or }F}$	S_D
Spectral Acc. (short)	S_S	1.48 g
Spectral Acc. (1-sec)	S_1	0.51 g
Site Coefficient	F_a	1.0
Spectral Response (short)	SM_S	1.48 g
Design Spectral Response (short)	SD_S	0.99 g
MCE_G[2] PGA adjusted for Site Class	PGA_M	0.668 g

Notes:
1. Site Class D Description: Stiff soil profile with shear wave velocities between 600 and 1,200 ft/sec, standard blow counts between 15 and 50 blows per foot, and undrained shear strength between 1,000 and 2,000 psf.
2. Maximum Considered Earthquake Geometric Mean

5.2 Site Preparation and Grading

We anticipate minor grading, generally limited to excavations for new foundations, will be required for the project. The general grading recommendations presented below are appropriate for construction in the late spring through fall months. General recommendations for wintertime construction are provided later in this report.

5.2.1 Site Preparation

Clear pavements, all foundations, trees, brush, roots, over-sized debris, and organic material from areas to be graded. Trees that will be removed (in structural areas) must also include removal of stumps and roots larger than two inches in diameter. Excavated areas (i.e., excavations for stump removal) should be restored with properly moisture conditioned and compacted fill as described in the following sections. Any loose soil or rock at subgrade will need to be excavated to expose firm natural soils or bedrock. Debris, rocks larger than six inches and vegetation are not suitable for structural fill and should be removed from the site. Alternatively, vegetation strippings may be used in landscape areas.

Where fills or other structural improvements are planned on level ground, the subgrade surface should be scarified to a depth of about eight inches, moisture conditioned to at least 3% above the optimum moisture content and compacted to between 88-92% relative compaction (ASTM D-1557). Relative compaction, maximum dry density, and optimum moisture content of fill materials should be determined in accordance with ASTM Test Method D 1557, "Moisture-Density Relations of Soils, and Soil-Aggregate Mixtures Using a 10-lb. Rammer and 18-in. Drop." If soft, wet, or otherwise unsuitable materials are encountered at the subgrade elevation during construction, we will provide supplemental recommendations/field directives to address the specific condition.

5.2.2. Excavations

Site excavations for new foundations, utilities, and other improvements will generally encounter about 5- to 10-feet of stiff, medium to high plasticity clayey soils over weathered claystone bedrock. Based on our exploration and laboratory testing, we judge that most onsite excavations can be reasonably accomplished with conventional equipment, such as medium-size excavators and backhoes.

Onsite excavations are expected to yield clayey mixtures which will not be suitable for re-use as fill. Spoils from onsite excavations that do not meet the criteria below should be utilized in non-structural (landscape) areas or removed from the site.

Per the California Occupational Safety and Health Administration (Cal/OSHA), trench excavations having a depth of five feet or more which will be entered by workers must be sloped, braced, or shored to protect workers from potential collapse. Cal/OSHA dictates allowable slope configurations and minimum shoring requirements based on categorized soil types. Based on our subsurface exploration and laboratory testing, onsite fill and alluvial soils should be considered Type "C" and may be prone to raveling (where sandy) or squeezing (where clayey) in open excavations.

5.2.3 Fill Materials

Fill materials should consist of non-expansive soils that are free of organic matter, have a Liquid Limit of less than 40 (ASTM D 4318), a Plasticity Index of less than 20 (ASTM D 4318) and a minimum R-value of 10 (California Test 301). The fill material should contain no more than 50 percent of particles passing a No. 200 sieve and should have a maximum particle size of four inches. As noted above, onsite soils are not likely suitable for re-use as fill and should either be used in landscape areas or removed from the site. Any imported fill material needs to be tested to determine its suitability.

5.2.4 Compaction

Fill materials should be moisture conditioned to near the optimum moisture content prior to compaction. Properly moisture conditioned fill materials should subsequently be placed in loose, horizontal lifts of eight-inches-thick or less and uniformly compacted to at least 90 percent relative compaction. In areas subject to landscaping area, the upper 12 inches of fill should be compacted to at least 90 percent relative compaction. Maximum dry density and optimum moisture content of fill materials should be determined in accordance with ASTM D1557.

5.3 Foundation Design

We anticipate that primary design considerations for the new soundwall will include resisting considerable wind load/overturning moments, and that deep foundations will be required to provide adequate lateral resistance to those loads. In order to resist the effects of expansive soil behavior and tree root intrusion, we recommend that, regardless of the "preferred" deep foundation type, the deep foundation elements be connected at the ground surface with a reinforced grade beam designed to resist an uplift pressure of at least 2,500 psf.

In general, we judge that drilled, cast-in-place concrete piers or large-diameter helical piles will provide suitable support for the new wall. Drilled pier foundations should be designed in accordance with the values shown in Table C.

TABLE C
SHALLOW FOUNDATION DESIGN CRITERIA
New Soundwall
Country Hills Drive
Antioch, California

Drilled Piers	
Minimum Diameter:	16 inches
Minimum Embedment:	8 feet
Skin Friction[1,2]	
Native Soils:	500 psf
Weathered Bedrock:	1,500 psf
Lateral Passive Resistance[2,3]	
Native Soil	300 pcf
Weathered Bedrock	450 pcf
Grade Beam Uplift Pressure:	2,500 psf

Notes:

1. Uplift resistance is equal to 80% of the total skin friction.
2. Equivalent Fluid Pressure, not to exceed 10 times value in psf. Neglect upper 3 feet.
3. Apply values over effective width of 2 pier diameters.

Helical pile elements, if utilized, may consist of either square- or round-shaft piles and may be expected to develop minimum capacities on the order of 5- to 10-kips each at installation depths between about 10- and 15-feet. Note that larger-diameter shafts (such as 6- or 8-inch round-shafts) may be needed to develop adequate lateral capacity.

5.4 Site Drainage

The site is relatively level and there is a possibility that new grading could result in adverse drainage patterns and water ponding around the new wall, which is expected to exacerbate expansive soil behavior. Careful consideration should therefore be given to the design of finished grades at the site. We recommend that landscaped areas be sloped downward at least 0.25 feet over 5 feet (5%) away from foundations. Where hard surfaces such as concrete abut foundations, slope these surfaces at least 0.10 feet in the first 5 feet (2%). Where possible, provide area drains for landscape planters and collect downspout discharges into a tight pipe collection system. Site drainage improvements should ideally discharge to an existing storm drainage system.

6.0 SUPPLEMENTAL GEOTECHNICAL SERVICES

We must review the plans and specifications for the project when they are nearing completion to confirm that the intent of our geotechnical recommendations has been incorporated and provide supplemental recommendations, if needed. During construction, we must observe and test site grading, foundation excavations for the structures and associated improvements to confirm that the soils encountered during construction are consistent with the design criteria.

7.0 LIMITATIONS

We believe this report has been prepared in accordance with generally accepted geotechnical engineering practices in the San Francisco Bay Area at the time the report was prepared. This report has been prepared for the exclusive use of Bellecci & Associates and/or their assignees specifically for this project. No other warranty, expressed or implied, is made. Our evaluations and recommendations are based on the data obtained during our subsurface exploration program and our experience with soils in this geographic area.

Our approved scope of work did not include an environmental assessment of the site. Consequently, this report does not contain information regarding the presence or absence of toxic or hazardous wastes.

The evaluations and recommendations do not reflect variations in subsurface conditions that may exist between boring locations or in unexplored portions of the site. Should such variations become apparent during construction, the general recommendations contained within this report will not be considered valid unless MPEG is given the opportunity to review such variations and revise or modify our recommendations accordingly. No changes may be made to the general recommendations contained herein without the written consent of MPEG.

We recommend that this report, in its entirety, be made available to project team members, contractors, and subcontractors for informational purposes and discussion. We intend that the information presented within this report be interpreted only within the context of the report as a whole. No portion of this report should be separated from the rest of the information presented herein. No single portion of this report shall be considered valid unless it is presented with and as an integral part of the entire report.

8.0 LIST OF REFERENCES

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SITE COORDINATES
LAT. 37.9660°
LON. -121.7628°

SITE LOCATION

N.T.S.

NORTH

REFERENCE: Google Earth, 2022

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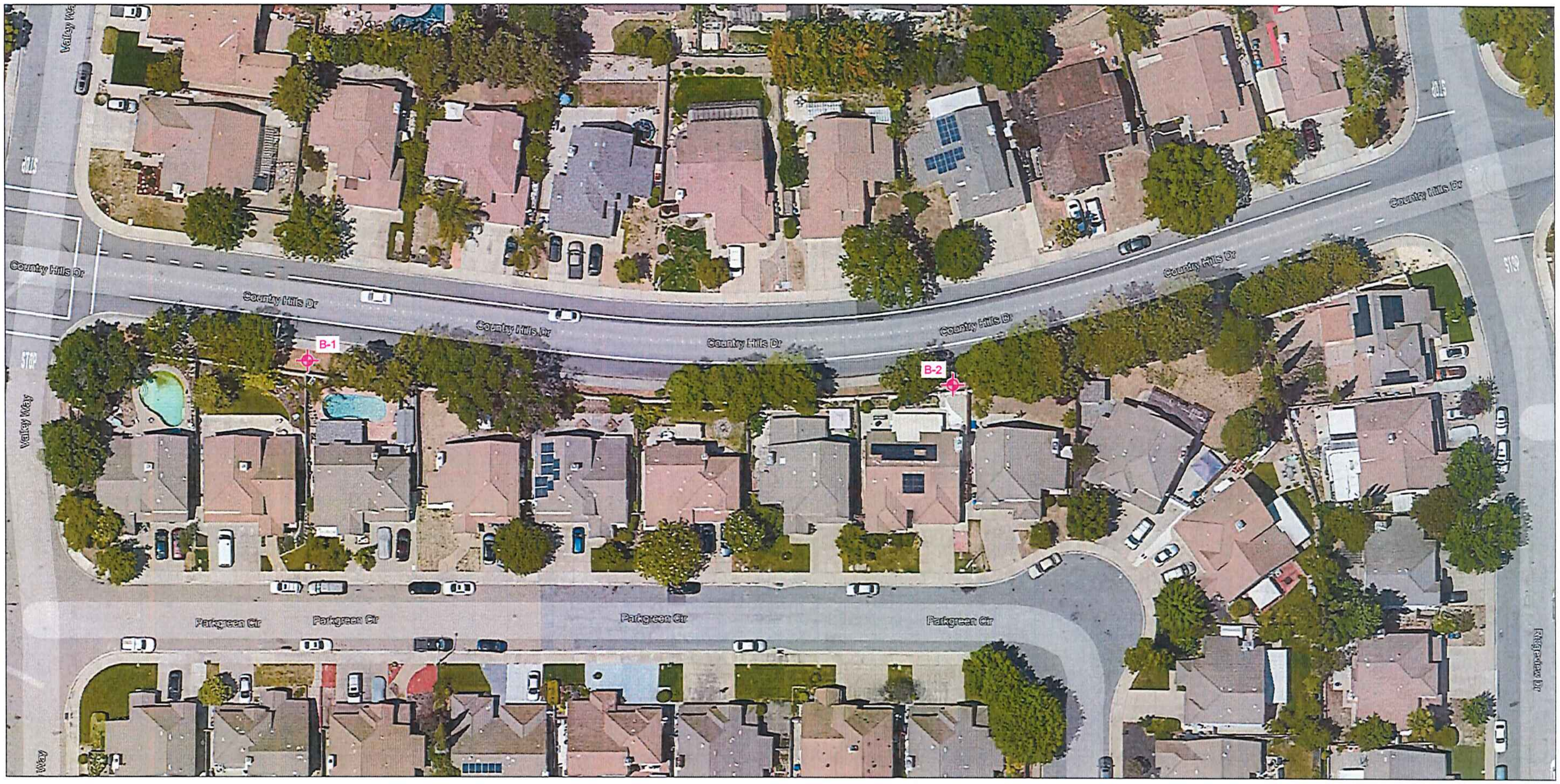
SITE LOCATION MAP

Country Hills Drive Soundwall
Antioch, California

Project No. 1465.107
Date: 12/21/2022

Drawn YHS
Checked

1
FIGURE



SITE PLAN

SCALE

0 20 40 80 FEET

NORTH

Approximate boring location completed by MPEG, 2022

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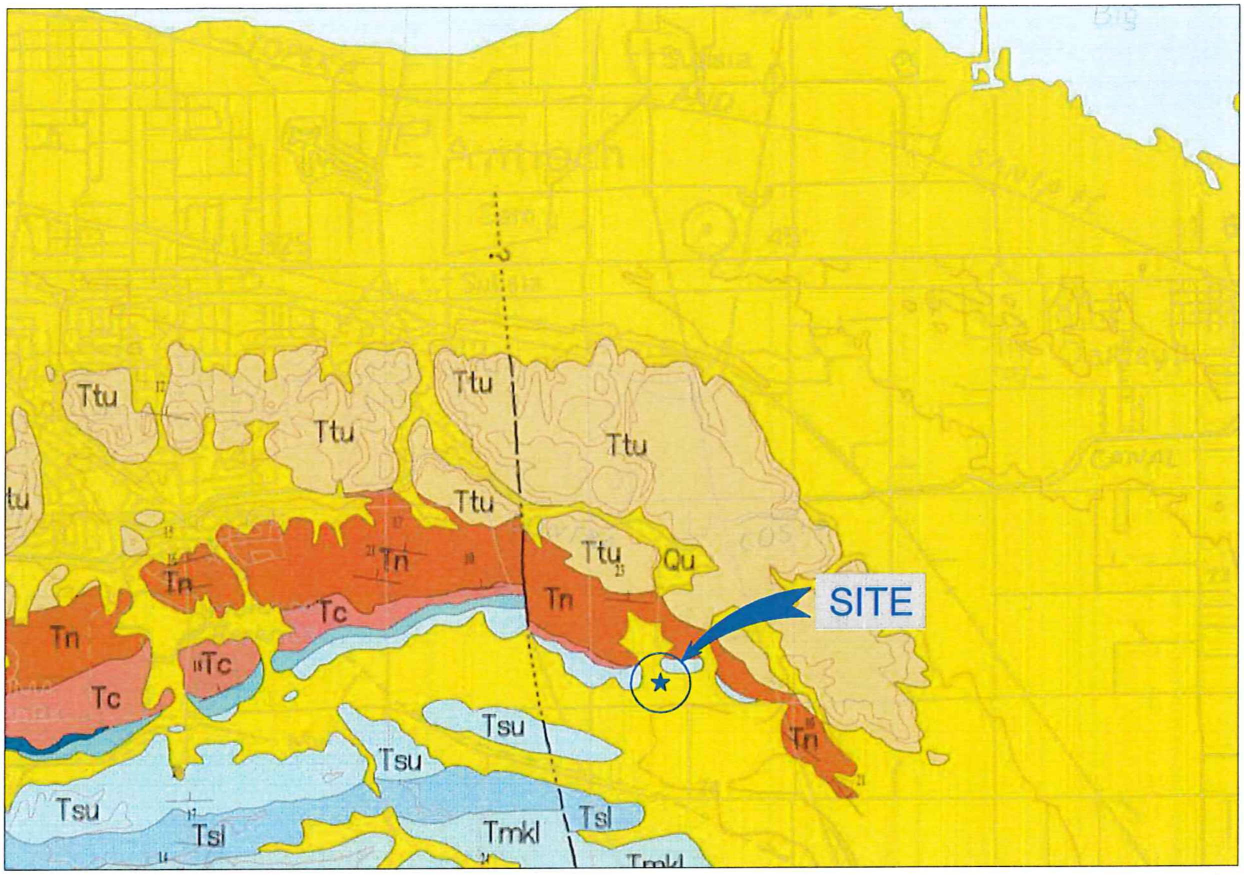
SITE PLAN

Country Hills Drive Soundwall
Antioch, California

Project No. 1465.107 Date: 12/29/22

Drawn MFJ
Checked MFJ

2
FIGURE



REGIONAL GEOLOGIC MAP

(NOT TO SCALE)

NORTH

LEGEND

🟨 Qu – Undivided Quaternary deposits

⬜ Qls – Landslide deposits

Tertiary Intrusive Rocks

🟥 Tn – Neroly Formation

🟧 Tc – Cierbo Formation

🟫 Ttu – Tulare Formation

🟦 Tmk – Markley Formation

🟦 Tmku– Markley Formation, upper member

🟦 Tsu – Markley Formation, upper Sidney Flat Shale member

Reference: Graymer, R.W., Jones, D.L., and Brabb, E.E. (1994), "Preliminary Geologic Map Emphasizing Bedrock Formations in Contra Costa County, California", United States Geological Survey Open File Report 94-622, Map Scale 1:75,000.

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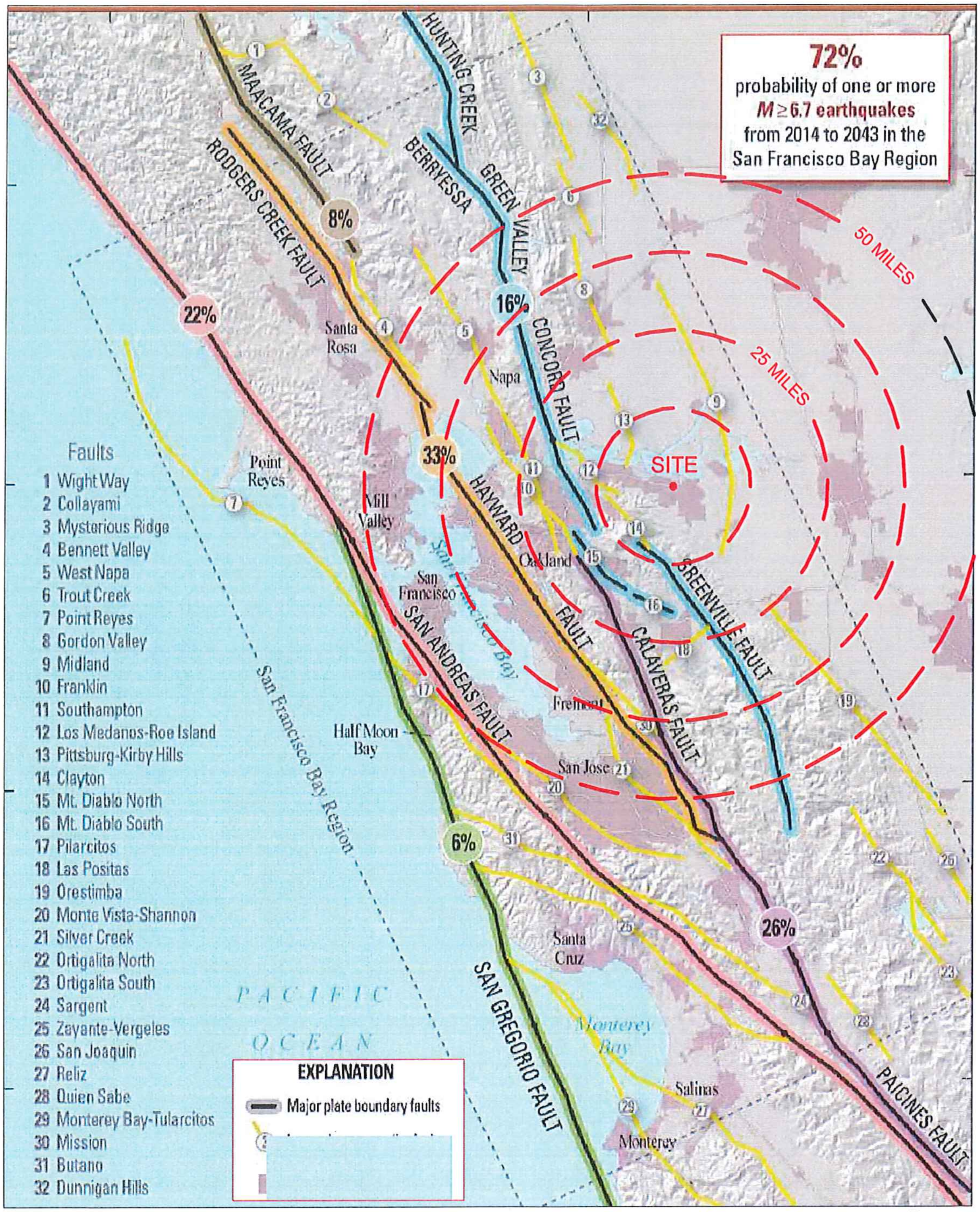
GEOLOGIC MAP

Country Hills Drive Soundwall
Antioch, California

Project No. 1465.107 Date: 12/21/2022

Drawn YHS
Checked

3
FIGURE



SITE COORDINATES
LAT. 37.9660°
LON. -121.7628°

SCALE

0 12.5 25 50 MILES

NORTH

DATA SOURCE:
1) U.S. Geological Survey, U.S. Department of the Interior, "Earthquake Outlook for the San Francisco Bay Region 2014-2043", Map of Known Active Faults in the San Francisco Bay Region, Fact Sheet 2016-3020, Revised August 2016 (ver. 1.1).

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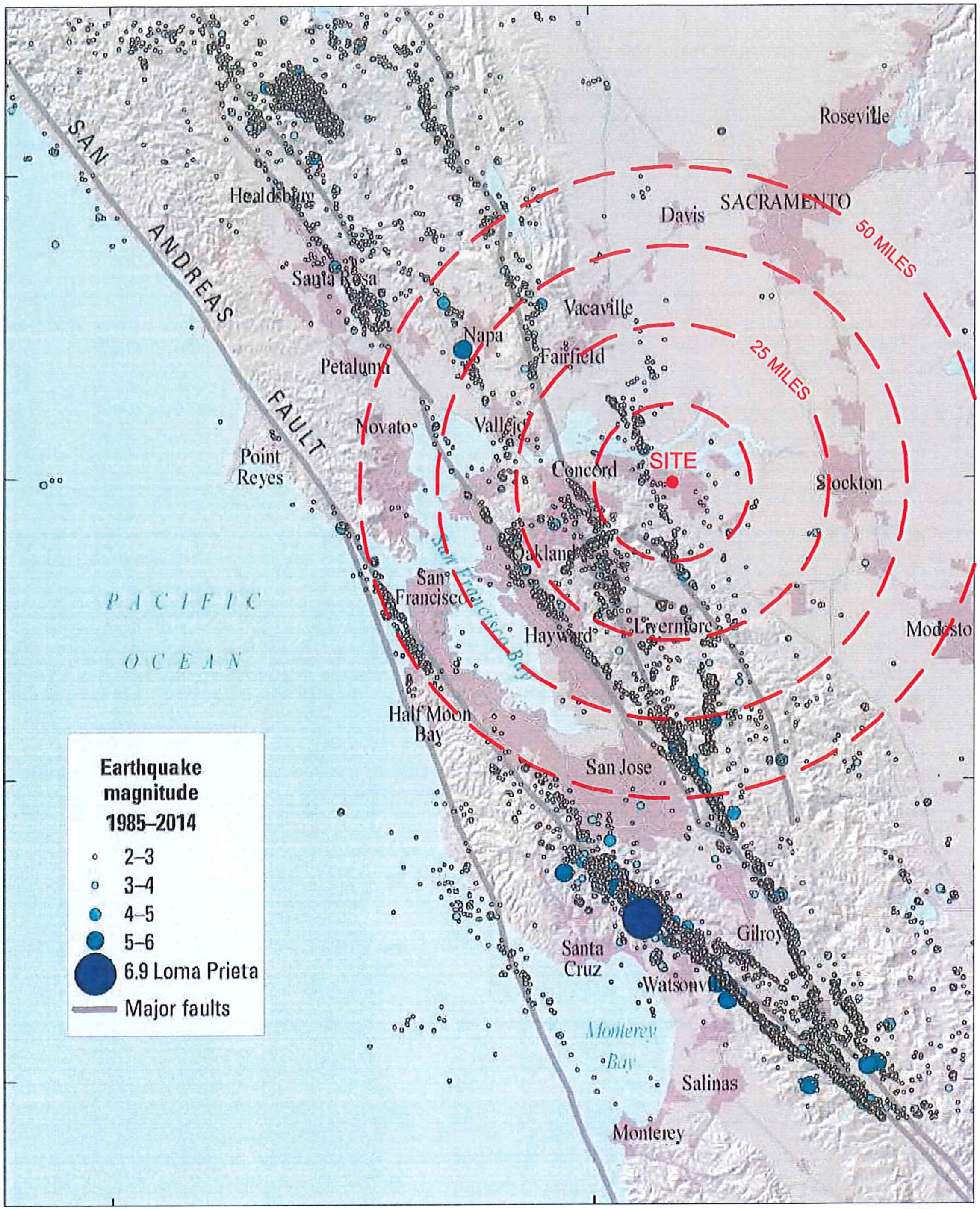
A CALIFORNIA CORPORATION, © 2022, ALL RIGHTS RESERVED FILENAME: 1465.107 SF.dwg	www.millerpac.com	Project No. 1465.107	Date: 12/21/2022	



SITE COORDINATES
LAT. 37.9660°
LON. -121.7628°

SCALE

0 12.5 25 50 MILES

NORTH

DATA SOURCE:

1) U.S. Geological Survey, U.S. Department of the Interior, "Earthquake Outlook for the San Francisco Bay Region 2014-2043", Map of Earthquakes Greater Than Magnitude 2.0 in the San Francisco Bay Region from 1985-2014, Fact Sheet 2016-3020, Revised August 2016 (ver. 1.1).

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HISTORIC EARTHQUAKE MAP

Country Hills Drive Soundwall
Antioch, California

Drawn YHS
Checked

Project No. 1465.107
Date: 12/21/2022

5
FIGURE

APPENDIX A
SUBSURFACE EXPLORATION AND LABORATORY TESTING

1.0 Subsurface Exploration

We explored subsurface conditions at the site by drilling two test borings utilizing portable hydraulic-powered drilling equipment with 4.5-inch solid flight augers on December 1, 2022, at the approximate locations are shown on Figure 2. The borings were drilled to a maximum depth of 11.5-feet below the ground surface.

The soils encountered were logged and identified in the field in general accordance with ASTM Standard D 2487, "Field Identification and Description of Soils (Visual-Manual Procedure)." This standard is briefly explained on Figure A-1, Soil Classification Chart. The boring logs are presented on Figures A-2 through A-4.

We obtained "undisturbed" samples using a 3-inch diameter, split-barrel modified California sampler with 2.5 by 6-inch brass tube liners or with a 2-inch diameter, split-barrel Standard Penetration Test (SPT) sampler. The sampler was driven with a 140-pound hammer falling 30 inches. The number of blows required to drive the samplers 18 inches was recorded and is reported on the boring logs as blows per foot for the last 12 inches of driving. The samples obtained were examined in the field, sealed to prevent moisture loss, and transported to our laboratory.

2.0 Laboratory Testing

We conducted laboratory tests on selected intact samples to verify field identifications and to evaluate engineering properties. The following laboratory tests were conducted in accordance with the ASTM standard test method cited:

- Laboratory Determination of Water (Moisture Content) of Soil, Rock, and Soil-Aggregate Mixtures, ASTM D 2216;
- Density of Soil in Place by the Drive-Cylinder Method, ASTM D2937;
- Unconfined Compressive Strength of Cohesive Soil, ASTM D2166; and
- Liquid and Plastic Limits of Soil, ASTM D 4318;

The moisture content, dry density, unconfined compressive strength, and liquid limit are shown on the exploratory Boring Logs and the results of plasticity index tests are presented on Figure A-5. The exploratory boring logs, description of soils encountered, and the laboratory test data reflect conditions only at the location of the boring at the time they were excavated or retrieved. Conditions may differ at other locations and may change with the passage of time due to a variety of causes including natural weathering, climate, and changes in surface and subsurface drainage.

MAJOR DIVISIONS		SYMBOL	DESCRIPTION
COARSE GRAINED SOILS over 50% sand and gravel	CLEAN GRAVEL	GW	Well-graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines
	GRAVEL with fines	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	CLEAN SAND	SW	Well-graded sands or gravelly sands, little or no fines
		SP	Poorly-graded sands or gravelly sands, little or no fines
	SAND with fines	SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS over 50% silt and clay	SILT AND CLAY liquid limit <50%	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silt-clays of low plasticity
	SILT AND CLAY liquid limit >50%	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS		PT	Peat, muck, and other highly organic soils
ROCK			Undifferentiated as to type or composition

KEY TO BORING AND TEST PIT SYMBOLS

CLASSIFICATION TESTS

PI	PLASTICITY INDEX
LL	LIQUID LIMIT
SA	SIEVE ANALYSIS
HYD	HYDROMETER ANALYSIS
P200	PERCENT PASSING NO. 200 SIEVE
P4	PERCENT PASSING NO. 4 SIEVE

SAMPLER TYPE

▮	MODIFIED CALIFORNIA
▯	STANDARD PENETRATION TEST
▨	THIN-WALLED / FIXED PISTON
⊠	HAND SAMPLER
⊠	ROCK CORE
X	DISTURBED OR BULK SAMPLE

NOTE: Test boring and test pit logs are an interpretation of conditions encountered at the excavation location during the time of exploration. Subsurface rock, soil or water conditions may vary in different locations within the project site and with the passage of time. Boundaries between differing soil or rock descriptions are approximate and may indicate a gradual transition.

STRENGTH TESTS

UC	LABORATORY UNCONFINED COMPRESSION
TXCU	CONSOLIDATED UNDRAINED TRIAXIAL
TXUU	UNCONSOLIDATED UNDRAINED TRIAXIAL
	UC, CU, UU = 1/2 Deviator Stress
DS (2.0)	DRAINED DIRECT SHEAR (NORMAL PRESSURE, ksf)

SAMPLER DRIVING RESISTANCE

Modified California and Standard Penetration Test samplers are driven 18 inches with a 140-pound hammer falling 30 inches per blow. Blows for the initial 6-inch drive seat the sampler. Blows for the final 12-inch drive are recorded onto the logs. Sampler refusal is defined as 50 blows during a 6-inch drive. Examples of blow records are as follows:

25	sampler driven 12 inches with 25 blows after initial 6-inch drive
85/7"	sampler driven 7 inches with 85 blows after initial 6-inch drive
50/3"	sampler driven 3 inches with 50 blows during initial 6-inch drive or beginning of final 12-inch drive

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SOIL CLASSIFICATION CHART

Country Hills Drive Soundwall
Antioch, California

Project No. 1465.107

Date: 12/8/2022

Drawn CMS
Checked

A-1
FIGURE

FRACTURING AND BEDDING

Fracture Classification	Spacing	Bedding Classification
Crushed	less than 3/4 inch	Laminated
Intensely fractured	3/4 to 2-1/2 inches	Very thinly bedded
Closely fractured	2-1/2 to 8 inches	Thinly bedded
Moderately fractured	8 to 24 inches	Medium bedded
Widely fractured	2 to 6 feet	Thickly bedded
Very widely fractured	greater than 6 feet	Very thickly bedded

HARDNESS

Low	Carved or gouged with a knife
Moderate	Easily scratched with a knife, friable
Hard	Difficult to scratch, knife scratch leaves dust trace
Very hard	Rock scratches metal

STRENGTH

Friable	Crumbles by rubbing with fingers
Weak	Crumbles under light hammer blows
Moderate	Indentations <1/8 inch with moderate blow with pick end of rock hammer
Strong	Withstands few heavy hammer blows, yields large fragments
Very strong	Withstands many heavy hammer blows, yields dust, small fragments

WEATHERING

Complete	Minerals decomposed to soil, but fabric and structure preserved
High	Rock decomposition, thorough discoloration, all fractures are extensively coated with clay, oxides or carbonates
Moderate	Fracture surfaces coated with weathering minerals, moderate or localized discoloration
Slight	A few stained fractures, slight discoloration, no mineral decomposition, no affect on cementation
Fresh	Rock unaffected by weathering, no change with depth, rings under hammer impact

NOTE: Test boring and test pit logs are an interpretation of conditions encountered at the location and time of exploration. Subsurface rock, soil and water conditions may differ in other locations and with the passage of time.

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ROCK CLASSIFICATION CHART

Country Hills Drive Soundwall
Antioch, California

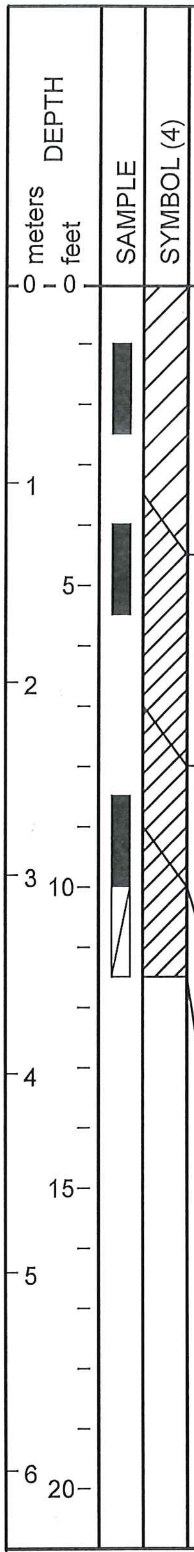
Project No. 1465.107
Date: 12/8/2022

Drawn CMS
Checked

A-2
FIGURE

BORING 1

EQUIPMENT: Portable Hydraulic Drill Rig with 4.5-inch Solid Flight Auger
DATE: 12/1/22
ELEVATION: 131 - feet*
*REFERENCE: Google Earth, 2019



	BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
CLAY with Sand (CH) dark brown mottled tan, moist, medium stiff to stiff, high plasticity, 10-15% fine to coarse sand, 5-10% subangular gravels [Alluvium]	13	94	23.2	942	LL:62 PI:32	
CLAY (CL) dark brown mottled dark red, moist, stiff, low to medium plasticity, organics present [Residual Soil]	23	101	16.7			
Sandy CLAY (CL) medium-dark brown clay with medium tan sandy lenses, moist, soft, low to medium plasticity, 25-40% fine to coarse sand [Alluvium]	6	96	23.3	613		
Sandy CLAY (CL) medium tan, moist, stiff, low plasticity, 35-45% fine to coarse sand [Alluvium]	14		21.9			
Bottom of boring at 11.5-feet. No groundwater encountered.						

▽ Water level encountered during drilling

▼ Water level measured after drilling

NOTES:
(1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3= 0.1571 x DRY UNIT WEIGHT (pcf)
(3) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(4) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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BORING LOG

Country Hills Drive Soundwall
Antioch, California

Project No. 1465.107

Date: 12/8/2022

Drawn CMS
Checked

A-3
FIGURE

BORING 2

EQUIPMENT: Portable Hydraulic Drill Rig with 4.5-inch Solid Flight Auger
DATE: 12/1/22
ELEVATION: 130 - feet*
*REFERENCE: Google Earth, 2019

DEPTH meters feet	SAMPLE	SYMBOL (4)		BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	OTHER TEST DATA
0 – 0 1	■	▨	CLAY with Sand (CL) dark brown, moist, very stiff, low to medium plasticity, 10-20% fine sand [Alluvium]	30	95	17.3	2336		
5 2	■	▨	CLAY with Sand (CL) medium brown, moist, very stiff, low to medium plasticity, 15-25% fine sand [Residual Soil]	57	93	26.8	3180		
3 10	■	▩	CLAYSTONE light gray and red-orange, low hardness, friable, completely weathered, quartz veins present [Bedrock]	48	92	30.0	1232		
4 15 5 6 20			Bottom of boring at 10.5-feet. No groundwater encountered.						

▽ Water level encountered during drilling
▼ Water level measured after drilling

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3= 0.1571 x DRY UNIT WEIGHT (pcf)
(3) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(4) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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BORING LOG

Country Hills Drive Soundwall
Antioch, California

Project No. 1465.107 Date: 12/8/2022

Drawn CMS
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A-4
FIGURE

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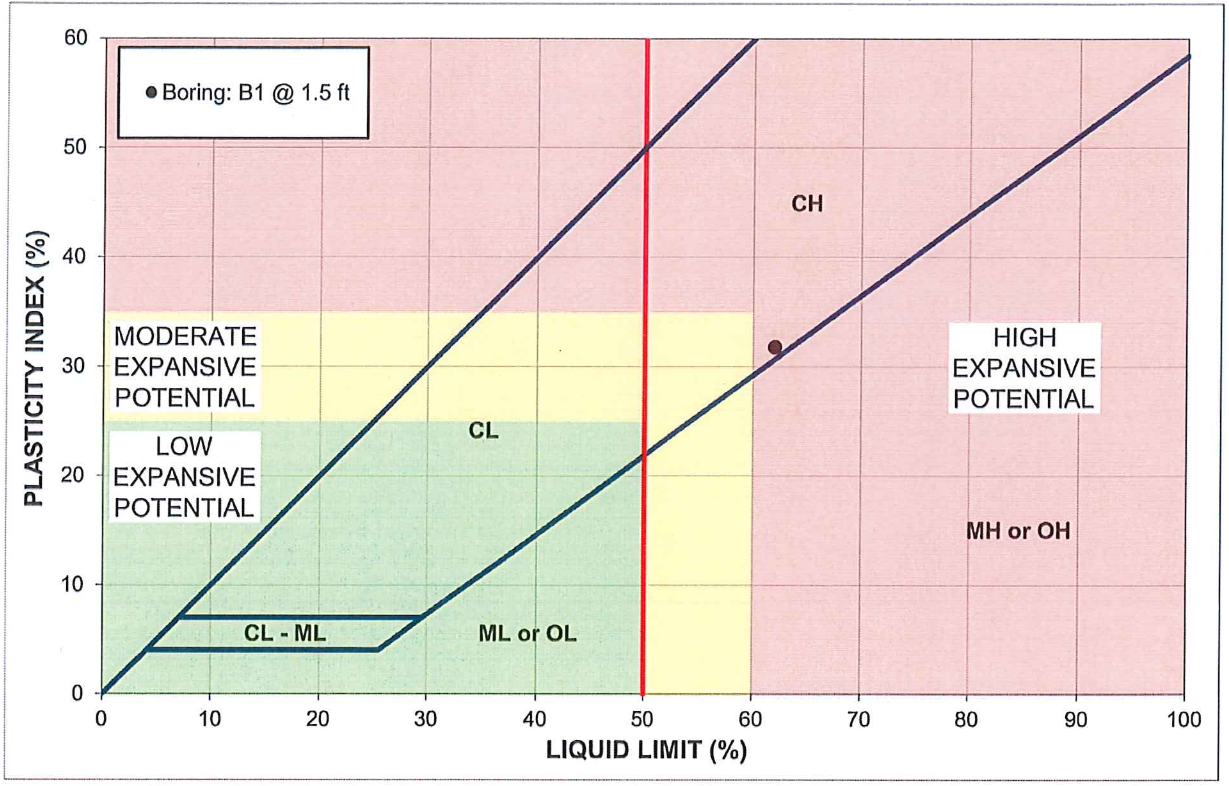
ATTERBERG LIMITS TEST (ASTM D 4318)



Sample	Classification	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
Boring: B1 @ 1.5 ft	CLAY with Gravel (CH) dark brown mottled tan	62	30	32

PI = 0-3: Non-Plastic
PI = 3-15: Slightly Plastic
PI = 15-30: Medium Plasticity
PI = >30: High Plasticity

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FILENAME: Plasticity Index Overlay REALIGNED.dwg

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PLASTICITY INDEX TEST RESULTS

Country Hills Soundwall
Antioch, California

Project No. 1465.107 Date: 5/17/2018

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A-5
FIGURE