52 FRANKLIN AVENUE PROJECT

Initial Study / Mitigated Negative Declaration

October 2025



Prepared for:

City of South San Francisco
Department of Economic and Community Development
Planning Division
315 Maple Avenue
South San Francisco, CA 94083

Prepared By:

RCH GROUP
planning & environmental consulting

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INTRODUCTION

1.1 INITIAL STUDY

This Initial Study has been prepared in accordance with the California Environmental Quality Act (CEQA), which can be found in the California Public Resources Code (PRC) Section 21000 et seq., and the CEQA Guidelines found in California Code of Regulations Title 14, Chapter 3, (CCR) Section 15000 et seq., as amended. This Initial Study identifies the potential environmental impacts associated with construction and operation of the Project which includes any *reasonably foreseeable* impacts associated with the Project in its entirety. CEQA (PRC Section 21065) defines a Project as:

> An activity which may cause either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment, and which is any of the following:
>
> a) An activity directly undertaken by a public agency.
>
> b) An activity undertaken by a person which is supported, in whole or in part, through contracts, grants, subsidies, loans, or other forms of assistance from one or more public agencies.
>
> c) An activity that involves the issuance to a person of a lease, permit, license, certificate, or other entitlement for use by one or more agencies.

The proposed project (Project) meets criteria "c", identified above, and therefore requires environmental review. The Applicant is seeking entitlement approvals to construct a single-family residence. Typically, the construction of one single-family residence in a residential zone with utilities and infrastructure in place is categorically exempt from the CEQA requirements (CEQA Guidelines section 15303, Class 3 New Construction or Conversion of Small Structures). However, there are "exceptions" to exemptions as stated in CEQA Guidelines section 15300.2, subsection (a). Subsection (a) clearly states Class 3 exemptions are qualified based upon where the project would be located. The subsection further notes a project that in itself "is ordinarily insignificant in its impact on the environment may in a particularly sensitive environment be significant." Therefore, if a project might be located in a biological habitat, or on steep or potentially unstable slopes, or on properties known to have environmental contamination (hazardous materials), the exception to the exemption noted above requires the lead agency to conduct an Initial Study, which may be satisfied by utilizing the sample forms provided in Appendices G and H of the CEQA Guidelines.

Preparation of an environmental analysis and subsequent environmental determination is required prior to or simultaneously with entitlement review. Environmental review does not constitute project approval but is an independent analysis of potential project impacts and mitigation measures. The Lead Agency may, after reviewing the entirety of the record, find that the

environmental analysis is adequate and approve, disapprove or conditionally approve the project based upon environmental and merits review.

The Lead Agency for the Project is the City of South San Francisco. The Planning Commission will hold a study session to take public comments and will make the final determination on the environmental document.

1.2 PROJECT APPLICANT TEAM/LEAD AGENCY TEAM

PROJECT APPLICANT

Mr. Juan Pedro Diaz/Ms. Karen Lisette Diaz
23 Carlsbad Ct
South San Francisco, CA 94080
karenlisettediaz@gmail.com

PROJECT TEAM

ENGINEERING

Berns Infrastructure, LLC
1345 N. Jefferson Street #434
Milwaukee, WI 53202

Mark Berns, PE
mberns@bernsinfrastructure.com

DESIGN

I.C.E. Design Team
338 N Canal Ave, #20
South San Francisco, CA 94080

Derek Vinh
info@icedesigninc.com

GEOTECHNICAL ENGINEERING

Michelucci & Associates, Inc.
1801 Murchison Drive, Suite #88,
Burlingame, California 94010

Curtis Jensen, PE/GE
cnj7781@gmail.com

LEAD AGENCY AND ENVIRONMENTAL CONSULTANT TEAM

The Lead Agency for this Initial Study is the City of South San Francisco. The administrative record for the Project is on file at the City's Planning Division. The following person has been assigned as the custodian and Case Planner/Project Manager for the Lead Agency:

Mr. Billy Gross, Principal Planner
Department of Economic and Community Development-Planning Division
315 Maple Avenue
South San Francisco, CA 94080
(650) 877-8535

The Lead Agency's Environmental Consultant is RCH Group, Inc. represented by Dan Jones, Senior Project Manager.

Dan Jones
Senior Project Manager
RCH Group, Inc.
(916) 782-4427
DJones@theRCHgroup.com

Dan Jones serves as Project Manager, preparer of the initial study, and represents the CEQA document in all hearings and meetings. The Biological Resources Assessment Update was prepared by Wood Biological Consulting and was peer reviewed by Dan Jones of RCH Group. Geotechnical evaluations of the Project site have occurred between 2008 and 2025 by various firms to analyze the site's slope instability and recommend mitigation measures. All geotechnical documentation prepared for the Project was peer reviewed by Cotton Shires Associates, Inc (see **Appendix A**).

1.3 DOCUMENTS INCORPORATED BY REFERENCE AND INCLUDED IN APPENDIX A

PROJECT PLAN SET

I.C.E. Design Team. Project Site Plan for 52 Franklin Avenue, South San Francisco CA, APN: 012.039.180. March 2025.

BIOLOGICAL RESOURCES

Michael Marangio, Biological Resources Assessment, November 10, 2015.

Wood Biological Consulting, Biological Resources Assessment Update, September 6, 2023.

GEOLOGY AND SOILS

Applicant's Reports

Michelucci & Associates, Inc., Second Review of Plans for Proposed New Residence Letter, March 3, 2025.

Michelucci & Associates, Inc., Review of Plans for Residence Letter, January 27, 2025.

Michelucci & Associates, Inc., Responses to Cotton Shires Peer Review Letter, August 2, 2023.

Michelucci & Associates, Inc., Geotechnical Consultation Mitigation of Debris Flow Potential and Construction of New Residence, July 11, 2023.

Earth Systems Pacific, Conceptual Debris Flow Management Plan and Geotechnical Engineering Evaluation, January 31, 2023.

Earth Systems Pacific, Rear Yard Grading and Drainage Plan Review, October 24, 2017.

Earth Systems Pacific, Supplemental Geologic and Geotechnical Engineering Evaluation, April 25, 2017.

Earth Systems Pacific, Geologic Hazards Evaluation and Geotechnical Engineering Study, June 17, 2016.

Michelucci & Associates, Inc., Updated Geologic and Geotechnical Evaluation, August 7, 2008.

City Peer Review-Cotton Shires Associates

Cotton Shires Associates, Inc., Second Supplemental Geotechnical Peer Review, May 29, 2025.

Cotton Shires Associates, Inc., Supplemental Update Geotechnical Peer Review, August 23, 2023.

Cotton Shires Associates, Inc., Updated Geotechnical Peer Review, July 24, 2023.

LAND USE AND PLANNING

Documents Incorporated by Reference Available on City Website:

South San Francisco General Plan (Adopted October 1999)

2040 South San Francisco General Plan (Adopted October 2022)

2022 Final Environmental Impact Report: General Plan Update, Zoning Code, Amendments, and Climate Action Plan (2040GP Program EIR), State Clearinghouse Number 2021020064, September 6, 2022.

1.4 CITY OF SOUTH SAN FRANCISCO PROJECT REVIEW PROCESS

As a matter of law, the Project is required to comply with federal, state and local laws and regulations. These regulations are verified as satisfied and incorporated into the Project as a matter of grading and /or building permit issuance or permits will not be issued by the City of South San Francisco. As such, these requirements are considered a part of the Project, not a separate and distinct requirement levied through CEQA review.

City of South San Francisco project processing requires that applications for projects are first reviewed by the City's Technical Advisory Group (TAG). TAG is comprised of representatives from Planning, Building, Police, Fire, Engineering, Parks and Recreation, and Water Quality Control. TAG review identifies changes and additions that are required in a project to comply with local, state and federal laws that are implemented through the City's Municipal Code. The Planning Division, after TAG review, issues a letter to the applicant identifying the changes required in Project plans and supporting materials necessary to comply with prevailing laws pursuant to site development, construction and land use. The applicant is required to revise the plans and supporting documentation, or the application is not certified as complete and not processed. Revised plans and documentation are submitted to the Planning Division to be routed again to all affected City departments and divisions; again, to evaluate the application in light of their earlier comments and requirements. The process results in an application that can be certified 'complete' as well as identification of the Conditions of Approval (COAs) that are required should the Project be approved. Many of these COAs implement environmental mitigations that were historically identified through the environmental review process (California Environmental Quality Act, or CEQA) and now have become a part of the City's legislative requirements, through its general plan, specific, area, municipal code, special districts, or memoranda of understanding (i.e., its police power).

After a project application is complete it is subject to environmental, public and discretionary review through and by the Planning Commission and/or City Council, depending upon the type of project, as defined by the Municipal Code of South San Francisco and state law. The COAs identified through staff review of the project, and any additional ones identified through the public review process become required of the project as a matter of law. Prior to the City issuing a building, grading and/or demolition permit, all City departments and divisions (identified above) review the project plans for compliance with their identified COAs and any additional ones added through the public review process. Permits are not issued by the Building Division in absence of authorization from City staff or in absence of the requirements being incorporated into the Project plans.

1.5 ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

Environmental factors that may be affected by the Project, as defined by CEQA and as described in **Chapter 3**, are listed below. Factors identified in **bold** have been determined to have the potential for significant impacts, in absence of the mitigations identified in **Chapter 3**. Factors which are unshaded have been determined to pose no potential for significant impacts.

Aesthetics	Hazards & Hazardous Materials	Public Services
Agriculture & Forest Resources	Hydrology and Water Quality	Recreation
Air Quality	Land Use and Planning	Transportation
Greenhouse Gas Emissions	Mineral Resources	Utilities & Service Systems
Biological Resources	Noise	Cumulative Impacts
Cultural Resources	Population &Housing	Tribal Cultural Resources
Geology & Soils	Energy	Wildfire

1.6 LEAD AGENCY'S DETERMINATION

On the basis of the analysis contained in **Chapter 3**:

I find that the proposed Project COULD NOT have a significant effect on the environment because the Applicant has proposed measures as part of the project to reduce potential impacts to less than significant, and a NEGATIVE DECLARATION will be prepared.

I find that although the proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the Project have been made by or agreed to by the Project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

I find that the proposed Project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

I find that the proposed Project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

I find that although the proposed Project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed Project, nothing further is required.

Billy Gross — 10/10/2025

Billy Gross — Date

Principal Planner

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PROJECT DESCRIPTION

2.1 PROJECT LOCATION AND SETTING

PROJECT LOCATION

The Project site is located in the northern portion of the City of South San Francisco ("City"), in an area known as the Paradise Valley/Terrabay planning sub-area (p 105, 2040 General Plan, "2040GP"). The Project is in the western portion of the planning area in a single-family neighborhood known as "Sterling Terrace". The Project site (52 Franklin Avenue, APN# 012-039-180) is located at the northeastern edge of the looped portion of Franklin Avenue, approximately 300 feet from the intersection of Highland and Franklin Avenues and 700 feet from the intersection of Larch and Franklin Avenues. Franklin Avenue intersects Hillside Boulevard, approximately 1,300 feet north of the Project site. Franklin Avenue is largely a northeast/southwest trending roadway that jogs west at its intersection of Larch Avenue, in the Project area.

Sign Hill abuts the Project site to the south. The northern and northeastern facing slopes of Sign Hill, consisting of approximately 46 acres, are in private ownership. Sign Hill Park located on the south facing slopes of the hill, is owned by the City and is public park and recreation land. Sign Hill Park consists of 27 acres of open space with approximately two miles of hiking trails. Sign Hill Park gets its name from the sign, "*South San Francisco The Industrial City*" which was listed on the National Historic Register in 1996. The Project is on the north facing side of Sign Hill (**see Project Description Figures 1 Project Location and 2 Project Site and Vicinity**).

Paradise Valley/Terrabay Planning Area

The Paradise Valley/Terrabay planning area spans the northern slope of Sign Hill to the City boundaries with the Town of Colma, the City of Brisbane, and San Bruno Mountain County Park to the north; Bayshore Boulevard to the south; and Hillside School to the west. Airport, Sister Cities and Hillside Boulevards are within the planning area. The planning area is largely residential. Older residential single-family development, circa 1940-50, is located south of Sister Cities and Hillside Boulevards. The townhouse, single-family detached, duplex and condominium development associated with Terrabay Phases I and II are north of Sister Cities and Hillside Boulevards and were constructed between the 1990s and early 2000s.



Source: RCH Group; Google Earth Pro, 2023

Figure 1
Regional Project Location

RCH GROUP
planning & environmental consulting



Source: RCH Group; Google Earth Pro, 2023

Figure 2
Project Vicinity Map

RCHGROUP
planning & environmental consulting

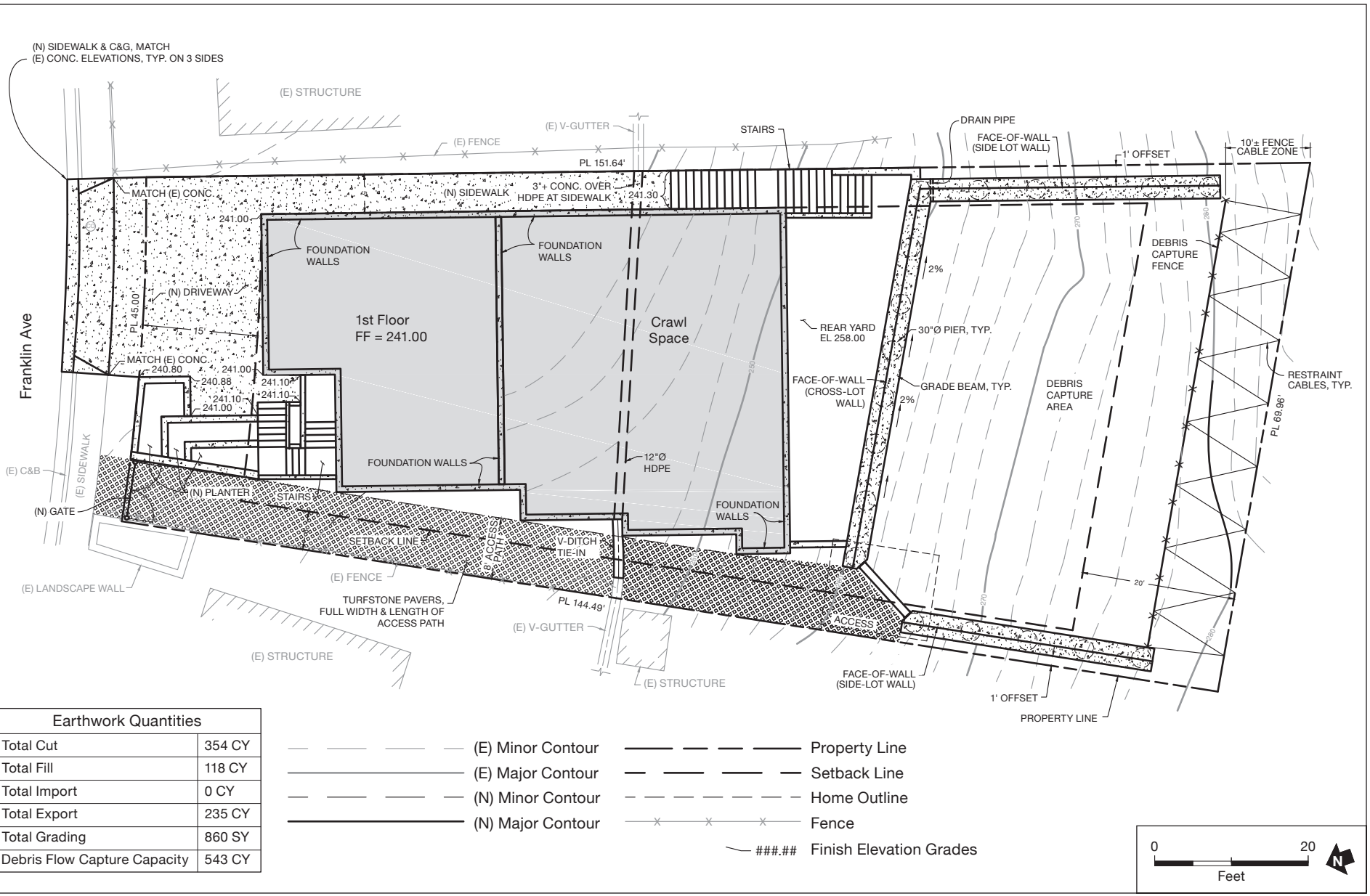
Martin School is 1,500 feet southeast of the Project. Hillside Christian Academy, at 1415 Hillside Boulevard, Mills Montessori School, at 1400 Hillside Boulevard and the closed Hillside School are located in the western portion of the planning area, approximately 3,000 feet from the Project site. A small pocket of commercial land use is located southeast of the Project bounded by Hillside Boulevard, North Spruce and Linden Avenues. Terrabay Phase III fronting Airport Boulevard is also in the planning area, consisting of research and development, retail and office commercial land uses. Business commercial land uses are also in the planning area along Airport Boulevard.

The planning area includes the Terrabay Fire Station, Terrabay Recreation Center, Hillside Recreation Center, the Preservation Parcel associated with Terrabay Phase III now dedicated as part of San Bruno Mountain County Park, the history trail on the Terrabay Phase III site, the shared use performing arts facility located in the South Tower of Terrabay Phase III, the linear park along Sister Cities Boulevard, a pocket park on Linden Avenue, and open space and recreation uses associated with the schools.

Project Site

The vacant site is fronted by Franklin Avenue and is situated in predominately a north/south direction. Adjacent properties and boundaries include Franklin Avenue to the north, single-family Mid 20th Century residences on the east and west, and privately owned open space southeast and southwest (northeastern face of Sign Hill, see **Project Description Figure 2**).

The Project site is vacant resulting from a mudslide in 1982 that moved the garage and a portion of the residence into the street. The residence was constructed in 1949 as part of the Sterling Terrace subdivision. Portions of the old foundation appear on the site. The development area of the site is relatively flat, 10 percent slope along Franklin Avenue, and rises to a 60 percent slope in the mid-and rear portions of the lot. The varying topography is predominately from cut and fill activities and slope instability. The site measures approximately 45 feet in width along Franklin Avenue (north side) and 70 feet at the rear (south side), 145 feet in depth along the west side and 152 feet along the east side consisting of 8,422 square feet (see **Project Description Figure 3**). The Project Plan Set is located in **Appendix A.**



Earthwork Quantities	
Total Cut	354 CY
Total Fill	118 CY
Total Import	0 CY
Total Export	235 CY
Total Grading	860 SY
Debris Flow Capture Capacity	543 CY

Source: Berns Infrastructure, 2023

Figure 3
Grading Plan

RCH GROUP
planning & environmental consulting

2.2 PROPOSED PROJECT

SITE HISTORY

A building permit was issued on September 13, 1949 for the dwelling that previously existed on the site. The residence was constructed and occupied. A mudslide occurred on January 4, 1982 which pushed the dwelling partially into the public right of way. Project files indicate that due to the then recent, heavy and prolonged rainfall there were mudslides on Sign Hill and soil instability and mudslides at 48 and 50 Franklin Avenue as well as 52 Franklin. The South San Francisco City Council (January 6, 1982) passed a resolution declaring the property a public nuisance. A building permit was issued to demolish the damaged structure associated with 52 Franklin Avenue on January 8, 1982. The foundations were allowed to remain (Ms. Rozalynne Thompson, Associate Planner, file notes. Undated).

52 Franklin Avenue has been under various ownership since 1949. Plans for a new dwelling on the site were submitted to the City in the early 1990s. Design review was approved in 1991 while geotechnical review was occurring between the City, the City's geotechnical consultant Cotton Shires Associates (CSA) and Michelucci and Associates, the then property owner's geotechnical consultant. CSA expressed concerns with respect to the adequacy of the proposed crib wall design to buttress the slope. Moreover, a second debris flow was discovered on the property which appeared to have occurred in or around 1955. Based upon site reconnaissance it appeared that a cut bench immediately south of the site directed water onto the site slopes contributing to the initiation of debris flows in 1982 and 1955. The consultant noted that if the slopes immediately west of the 1982 debris flow become saturated in a similar manner as had occurred in the adjacent failure area, another debris flow could be generated with associated potential adverse impacts to the subject property and the existing residence to the west.

In 1997 CSA recommended that the then applicant retain the services of a Certified Engineering Geologist to identify and characterize potential site geologic hazards and update the mapping of local geologic features both on, and adjacent to, the property. CSA also recommended that the consultant specifically detail the locations of existing drainage courses (primarily south and southwest of the subject property) that direct concentrated surface flow or potential slope debris toward the property. The Certified Engineering Geologist was also requested to recommend mitigation measures necessary to protect the proposed residential building site from adverse impacts caused by slope instability. Accordingly, geotechnical evaluations of the Project site have occurred between 2008 and 2025 to analyze the site's slope instability and recommend mitigation measures, as necessary (see Chapter 3, Section VII. Geology and Soils).

In 2015 an application was filed to construct a single-family dwelling and garage. The application was never completed again due to unresolved geotechnical issues.

PROJECT DESCRIPTION

The Project consists of the construction and operation of a residence. The lot slopes uphill from Franklin Avenue. A building footprint is shown on the front two-thirds of the lot. Because the site is

limited in developable area, due to the debris capture area and associated 8-foot-wide access path (discussed below), it is anticipated that the Project could require setback variances. The estimated construction schedule is provided in **Table 1**.

PROJECT DESCRIPTION TABLE 1
CONSTRUCTION SCHEDULE

PHASE	DESCRIPTION	WORKING DAYS
1	Site Preparation	5
2	Grading	90
3	Building Construction	100
4	Paving	5
5	Architectural Coating	5

Note: Grading phase includes access preparation, removal of unsuitable materials and organics in fill areas, drilled shaft work, construction of retaining walls, excavation of soils planned removal, and soil placement and compaction. Current earthwork quantities are estimated at 354 cubic yards of cut, 118 cubic yards of fill, and 235 cubic yards of export to develop the site and provide the debris flow capture capacity of 543 cubic yards.

As discussed previously, geotechnical engineering and engineering geologic investigations carried out between 1989 and 2025 concluded that the potential for another debris flow exists, derived from susceptible soils on the steeper, upper portions of the property and the hillside above the rear property line. The potential hazard for a new house built on the property, associated with potential future debris flows, would be similar to the 1982 debris flow unless mitigative measures are undertaken (Michelucci & Associates, Inc., 2023).

Geotechnical mitigation measures on the site included as Project design and peer reviewed by Cotton Shires Associates (CSA) as part of this environmental review would consist of constructing a "U" shaped debris barrier, consisting of retaining walls, to form a basin that would capture and enclose a potential debris flow onto the Project site **(see Project Description Figure 3).** The debris flow capture capacity is currently estimated at 543 cubic yards, above the recommendation of 500 cubic yards by the Applicant's geotechnical consultants (Michelucci and Associates and Earth Systems) and confirmed by the City's geotechnical consultant, CSA. An 8-foot-wide setback along the western property line would allow access to the debris capture area for equipment to remove debris captured within the basin, as needed.

2.3 GENERAL PLAN AND ZONING

GENERAL PLAN DESIGNATION

The Project site is designated Low Density Residential (RL) permitting up to eight (8) units per acre. The site is within the Sterling Terrace neighborhood, constructed in the mid-20th century consisting of single-family detached residences.

ZONING CLASSIFICATION

The Project site is zoned Residential Low Density allowing a maximum of eight (8) units per acre (RL-8).

2.4 REQUIRED ENTITLEMENTS

LEAD AGENCY REQUIREMENTS

- Design Review
- Grading and Building permits.
- Encroachment permits to work in the public right-of-way.

3

ENVIRONMENTAL CHECKLIST

ENVIRONMENTAL CHECKLIST

The following checklist is consistent with CEQA Guidelines, Appendix G. A "***no impact***" response indicates that the Project would not result in an environmental impact in a particular area of interest, either because the resource is not present, or the Project does not have the potential to cause an effect on the resource. A "***less than significant***" response indicates that, while there may be potential for an environmental impact, the significance of the impact would not exceed established thresholds and/or that there are standard procedures or regulations in place that would apply to the Project and hence no mitigation is required, or that, although there is the potential for a significant impact, feasible mitigation measures are available and have been agreed to and proposed by the Project to reduce the impact to a level of "***less than significant***." A "***potentially significant impact***" response indicates that the Project could exceed established thresholds, no mitigation is currently proposed or identified and therefore the impact will be analyzed in an environmental impact report. A "***less than significant with mitigation***" response indicates that although the impact would be considered significant, measures are identified and required herein that will reduce the impact to less than significant.

Citations for this chapter are contained within the relevant discussion.

I. Aesthetics *Except as provided in Public Resources Code Section 21099, would the project:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☐	☒
d. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

SETTING

SOUTH SAN FRANCISCO

South San Francisco's urban character is one of contrasts within a visually well-defined setting. San Bruno Mountain to the north, the ridge along Skyline Boulevard to the west, Interstate 380 to the south, and the San Francisco Bay to the east provide the City with distinctive edges. The City is contained in an almost bowl-like shape by hills on two sides. The City's terrain ranges from the flatlands along the water to hills east and north. Hills are visible from all parts of the City; Sign Hill and San Bruno Mountain are visual landmarks. Much of the City's topography is rolling, resulting in distant views from many neighborhoods. Geographically, the City is relatively small, extending approximately two miles in a north-south direction and about five miles from east to west. According to the United States Census Bureau South San Francisco consists of 32 square miles of which 9.1 square miles are land and 21 square miles water.

PROJECT SITE AND AREA

The Project site is located in the northern portion of the City of South San Francisco, in an area known as the Paradise Valley/Terrabay planning sub area (p 105, 2040 General Plan, "2040GP"). The Project site is in the central portion of the planning area in a single-family neighborhood known as "Sterling Terrace." The Project site is located at the northeastern edge of the looped portion of Franklin Avenue, approximately 300 feet from the intersection of Highland and Franklin Avenues and 700 feet from the intersection of Larch and Franklin Avenues. Franklin Avenue intersects Hillside Boulevard, approximately 1,300 feet north of the Project site. Franklin Avenue is largely a northeast/southwest trending roadway that jogs west at the intersection of Larch Avenue (see **Project Description Figures 1 and 2 in Chapter 2**). Franklin Avenue rises in elevation from its intersection with Hillside Boulevard to the Project site. The elevation at Franklin Avenue and Hillside Boulevard is 119 feet above mean sea level (msl); the Franklin and Larch Avenue intersection is 152 feet above msl; the Franklin and Highland Avenue intersection is 200 feet above msl; and in front of Project site is 242 feet above msl (Google Earth, 2023).

Adjacent properties and boundaries include Franklin Avenue to the north, single-family mid 20th-century residences east, west and across Franklin Avenue to the north, and privately owned open space to the south, including Sign Hill Park. Residences in the immediate vicinity of the Project, along the looped portion of the road are one-story over a garage and at the intersection of Franklin and Larch Avenues two-story residences over a garage begin to appear. In both cases, more massing appears on the downhill portion of the structures (see **Aesthetics Figures 1, 2, and 3** (All figures are from Google Earth, 2023).

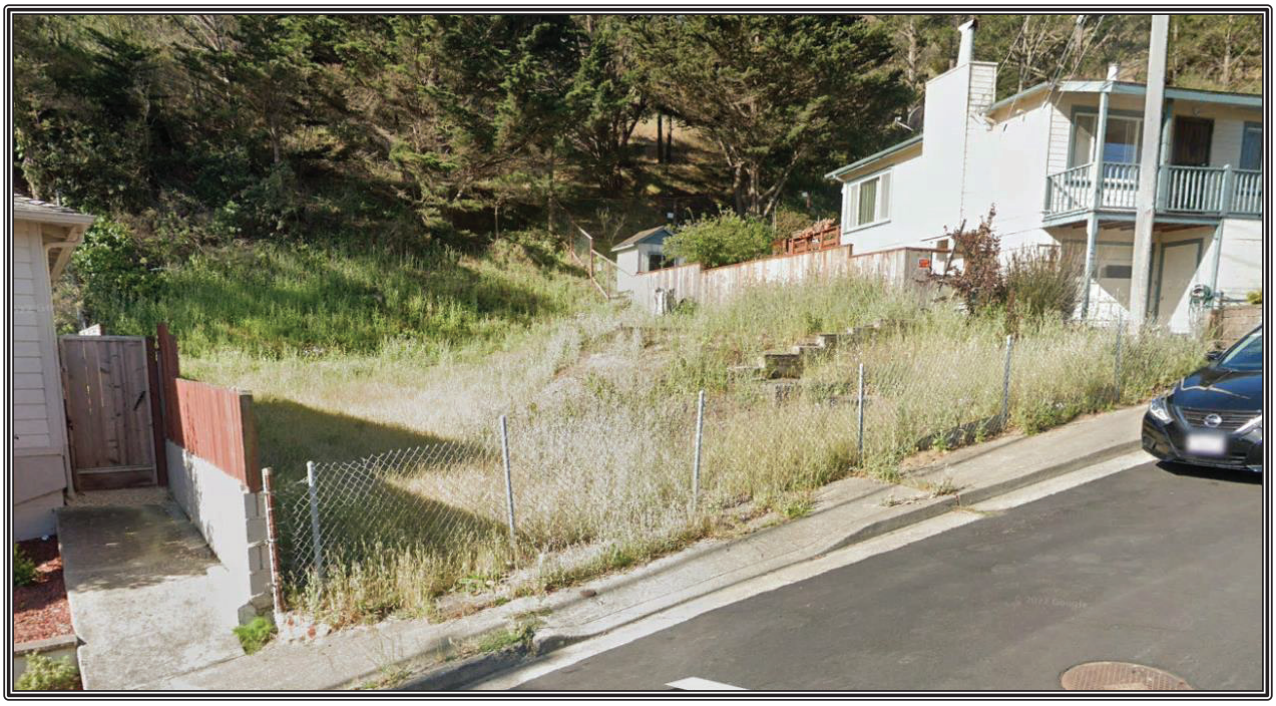
The Project site is vacant resulting from a mudslide in 1982 that moved the residence into the street. As shown in **Aesthetics Figure 1**, some of the remnants from the 1949 structure are still evident on the lot. The site is relatively flat, 10 percent slope along Franklin Avenue, and rises to a 60 percent slope in the mid-and rear portions of the lot. The varying topography is predominately from cut and fill activities and slope instability. The site measures approximately 45 feet in width along Franklin Avenue and 70 feet at the rear, 145 feet in depth along the right (western) side and 152 feet along the left (eastern) side consisting of 8,422 square feet (see **Project Description Figure 3 in Chapter 2**).

AESTHETICS FIGURE 1
PROJECT SITE (VIEW SOUTH)
PORTIONS OF STAIRS AND FOUNDATION FROM 1949 HOUSE
ADJACENT SINGLE-FAMILY SINGLE-STORY RESIDENCES OVER GARAGE



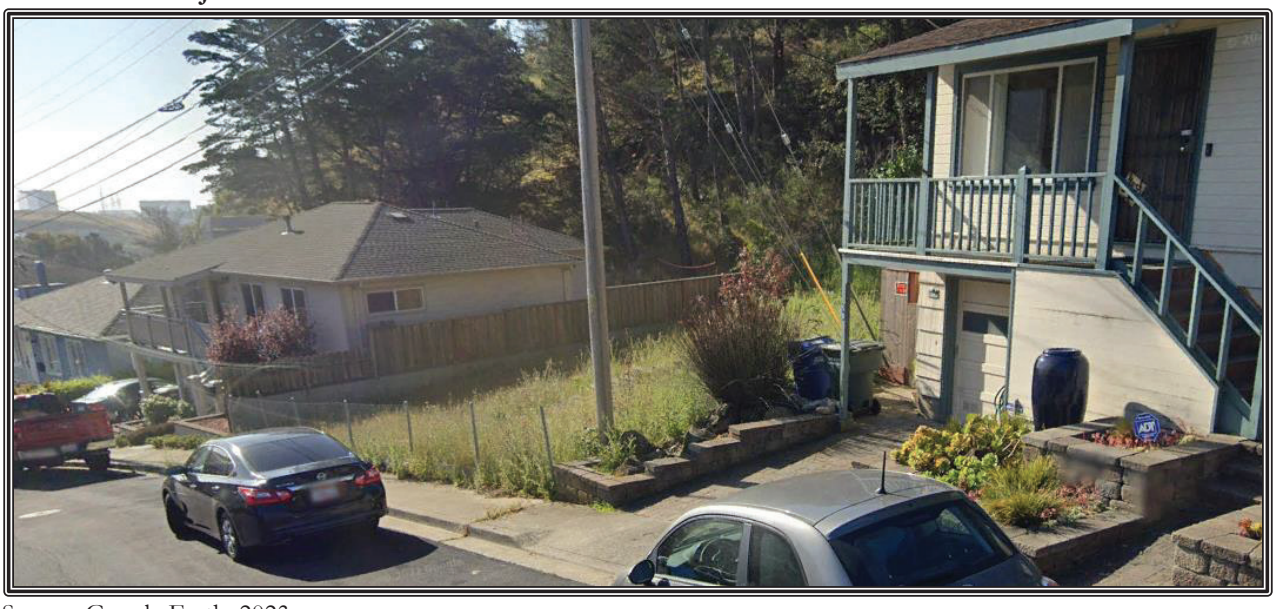
Source: Google Earth, 2023.

AESTHETICS FIGURE 2
PROJECT SITE (VIEW SOUTHWEST)
PORTIONS OF STAIRS AND FOUNDATION FROM 1949 HOUSE
ADJACENT SINGLE-FAMILY SINGLE-STORY RESIDENCES OVER GARAGE



Source: Google Earth, 2023.

AESTHETICS FIGURE 3
PROJECT SITE (VIEW SOUTHEAST)
ADJACENT SINGLE-FAMILY SINGLE-STORY RESIDENCES OVER GARAGE



Source: Google Earth, 2023.

REGULATORY FRAMEWORK

CITY

Design Review Board

As identified in **Chapter 1 Section 1.5.1,** the Project is required by law to undergo review by the City's Design Review Board (DRB). Changes in design may be identified by DRB and may also be identified by the Planning Commission. Design review regulates signage, site layout, architecture, urban design and lighting.

2040 General Plan (2040GP)

The 2040GP does not identify scenic vistas, corridors or viewpoints in the City. Scenic vistas and corridors are identified in the *1999 South San Francisco General Plan (1999GP)*. The Project site is not identified as a site that is visible from at least one viewpoint and is not identified as a viewpoint site (*Figure 2-4 Viewshed*, 1999GP, p 36).

IMPACTS

a) Scenic Vistas

Significance Criteria: For the purpose of assessing impacts of a project on scenic vistas, the threshold of significance is exceeded when a project would result in the obstruction of a designated public vista, or in the placement of an arguably offensive or negative-appearing project within such a vista. Any clear conflict with a general plan policy or other adopted planning policy regarding scenic vistas would also be considered a potentially significant adverse environmental impact.

The view of Sign Hill is on the south-sloping portion of the mountain, not the north-facing portion where the Project is located. The ridge of Sign Hill reaches approximately 600 feet in elevation. The Sterling Terrace subdivision ranges in elevation from approximately 200 to 450 feet above msl, below the crest of Sign Hill. The historic portion of Sign Hill is not visible from the northern and western slopes of Sign Hill. The Project would not block views to the northern slopes of Sign Hill. The Project would not block views of the historic sign or Sigh Hill.

The Project is not located within a formally designated public vista, nor would it result in the obstruction of a formally designated public vista. The Project is not identified as a viewpoint parcel or as one containing view value. The Project would not conflict with an adopted planning policy regarding scenic vistas. The Project would have a no impact on scenic vistas.

b) Substantially Damage Scenic Resources, i.e. including those within a State Scenic Highway

Significance Criteria: For the purposes of assessing impacts of the Project on scenic resources, the threshold of significance is exceeded by any Project-related action that would substantially damage scenic resources (i.e., trees, rock outcroppings, and historic buildings within a state [or local] scenic highway).

There are no state or local scenic highways within the Project area. Additionally, there are no rock outcroppings, heritage or historic trees or buildings on the Project site. Therefore, there are no scenic resources or scenic route impacts associated with the Project as defined by the significance criteria. The Project would have no impact on scenic resources.

c) For a Project located in an Urbanized Area, would the project Conflict with Applicable Zoning and other regulations Governing Scenic Quality

Significance Criteria: The Project would have a significant environmental impact if it were to substantially degrade the existing visual character or quality of the site and its surroundings.

The Project site is in a single-family residential neighborhood. The looped roadway portion of Franklin Avenue, the area in which the Project is located, consists of one-story residences over garages. Approximately 300 feet downhill and north of the Project two-story residences over garages are introduced. Houses in the Sterling Terrace subdivision are predominately one-and two-story over a garage on sloping lots that typically result in more massing on the downhill portion of the lots (see **Aesthetics Figures 1-3**).

The Project would be a two-story residential building with a ground floor garage and living area and a second floor living area. The Project area is predominately two-story residences. The view from Franklin Avenue would appear as a two-story structure similar in height and bulk as the other residences in the immediate Project area.

Franklin Avenue increases in elevation from north to south. The 145-foot stretch of Franklin Avenue fronting the Project and two adjacent residences ranges in elevation from 240 above feet msl to 248 feet above msl. The Project would be similar to the adjacent residences in height and the streetscape would continue to step up the roadway. The Project would have no impact on visual character or the quality of the site or its surroundings.

d) Light or Glare

Significance Criteria: Project related creation of any new source of substantial light or glare that would adversely affect day or nighttime views in the area would be regarded as a significant environmental impact.

The Project site is in a built-out residential neighborhood on one single vacant lot. The addition of light associated with one single-family detached residence is de minimis. Exterior lighting for doorways, pathways, etc., would be downcast and task oriented as required by the South San Francisco Municipal Code (SSFMC). As required to be constructed per law, the Project would not substantially increase light in the area and would not produce glare. Therefore, the Project would have a less-than-significant impact on light and glare.

Aesthetics Finding:

(1) The Project is not located within a formally designated public vista, nor would it result in the obstruction of a formally designated public vista. The Project is not identified as a viewpoint parcel or as one containing view value. The Project would not conflict with an adopted planning policy regarding scenic vistas. The Project would have no impact on scenic vistas.

(2) There are no state or local scenic highways within the Project area. Additionally, there are no rock outcroppings, heritage or historic trees or buildings on the Project site. Therefore, there are no scenic resources or scenic route impacts associated with the Project as defined by the significance criteria. The Project would have no impact on scenic resources.

(3) The Project would be similar to the adjacent residences in height and the streetscape would continue to step up the roadway. Therefore, the Project would have no impact on visual character or the quality of the site or its surroundings.

(4) As required to be constructed per law, the Project would not substantially increase of light in the area and would not produce glare. The Project would have a less-than-significant impact on light and glare.

II. Agriculture and Forestry Resources	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and the forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d. Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

SETTING

The site was developed in 1949 with a residence. The lot failed in 1982 due to a mudslide and heavy rains and the residence slid into the street. The site has never been used for forestry or agriculture (building address files). The City does not have any timber or farmlands, as defined below, within its boundaries (2040GP).

IMPACTS

a, b and e) Farmland Impacts

Significance Criteria: The Project would have a significant environmental impact if it would result in the conversion of farmland to non-agricultural use, conflict with current zoning for agricultural use or the provisions of a current Williamson Act contract or involve any environmental changes that could result in the conversion of farmland currently in agricultural uses to non-agricultural uses.

The Project site contains no farmland, is not zoned agricultural or adjacent thereto, and as such would not involve the conversion of Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency. The Project site is not under a Williamson Act Contract. The Project site is not nearby or adjacent to any agricultural use and as such would have no impact to farmland.

c, d and e) Forest Land Impacts

Significance Criteria: A significant impact would result from a conflict with existing zoning for, or cause rezoning of, forest land (as defined in the Public Resources Code section 12220(g)), timberland (as defined in Public Resources Code section 4526) or timberland zoned Timberland Production (as defined by Government Code section 51104 (g)) or result in the loss of forest land or conversion of forest land to non-forest use.

The site is not zoned for timberland production or in use as such, or in proximity to such a use. The Project is not nearby or adjacent to timberland or forest lands and would have no impact on timberland production or resources or forest lands.

Agriculture and Timber Resources Finding:

(1) The Project would not adversely affect any existing agricultural operations as none exist on the site.

(2) The Project would not impact agricultural resources individually or cumulatively and does not contain any Farmland, Unique Farmland, Farmland of Statewide Importance (Farmland) nor land in a Williamson Act Contract.

(3) The site is not zoned for timberland production or in use as such and would not cause rezoning of forest land (as defined in the Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526) or timberland zoned Timberland Production (as defined by Government Code section 51104(g)).

III. Air Quality *Where applicable, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐
b. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☐	☒	☐
c. Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

SETTING

ENVIRONMENTAL SETTING

Air quality in a region is determined by its topography, meteorology, and existing air pollutant sources. These factors are discussed below, along with the current regulatory structure that applies to the San Francisco Bay Area Air Basin (SFBAAB), which encompasses the Project Site, pursuant to the regulatory authority of the BAAQMD.

Ambient air quality is commonly characterized by climate conditions, the meteorological influences on air quality, and the quantity and type of pollutants released. The air basin is subject to a combination of topographical and climatic factors that reduce the potential for high levels of regional and local air pollutants. The following section describes the pertinent characteristics of the air basin and provides an overview of the physical conditions affecting pollutant dispersion in the Project area.

San Francisco Bay Air Basin

The California Air Resources Board (CARB) divides the state into air basins that share similar meteorological and topographical features. The Project site is in the SFBAAB. The SFBAAB is approximately 5,600 square miles in area and consists of nine counties that surround the San Francisco Bay, including all of Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, and Napa Counties; the southwestern portion of Solano County; and the southern portion of Sonoma County.

Criteria Air Pollutants

Criteria air pollutants are defined as those pollutants for which the federal and state governments have established air quality standards for outdoor or ambient concentrations to protect public health with a determined margin of safety. Ozone, coarse particulate matter (PM_{10}), and fine particulate matter ($PM_{2.5}$) are generally considered to be regional pollutants because they or their precursors affect air quality on a regional scale. Pollutants such as carbon monoxide (CO), nitrogen dioxide (NO_2), and sulfur dioxide (SO_2) are considered as local pollutants because they tend to accumulate in the air locally. Particulate matter is also considered a local pollutant.

Toxic Air Contaminants

In addition to the criteria pollutants, toxic air contaminants (TACs) are another group of localized pollutants of concern. TACs are considered either carcinogenic or noncarcinogenic based on the nature of the health effects associated with exposure to the pollutant. For regulatory purposes, carcinogenic TACs are assumed to have no safe threshold below which health impacts would not occur, and cancer risk is expressed as excess cancer cases per one million exposed individuals. Noncarcinogenic TACs differ in that there is generally assumed to be a safe level of exposure below which no negative health impact is believed to occur. These levels are determined on a pollutant-by-pollutant basis. Carcinogenic TACs can also have noncarcinogenic health hazard levels.

There are many different types of TACs, with varying degrees of toxicity. Sources of TACs include industrial processes such as petroleum refining and chrome plating operations, commercial operations such as gasoline stations and dry cleaners, and motor vehicle exhaust. Additionally, diesel engines emit a complex mixture of air pollutants composed of gaseous and solid material. The solid emissions in diesel exhaust are known as diesel particulate matter (DPM). In 1998, California identified DPM as a TAC based on its potential to cause cancer, premature death, and other health problems (e.g., asthma attacks and other respiratory symptoms). Those most vulnerable are children (whose lungs are still developing) and the elderly (who may have other serious health problems). Overall, diesel engine emissions are responsible for the majority of California's known cancer risk from outdoor air pollutants. Diesel engines also contribute to California's $PM_{2.5}$ air quality problems. Public exposure to TACs can result from emissions from normal operations, as well as from accidental releases of hazardous materials during upset conditions. The health effects of TACs include cancer, birth defects, neurological damage, and death.

Diesel Exhaust

Most recently, CARB identified DPM as a TAC. DPM differs from other TACs in that it is not a single substance but rather a complex mixture of hundreds of substances. Diesel exhaust is a complex mixture of particles and gases produced when an engine burns diesel fuel. DPM is a concern because it causes lung cancer; many compounds found in diesel exhaust are carcinogenic. DPM includes the particle-phase constituents in diesel exhaust. The chemical composition and particle sizes of DPM vary between different engine types (heavy-duty, light-duty), engine operating conditions (idle, accelerate, decelerate), fuel formulations (high/low sulfur fuel), and the year of the engine. Some short-term (acute) effects of diesel exhaust include eye, nose, throat, and lung irritation, and diesel exhaust can cause coughs, headaches, light-headedness, and nausea. DPM poses the greatest health risk among the TACs; due to their extremely small size, these particles can be inhaled and eventually trapped in the bronchial and alveolar regions of the lung.

Ambient Air Quality

Ambient air quality at the Project Site can be inferred from ambient air quality measurements conducted at nearby air quality monitoring stations. See the AQ/GHG Assessment for a summary of ambient air quality data at the nearest monitoring station to the Project site. The United States Environmental Protection Agency (USEPA) and CARB designate air basins or portions of air basins and counties as being in "attainment" or "nonattainment" for each of the criteria pollutant standards. The federal standards are referred to as the National Ambient Air Quality Standards (NAAQS) and the state standards are referred to as the California Ambient Air Quality Standards (CAAQS). Areas that do not meet the standards are classified as nonattainment areas. The San Mateo County region of the BAAQMD is designated as a nonattainment area for the federal ozone and $PM_{2.5}$ standards and is also a nonattainment area for the state standards for ozone, PM_{10}, and $PM_{2.5}$.

Sensitive Receptors

Sensitive receptors are defined as facilities or land uses that include members of the population who are particularly sensitive to the effects of air pollutants, such as children, the elderly, and people with illnesses. Examples of these sensitive receptors are residences, schools, hospitals, and daycare centers. CARB has identified the following groups of individuals as the most likely to be affected by air pollution: the elderly over 65, children under 14, athletes, and persons with cardiovascular and chronic respiratory diseases such as asthma, emphysema, and bronchitis. The nearest sensitive land uses to the Project site are the two single-family homes adjacent to the east and west.

REGULATORY FRAMEWORK

FEDERAL

Federal Clean Air Act

The Clean Air Act (CAA) of 1970 and the CAA Amendments of 1971 required the USEPA to establish the NAAQS, with states retaining the option to adopt more stringent standards or to include other specific pollutants.

These standards are the levels of air quality considered safe, with an adequate margin of safety, to protect the public health and welfare. They are designed to protect those "sensitive receptors" most susceptible to further respiratory distress such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise. Healthy adults can tolerate occasional exposure to air pollutant concentrations considerably above these minimum standards before adverse effects are observed.

STATE

California Clean Air Act

The California Clean Air Act (CCAA) allows the state to adopt ambient air quality standards and other regulations provided that they are at least as stringent as federal standards. CARB, a part of the California Environmental Protection Agency, is responsible for the coordination and administration of both federal and state air pollution control programs within California, including setting the CAAQS. CARB also conducts research, compiles emission inventories, develops suggested control measures, and provides oversight of local programs. CARB establishes emissions standards for motor vehicles sold in California, consumer products (such as hairspray, aerosol paints, and barbecue lighter fluid), and various types of commercial equipment. It also sets fuel specifications to further reduce vehicular emissions. CARB also has primary responsibility for the development of California's State Implementation Plan (SIP), for which it works closely with the federal government and the local air districts.

Bay Area Air Quality District (BAAQMD)

2017 BAAQMD Clean Air Plan

In April 2017, BAAQMD adopted the 2017 Clean Air Plan, whose primary goals are to protect public health and to protect the climate. The 2017 Clean Air Plan updates the Bay Area 2010 Clean Air Plan and complies with state air quality planning requirements, as codified in the California Health and Safety Code (although the 2017 plan was delayed beyond the three-year update requirement of the code). State law requires the Clean Air Plan to include all feasible measures to reduce emissions of O_3 precursors and to reduce the transport of O_3 precursors to neighboring air basins. The 2017 Clean Air Plan contains 85 measures to address reduction of several pollutants: O_3 precursors, PM, air toxics, and GHGs. Other

measures focus on a single type of pollutant: super GHGs such as methane and black carbon that consists of harmful fine particles that affect public health. These control strategies are grouped into the following categories:

- Stationary Source Measures
- Transportation Control Measures
- Energy Control Measures
- Building Control Measures
- Agricultural Control Measures
- Natural and Working Lands Control Measures
- Waste Management Control Measures
- Water Control Measures
- Super GHG Control Measures

BAAQMD Rules and Regulations

The BAAQMD is designated by law to adopt and enforce regulations to achieve and maintain ambient air quality standards. The BAAQMD's responsibilities include preparing plans for the attainment of ambient air quality standards, adopting and enforcing air pollution rules, issuing permits for and inspecting stationary air pollution sources, responding to citizen complaints, monitoring ambient air quality and meteorological conditions, and implementing state and federal programs and regulations. The BAAQMD has also adopted various rules and regulations that are designed to reduce and control pollutant emissions from construction activities.

Air Quality Conditions of Approval for the Project

For a project to have a less-than-significant criteria air pollutant impact related to construction-related fugitive dust emissions, it must implement the BAAQMD's basic best management practices (BMPs), which are required by the City of South San Francisco through Conditions of Approval. All construction projects are required to comply with BAAQMD's basic BMPs. These measures are levied by the Engineering Division as a condition of building permit issuance and are monitored for compliance by staff and/or special City Engineering and/or Planning inspectors. The Air Quality Conditions of Approval that are required to be implemented as part of the Project pursuant to the City of South San Francisco's project review and building permit process are as follows:

a) All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.

b) All haul trucks transporting soil, sand, or other loose material off-site shall be covered.

c) All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.

d) All vehicle speeds on unpaved roads shall be limited to 15 mph.

e) All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.

f) All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph.

g) All trucks and equipment, including their tires, shall be washed off prior to leaving the site.

h) Unpaved roads providing access to sites located 100 feet or further from a paved road shall be treated with a 6- to 12-inch layer of compacted layer of wood chips, mulch, or gravel.

i) Publicly visible signs shall be posted with the telephone number and name of the person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The BAAQMD's General Air Pollution Complaints number shall also be visible to ensure compliance with applicable regulations.

IMPACTS

a) Conflict with or Obstruct Implementation of Applicable Air Quality Plan

Significance Criteria: The Project would have a significant environmental impact if it would conflict with or obstruct implementation of BAAQMD's 2017 Clean Air Plan. The Project site is zoned and designated for single-family residential. Furthermore, a single-family home existed on the site prior to 1982. Therefore, the Project would not conflict with or obstruct reduction measures presented in the 2017 Clean Air Plan.

b) Result in a Cumulatively Considerable Net Increase of Non-Attainment Criteria Pollutants

Significance Criteria: The Project would have a significant environmental impact if it would result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard. The Project would result in a cumulatively considerable net increase of a criteria pollutant or precursor if it exceeds the applicable BAAQMD threshold of significance for that pollutant. BAAQMD published preliminary screening criteria for project construction and operation, which provides a conservative indication of whether implementing a project could potentially result in the generation of criteria pollutants or precursors that exceed BAAQMD's threshold of significance. If the Project is below the applicable screening criteria then impacts would be less than significant (BAAQMD, 2023).

Construction

The Project is below the construction screening criteria of 254 dwelling units (BAAQMD, 2023). The Project would implement the BAAQMD's basic BMPs as a Condition of Approval and would not include any features that render the screening criteria unusable requiring a detailed air quality assessment with emissions modeling (e.g., overlapping construction with operation, demolition, simultaneous occurrence of two or more construction phases, extensive site preparation or material transport, or stationary sources). Therefore, construction air quality impacts related to a cumulatively considerable net increase of non-attainment criteria pollutants and precursors would be less than significant.

Operation

The Project is below the operational screening criteria of 421 dwelling units (BAAQMD, 2023). The Project would not include any features that render the screening criteria unusable requiring a detailed air quality assessment with emissions modeling (e.g., overlapping construction with operation or including stationary sources). Therefore, operational air quality impacts related to a cumulatively considerable net increase of non-attainment criteria pollutants and precursors would be less than significant.

c) Expose Sensitive Receptor to Substantial Pollutant Concentrations

Significance Criteria: The Project would have a significant environmental impact if it would expose sensitive receptors to substantial pollutant concentrations.

People within the general population that are more susceptible to the effects of air pollution include children, the elderly, and those that suffer from certain illnesses or disabilities. Therefore, schools, convalescent homes, and hospitals are considered to be sensitive receptors to air pollution. Residential areas are also considered sensitive to poor air quality because people usually stay home for extended periods of time, which results in greater exposure to localized air pollutants.

The Project site is a vacant lot in an existing residential subdivision. Single family homes are located to the west, northwest, north, northeast, and east of the Project site. Sign Hill Park is located to the south. Martin Elementary School is located approximately 1,500 feet southeast of the Project site. The nearest sensitive receptors are the adjacent properties to the east and west of the Project site.

Construction activities would entail the use of diesel equipment that generate emissions of DPM, which the CARB has categorized as a human carcinogen. Typically, health risks are estimated based on a lifetime exposure period of 30 years. Because exhaust emissions associated with construction activities of the Project would be very low and short-term in nature, it is anticipated that exposure to construction related DPM would not result in an elevated health risk. All construction equipment and operation thereof would be regulated per CARB's In-Use Off- Road Diesel Vehicle Regulation, which is intended to reduce emissions associated with off-road diesel vehicles and equipment, including DPM. Project construction would also be required to comply with all applicable BAAQMD rules and regulations and would implement BAAQMD's basic construction BMPs. Therefore, the health risk and hazard impacts to sensitive receptors from Project construction would be less than significant.

The Project site is in a residential neighborhood and was developed with a single-family residence prior to 1982. There are no permitted sources of air pollutants, highways/freeways, railways, or other high-volume roadways within 1,000 feet of the Project site. Therefore, the health risk and hazard impacts associated with siting a new receptor would be less than significant.

d) Odors Adversely Affecting a Substantial Number of People

Significance Criteria: The Project would have a significant environmental impact if it would result in odors adversely affecting a substantial number of people. The BAAQMD's significance criteria for odors are subjective and are based on the number of odor complaints generated by a project. The BAAQMD considers any project with the potential to frequently expose members of the public to objectionable odors to cause a significant impact.

Odors from diesel exhaust during construction are short-term in nature and would rapidly dissipate and be diluted by the atmosphere downwind of the emission sources. Additionally, odors would be localized and confined to the construction area. Single-family residences do not pose odor issues during operations. Therefore, odors from the Project would not adversely affect a substantial number of people and odor impacts would be less than significant.

Air Quality Finding:

(1) The Project would not conflict with or obstruct reduction measures presented in the 2017 Clean Air Plan.

(2) The Project would be below the BAAQMD's screening criteria for Project construction and operations. Therefore, construction and operational air quality impacts related to a cumulatively considerable net increase of non-attainment criteria pollutants or precursors would be less than significant.

(3) The health risk and hazard impacts to sensitive receptors from Project construction would be less than significant. Health risk and hazard impacts associated with siting a new receptor would be less than significant.

(4) Odors from the Project would not adversely affect a substantial number of people and odor impacts would be less than significant.

IV. Biological Resources *Would the project:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, or NOAA Fisheries?	☐	☒	☐	☐
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☐	☒
c. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

INTRODUCTION

A Biological Resources Assessment (BRA) was prepared for the Project in 2015 (Marangio, 2015). Wood Biological Consulting (WBC) prepared an update to the 2015 BRA in September 2023 (2023 BRA Update), which also included a reconnaissance-level survey of the Project site in February 2023 (WBC, 2023). The 2015 BRA and 2023 BRA Update were used to analyze biological resources impacts and are provided in full in **Appendix A**.

SETTING

REGULATORY FRAMEWORK

Local, State, and federal regulations have been enacted to provide for the protection and management of sensitive biological and wetland resources. The following section outlines the key local, State, and federal regulations that apply to these resources.

FEDERAL

Federal Endangered Species Act (FESA)

Species listed or proposed for listing as Threatened or Endangered or candidates for possible future listing as Threatened or Endangered under the FESA (50 CFR §17.12).

Migratory Bird Treaty Act (MBTA)

Protection is afforded to bird species, administered by the United States Fish and Wildlife Service (USFWS), which makes it unlawful, unless expressly authorized by permit pursuant to federal regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export at any time, or in any manner, any migratory bird, or any part, nest, or egg of any such bird." This includes direct and indirect acts, with the exception of harassment and habitat modification, which are not included unless they result in direct loss of birds, nests or eggs. Most bird species occurring within California fall under the protection of the MBTA (16 U.S.C. 703-712).

Bald Eagle Protection Act (BEPA)

The BEPA (16 U.S.C. 668-668d, 54 Stat. 250) as amended, provides protection for the bald eagle (Haliaeetus leucocephalus) and golden eagle (Aquila chrysaetos) by prohibiting the taking, possession and commerce of such birds, their nests, eggs or feathers unless expressly authorized by permit pursuant to federal regulations.

Federal Clean Water Act (CWA)

Section 404 of the CWA prohibits the discharge of dredged or fill material into "waters of the United States" without a permit from the U.S. Army Corps of Engineers (USACE). The definition of waters of the U.S. includes rivers, streams, estuaries, the territorial seas, ponds, lakes and wetlands. Wetlands are defined as those areas "that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3 7b). Tributaries to "waters of the United States" and adjacent wetlands would also be included (33 CFR §328.3). The U.S. Environmental Protection Agency (USEPA) also has authority over wetlands and may override an USACE permit.

Some intermittent streams may be "waters of the United States," depending on connection to navigable waters. Both wetlands and non-wetland waters can be included within the regulated area. Within non-wetlands that are classified as waters of the U.S., the USACE maintains jurisdiction to the limit of the "Ordinary High Water Mark (OHWM)," which is defined as a "line on the shore established by the fluctuations. of water and indicated by physical. characteristics such as clear, natural line." If wetlands are present that meet the criteria established by the USACE, the limit of jurisdiction is the OHWM or the limit of the adjacent or associated wetland, whichever is greater. If waters are determined to be under the jurisdiction of the USACE, the RWQCB would be the state permitting authority. At the discretion of the USACE, impacts to these areas could require a permit, depending on the type and size of the activity within USACE jurisdiction.

Substantial impacts to wetlands may require an individual permit. Projects that only minimally affect wetlands may meet the conditions of one of the existing Nationwide Permits. A Water Quality

Certification or waiver pursuant to Section 401 of the CWA is required for Section 404 permit actions; this certification or waiver is issued by the Regional Water Quality Control Board (RWQCB).

STATE

California Endangered Species Act (CESA)

Listed[1] or candidates for listing by the State of California as Threatened or Endangered. A species, subspecies, or variety of plant is **endangered** when the prospects of its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, disease, or other factors (CFGC § 2062). A plant is **threatened** when it is likely to become endangered in the foreseeable future in the absence of special protection and management measures (CFGC § 2067).

California Fish and Game Code (CFGC)

§3503 prohibits the take, possession, or needless destruction of the nest or eggs of any bird; §3503.5 prohibits the take, possession, or needless destruction of any nests, eggs or birds in the orders Falconiformes (new world vultures, hawks, eagles, ospreys and falcons, among others) or Strigiformes (owls); §3511 prohibits the take or possession of fully protected birds; and §3513 prohibits the take or possession of any migratory nongame bird or part thereof as designated in the MBTA.

California Native Plant Protection Act (CNPPA)

(§ 1900, *et seq*) A plant is **Rare** when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens (CFGC § 1901).

California Environmental Quality Act (CEQA)

§15380. Species that may meet the definition of Rare or Endangered include the following:

- Species with California Rare Plant Rank of 1A, 1B, and 2, considered to be "rare, threatened or endangered in California";
- Species that may warrant consideration on the basis of local significance or recent biological information;
- Some species included on the California Natural Diversity Database's (CNDDB) Special Plants, Bryophytes, and Lichens List or Special Animals List.

Although sensitive natural communities have no protected legal status under the State or federal Endangered Species Acts, they are provided some level of protection under CEQA. The CEQA Guidelines identify potential impacts on a sensitive natural community as one of six significance criteria. Where determined to be significant under CEQA, the potential impact would require mitigation through avoidance, minimization of disturbance or loss, or some type of compensatory mitigation when unavoidable.

Locally significant species, that is, a species that is not rare from a statewide perspective but is rare or uncommon in a local context such as within a county or region (CEQA §15125 [c]), or is so designated in local or regional plans, policies, or ordinances (CEQA Guidelines, Appendix G). Examples include a species at the outer limits of its known range or a species occurring on an uncommon soil type.

[1] Refer to current online published lists available at: https://wildlife.ca.gov/Data/CNDDB/Plants-and-Animals.

Clean Water Act Section 401 and Porter Cologne Water Quality Control Act

The State of California regulates water quality related to discharge of fill material into waters of the State pursuant to Section 401 of the CWA. Section 401 compliance is a federal mandate implemented by the State. The local RWQCB has jurisdiction over all those areas defined as jurisdictional under Section 404 of the CWA and regulates water quality for all waters of the State. These waters may include isolated wetlands as defined under the California Porter-Cologne Water Quality Control Act (Porter Cologne; California Water Code, Div. 7, §13000 et seq.). Regulated discharges include those that can affect water quality, even if there is no significant nexus to a traditional navigable water body required for USACE determination of jurisdiction over waters of the U.S.

CITY

2040 General Plan (2040GP)

The 2040GP identifies biologically sensitive areas and policies to improve the City's biological health and diversity. Chapter 15 Environmental and Cultural Stewardship (p 339, 2040GP) identifies policies and action items to protect habitat, promote tree cover connectivity and protect ecologically sensitive areas. Figure 48: Existing Habitat and Protected Areas (p 344, 2040GP) identifies habitat and protection areas throughout South San Francisco. The Project site is not identified as a habitat or protected area. Figure 49: Connectivity (p 344, 2040GP) identifies areas that contain tree cover. The Project site is shown with sparse tree cover. Figure 50: Ecologically Sensitive Areas (p 345, 2040GP) identifies environmentally sensitive areas. The Project site is not identified as an ecologically sensitive site.

The 2040GP identifies goals to improve habitat and quality of life. These goals, not specific to endangered or threatened species, are applicable to urban open spaces and tree removal.

> "GOAL ES-1: The City supports nature in South San Francisco to encourage healthy ecosystems, improve air and water quality, improve public health, and adapt to a changing climate. INTENT: To foster urban ecology in South San Francisco including open space and connectivity, habitat diversity, urban forestry, planting and vegetation, and land and vegetation management (p 357, 2040GP).
>
> GOAL ES-4: An abundant, robust urban forest that contributes to South San Francisco's quality of life as it combats the effects of climate change. INTENT: To enhance South San Francisco's environmental quality and the mental and physical health of its residents, while bringing significant economic benefits through increased property values. To make the city more resilient to the impacts of climate change and provide habitat for wildlife (p 358, 2040GP).
>
> Policy ES-4.2: Avoid tree removal. Avoid removing trees whenever possible. When removals are warranted, replace each removed tree with three new trees (p 358, 2040GP)."

Municipal Code – Protected Trees

SSFMC Section 13.30.020 defines a "Protected Tree" as one with a circumference of 48 inches or more when measured 54 inches above natural grade; a tree or stand of trees designated by the Director of Parks and Recreation as one of uniqueness, importance to the public due to its location or unusual appearance, historical significance or other factor; or a stand of trees that the Director of Parks and Recreation has determined each tree is dependent on the others for survival.

IMPACTS

a) Special-Status Species

Significance Criteria: The Project would have a significant impact if were to result in a substantial adverse effect on special-status species.

Plant and animal species are considered to have special status if they are listed or proposed for listing under the federal or State endangered species acts, meet the definition of Rare or Endangered under CEQA, listed as a Special Plant or Animal by CDFW, or are considered rare locally. Certain natural plant communities, wildlife habitats, and landscape features are considered to have special status due to their restricted occurrence in the State, their tendency to support rare plant or animal species, or because impacts are restricted or otherwise regulated under federal, State, or local laws or ordinances. Pursuant to the guidelines of CEQA, any project that could result in significant adverse effects on special-status biological resources must, in most cases, incorporate measures to reduce potential impacts to a less-than-significant level.

The Project site supports predominantly non-native vegetation, with herbaceous annual species on the lower building site, and a mix of non-native trees, shrubs and herbaceous species on the upper slope (WBC, 2023).

The Project site is not within a special-status species habitat as shown on Figure 48: Existing Habitat and Protected Areas (p 344, 2040GP). The Project site is not within an ecologically sensitive area as shown in Figure 50: Ecologically Sensitive Areas (p 345, 2040GP). The Project site is not identified as a biologically sensitive site, as it is located within an urbanized area of the City.

Plant Species of Concern. The Project site is highly disturbed. The habitat suitability on the Project site is considered marginal for special-status plant species because of periodic vegetation management and the high density of non-native plants in the understory. No special-status plants were observed in the 2023 reconnaissance-level survey and special-status plants are unlikely to occur on the Project site. Additional focused floristic surveys in support of CEQA are not warranted and no sensitive plant species would be affected by the Project (WBC, 2023).

Animal Species of Special Concern. Based on location information contained in the CNDDB, 20 special-status animal species have been recorded within three miles of the Project site. Of these, 12 are considered to have no potential to occur on or near the Project site because suitable habitat is absent. Seven species of insects and one mammal are considered to have low to moderate potential to occur on the Project site, and are discussed in detail in the 2023 BRA.

The Project would not affect special-status butterflies or their habitat. Some of these species have been documented occurring on Sign Hill in high-quality and relatively undisturbed coastal scrub and grassland habitat. These habitats do not occur on the Project site, and would be protected by limiting the project construction activities to the Project parcel. Based on the distance and isolation from suitable habitat for these butterflies, removal of a small number of non-native thistles that are potential nectar sources would not result in a significant impact to butterfly species.

Because there are several large trees on the steep slope of the southern portion of the Project site that are planned for removal, there is the potential for raptors (birds of prey) and other protected birds to nest on and adjacent to the site. These birds are protected under the Migratory Bird Treaty Act and Fish and Game Code 3503.5. If construction begins during nesting season (February 15-August 31), potentially significant impacts could occur. The implementation of **Mitigation Measure BIO-1** (pre-construction nesting survey) would reduce impacts to a less-than-significant level.

Large trees on the upper slope of the southern portion of the Project site that are planned for removal could be used by hoary bat for roosting. Roosting bats are protected under Fish and Game Code. Disturbance of roosting bats would be a significant environmental impact. The implementation of **Mitigation Measure BIO-2** (pre-construction roosting bat survey) would reduce impacts to a less-than-significant level.

Biological Resources Mitigation Measures

BIO-1: Pre-Construction Nesting Birds Survey. If Project construction activities occur during the nesting season (approximately February 15 to August 31), for birds protected under the California Fish and Game Code and Federal (MBTA) the applicant shall retain a qualified biologist to conduct a preconstruction survey for protected birds on the site and in the immediate vicinity. The survey shall be done no more than 14 days prior to the initiation to construction activities. If nesting birds are found on the Project site or in the immediate vicinity, the developer shall locate and map the nest site(s) within three days and submit a report to the City and California Department of Fish and Wildlife ("CDFW"), establish a no-disturbance buffer of 250-feet, and conduct on-going weekly surveys to ensure the no-disturbance buffer is maintained. In the event of destruction of a nest with eggs, or if a juvenile or adult raptor should become stranded from the nest, injured or killed, the qualified biologist shall immediately notify the CDFW. The qualified biologist shall coordinate with the CDFW to have the injured bird either transferred to a raptor recovery center or, in the case of mortality, transfer it to the CDFW within 48 hours of notification. These procedures reduce the potential for the disturbance of nesting birds or the destruction of active nests. Implementation of this mitigation would reduce the potential impacts from significant to mitigable.

Tree removal outside of the nesting season would preclude the need for any other mitigation activities related to protected birds.

BIO-2 Pre-Construction Roosting Bat Survey. Removal or pruning of trees could result in the destruction of bat roosts or disruption of breeding of special-status bats such as the hoary bat. In addition, disturbance during the maternity roosting season could result in potential roost abandonment and mortality of young. Prior to the removal or pruning of any trees or the commencement of construction activities within 100 ft of mature trees, the following avoidance measures should be performed.

1. Bat Habitat Assessment. If work is to take place during the bat breeding season (April 1 through August 31), a qualified biologist should conduct a survey of the project site and vicinity to determine if active maternity roosts are present. This survey should be conducted no more than 14 days prior to the initiation of work.
2. Maternal Roosts. If any trees or structures are determined to support or potentially support maternal bat roosts, work may not proceed if it would destroy or disrupt breeding. Maternal bat roost sites may only be removed or demolished after coordination with the CDFW and/or the USFWS. Passive exclusion of roosting bats would be required and this may only be performed during the non-breeding season (i.e., between October 1 and March 30).
3. Pre-construction Survey. A pre-construction survey should be conducted by a qualified biologist to identify suitable bat roosting sites. The study area should include an area extending up to 100 ft of the limits of work, access permitting.
4. Protocol for Observations of Live Bats. If live bats are detected in the work area, work may not proceed until CDFW has been consulted. Contractor or others may not attempt to disturb (e.g.,

shake, prod) roosting features to coax bats to leave. Such actions would constitute "harassment" under the CCR.[2]

5. Day or Night Roosts. Any trees or structures present on site and determined to provide suitable day or night roosting sites for bats should be identified and marked on site plans. If no suitable roost sites or evidence of bat roosting are identified, impact minimization measures are not warranted. If suitable roosting sites or evidence of bat roosting are identified, the following measures should be conducted in coordination with CDFW:

a. A qualified biologist should survey suitable roost sites immediately prior to the removal or significant pruning of any of the larger trees, or demolition or significant renovation of any structures suspected or known to support bat roosts.

b. If the project biologist identifies suitable day or night roost sites or evidence of bat occupation, the following steps should be followed to discourage use of the sites by bats and to ensure that any bats present are able to safely relocate.

   For trees:

   a. Tree limbs smaller than three inches in diameter should be removed and any loose bark should be peeled away.
   b. Any competing limbs that provide shelter around the potential roost site should be removed to create as open of an area as possible.
   c. The tree should then be alone to allow any bats using the tree/snag to find another roost during their nocturnal activity period.
   d. Trees should be re-surveyed 48 hours after trimming.
   e. If no bats are present, work may proceed.
   f. If bats remain on site, additional measures would be prescribed by the biologist.

b) and c) Sensitive Natural Communities and Jurisdictional Habitat

Significance Criteria: The Project would have a significant impact if it were to substantially impact riparian or other sensitive natural communities or jurisdictional wetlands and Waters of the U.S.

No sensitive natural communities are present on the Project site. Native habitat that supports special status plants and wildlife occurs adjacent to the Project site in Sign Hill Park. The Project would be limited to the Project parcel at 52 Franklin Avenue, and would not have direct or indirect impacts on sensitive natural communities. No federal or state protected wetlands are located on the Project site. Therefore, the Project would have no impact on sensitive natural communities or jurisdictional wetlands.

d) Native Fish and Wildlife Movement Opportunities, Nesting Habitat, and Native Wildlife Nursery Sites.

Significance Criteria: The Project would have a significant environmental impact if it were to interfere substantially with the movement of any native resident or migratory fish or wildlife species or with

[2] 14 CCR § 251.1 states: Except as otherwise authorized in these regulations or in the Fish and Game Code, no person shall harass, herd or drive any game or nongame bird or mammal or furbearing mammal. For the purposes of this section, harass is defined as an intentional act which disrupts an animal's normal behavior patterns, which includes, but is not limited to, breeding, feeding or sheltering.

established native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites.

Project construction would occur on a previously occupied home site adjacent to other homes. While it would reduce the opportunities for urban-adapted wildlife (*i.e.*, coyote, deer, raccoon) to access Franklin Avenue from the open space of Sign Hill, this is not a critical movement pathway, and other routes would continue to exist. The wildlife trail that crosses east-west through the upper slope (currently being monitored for use by coyotes) would be interrupted by construction and geotechnical repair of the slope. However, wildlife would continue to have uninterrupted access to the slope above the repair and into Sign Hill Park. Therefore, the Project would have a less-than-significant impact on wildlife movement.

e) Local Policies and Ordinances

Significance Criteria: The Project would have a significant environmental impact if it were to conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

The Project would be consistent with the 2040GP and would not result in the removal of trees requiring permits from the City of South San Francisco. Therefore, the Project would have no impact on conflicting with local policies and ordinances.

f) Conflict with any Habitat Conservation Plan or Community Conservation Plan.

Significance Criteria: The Project would have a significant environmental impact if it were to conflict with a habitat or community conservation plan or other approved local, regional or state habitat conservation plan protecting biological resources.

The Project site is not within a habitat conservation plan area and contains no habit suitable for conservation. The Project would have no impact on an adopted habitat conservation plan.

Biology Finding:

(1) The Project site is highly disturbed. The habitat suitability on the Project site is considered marginal for special-status plant species because of periodic vegetation management and the high density of non-native plants in the understory. No special-status plants were observed in the 2023 reconnaissance-level survey and special-status plants are unlikely to occur on the Project site. Additional focused floristic surveys in support of CEQA are not warranted and no sensitive plant species would be affected by the Project. Potential impacts to special-status animal species would be mitigated through implementation of Mitigation Measure BIO-1 and BIO-2.

(2) No sensitive natural communities are present on the Project site. Native habitat that supports special status plants and wildlife occurs adjacent to the Project site in Sign Hill Park. The Project would be limited to the Project parcel at 52 Franklin Avenue and would not have direct or indirect impacts on sensitive natural communities. No federal or state protected wetlands are located on the Project site. Therefore, the Project would have no impact on sensitive natural communities or jurisdictional wetlands.

(3) Project construction would occur on a previously occupied home site adjacent to other homes. While it would reduce the opportunities for urban-adapted wildlife (*i.e.*, coyote, deer, raccoon) to access Franklin Avenue from the open space of Sign Hill, this is not a critical movement pathway, and other routes would continue to exist. The wildlife trail that crosses east-west through the upper slope (currently being monitored for use by coyotes)

would be interrupted by construction and geotechnical repair of the slope. However, wildlife would continue to have uninterrupted access to the slope above the repair and into Sign Hill Park. Therefore, the Project would have a less-than-significant impact on wildlife movement.

(4) The Project would be consistent with the 2040GP and would not result in the removal of trees requiring permits from the City of South San Francisco. Therefore, the Project would have no impact on conflicting with local policies and ordinances.

(5) The Project site is not within a habitat conservation plan area and contains no habit suitable for conservation. The Project would have no impact on an adopted habitat conservation plan.

V. Cultural Resources *Would the project:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Cause a substantial adverse change in the significance of a historical resource pursuant to in §15064.5?	☐	☐	☐	☒
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☐	☒	☐
c. Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☒	☐

SETTING

The Project site is vacant resulting from a mudslide in 1982 that moved the residence into the street. The residence was constructed in 1949 as part of the Sterling Terrace subdivision. Portions of the old foundation appear on the site. The site is relatively flat, 10 percent slope along Franklin Avenue, and rises to a 60 percent slope in the mid-and rear portions of the lot. The varying topography is predominately from cut and fill activities and slope. The site measures approximately 45 feet in width along Franklin Avenue and 70 feet at the rear, 145 feet in depth along the right side and 152 feet along the left side consisting of 8,422 square feet (see Chapter 2 Project Description). The site is highly disturbed from mudslides, slope instability and pervious grading.

REGULATORY FRAMEWORK

STATE

Assembly Bill 52 (AB 52)

AB52 became effective July 1, 2015 and requires notification to Native American tribes that are traditionally and culturally affiliated with the geographic location of a project that is being proposed. The Lead Agency, in this case the City of South San Francisco, is required by law to within 14 days of an application being deemed complete, provide a formal notification to the designated contact or tribal representative of traditionally and culturally affiliated California Native American tribe(s) that have requested notice.

No designated contact or tribal representative of traditionally and culturally affiliated California Native American tribes have requested to be noticed by the City pursuant to AB 52. Therefore, the City has no obligation to consult as no one has requested notification to be consulted.

IMPACTS

The analysis regarding cultural, archeological and historic resources are based, in part, on examining the criteria identified in California Code of Regulations, Title 14, Chapter 3, Article 5, section 15064.5 (a)(3). In summary, these criteria include consideration of whether any object, building, structure, site, area or other resource would be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military or cultural annals of California, based on criteria such as that the resource:

1) Is associated with events that have made a significant contribution to the broad patterns of California history and cultural heritage;
2) Is associated with the lives of persons important in our past;
3) Embodies the distinctive characteristics of type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or,
4) Has yielded or may be likely to yield, information important in prehistory or history.

A lead agency does not have to rely solely on the above criterion and may determine the appropriateness of a potential resource based upon age. Commonly 50 years of age is used as a basis by which to consider a structure's potential historic significance under which a more detailed and rigorous analysis is required to determine actual or imagined significance (section 15064.5, California Code of Regulations).

Archaeological resources are evaluated pursuant to Public Resources Code section 21083.2, 21084.1 and Section 15064.5 of the CEQA Guidelines. If it is determined that a project will cause damage to a unique archaeological resource the lead agency may require reasonable efforts to permit the resource to remain in situ. Measures that are listed as appropriate in subsection(b) of Section 21083.2 include planning construction to avoid the resource; deed the resource into a conservation easement; cap the resource with a layer of soil prior to building; and planning a park or open space to incorporate the resource. A mitigation plan is required if disturbance of the resource is not feasible per subsection (c). Subsection (e) identifies not-to-exceed mitigation cost maximums for archaeological resources.

a) Historic Resources

Significance Criteria: The Project would have a significant environmental impact if it were to cause a substantial adverse change in the significance of a historical resource as defined in section 15064.5.

There are no structures on the site. There are no historical resources or structures on the Project site. The Project would have no impact on historic resources.

b -c) Archaeological Resources and Human Remains

Significance Criteria: The Project would have a significant environmental impact if it were to cause a substantial adverse change in the significance of an archaeological resource as defined in section 15064.5, directly or indirectly destroy a unique paleontological resource or unique geologic feature, or disturb any human remains, including those interred outside formal cemeteries.

Native Americans, over 5,000 years ago, typically settled along creek banks and the margins of San Francisco Bay. The Project site is upland and remote, more than a mile from historic baylands, and approximately two miles west of a known archaeological site along the historic baylands.

The site is relatively flat, 10 percent slope along Franklin Avenue, and rises to a 60 percent slope in the mid-and rear portions of the lot. The varying topography is predominately from cut and fill activities and slope instability. The grading and paving associated with construction of the road and subdivision as well as the deep mudslides in 1955 and 1982 would have destroyed archaeological resources in the unlikely event they had once been present in the area. Project impacts associated with archaeological resources are less than significant due to the remote location of the Project, more than a mile from the historic baylands and the cut and fill and slope instability that has historically occurred on the site.

Furthermore, Policy ES-10.5 from the 2040GP (page 363) requires the following if archaeological resources are discovered:

> "If construction or grading activities result in the discovery of significant historic or prehistoric archaeological artifacts, then all work within 100 feet of the discovery shall cease, the Economic and Community Development Department shall be notified, the resources shall be examined by a qualified archaeologist for appropriate protection and preservation measures; and work may only resume when appropriate protections are in place and have been approved by the Economic and Community Development Department.

In accordance with the California Health and Safety Code, if human remains are encountered during ground-disturbing activities, the City shall immediately halt potentially damaging excavation in the area of the remains and notify the San Mateo County Coroner and a professional archaeologist to determine the nature of the remains. The Coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or State lands (California Health and Safety Code Section 7050.5[b]). Therefore, the Project would have a less than significant impact on cultural, archaeological, and paleontological resources.

Cultural Resources Finding:

(1) There are no structures on the site. There are no historical resources or structures on the Project site. The Project would have no impact on historic resources.

(2) Project impacts associated with archaeological resources are less than significant due to the remote location of the Project, more than a mile from the historic Baylands, and the cut and fill and slope instability that has historically occurred on the site. Inadvertent discovery of archaeological resources would require compliance with 2040GP Policy ES-10.5. If human remains are encountered, the Project would be required to comply with the California Health and Safety Code. Therefore, the Project would have a less than significant impact on cultural, archaeological, and paleontological resources.

VI. Energy *Would the project:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐
b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒

SETTING

The following includes pertinent environmental and regulatory setting information.

ENVIRONMENTAL FRAMEWORK

Electricity

Electricity is provided to the City and the Project site by Pacific Gas & Electric (PG&E). Electricity is not currently consumed at the Project site, but has been historically prior to the mudslide in 1982. Peninsula Clean Energy (PCE) is San Mateo County's official Community Choice Aggregation electricity provider. PCE delivers electricity through existing PG&E utility infrastructure. In 2020, San Mateo County consumed approximately 4,167,506,557 kilowatt-hours (kWh) of electricity.[3]

Petroleum Fuels

Petroleum fuels (diesel and gasoline) are not currently consumed at the Project site, but have been historically prior to the mudslide in 1982. Petroleum fuel consumption for San Mateo County is not available. In 2019, California consumed approximately 662 million barrels of petroleum, with transportation sources consuming approximately 85 percent. In 2019, California consumed approximately 1,668 trillion BTU of gasoline (roughly 14.4 billion gallons) and 567 trillion BTU of diesel (roughly 4.1 billion gallons).[4]

REGULATORY FRAMEWORK

STATE

California Building Energy Efficiency Standards (Title 24, Part 6)

The energy consumption of new residential and nonresidential buildings in California is regulated by the state's Title 24, Part 6, Building Energy Efficiency Standards (California Energy Code). The California Energy Code was established by CEC in 1978 in response to a legislative mandate to create uniform building codes to reduce California's energy consumption and provide energy efficiency standards for residential and nonresidential buildings. CEC updates the California Energy Code every 3 years with

[3] California Energy Commission, Energy Reports, California Energy Consumption Database, http://www.ecdms.energy.ca.gov/Default.aspx, Accessed August 27, 2023.

[4] United States Energy Information Administration (USEIA), California State Energy Profile, https://www.eia.gov/state/print.php?sid=CA, Accessed August 27, 2023.

more stringent design requirements for reduced energy consumption, which results in the generation of fewer GHG emissions.

The 2022 California Energy Code was adopted by the CEC on August 11, 2021 and will apply to projects constructed after January 1, 2023. The 2022 Energy Code focuses on four key areas in new construction and businesses: (1) encouraging electric heat pump technology and use, (2) establishing electric ready requirements when natural gas is installed, (3) expanding solar system and battery storage standards, and (4) strengthening ventilation standards to improve indoor air quality. The building efficiency standards are enforced through the local plan check and building permit process. Local government agencies may adopt and enforce additional energy standards for new buildings as reasonably necessary in response to local climatologic, geologic, or topographic conditions, provided that these standards exceed those in the California Energy Code.

California Green Building Standards Code (Title 24, Part 11)

The California Green Building Standards Code (CALGreen) is part 11 of Title 24, California Code of Regulations. CALGreen is the first-in-the-nation mandatory green building standards code, developed in an effort to meet the goals of California's landmark initiative AB 32, which established a comprehensive program of cost-effective reductions of GHG emissions to 1990 levels by 2020. CALGreen includes a waste diversion mandate, which requires that at least 65 percent of construction materials generated during new construction or demolition projects are diverted from landfills.

DISTRICT/PROVIDER

PG&E Integrated Resource Plan

PG&E adopted the 2020 Integrated Resource Plan (IRP) on September 1, 2020, to provide guidance for serving the electricity and natural gas needs of residents and businesses within its service area while fulfilling regulatory requirements.

PCE 2018 Integrated Resource Plan

PCE is a Community Choice Aggregation energy program that serves the entirety of San Mateo County, including the City of South San Francisco. PCE adopted the 2018 IRP on December 14, 2017, to provide guidance for serving the electricity needs of the residents and businesses in the county, all while fulfilling regulatory requirements over a 10-year period from 2018 to 2027.

CITY

2022 Climate Action Plan

The City of South San Francisco adopted the 2022 Climate Action Plan (CAP) in October 2022. The 2022 CAP update outlines how the City of South San Francisco will create new policies, programs, and services that will support the community in taking strong action to reduce GHG emissions. Although the City implemented many policies and programs identified in the 2014 CAP, the City experienced steady economic and population growth over that time period. By updating its existing CAP, the City of South San Francisco reaffirms its commitment to leading the way to a more sustainable future. The City has set bold targets and developed strategies for reducing GHG emissions while increasing the City's resilience to climate change impacts. The 2022 CAP identifies 62 actions to achieve the GHG reduction targets and has reduction targets of 40 percent below 1990 levels by 2030 (SB 32), 80 percent reduction by 2040 and carbon net neutrality by 2045.

IMPACTS

a) Result in Potentially Significant Environmental Impact Due to Wasteful, Inefficient, or Unnecessary Consumption of Energy Resources

Significance Criteria: The Project would have a significant environmental impact if it would result in potentially significant environmental impacts due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.

Construction

Construction of the Project would require consumption of petroleum fuels (gasoline and diesel fuel) by construction workers travelling to and from the site, transportation of site and building materials, and equipment for on-site construction activities. Petroleum fuels would be the primary sources of energy for these activities except where electricity is available and feasible, thus electricity use during construction would be minor. Construction of the Project would utilize fuel efficient equipment and trucks consistent with state regulations and would be consistent with state regulations intended to reduce the inefficient, wasteful, or unnecessary consumption of energy, such as anti-idling and emissions regulations. This minor increase in fuel consumption would not require the development of new petroleum supplies or construction of new production or distribution facilities. Therefore, energy usage during construction of the Project would not be wasteful, inefficient, or unnecessary and construction energy impacts would be less than significant.

Operations

Energy consumption during Project operation would consist of electricity consumption for operation of the Project building and petroleum fuel consumption for Project vehicles (assumed to be gasoline for the purpose of estimating the volume). The Project building would be highly energy efficient due to California Building Energy Efficiency Standards (Title 24, Part 6) and California Green Building Standards Code (Title 24, Part 11). Therefore, energy usage during operation of the Project would not be wasteful, inefficient, or unnecessary and operational energy impacts would be less than significant.

b) Conflict With or Obstruct a State or Local Energy Plans

Significance Criteria: The Project would have a significant environmental impact if it would conflict with or obstruct implementation State or local plans for renewable energy or energy efficiency.

The Project would be required to comply with all applicable standards related to State and local plans for renewable energy and energy efficiency. Therefore, the Project would not conflict with State or local energy plans and the Project would have no impact.

Energy Finding:

(1) Energy usage during construction and operation of the Project would not be wasteful, inefficient, or unnecessary and operational energy impacts would be less than significant.

(2) The Project would not conflict with State or local energy plans and the Project would have no impact.

VII. Geology and Soils *Would the project:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
ii) Strong seismic ground shaking?	☐	☐	☒	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv) Landslides?	☐	☒	☐	☐
b. Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☒	☐	☐
d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☒	☐
e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒
f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☒	☐

SETTING

Typically, the construction of one single-family residence in a residential zone with utilities and infrastructure in place is categorically exempt from the California Environmental Quality Act (CEQA) requirements (Section 15303, Class 3 New Construction or Conversion of Small Structures, California Code of Regulations, Title 14, Chapter 3) (*CEQA Guidelines*). However, there are "exceptions" to exemptions as stated in Section 15300.2 *CEQA Guidelines* subsection (a). Subsection (a) clearly states Class 3 exemptions are qualified based upon where the project would be located. The subsection further notes a project that "in itself is ordinarily insignificant in its impact on the environment may be in a particularly sensitive environment be significant." Therefore, if a project might be located in biological habitat, or on steep or potentially unstable slopes, or on properties known to have environmental contamination (hazardous materials) the exception to the exemption, noted above,

defaults to a requirement to conduct an initial study pursuant to Appendix G of the *CEQA Guidelines*. The site contains steep and potentially unstable slopes therefore the City has prepared this initial study.

REGULATORY FRAMEWORK

CITY

2040 General Plan (2040GP)

The 2040GP identifies areas and policies to minimize risk from seismic activity and geologic hazards. Chapter 13 Community Resilience (p 278, 2040GP) identifies policies and action items to protect habitat, promote tree cover connectivity and protect ecologically sensitive areas. Figure 40: Projected Groundshaking (p 295, 2040GP) identifies ground shaking zones for South San Francisco. The Project site is identified as being within Severe Shaking zone (assuming an M7.2 earthquake on the San Andreas Fault). Figure 41: Liquefaction Risk (p 295, 2040GP) identifies areas that have the potential for liquefaction risk. The Project site is outside of the liquefaction zone. Figure 42: Landslide Zones (p 297, 2040GP) identifies areas with general susceptibility to landslides. The Project site appears to be within the earthquake-induced landslide zone.

The 2040GP identifies goals and policies to minimize risk related to seismic activity and geologic hazards.

> "GOAL CR-4: The City minimizes the risk to life and property from seismic activity and geologic hazards in South San Francisco (p 309, 2040GP).
>
> Policy CR-4.1: Protect buildings, infrastructure, and other assets from seismic hazards (p 309, 2040GP).
>
> Policy CR-4.4: Protect buildings, infrastructure, and other assets from other geologic hazards. Protect existing and new buildings, infrastructure and other assets from other geologic hazards, including landslides, slope instability, liquefaction, settlement, subsidence, unstable geologic units, unstable soils, and expansive soils (p 309, 2040GP).
>
> Action CR-4.4.1: Require site-specific soils and geologic reports for projects located in high-hazard areas. On a parcel-by-parcel basis, require that permit applications for projects located within areas susceptible to geologic hazards, as shown in Figure 43, prepare site-specific soils and geologic reports for review and approval by the City Engineer, and incorporation of the recommended actions during construction (p 314, 2040GP)."

Municipal Code

SSFMC Section 13.04.000 regulates excavation and construction on public property. The municipal code requires that excavation and construction must adhere to certain conditions, including adhering to applicable restrictions and requirements for excavation and grading as imposed by the Uniform Building Code (enforced through adoption of the California Building Standards Code), disposing of constructed or excavated materials, adhering to maximum or minimum slopes to be used, adhering to requirements for degree of compaction of fill immaterial, and adhering to requirements for safe and adequate drainage of the site.

Geotechnical Reports Required by City

The City Engineering Division requires geotechnical reports as a part of the building permit process for projects to be constructed on vacant land, demolition and rebuilding, and additions to buildings that require grading and additional loading. Geotechnical reports are required to be prepared by a licensed geologist, geotechnical engineer, or engineering geologist. The reports shall include a detailed site

characterization study, an analysis of potential hazards and design specifications to mitigate the potential hazards. The reports identify design and construction specifications for (among other items) grading, site stabilization, drainage, utility and infrastructure design and placement, foundation design, retaining wall specifications and placement, and soil compaction requirements. The reports are peer reviewed by the City's geotechnical consultant and are often modified through this process. The final geotechnical report is required to incorporate the modifications recommended by the City's consultant and the project is required to be built as identified through this process. The types of grading and construction methods that are required reduce geotechnical impacts (i.e., expansive soils, liquefaction, differential settlement, severe ground shaking, etc.) to the maximum extent technically feasible.

The Project geotechnical reports and peer reviews are listed below, used to analyze geologic and soils impacts, and located in full in **Appendix A**.

Applicant's Reports

Michelucci & Associates, Inc., Second Review of Plans for Proposed New Residence Letter, March 3, 2025.

Michelucci & Associates, Inc., Review of Plans for Residence Letter, January 27, 2025.

Michelucci & Associates, Inc., Responses to Cotton Shires Peer Review Letter, August 2, 2023.

Michelucci & Associates, Inc., Geotechnical Consultation Mitigation of Debris Flow Potential and Construction of New Residence, July 11, 2023.

Earth Systems Pacific, Conceptual Debris Flow Management Plan and Geotechnical Engineering Evaluation, January 31, 2023.

Earth Systems Pacific, Rear Yard Grading and Drainage Plan Review, October 24, 2017.

Earth Systems Pacific, Supplemental Geologic and Geotechnical Engineering Evaluation, April 25, 2017.

Earth Systems Pacific, Geologic Hazards Evaluation and Geotechnical Engineering Study, June 17, 2016.

Michelucci & Associates, Inc., Updated Geologic and Geotechnical Evaluation, August 7, 2008.

City Peer Review-Cotton Shires Associates

Cotton Shires Associates, Inc., Second Supplemental Geotechnical Peer Review, May 29, 2025.

Cotton Shires Associates, Inc., Supplemental Update Geotechnical Peer Review, August 23, 2023.

Cotton Shires Associates, Inc., Updated Geotechnical Peer Review, July 24, 2023.

IMPACTS

SEISMIC HAZARDS

Seismic hazards are generally classified as two types, primary and secondary. Primary geologic hazards include surface fault rupture. Secondary geologic hazards include ground shaking, liquefaction, dynamic densification and seismically induced ground failure.

ai) Surface Fault Rupture

Significance Criteria: The Project would have a significant environmental impact if it were to expose people or structures to potential substantial adverse effects associated with the surface rupture of a known earthquake fault.

There are no active faults underlying the site and the nearest one is the San Andreas Fault, located about three miles southwest. The Hillside fault is located nearby, but there is no evidence that this fault has been active within geologically recent time. In general, ground rupture during earthquakes is most likely to occur along a pre-existing and identifiable fault trace and the potential for surface fault rupture to affect the new residence proposed by the Project is low (Earth Systems Pacific, 2016). Therefore, the Project would have a less-than-significant impact on exposing people or structures to danger from surface rupture of a known earthquake fault.

aii) Strong Seismic Ground Shaking

Significance Criteria: The Project would have a significant environmental impact if it were to expose people or structures to potential substantial adverse effects associated with strong seismic ground shaking.

Given that there are no active faults within the Project site, damage from a seismic event is most likely to occur from the secondary impact of strong seismic ground shaking originating on a nearby fault. A moderate to major earthquake on the San Andreas, San Gregorio, Hayward, Calaveras, or other nearby faults could cause severe ground shaking at the Project site. The foundations for the proposed residence would be designed for seismic shaking, including horizontal and vertical accelerations, as required by the latest edition of the California Building Code (Earth Systems Pacific, 2016). Therefore, the Project would result in a less-than-significant impact associated with severe groundshaking with implementation of the measures required by law.

aiii) Seismic-Related Ground Failure/Liquefaction

Significance Criteria: The Project would have a significant environmental impact if it were to expose people or structures to potential substantial adverse effects associated with seismic-related ground failure, including liquefaction.

Liquefaction is generally associated with saturated, well-sorted fine to medium grained sands and is expressed as a sudden loss of cohesion and resultant flow and/or settlement of the material during an earthquake. Liquefaction may also occur in fine-grained sediments with low plasticity indices. The Project site is underlain at shallow depth by Franciscan bedrock which is not susceptible to liquefaction. Furthermore, the Project site is not within a state or county-defined liquefaction zone and the potential for liquefaction is low (Earth Systems Pacific, 2016). Furthermore, the Project site is not in an area that has the potential for liquefaction risk according to Figure 41 of the 2040GP. In addition, the geotechnical recommendations from the City's Geotechnical Consultant (CSA) would be required as condition of

approval to the City's Geotechnical permit approval (CSA, May 2025). Therefore, the Project would result in a less-than-significant impact associated with liquefaction.

aiv) Landslides and c) Geologic Instability

Significance Criteria: The Project would have a significant environmental impact if it were to expose people or structures to substantial hazards from landslides. The Project would also have a significant environmental impact if located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.

A landslide is a mass of rock, soil and debris displaced down slope by sliding, flowing or falling. Figure 42: Landslide Zones (p 297, 2040GP) of the 2040GP identifies the Project site as within an earthquake-induced landslide zone. Numerous small-scale landslides, soil lumps, and debris flows were observed at the site and no evidence of large-scale landsliding was observed, thus the hazard posed by landsliding at the Project site is low (Earth Systems Pacific, 2016).

Debris flows are a type of landslide characterized by a rapidly flowing mass of rock fragments, soil, and mud with more than half of the particles being larger than sand size and typically containing cobbles and boulders as well. Debris flows generally are initiated in colluvium filled hollows. These flows result almost invariably from unusually heavy rain, and tend to find their way into drainages and travel for significant distances. The proposed residence is in a location likely to be affected by debris flow since the previous residence constructed at the site was severely damaged by a debris flow in 1982. Numerous debris flows have occurred around the Franklin Avenue terminus area since the construction of the subdivision in 1949 (Earth Systems Pacific, 2016).

The potential hazard for a new house built on the property, associated with potential future debris flows, would be similar to the 1982 debris flow unless mitigative measures are undertaken (Michelucci & Associates, Inc., 2023).

Geotechnical mitigation measures on the site included as Project design would consist of constructing a "U" shaped debris barrier, consisting of retaining walls, to form a basin that would capture and enclose a potential debris flow onto the Project site **(see Project Description Figure 3).** The debris flow capture capacity is currently estimated at 543 cubic yards, well above recommendation of 500 cubic yards by the Applicant's geotechnical consultants (Michelucci and Associates and Earth Systems) and confirmed by the City's geotechnical consultant, CSA. An 8-foot-wide setback along the western property line would allow access to the debris capture area for equipment to remove debris captured within the basin, as needed. These geotechnical mitigation measures/solutions were vetted by the City's Geotechnical Consultant (CSA) and were found to be acceptable for site development (CSA, July & August 2023).

An unmaintained debris basin would not adequately prevent damage to the proposed residence during a future debris flow or landslide event, which would be potentially significant environmental impact. The implementation of **Mitigation Measure GEO-1** (debris basin maintenance plan) would reduce impacts to a less-than-significant level.

Geology/Soils Mitigation Measures

GEO-1: Debris Basin Maintenance Plan. A Maintenance Program for the Debris Basin ("Basin") shall be prepared, and peer reviewed by the City's Engineering and Building Divisions and/or their designee. The Maintenance Program shall be modified as directed by the City. At a minimum, the Maintenance Program shall define the type of inspections, frequency (taking into account periods of intense or prolonged rainfall), and maintenance of the Basin and support structures. Inspections and

recommendations shall be conducted and developed by a California state licensed engineering geologist or geotechnical engineer. Inspection reports shall be provided to the City of SSF Building and/or Engineering Division. City permits (i.e., Building, Engineering, Planning) shall be obtained prior to commencement of construction and all permits shall require a final inspection. This requirement shall be recorded on the title to the property. Said recordation is required prior to issuance of any building or grading permits for the property known as 52 Franklin Avenue, South San Francisco, CA.

b) Erosion or Loss of Topsoil

Significance Criteria: The Project would result in a significant environmental impact if it were to result in substantial soil erosion or in the loss of topsoil.

Erosion of topsoil can result from grading and site preparation activities as well as a result of improper landscaping design. The Project would require site preparation, grading, and landscaping. The Project would be subject to requirements enforced by the City as a condition of building and grading permit issuance for the Project, which are implemented to reduce impacts associated with soil erosion and water pollution during construction and operation of projects.

Furthermore, the Project would be subject to the South San Francisco Municipal Code, including Chapter 14.04 Stormwater Management and Discharge Control (Stormwater Ordinance), as levied through standard City conditions of project approval by the Water Quality Control Division of the Public Works Department. Specifically, Chapter 14.04.180(d) requires BMPs for all new developments and redevelopments, including year round erosion control during construction until the site is stabilized by landscaping or permanent erosion control measures These measures are required by the City in compliance with their permitting authority and are designed to reduce potential water quality impacts to less than significant. Therefore, the Project would result in a less-than-significant impact associated with erosion and loss of topsoil with implementation of the measures required by law.

d) Expansive Soils

Significance Criteria: The Project would have a significant environmental impact if it would occur on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property.

Expansive soils contain minerals such as smectite, bentonite, montmorillonite, beidellite, vermiculite, attapulgite, nontronite, illite and chlorite. There are also some sulfate salts that will expand with changes in temperature. When soil contains a large amount of expansive minerals it has the potential of significant expansion. When the soil contains very little expansive minerals it has little expansive potential. The clays are capable of absorbing water and as they do so they increase in volume. The more water they absorb the more their volume increases. Expansions of ten percent or more are not uncommon. The change in volume can exert enough force on a building or other structure to cause damage. The near-surface soils at the Project site have a Plasticity index of 13 to 17 indicating a low to moderate expansion potential and no mitigation is required for expansive soil (Earth Systems Pacific, 2016). Therefore, the Project would result in a less-than-significant impact associated with expansive soils.

e) Capability of Soils to Support Septic Tanks

Significance Criteria: The Project would have a significant environmental impact if it involved construction of septic systems in soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems.

The Project does not propose to build any new septic tank or alternate waste disposal systems. The Project site would be connected to the city's sanitary sewer system. The Project would have no impact on soils due to septic systems as the Project would be connected to the City's wastewater system.

f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature

Significance Criteria: The Project would have a significant environmental impact if it directly or indirectly destroyed a unique paleontological resource, site, or geologic feature.

The presence of paleontological resources is very low to low as identified in Section V Cultural Resources. Therefore, the Project would result in a less-than-significant impact.

Geology and Soils Finding:

(1) In general, ground rupture during earthquakes is most likely to occur along a pre-existing and identifiable fault trace and the potential for surface fault rupture to affect the new residence proposed by the Project is low (Earth Systems Pacific, 2016). Therefore, the Project would have a less-than-significant impact on exposing people or structures to danger from surface rupture of a known earthquake fault.

(2) The foundations for the proposed residence would be designed for seismic shaking, including horizontal and vertical accelerations, as required by the latest edition of the California Building Code (Earth Systems Pacific, 2016). Therefore, the Project would result in a less-than-significant impact associated with severe groundshaking with implementation of the measures required by law.

(3) The Project site is underlain at shallow depth by Franciscan bedrock which is not susceptible to liquefaction. Furthermore, the Project site is not within a state or county-defined liquefaction zone and the potential for liquefaction is low (Earth Systems Pacific, 2016). Furthermore, the Project site is not in an area that has the potential for liquefaction risk according to Figure 41 of the 2040GP. In addition, the geotechnical recommendations from the City's Geotechnical Consultant (CSA) would be required as condition of approval to the City's Geotechnical permit approval (CSA, May 2025). Therefore, the Project would result in a less-than-significant impact associated with liquefaction.

(4) Geotechnical mitigation measures on the site included as Project design would consist of constructing a "U" shaped debris barrier, consisting of retaining walls, to form a basin that would capture and enclose a potential debris flow onto the Project site (see Project Description Figure 3). The debris flow capture capacity is currently estimated at 543 cubic yards, well above recommendation of 500 cubic yards by the Applicant's geotechnical consultants (Michelucci and Associates and Earth Systems) and confirmed by the City's geotechnical consultant, CSA. An 8-foot-wide setback along the western property line would allow access to the debris capture area for equipment to remove debris captured within the basin, as needed. These geotechnical mitigation measures/solutions were vetted by the City's Geotechnical Consultant (CSA) and were found to be acceptable for site development (CSA, July & August 2023).

An unmaintained debris basin would not prevent damage to the residence during a future debris flow or landslide event, which would be potentially significant environmental impact.

The implementation of Mitigation Measure GEO-1 (debris basin maintenance plan) would reduce impacts to a less-than-significant level.

(5) Chapter 14.04.180(d) requires BMPs for all new developments and redevelopments, including year-round erosion control during construction until the site is stabilized by landscaping or permanent erosion control measures These measures are required by the City in compliance with their permitting authority and are designed to reduce potential water quality impacts to less than significant. Therefore, the Project would result in a less-than-significant impact associated with erosion and loss of topsoil with implementation of the measures required by law.

(6) The near-surface soils at the Project site have a Plasticity index of 13 to 17 indicating a low to moderate expansion potential and no mitigation is required for expansive soil (Earth Systems Pacific, 2016). Therefore, the Project would result in a less-than-significant impact associated with expansive soils.

(7) The Project does not propose to build any new septic tank or alternate waste disposal systems. The Project site would be connected to the city's sanitary sewer system. The Project would have no impact on soils due to septic systems as the Project would be connected to the City's wastewater system.

(8) The presence of paleontological resources is very low to low as identified in Section V Cultural Resources. Therefore, the Project would result in a less-than-significant impact.

VIII. Greenhouse Gas Emissions *Would the project:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

SETTING

ENVIRONMENTAL SETTING

Certain gases in the earth's atmosphere, classified as GHGs, play a critical role in determining the earth's surface temperature. Solar radiation enters the earth's atmosphere from space. A portion of the radiation is absorbed by the earth's surface and a smaller portion of this radiation is reflected back toward space. This absorbed radiation is then emitted from the earth as low-frequency infrared radiation. The frequencies at which bodies emit radiation are proportional to temperature. Because the earth has a much lower temperature than the sun, it emits lower-frequency radiation. Most solar radiation passes through GHGs; however, infrared radiation is absorbed by these gases. As a result, radiation that otherwise would have escaped back into space is instead trapped, resulting in a warming of the atmosphere. This phenomenon, known as the greenhouse effect, is responsible for maintaining a habitable climate on earth. Without the greenhouse effect, the earth would not be able to support life as we know it.

Prominent GHGs contributing to the greenhouse effect are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Fluorinated gases also make up a small fraction of the GHGs that contribute to climate change. Fluorinated gases include chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride; however, it is noted that these gases are not associated with typical land use development. Human-caused emissions of these GHGs in excess of natural ambient concentrations are believed to be responsible for intensifying the greenhouse effect and leading to a trend of unnatural warming of the earth's climate, known as global climate change or global warming. It is "extremely likely" that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in GHG concentrations and other anthropogenic factors together.

Each GHG differs in its ability to absorb heat in the atmosphere based on the lifetime, or persistence, of the gas molecule in the atmosphere. CH_4 traps over 25 times more heat per molecule than CO_2, and N_2O absorbs 298 times more heat per molecule than CO_2. Often, estimates of GHG emissions are presented in carbon dioxide equivalents (CO_2e), which weight each gas by its global warming potential. Expressing GHG emissions in CO_2e takes the contribution of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted.

Climate change is a global problem. GHGs are global pollutants, unlike criteria air pollutants and TACs, which are pollutants of regional and local concern. Whereas pollutants with localized air quality effects have relatively short atmospheric lifetimes (about one day), GHGs have long atmospheric lifetimes (one

to several thousand years). GHGs persist in the atmosphere for long enough time periods to be dispersed around the globe. Although the exact lifetime of any particular GHG molecule is dependent on multiple variables and cannot be pinpointed, it is understood that more CO_2 is emitted into the atmosphere than is sequestered by ocean uptake, vegetation, or other forms. Of the total annual human-caused CO_2 emissions, approximately 55 percent is sequestered through ocean and land uptakes every year, averaged over the last 50 years, whereas the remaining 45 percent of human-caused CO_2 emissions remains stored in the atmosphere.

REGULATORY FRAMEWORK

STATE

Executive Order S-3-05

Executive Order (EO) S-3-05, signed by Governor Arnold Schwarzenegger in 2005, proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra Nevada snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the EO established total GHG emission targets for the state. Specifically, emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80 percent below the 1990 level by 2050.

Assembly Bill 32 Climate Change Scoping Plan and Updates

In 2006, the California legislature passed Assembly Bill (AB) 32 (Health and Safety Code § 38500 et seq., or AB 32), also known as the Global Warming Solutions Act. AB 32 required CARB to design and implement feasible and cost-effective emission limits, regulations, and other measures, such that statewide GHG emissions are reduced to 1990 levels by 2020 (representing a 25 percent reduction in emissions). Pursuant to AB 32, CARB adopted a Scoping Plan in December 2008, which outlined measures to meet the 2020 GHG reduction goals. California exceeded the target of reducing GHG emissions to 1990 levels by the year 2017.

The Scoping Plan is required by AB 32 to be updated at least every five years. The latest update, the 2017 Scoping Plan Update, addresses the 2030 target established by Senate Bill (SB) 32 as discussed below and establishes a proposed framework of action for California to meet a 40 percent reduction in GHG emissions by 2030 compared to 1990 levels. The key programs that the Scoping Plan Update builds on include increasing the use of renewable energy in the State, the Cap-and-Trade Regulation, the Low Carbon Fuel Standard, and reduction of methane emissions from agricultural and other wastes.

Senate Bill 32 and Assembly Bill 197 of 2016

In August 2016, Governor Brown signed SB 32 and AB 197, which serve to extend California's GHG reduction programs beyond 2020. SB 32 amended the Health and Safety Code to include § 38566, which contains language to authorize CARB to achieve a statewide GHG emission reduction of at least 40 percent below 1990 levels by no later than December 31, 2030.

Senate Bill X1-2

SB X1-2 expanded the RPS by establishing that 20 percent of the total electricity sold to retail customers in California per year by December 31, 2013, and 33 percent by December 31, 2020, and in subsequent years be secured from qualifying renewable energy sources.

Senate Bill 350

SB 350 further expanded the RPS by establishing that 50 percent of the total electricity sold to retail customers in California per year by December 31, 2030, be secured from qualifying renewable energy sources. In addition, SB 350 includes the goal to double the energy efficiency savings in electricity and natural gas final end uses (such as heating, cooling, lighting, or class of energy uses on which an energy efficiency program is focused) of retail customers through energy conservation and efficiency.

Senate Bill 100 of 2018

In 2018, SB 100 was signed codifying a goal of 60 percent renewable procurement by 2030 and 100 percent by 2045.

California Building Energy Efficiency Standards (Title 24, Part 6)

The energy consumption of new residential and nonresidential buildings in California is regulated by the state's Title 24, Part 6, Building Energy Efficiency Standards (California Energy Code). The California Energy Code was established by CEC in 1978 in response to a legislative mandate to create uniform building codes to reduce California's energy consumption and provide energy efficiency standards for residential and nonresidential buildings. CEC updates the California Energy Code every 3 years with more stringent design requirements for reduced energy consumption, which results in the generation of fewer GHG emissions.

The 2022 California Energy Code was adopted by the CEC on August 11, 2021 and will apply to projects constructed after January 1, 2023. The 2022 Energy Code focuses on four key areas in new construction and businesses: (1) encouraging electric heat pump technology and use, (2) establishing electric ready requirements when natural gas is installed, (3) expanding solar system and battery storage standards, and (4) strengthening ventilation standards to improve indoor air quality. The building efficiency standards are enforced through the local plan check and building permit process. Local government agencies may adopt and enforce additional energy standards for new buildings as reasonably necessary in response to local climatologic, geologic, or topographic conditions, provided that these standards exceed those in the California Energy Code.

California Green Building Standards Code (Title 24, Part 11)

The California Green Building Standards Code (CALGreen) is part 11 of Title 24, California Code of Regulations. CALGreen is the first-in-the-nation mandatory green building standards code, developed in an effort to meet the goals of California's landmark initiative AB 32, which established a comprehensive program of cost-effective reductions of GHG emissions to 1990 levels by 2020. CALGreen includes a waste diversion mandate, which requires that at least 65 percent of construction materials generated during new construction or demolition projects are diverted from landfills.

BAY AREA AIR QUALITY DISTRICT (BAAQMD)

2017 BAAQMD Clean Air Plan

In April 2017, BAAQMD adopted the 2017 Clean Air Plan, whose primary goals are to protect public health and to protect the climate. The 2017 Clean Air Plan updates the Bay Area 2010 Clean Air Plan and complies with state air quality planning requirements, as codified in the California Health and Safety Code (although the 2017 plan was delayed beyond the three-year update requirement of the code). State law requires the Clean Air Plan to include all feasible measures to reduce emissions of O_3 precursors and to reduce the transport of O_3 precursors to neighboring air basins. The 2017 Clean Air Plan contains 85 measures to address reduction of several pollutants: O_3 precursors, PM, air toxics, and GHGs. Other

measures focus on a single type of pollutant: super GHGs such as methane and black carbon that consists of harmful fine particles that affect public health. These control strategies are grouped into the following categories:

- Stationary Source Measures
- Transportation Control Measures
- Energy Control Measures
- Building Control Measures
- Agricultural Control Measures
- Natural and Working Lands Control Measures
- Waste Management Control Measures
- Water Control Measures
- Super GHG Control Measures

CITY

Chapter 15.60.030 Diversion and Requirements, South San Francisco Municipal Code, Demolition Debris Ordinance

The City's Construction and Demolition Debris Ordinance requires that at least 65 percent of non-inert waste materials and 100 percent of inert waste materials are diverted from landfills through recycling and salvage.

2022 Climate Action Plan

The City of South San Francisco adopted the 2022 Climate Action Plan (CAP) in October 2022. The 2022 CAP update outlines how the City of South San Francisco will create new policies, programs, and services that will support the community in taking strong action to reduce GHG emissions. Although the City implemented many policies and programs identified in the 2014 CAP, the City experienced steady economic and population growth over that time period. By updating its existing CAP, the City of South San Francisco reaffirms its commitment to leading the way to a more sustainable future. The City has set bold targets and developed strategies for reducing GHG emissions while increasing the City's resilience to climate change impacts. The 2022 CAP identifies 62 actions to achieve the GHG reduction targets and has reduction targets of 40 percent below 1990 levels by 2030 (SB 32), 80 percent reduction by 2040 and carbon net neutrality by 2045.

THRESHOLDS OF SIGNIFICANCE

The State CEQA Guidelines do not prescribe specific methodologies for performing a GHG assessment, do not establish specific thresholds of significance, and do not mandate specific mitigation measures. Rather, the CEQA Guidelines emphasize the lead agency's discretion to determine the appropriate methodologies and thresholds of significance consistent with the manner in which other impact areas are handled in CEQA. With respect to GHG emissions, the CEQA Guidelines § 15064.4(a) state that lead agencies "shall make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate" GHG emissions resulting from a project. The CEQA Guidelines note that an agency has the discretion to either quantify a project's GHG emissions or rely on a "qualitative analysis or other performance-based standards." (14 California Code of Regulations [CCR] 15064.4(b)). A lead agency may use a "model or methodology" to estimate GHG emissions and has the discretion to select the model or methodology it considers "most appropriate to enable decision makers to intelligently take into account the project's incremental contribution to climate change." (14

CCR 15064.4(c)). Section 15064.4(b) provides that the lead agency should consider the following when determining the significance of impacts from GHG emissions on the environment:

1. The extent a project may increase or reduce GHG emissions as compared to the existing environmental setting.
2. Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.
3. The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions (14 CCR 15064.4(b)).

In addition, Section 15064.7(c) of the CEQA Guidelines specifies that "[w]hen adopting or using thresholds of significance, a lead agency may consider thresholds of significance previously adopted or recommended by other public agencies, or recommended by experts, provided the decision of the lead agency to adopt such thresholds is supported by substantial evidence" (14 CCR 15064.7(c)). The CEQA Guidelines also clarify that the effects of GHG emissions are cumulative and should be analyzed in the context of CEQA's requirements for cumulative impact analysis (see CEQA Guidelines § 15130(f)). As a note, the CEQA Guidelines were amended in response to SB 97. In particular, the CEQA Guidelines were amended to specify that compliance with a GHG emissions reduction plan renders a cumulative impact insignificant.

Per CEQA Guidelines § 15064(h)(3), a project's incremental contribution to a cumulative impact can be found not cumulatively considerable if the project would comply with an approved plan or mitigation program that provides specific requirements that would avoid or substantially lessen the cumulative problem within the geographic area of the project. To qualify, such plans or programs must be specified in law or adopted by the public agency with jurisdiction over the affected resources through a public review process to implement, interpret, or make specific the law enforced or administered by the public agency. Examples of such programs include a "water quality control plan, air quality attainment or maintenance plan, integrated waste management plan, habitat conservation plan, natural community conservation plans [and] plans or regulations for the reduction of greenhouse gas emissions." Put another way, CEQA Guidelines § 15064(h)(3) allows a lead agency to make a finding of less than significant for GHG emissions if a project complies with adopted programs, plans, policies and/or other regulatory strategies to reduce GHG emissions.

This analysis relies upon BAAQMD's newly adopted GHG significance thresholds for determining significance, as displayed in Table GHG-1, specifically, consistency with a local GHG reduction strategy that meets the criteria under State CEQA Guidelines Section 15183.5(b), the City's 2022 CAP.

TABLE GHG-1
BAAQMD CEQA THRESHOLDS FOR EVALUATING CLIMATE CHANGE IMPACTS

Thresholds for Land Use Projects (Must include A or B)
A. Projects must include, at a minimum, the following project design elements: 1. Buildings a. The project will not include natural gas appliances or natural gas plumbing (in both residential and nonresidential development). b. The project will not result in any wasteful, inefficient, or unnecessary energy usage as determined by the analysis required under CEQA Section 21100(b)(3) and Section 15126.2(b) of the State CEQA Guidelines. 2. Transportation a. Achieve a reduction in project-generated vehicle miles traveled (VMT) below the regional average consistent with the current version of the California Climate Change Scoping Plan (currently 15 percent) or meet a locally adopted Senate Bill 743 VMT target, reflecting the recommendations provided in the Governor's Office of Planning and Research's Technical Advisory on Evaluating Transportation Impacts in CEQA: i. Residential projects: 15 percent below the existing VMT per capita ii. Office projects: 15 percent below the existing VMT per employee iii. Retail projects: no net increase in existing VMT b. Achieve compliance with off-street electric vehicle requirements in the most recently adopted version of CALGreen Tier 2.
B. Projects must be consistent with a local GHG reduction strategy that meets the criteria under State CEQA Guidelines Section 15183.5(b).

Source: BAAQMD, 2023.

IMPACTS

a) Generate GHG Emissions That May Have a Significant Impact on the Environment; and
b) Conflict with an Applicable Plan, Policy, or Regulation Adopted for Reducing GHG Emissions

Significance Criteria: The Project would have a significant environmental impact if it would generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment, or if it would conflict with an applicable plan, policy or regulation adopted for the purpose of reducing GHG emissions. If the Project would conflict with the GHG reductions measures in the City's 2022 CAP, it would be deemed to have a potentially significant impact.

Construction

Construction-related activities that would generate GHG emissions include worker commute trips, haul trucks carrying supplies and materials to and from the Project site, and off-road construction equipment (e.g., dozers, loaders, excavators). The Project would be required to comply with the applicable version of the Title 24 Building Energy Efficiency Standards and CALGreen, as well as the City's Construction and Demolition Debris Ordinance, which requires that at least 65 percent of non-inert waste materials and 100 percent of inert waste materials are diverted from landfills through recycling and salvage. This requirement greatly reduces the generation of GHG emissions by reducing decomposition at landfills and reduces demand for natural resources. The City's 2022 CAP does not contain GHG reduction measures or policies related to construction emissions. Therefore, the Project would not generate GHG

emissions that would have a significant impact on the environment or conflict with or obstruct implementation of the City's 2022 CAPs and construction GHG emissions impacts would be less than significant.

Operations

Implementation of the Project would result in long-term operational GHG emissions from area sources, energy use, motor vehicles, water usage, and solid waste disposal. The Project building would be highly energy efficient due to California Building Energy Efficiency Standards (Title 24, Part 6) and California Green Building Standards Code (Title 24, Part 11).

The Project was reviewed relative to the GHG reductions measures and policies within the City's 2022 CAP. The Project would not conflict with the GHG reductions measures in the City's 2022 CAP. Furthermore, all development within the City is required to adhere to applicable City-adopted policy provisions supporting its GHG reduction program, including those contained in the 2022 CAP. The Project applicant would be required to complete a Development Review Checklist to confirm consistency with the CAP measures to the satisfaction of City staff. The City ensures all CAP provisions are incorporated into projects and their permits through development review and applications of conditions of approval as applicable. Applicable and feasible provisions of the City GHG reduction program as promulgated by its CAP documents would be incorporated into the Project. Therefore, the Project would not generate GHG emissions that would have a significant impact on the environment or conflict with or obstruct implementation of the City's 2022 CAP and operational GHG emissions impacts would be less than significant.

Greenhouse Gas Emissions Finding:

(1) The Project would not generate GHG emissions that would have a significant impact on the environment or conflict with or obstruct implementation of the City's 2022 CAP and construction and operational GHG emissions impacts would be less than significant.

IX. Hazards and Hazardous Materials *Would the project:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☒
f. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
g. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☐	☒

SETTING

The vacant Project site is located within a residential neighborhood consisting of single-family detached structures in the Sterling Terrace subdivision. The northern and northeastern facing slopes of Sign Hill, consisting of approximately 46 acres, are in private ownership. Sign Hill Park is located on the south facing slopes of the hill, is owned by the City and is public park and recreation land. The nearest school, Martin School, is 1,500 feet (0.28 mi) southeast of the Project.

SENSITIVE RECEPTORS

Residential, schools, childcare facilities, schools and convalescent facilities are typically considered sensitive land uses. Heavy commercial and industrial land uses are typically considered potential sources of toxic or hazardous materials. The Project and the neighborhood within which it is located are considered sensitive receptors.

REGULATORY FRAMEWORK

As noted above the Project is considered a receptor and not a generator of hazardous materials. The following regulatory framework is provided for informational purposes. Hazardous materials use, storage, and disposal are governed by the following standards and permits at both the federal and state level.

FEDERAL

- Toxic Substances Control Act, administered by the EPA, Regulation 40 CFR, Part 720.
- Hazardous Materials Transportation Act, administered by the Department of Transportation, Regulation 49 CFR 171 et seq.
- Resource Conservation and Recovery Act (RCRA) 42 U.S.C. 6901 et seq.
- Hazardous Waste Management Standards for Generators, Transporters, and Waste Facilities, administered by EPA, 40 CFR 260 et seq.
- Occupation Safety and Health Act, 29 U.S.C. 651.
- Workplace Exposure Limits, administered by Occupational Safety and Health Administration. 29 CFR 1900 et seq.

STATE

- California Hazardous Waste Control Act. California Health and Safety Code, Division 20, Chapter 6.5.
- California Hazardous Waste Management Regulations. California Code of Regulations, Title 22. Social Security, Division 4. Environmental Health.
- California Department of Toxic Substances Control, Hazardous Waste and Substances Site List – Site Cleanup (Cortese List).
- California Occupational Safety and Health Act, California Labor Code sections 6300 et seq.

REGIONAL/COUNTY

The San Mateo County Department of Environmental Health (SMCDEH) largely serves as the lead permitting or remediation agency through various memoranda of understandings with federal, state, regional agencies, and local government. Often the Regional Water Quality Control Board (RWQCB) and/or the BAAQMD take a lead or partnership in site remediation with the SMCDEH.

The Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program) was established in 1993 to protect public health and safety, and to restore and enhance environmental quality, and sustain economic vitality through an effective and efficient implementation of the Unified Program. San Mateo County Environmental Health Services was designated by the State Secretary for Environmental Protection as the Certified Unified Program Agency (CUPA) for San Mateo County in 1996. Compliance is achieved through routine inspections of regulated facilities, and investigation of citizen-based complaints and inquiries regarding improper handling and/or disposal of hazardous materials and/or hazardous wastes.

Businesses must complete a Hazardous Materials Business Plan (HMBP) using an electronic reporting system for the safe storage and use of chemicals. Firefighters, health officials, planners, public safety

officers, health care providers and others rely on the HMBP in an emergency. They use it to prevent or lessen damage to the health and safety of people and the environment when a hazardous material is released. The HMBP Program is also known as the Community Right to Know Program and any citizen has the right to review these plans upon request.

The HMBP must include:

- Summary of business activities
- Owner/operator information including emergency contacts
- The type and quantity of reportable hazardous materials
- Site map
- Emergency response procedures
- Employee training program

In general, a HMBP is required if a business/facility handles and/or stores a hazardous material equal to or greater than the minimum reportable quantities. These quantities are 55 gallons for liquids, 500 pounds for solids and 200 cubic ft (at standard temperature and pressure) for compressed gases. For, minimum reportable quantities other than the quantities referenced above, refer to the Health and Safety Code Division 20 Chapter 6.95.

SAN MATEO COUNTY EVACUATION MAP

San Mateo County along with other Bay Area Counties have launched an interactive map enabling residents to find out which evacuation zone they live within and obtain the evacuation status for a given zone. The interactive map is accessed through myzone.zonehaven.com.

CITY

Fire Department

The South San Francisco Fire Department (SSFFD) reviews development and entitlement applications, levies and enforces code requirements for fire prevention and safety and conducts periodic inspections of business activities.

2040 General Plan (2040GP)

The 2040GP (Figure 44), identifies the only California High Fire Hazard Severity Zone in the City to be San Bruno Mountain State & County Park approximately 0.4 mi north of the Project site. The 2040GP also shows the Project site well outside of Airport Hazard Zones (Figure 46), such as runway protection zones, approach/turning zones, and sidelines zones.

IMPACTS

a) and b) Hazardous Materials Impacts to the Public or Environment

Significance Criteria: The Project would have a significant environmental impact if it were to create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials or if it were to create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

Construction Impacts

Hazardous materials would be stored, used, and transported in varying amounts during construction of Project. Construction activities associated with the Project would involve the use of heavy equipment,

which would contain fuels and oils, and various other products such as concrete, paints, and adhesives. The Project would be required to comply with all Federal, State, and local regulations regulating the handling, storage, and transportation of hazardous materials. Construction activities would not create a significant hazard to the public or the environment through routine transport, use, or disposal of hazardous materials or through a reasonably foreseeable upset and accident condition involving the release of hazardous materials in the environment. Therefore, construction impacts would be less than significant.

Operational Impacts

The Project is considered a sensitive receptor. The Project would not handle large amounts of hazardous materials as a course of everyday activities such as traveling to and from the site in vehicles (gasoline or electrically powered) or using lawnmowers or small amounts of pesticides for landscaping. The Project would be required to comply with all Federal, State, and local regulations regulating the handling, storage, and transportation of hazardous materials during operations. Operational activities would not create a significant hazard to the public or the environment through routine transport, use, or disposal of hazardous materials or through a reasonably foreseeable upset and accident condition involving the release of hazardous materials in the environment. Therefore, operational impacts would be less than significant.

c) Hazardous Materials Impacts to Schools within One-Quarter Mile

Significance Criteria: The Project would have a significant environmental impact if it were to emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within a quarter mile of an existing or proposed school.

The Project site is not within a quarter mile of an existing or proposed school. The nearest school, Martin School, is 1,500 feet (0.28 mi) southeast of the Project. Therefore, no impacts related to hazardous materials on schools would occur.

d) Hazardous Materials Presence Pursuant to Government Code Section 65962.5

Significance Criteria: The Project would have a significant environmental impact if it was located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 ("Cortese List") and, as a result, would create a significant hazard to the public or the environment.

The Project site is not on a list of hazardous materials site complied pursuant to Government Code section 65962.5 ("Cortese List"). Therefore, no impacts related to the presence of hazardous materials presence would occur.

e) Safety Hazards Due to Nearby Airport or Airstrip

Significance Criteria: The Project would have a significant environmental impact if it were located within an airport land use plan (or, where such a plan has not been adopted, within two miles of a public airport or public use airport), and it would result in a safety hazard for people residing or working in the Project area.

San Francisco International Airport is approximately 2.5 miles southeast of the site. The Project site is not within the San Mateo County Airport Land Use Commission's (ALUC) and ALUC Plan Area jurisdiction. The Project is not within 2 miles of a private airstrip. There would be no impact associated with the location of airports and airstrips.

f) Conflict with Emergency Response Plan or Emergency Evacuation Plan

Significance Criteria: The Project would have a significant environmental impact if it were to impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan.

There are no emergency response or evacuation plans in effect in the Project vicinity. The Project site is in an already developed neighborhood and would not interfere with emergency evacuations. The Project would have no impact on the implementation of any adopted emergency response plan or emergency evacuation plan.

g) Exposure of People or Structures to Wildland Fires

Significance Criteria: The Project would have a significant environmental impact if it were to expose people or structures to a significant risk of loss, injury or death involving wildland fires.

The Project site is in a developed neighborhood. The closest wildlands area is San Bruno Mountain State & County Park approximately 0.4 mi away (see Section XX. Wildfire). The Project site is not near a Local or State Responsibility area with a Very High Fire Hazard Severity Zone designation. Therefore, no impacts would occur related to the exposure of people or structures to significant risk of loss, injury or death involving wildland fires.

Hazards and Hazardous Materials Finding:

(1) The Project would be required to comply with all Federal, State, and local regulations regulating the handling, storage, and transportation of hazardous materials during construction and operations. Construction and operational activities would not create a significant hazard to the public or the environment through routine transport, use, or disposal of hazardous materials or through a reasonably foreseeable upset and accident condition involving the release of hazardous materials in the environment. Therefore, impacts would be less than significant.

(2) The Project site is not within a quarter mile of an existing or proposed school. Therefore, no impacts related to hazardous materials on schools would occur.

(3) Project site is not on a list of hazardous materials site complied pursuant to Government Code section 65962.5 ("Cortese List"). Therefore, no impacts related to the presence of hazardous materials presence would occur.

(4) San Francisco International Airport is approximately 2.5 miles southeast of the site. The Project site is not within the San Mateo County Airport Land Use Commission's (ALUC) and ALUC Plan Area jurisdiction. The Project is not within 2 miles of a private airstrip. There would be no impact associated with the location of airports and airstrips.

(5) There are no emergency response or evacuation plans in effect in the Project vicinity. The Project site is in an already developed neighborhood and would not interfere with emergency evacuations. The Project would have no impact on the implementation of any adopted emergency response plan or emergency evacuation plan.

(6) The Project site is not near a Local or State Responsibility area with a Very High Fire Hazard Severity Zone designation. Therefore, no impacts would occur related to the exposure of people or structures to significant risk of loss, injury or death involving wildland fires.

X. Hydrology and Water Quality *Would the project:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	☒	☐
b. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such the project may impede sustainable groundwater management of the basin?	☐	☐	☐	☒
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:	☐	☐	☒	☐
i) result in substantial erosion or siltation on- or off-site;	☐	☐	☒	☐
ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	☐	☐	☒	☐
iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	☒	☐
iv) impede or redirect flood flows?	☐	☐	☒	☐
d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☒	☐
e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☒	☐

SETTING

ENVIRONMENTAL SETTING

Colma Creek, the City's main natural drainage system, is a perennial stream with a watershed of about 16.3 square miles that trends in a roughly southeasterly direction through the center of the City. The Colma Creek watershed is one of the three largest in the County. The basin is bounded on the northeast by San Bruno Mountain and on the west by a ridge traced by Skyline Boulevard. Dominant topographic features of the drainage basin include two relatively straight mountain ridges that diverge toward the southeast that are connected by a low ridge at the northern boundary of the area. The valley enclosed by the ridges widens toward the southeast where it drains into San Francisco Bay.

Flood hazard areas identified on the Flood Insurance Rate Map (FIRM) are identified as a Special Flood Hazard Area (SFHA). SFHA are defined as the area that will be inundated by the flood event having a one-percent chance of being equaled or exceeded in any given year. The one-percent annual

chance flood is also referred to as the base flood or 100-year flood. SFHAs are labeled as Zone A, Zone AO, Zone AH, Zones A1-A30, Zone AE, Zone A99, Zone AR, Zone AR/AE, Zone AR/AO, Zone AR/A1-A30, Zone AR/A, Zone V, Zone VE, and Zones V1-V30. Moderate flood hazard areas, labeled Zone B or Zone X (shaded) are also shown on the FIRM, and are the areas between the limits of the base flood and the 0.2-percent-annual-chance (or 500-year) flood. The areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2-percent-annual-chance flood, are labeled Zone C or Zone X (unshaded).

Areas subject to inundation by the one-percent-annual-chance flood event are generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.

The Project site is located in Zone X (unshaded); an area of minimal flooding.

REGULATORY FRAMEWORK

COUNTY

San Mateo Water Pollution Prevention Program (SMCWPPP)

To comply with the Clean Water Act, San Mateo County and the twenty cities and towns in the County, including the City of South San Francisco, formed the San Mateo Water Pollution Prevention Program (SMCWPPP). SMCWPPP is a partnership of the City/County Association of Governments (C/CAG) which share a common NPDES Permit, also referred to as the Municipal Regional Permit (MRP), from the RWQCB. This common permit allows each of the C/CAG co-permittees to discharge stormwater from their storm drain systems to San Francisco Bay. Under the provisions of the MRP, the City is required to take steps within its area of authority to reduce or eliminate pollutants in stormwater to the maximum extent practical.

CITY

South San Francisco Municipal Code

The South San Francisco Municipal Code includes Chapter 14.04 Stormwater Management and Discharge Control (Stormwater Ordinance), for the purpose of ensuring the future health, safety and general welfare of the City's citizens by:

(a) Eliminating nonstormwater discharges to the municipal separate storm sewer;

(b) Controlling the discharge to municipal separate storm sewers from spills, dumping or disposal of materials other than stormwater;

(c) Reducing pollutants in stormwater discharges to the maximum extent practicable.

The intent of the Stormwater Ordinance is to protect and enhance the water quality of our watercourses, water bodies and wetlands in a manner pursuant to and consistent with the Clean Water Act.

IMPACTS

a) Violate Water Quality Standards or Waste Discharge Requirements, or Substantially Degrade Surface or Groundwater Quality

Significance Criteria: The Project would have a significant environmental impact if it would result in the violation of water quality standards or waste discharge requirements, or if it would substantially degrade surface or groundwater quality.

Construction of the Project would include earthwork activities (i.e., grading, excavation, and other soil-disturbing activities). Stormwater runoff from disturbed soils associated with construction activities is a common source of pollutants (mainly sediment) to receiving waters. The Project would be subject to the South San Francisco Municipal Code, including Chapter 14.04 Stormwater Management and Discharge Control (Stormwater Ordinance), as levied through standard City conditions of project approval by the Water Quality Control Division of the Public Works Department. Specifically Chapter 14.04.180(d) requires BMPs for all new developments and redevelopments, including year round erosion control during construction until the site is stabilized by landscaping or permanent erosion control measures. This is consistent with the SMCWPPP, which requires stormwater BMPs during construction. These stormwater BMPs are required by the City in compliance with their permitting authority and are designed to reduce potential water quality impacts to less than significant.

Therefore, the Project would result in a less-than-significant impact with respect to violation of water quality standards or waste discharge standards as the result of the City's permitting requirements which are in compliance with regional, state and federal laws.

b) Deplete Groundwater Supplies or Interfere Substantially with Groundwater Recharge

Significance Criteria: The Project would have a significant environmental impact if it would result in the depletion of groundwater supplies or interfere substantially with groundwater recharge.

The Project would not utilize groundwater and would connect to the water supply infrastructure provided by California Water Service. Development of the 8,422 square foot site could not possibly interfere substantially with groundwater recharge. Therefore, the Project would have no impact related to groundwater supply and recharge.

ci through ciii) Alter Existing Drainage Pattern Resulting in Substantial Erosion, Siltation, or Flooding or Create or Contribute Runoff Water Exceeding capacity of Existing Stormwater Drainage Systems or Provide Substantial Additional Sources of Polluted Runoff

Significance Criteria: The Project would have a significant environmental impact if it would alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would result in substantial erosion, siltation, or flooding on- or off-site. The Project would also have a significant environmental impact if it would alter the existing drainage pattern of the site or area in a manner that would create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.

The Project would be subject to the South San Francisco Municipal Code, including Chapter 14.04 Stormwater Management and Discharge Control (Stormwater Ordinance), as levied through standard City conditions of project approval by the Water Quality Control Division of the Public Works

Department. Stormwater control measures are required by the City in compliance with their permitting authority and are designed to reduce potential water quality impacts to less than significant.

Therefore, the Project would result in a less-than-significant impact with respect to altered drainage patterns resulting in substantial erosion, siltation, and flooding, and exceeding the capacity of existing or planned stormwater drainage systems or generating additional polluted runoff.

civ and d). Impede or Redirect Flood Flows or Risk Release of Pollutants

Significance Criteria: The Project would have a significant environmental impact if it impedes or redirects flood flows or risks release of pollutants due to Project inundation in flood hazard, tsunami, or seiche zones.

Implementation of the Project would not result in the alteration of the course of a stream or river and the Project site is not within a 100-year or 500-year flood zone nor is it subject to inundation due to tsunami or seiche. On-site stormwater would not redirect stormwater flows from large storms in a manner that could redirect flood flows off-site as compared to existing conditions. Therefore, impacts related to impeding or redirecting flood flows, or an increased risk of release of pollutants due to Project inundation would be less than significant.

e) Conflict with Water Quality Control Plan or Sustainable Groundwater Management Plan

Significance Criteria: The Project would have a significant environmental impact if it conflicts with or obstructs implementation of a water quality control plan or sustainable groundwater management plan.

Refer to Impact a) and b), above. The Project would have a less than significant impact to water quality. The Project would not require ongoing groundwater withdrawals or substantially alter groundwater recharge, and therefore would not conflict with or obstruct implementation of a sustainable groundwater management plan. Therefore, impacts relating to conflicting with or obstruction of implementing a water quality control plan or sustainable groundwater management plan would be less than significant.

Hydrology and Water Quality Finding:

(1) The Project would be subject to the South San Francisco Municipal Code includes Chapter 14.04 Stormwater Management and Discharge Control (Stormwater Ordinance), as levied through standard City conditions of project approval by the Water Quality Control Division of the Public Works Department. These measures are required by the City in compliance with their permitting authority and are designed to reduce potential water quality impacts to less than significant. Therefore, the Project would result in a less-than-significant impact with respect to violation of water quality standards or waste discharge standards as the result of the City's permitting requirements which are in compliance with regional, state and federal laws.

(2) The Project would not utilize groundwater and would connect to the water supply infrastructure provided by California Water Service. Development of the 8,422 square foot site could not possibly interfere substantially with groundwater recharge. Therefore, the Project would have no impact related to groundwater supply and recharge.

(3) The Project would be subject to the South San Francisco Municipal Code includes Chapter 14.04 Stormwater Management and Discharge Control (Stormwater Ordinance), as levied through standard City conditions of project approval by the Water Quality Control Division of the Public Works Department. These measures are required by the City in compliance

with their permitting authority and are designed to reduce potential water quality impacts to less than significant.

Therefore, the Project would result in a less-than-significant impact with respect to altered drainage patterns resulting in substantial erosion, siltation, and flooding, and exceeding the capacity of existing or planned stormwater drainage systems or generating additional polluted runoff.

(4) Implementation of the Project would not result in the alteration of the course of a stream or river and the Project site is not within a 100-year or 500-year flood zone nor is it subject to inundation due to tsunami or seiche. On-site stormwater would not redirect stormwater flows from large storms in a manner that could redirect flood flows off-site as compared to existing conditions. Therefore, impacts related to impeding or redirecting flood flows, or an increased risk of release of pollutants due to Project inundation would be less than significant.

(5) The Project would have a less than significant impact to water quality. The Project would not require ongoing groundwater withdrawals or substantially alter groundwater recharge, and therefore would not conflict with or obstruct implementation of a sustainable groundwater management plan. Therefore, impacts relating to conflicting with or obstruction of implementing a water quality control plan or sustainable groundwater management plan would be less than significant.

XI. Land Use and Planning *Would the project:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Physically divide an established community?	☐	☐	☐	☒
b. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒

SETTING

The Project site is located in the northern portion of the City of South San Francisco, in an area known as the Paradise Valley/Terrabay planning sub area (page 21, 2040GP). The Project site is in the central portion of the planning area in a single-family neighborhood known as Sterling Terrace. The Project site is one of the very few remaining vacant lots in the Sterling Terrace neighborhood.

The Paradise Valley/Terrabay planning sub area spans the northern slope of Sign Hill to the City boundaries between the Town of Colma, Brisbane and San Bruno Mountain County Park to the north; Bayshore Boulevard to the South; and Hillside Boulevard to the west. Airport, Sister Cities and Hillside Boulevards are within the planning area. The planning area is largely residential. Older residential development, circa 1940-50, single family development, is located south of Sister Cities and Hillside Boulevards. The townhouse, single-family detached, duplex and condominium development associated with Terrabay Phases I and II are north of Sister Cities and Hillside Boulevards.

REGULATORY FRAMEWORK

GENERAL PLAN DESIGNATION

The Project site is designated Low Density Residential (RL) permitting up to eight (8) units per acre. The site is in within the Sterling Terrace neighborhood, constructed in the mid-20th century consisting of single-family detached residences.

ZONING DESIGNATION

The Project site is zoned Residential Low Density maximum of eight (8) units per acre (RL-8). South San Francisco Municipal Code.

IMPACTS

a-b) Physically divide an established community or cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect

Significance Criteria: The Project would have a significant environmental impact if it were to physically divide an established community and/or the Project would have a significant environmental impact if it were to result in a conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project adopted for the purpose of avoiding or mitigating an environmental effect.

The Project conforms to the general plan and zoning classifications for the site as shown in **Chapter 2 Project Description**. The lot was created in the late 1940s designed and intended for a single-family residence.

This chapter, **Chapter 3 Environmental Checklist** evaluates potential impacts associated with 20 environmental resource areas and cumulative impacts and finds Project related impacts to be less than significant with implementation of the measures required by law and **Mitigation Measures BIO-1, BIO-2, and GEO-1**.

The Project would have no impact on dividing an established community and would continue to be consistent with City's General Plan and zoning. The Project would conform to all applicable land use plans and zoning regulations and proposes environmental mitigations as part of the Project and, therefore, would have no impact.

Land Use and Planning Finding: The Project would have no impact on dividing an established community and would continue to be consistent with City's General Plan and zoning. The Project would conform to all applicable land use plans and zoning regulations and proposes environmental mitigations as part of the Project and, therefore, would have no impact.

XII. Mineral Resources *Would the project:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

IMPACTS

a) and b) Loss of Mineral Resources

Significance Criteria: The Project would have a significant environmental impact if it were to result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state, or if it were to result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

No mineral resources of value to the region and the residents of the state have been identified in South San Francisco (2040GP) The Project site has not been delineated as a locally important mineral recovery site in the 2040GP, on any specific plan, or on any other land use plan. Therefore, the Project would have no impact on any known mineral resource or result in the loss of availability of any locally important resource recovery site.

Minerals Finding: The Project site does not contain any local or regionally significant mineral resources. The Project would not result in an impact or contribute to a cumulative impact to mineral resources.

XIII. Noise *Would the project result in:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b. Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

INTRODUCTION

This section presents background noise information, local noise regulatory framework, and an analysis of potential noise and vibration impacts that would result from construction and operation of the Project.

ENVIRONMENTAL SETTING

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Noise is defined as unwanted sound. Sound pressure level has become the most common descriptor used to characterize the "loudness" of an ambient sound level. Sound pressure level is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain. Decibels are measured using different scales, and it has been found that A-weighting of sound levels best reflects the human ear's reduced sensitivity to low frequencies, and correlates well with human perceptions of the annoying aspects of noise. The A-weighted decibel scale (dBA) is cited in most noise criteria. All references to decibels (dB) in this report will be A-weighted unless noted otherwise.

Several time-averaged scales represent noise environments and consequences of human activities. The most commonly used noise descriptors are the equivalent A–weighted sound level over a given time period (Leq)[5]; average day–night 24-hour average sound level (Ldn)[6] with a nighttime increase of 10 dB to account for sensitivity to noise during the nighttime; and community noise equivalent level (CNEL)[7], also a 24-hour average that includes both an evening and a nighttime sensitivity weighting.

[5] The Equivalent Sound Level (Leq) is a single value of a constant sound level for the same measurement period duration, which has sound energy equal to the time–varying sound energy in the measurement period.

[6] Ldn is the day–night average sound level that is equal to the 24-hour A-weighted equivalent sound level with a 10-decibel penalty applied to night between 10:00 p.m. and 7:00 a.m.

[7] CNEL is the average A-weighted noise level during a 24-hour day, obtained by addition of 5 decibels in the evening from 7:00 to 10:00 p.m., and an addition of a 10–decibel penalty in the night between 10:00 p.m. and 7:00 a.m.

NOISE ATTENUATION

Stationary point sources of noise, including construction equipment, attenuate (lessen) at a rate of 6 to 7.5 dB per doubling of distance from the source, depending on ground absorption. Soft sites attenuate at 7.5 dB per doubling because they have an absorptive ground surface such as soft dirt, grass, or scattered bushes and trees. Hard sites have reflective surfaces (e.g., parking lots or smooth bodies of water) and therefore have less attenuation (6.0 dB per doubling). A street or roadway with moving vehicles (known as a "line" source), would typically attenuate at a lower rate, approximately 3 to 4.5 dB each time the distance doubles from the source, that also depends on ground absorption. Physical barriers located between a noise source and the noise receptor, such as berms or sound walls, would increase the attenuation that occurs by distance alone.

VIBRATION

Vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of ground-borne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment).

Vibration amplitudes are usually expressed in peak particle velocity (PPV) or root mean squared (RMS), as in RMS vibration velocity. The PPV and RMS velocity are normally described in inches per second (in/sec). PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is often used in monitoring of blasting vibration because it is related to the stresses that are experienced by buildings. Vibrational effects from typical construction activities are only a concern within 25 feet of existing structures.[8]

SENSITIVE RECEPTORS

The South San Francisco General Plan Noise Element defines noise-sensitive land uses as residences, schools, churches, and healthcare facilities. The closest sensitive receptors to the Project site include single family homes adjacent to the Project site on the east and west and across Franklin Avenue to the north. The residences adjacent to the Project site to the east and west are approximately 5 feet from the Project boundary, and homes across Franklin Avenue are 60 to 70 feet from the Project boundary.

REGULATORY FRAMEWORK

CITY

2040 General Plan (2040GP)

The 2040GP Noise Element is designed to provide policies that will guide development in a manner that protects the residents and employees of the City from exposure to unacceptable noise and vibration levels and make the City a healthier place for all. The Element contains land use criteria for noise as it pertains to various land uses. These criteria define the desirable maximum noise exposure of various land uses in addition to certain conditionally acceptable levels contingent upon the implementation of noise reduction measures. For residential land uses, exterior noise levels up to 65 dB, CNEL are acceptable and interior noise levels up to 45 dB, CNEL are acceptable (p 377, 2040GP). Figure 52 of the Noise Element shows the Project site in not within the 60 dB, CNEL airport noise contour (p 374, 2040GP).

[8] California Department of Transportation (Caltrans). 2002. Transportation Related Earthborne Vibrations.

Noise Ordinance

The City of South San Francisco regulates exterior noise levels through its Noise Ordinance (Chapter 8.32, SSFMC). The Noise Ordinance contains special provisions for construction activities (§ 8.32.050). Construction activities authorized by a valid city permit shall be allowed on weekdays between the hours of 8:00 a.m. and 8:00 p.m., on Saturdays between the hours of 9:00 a.m. and 8:00 p.m., and on Sundays and holidays between the hours of 10:00 a.m. and 6:00 p.m., or at such other hours as may be authorized by the permit, as long as they meet at least one of the following noise limitations:

- No individual piece of equipment shall produce a noise level exceeding ninety dB at a distance of twenty-five feet. If the device is housed within a structure or trailer on the property, the measurement shall be made outside the structure at a distance as close to twenty-five feet from the equipment as possible.
- The noise level at any point outside of the property plane of the project shall not exceed ninety dB. (Ord. 1088 § 1, 1990).

According to § 8.32.060 of the Noise Ordinance, if the applicant can show to the city manager, or the manager's designee, that a diligent investigation of available noise abatement techniques indicates that immediate compliance with the requirements of this chapter would be impractical or unreasonable, a permit to allow exception from the provisions contained in this chapter may be issued, with appropriate conditions to minimize the public detriment caused by such exceptions. Any such permit shall be of as short a duration as possible, but in no case for longer than six months. These permits are renewable upon a showing of good cause and shall be conditioned by a schedule for compliance and details of compliance methods in appropriate cases. (Ord. 1088 § 1,1990)

IMPACTS

a) Generation of a Substantial Temporary or Permanent Increase in Ambient Noise Levels in Excess of Local Standards.

Significance Criteria: Construction and operation of the Project would have a significant environmental impact if it were to result in a substantial temporary or permanent increase in ambient noise levels in the Project vicinity in excess of standards established in the City's Noise Ordinance or 2040GP.

Temporary Construction Noise Impacts

Construction would result in a temporary increase in ambient noise levels in the vicinity of the Project. Construction activities would require the use of numerous pieces of noise-generating equipment, such as excavating machinery (e.g., loaders, etc.) and other construction equipment (e.g., dozers, compactors, trucks, etc.). The noise levels generated by construction equipment would vary greatly depending upon factors such as the type and specific model of the equipment, the operation being performed, the condition of the equipment and the prevailing wind direction. The small size of the Project site limits the type and size of construction equipment that could be used. The maximum noise levels for various types of construction equipment that could be used during Project construction are provided in **Noise Table 1** below. Estimated maximum noise levels generated by construction equipment used for the Project would range from 84 to 90 dB, Lmax at 25 ft.

NOISE TABLE 1
TYPICAL NOISE LEVELS FROM CONSTRUCTION EQUIPMENT

Construction Equipment	Noise Level (dB, Lmax at 50 ft)	Noise Level (dB, Lmax at 25 ft)
Backhoe	78	84
Dump Truck	74	80
Dozer	82	88
Auger Drill Rig	84	90
Crane	81	87
Excavator	81	87
Compressor (Air)	78	84
Generator	81	87
Roller	80	86
Vibratory Concrete Mixer	80	86
Concrete Mixer Truck	79	85
Front End Loader	79	85

Source: Federal Highway Administration (FHWA) Roadway Construction Noise Model User's Guide, 2006.

Construction activities would be required to occur during the construction hours contained in the City's Noise Ordinance. The Noise Ordinance requires that construction activities shall take place on weekdays between the hours of 8:00 a.m. and 8:00 p.m., on Saturdays between the hours of 9:00 a.m. and 8:00 p.m., and on Sundays and holidays between the hours of 10:00 a.m. and 6:00 p.m. The Noise Ordinance also requires that construction activities meet at least one of the limitations discussed in the setting above, unless an exception permit is granted by the City Manager.

As noted in the 2040GP Program EIR (p 3.11-26, 2040GP Program EIR):

> "The City has not adopted numeric thresholds of significance for construction noise. Construction noise is typically considered temporary in nature, intermittent, and a normal part of living in a developed, urban area. However, the City has adopted mandatory requirements in the South San Francisco Municipal Code and General Plan Update that will ensure that construction noise associated with General Plan implementation remains less than significant. Municipal Code Section 8.32.050 regulates the time when construction activities may occur, limiting such activities to the period between 8:00 a.m. and 8:00 p.m. on weekdays, on Saturdays between the hours of 9:00 a.m. and 8:00 p.m., and on Sundays and holidays between the hours of 10:00 a.m. and 6:00 p.m. or when authorized by a permit. According to Section 8.32.060 of the Municipal Code, an exception may be granted to these hours only if an application for construction-related exception is made to and considered by the City Manager or the City Manager's designee. Section 8.32.050 of the Municipal Code is applied to all construction permits and compliance is mandatory and is monitored by City grading and building department personnel and is also monitored and addressed through reporting by members of the public when construction hours are not being observed. Furthermore, Policy 1-2 of the Noise Element requires enforcement of the City's Noise Ordinance noise performance standards. In addition, the Actions of Policy 1-2 include the requirement to restrict construction activities to acceptable time periods and to consider constructing temporary sound walls surrounding construction sites during construction. This ensures that construction noise will not occur to a level past what is stipulated in the Municipal Code when residents are most vulnerable to noise disturbance."

Therefore, compliance with mandatory requirements of the Municipal Code and 2040GP would ensure that construction noise occurs only at appropriate times of day and is minimized to acceptable levels. Therefore, construction noise impacts would be less than significant.

Permanent Operational Noise Impacts

Land Use Noise Compatibility Impacts on the Project

The Project site is in an existing residential neighborhood and is not nearby any major noise generating sources such as highways, railways, or industrial sources. The 2040GP confirms this as it identifies the site outside of the 65 dB noise contour for roadway and rail road noise exposure (Figure 51, p 372, 2040GP) and outside of the 60 dB contour for airport noise (Figure 52, p 374, 2040GP). Thus, exterior noise levels at the Project site are less than 65 dB, CNEL and would comply with the land use criteria for residential land uses contained in the 2040GP.

Noise reduction afforded by building construction can vary depending on construction materials and techniques. Standard construction practices typically provide approximately 25-30 dB exterior-to-interior noise level reduction provided that exterior windows and doors are closed (Caltrans 2002). Given that the exterior noise environment is less than 65 dB, CNEL, interior noise levels would be below 45 dB, CNEL and interior noise levels comply with the land use criteria for residential land uses contained in the 2040GP. Therefore, the effect of existing noise on the Project would be a less-than-significant impact.

Stationary Noise Impacts from the Project

Operation of the Project would not produce substantial levels of off-site noise. Mechanical equipment would be required to comply with the City's Noise Ordinance Section 8.32.030. The Project applicant would be required to submit a design plan for the Project demonstrating that the noise level from operation of mechanical equipment will not exceed the exterior noise level limits for adjacent receiving land use categories as specified in Noise Ordinance Section 8.32.030. Therefore, noise impacts from Project stationary equipment during operations would result in a less-than-significant impact.

b) Generation of Excessive Groundborne Vibration or Groundborne Noise Levels

Significance Criteria: The Federal Transit Administration (FTA) recommends a threshold of 0.5 ppv for residential and commercial structures (FTA, 2006). The Project would have a significant environmental impact if it were to generate groundborne vibration levels that would exceed a peak particle velocity (ppv) threshold of 0.5 inch per second.

Policy NOI-2 of the 2040GP requires a vibration analysis for sensitive receptors for any construction-related activities located with 100-feet of residential or other sensitive receptors, that require the uses of pile driving or other construction method that has the potential to produce high vibration levels. The Project is within 100-feet of sensitive receptors, however pile driving or other construction methods producing high vibration levels would not be used. Nevertheless, vibration from Project construction activities was analyzed to ensure the FTA's threshold would not be exceeded.

Ground vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance. The effects of ground vibration may be imperceptible at the lowest levels, low rumbling sounds and detectable vibrations at moderate levels, and slight damage to nearby structures at the highest levels. Construction operations have the potential to result in varying degrees of temporary ground vibration, depending on the specific construction equipment used and operations involved.

At the highest levels of vibration, damage to structures is primarily architectural (e.g., loosening and cracking of plaster or stucco coatings) and rarely results in structural damage. For most structures, a peak particle velocity (ppv) threshold of 0.5 inch per second or less is sufficient to avoid structural damage. The FTA recommends a threshold of 0.5 ppv for residential and commercial structures, 0.25 ppv for historic buildings and archaeological sites, and 0.2 ppv for non-engineered timber and masonry buildings (FTA, 2006). There are no historic buildings, archeological sites, or engineered timber and masonry buildings in the vicinity of the Project site.

Construction could occur as close as approximately 10 feet to the nearest residential structures to the east and west. The estimated vibration levels (ppv) for construction equipment that could be used for Project construction is shown in **Noise Table 2** at 10 and 25 feet.

NOISE TABLE 2
TYPICAL VIBRATION LEVELS FROM CONSTRUCTION EQUIPMENT

Construction Equipment	PPV at 25-feet (in/sec)	PPV at 10-feet (in/sec)	Exceeds 0.5 PPV Threshold?
Large Bulldozer	0.089	0.35	No
Caisson Drilling	0.089	0.35	No
Loaded Trucks	0.076	0.30	No
Small Bulldozer	0.003	0.01	No

Source: Federal Transit Administration, 2006.

As shown in **Noise Table 2**, the vibration levels from typical construction equipment expected to be used for construction of the Project would not exceed the 0.5 ppv threshold recommended by the FTA. Therefore, vibrational impacts during construction would be less than significant.

Temporary Construction Noise Impacts

c) Aircraft Noise

Significance Criteria: The Project would have a significant environmental impact if it were located within an airport land use plan (or, where such a plan has not been adopted, within two miles of a public airport or public use airport) or in the vicinity of a private airstrip and were to expose people residing or working in the Project area to excessive noise levels.

San Francisco International Airport is approximately 2.5 miles southeast of the site. The Project site is not within the San Mateo County Airport Land Use Commission's (ALUC) and ALUC Plan Area jurisdiction. The Project is not within 2 miles of a private airstrip. There would be no impact associated with airport noise.

Noise Finding:

(1) Compliance with mandatory requirements of the Municipal Code and 2040GP would ensure that construction noise occurs only at appropriate times of day and is minimized to acceptable levels. Therefore, construction noise impacts would be less than significant.

Exterior and interior noise levels would comply with the land use criteria for residential land uses contained in the 2040GP. Therefore, the effect of existing noise on the Project would be a less-than-significant impact.

Operation of the Project would not produce substantial levels of off-site noise. Mechanical equipment would be required to comply with the City's Noise Ordinance Section 8.32.030. Therefore, noise impacts from Project stationary equipment during operations would result in a less-than-significant impact.

(2) Vibration levels from typical construction equipment expected to be used for construction of the Project would not exceed the 0.5 ppv threshold recommended by the FTA. Therefore, vibrational impacts during construction would be less than significant.

(3) San Francisco International Airport is approximately 2.5 miles southeast of the site. The Project site is not within the San Mateo County Airport Land Use Commission's (ALUC) and ALUC Plan Area jurisdiction. The Project is not within 2 miles of a private airstrip. There would be no impact associated with airport noise.

XIV. Population and Housing *Would the project:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐
b. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

SETTING

The vacant site was once developed with a single-family residence and is part of a single-family detached neighborhood known as Sterling Terrace. The neighborhood was constructed in the late 1940s-1950s. The Project would be the infill construction of one single-family detached residence in a subdivision planned and zoned for such development.

IMPACTS

a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

Significance Criteria: The Project would have a significant environmental impact if it were to induce either directly or indirectly substantial population growth.

The Project site has been planned for a single-family residence since the neighborhood's development in the 1940-1950s. The Project is a residence and not a source of employment, albeit it is likely that residents of the household would be employed. The Project would not add to the growth assumptions contained in the 2040GP and the impact on population growth would be less than significant.

b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

Significance Criteria: The Project would have a significant environmental impact if it would result in the displacement of substantial numbers of existing housing units or people living at the project site.

There are no residential units on the Project site. The Project would add a residential unit in a neighborhood with aging residential stock. The Project would have no impact on the displacement of housing or people.

Population and Housing Finding:

(1) The Project would not add to the growth assumptions contained in the 2040GP and the impact on population growth would be less than significant.

(2) The Project would add a residential unit in a neighborhood with aging residential stock. The Project would have no impact on the displacement of housing or people.

XV. Public Services *a. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
1. Fire protection?	☐	☐	☐	☒
2. Police protection?	☐	☐	☐	☒
3. Schools?	☐	☐	☐	☒
4. Parks?	☐	☐	☐	☒
5. Other public facilities?	☐	☐	☐	☒

SETTING

The vacant site was once developed with a single-family residence and is part of a single-family detached neighborhood known as Sterling Terrace. The neighborhood was constructed in the late 1940s-1950s. The Project would be the infill construction of one single-family detached residence in a subdivision planned and zoned for such development.

IMPACTS

a)1-5. Public Services

Significance Criteria: The Project would have a significant environmental impact if it were to result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for fire protection, police protection, schools, parks and recreational facilities, or other government facilities.

The addition of one single-family residence within an existing single-family neighborhood would have no impact on service ratios, response times or other performance objectives for any of the public services. No new or physically altered governmental facilities would be required with the Project. School impact fees are required for new construction and paid for at the time of building permit issuance. Therefore, the Project would have no impact.

Public Services Finding a)1-5.: The addition of one single-family residence within an existing single-family neighborhood would have no impact on service ratios, response times or other performance objectives for any of the public services. No new or physically altered governmental facilities would be required with the Project. School impact fees are required for new construction and paid for at the time of building permit issuance. Therefore, the Project would have no impact.

XVI. Recreation *Would the project:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒

SETTING

IMPACTS

a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated; and

b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

Significance Criteria: The Project would have a significant environmental impact if it were to result in an increase in the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated, or if the Project includes recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

The addition of one single-family residence within an existing single-family neighborhood would have no impact on neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated. The Project would not require the construction or expansion of recreational facilities. Therefore, the Project would have no impact.

Parks and Recreation Finding:

(1) The addition of one single-family residence within an existing single-family neighborhood would have no impact on neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated. The Project would not require the construction or expansion of recreational facilities. Therefore, the Project would have no impact.

XVII. Transportation *Would the project:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☐	☒
b) Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☐	☐	☐	☒
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
d) Result in inadequate emergency access?	☐	☐	☐	☒

SETTING

The Project is in the central portion of the planning area in a single-family neighborhood known as "Sterling Terrace". The Project site is located at the northeastern edge of the looped portion of Franklin Avenue, approximately 300 feet from the intersection of Highland and Franklin Avenues and 700 feet from the intersection of Larch and Franklin Avenues. Franklin Avenue intersects Hillside Boulevard, approximately 1,300 feet north of the Project site. Franklin Avenue is largely a northeast/southwest trending roadway that jogs west at its intersection of Larch Avenue, in the Project area.

Hillside Boulevard provides access to both the western and eastern portions of the City. Hillside Boulevard connects to Sister Cities Boulevard northwest of the site; at this intersection Sister Cities Boulevard trends easterly and in conjunction with Airport and Oyster Point Boulevards forms a leg of the Oyster Point Flyover while Hillside Boulevards continues in a westerly direction. The Oyster Point Flyover provides access to north and southbound U.S. Highway 101, as well as the East of 101 Area.

Hillside Boulevard provides access to the western and central portions of the City through a series of local, connector and arterial streets. Hillside Boulevard intersects Chestnut Avenue. Chestnut Avenue turns into Westborough Boulevard when it crosses El Camino Real. Westborough Boulevard provides access to Interstate 280, Skyline Boulevard and the City of Pacifica. Hillside Boulevard also forms the boundary between the Town of Colma and South San Francisco approximately 1,000 north of the Project site.

Sidewalks are present on both sides of Franklin Avenue. Franklin Avenue has a 60 foot right-of-way. Roadways in the Project area are not identified as needing major improvements in the 2040GP.

IMPACTS

a) Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities;

c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment), and

d) Result in inadequate emergency access.

Significance Criteria: The Project would have a significant environmental impact if it were to conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities, substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment), or result in inadequate emergency access.

The addition of one single-family residence within an existing single-family neighborhood would have no impact on plans, ordinances, or policies addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities. The roadways serving the Project are already developed within the existing residential neighborhood, thus the Project would not increase hazards due to geometric design features or incompatible uses. The development of the vacant lot within the existing single-family neighborhood would not result in inadequate emergency access. Therefore, the Project would have no impact.

b) A significant impact would result if the project were in conflict or inconsistent with CEQA Guidelines section 15064.3, subdivision (b).

Significance Criteria: The Project would have a significant environmental impact if the Project were in conflict or inconsistent with CEQA Guidelines section 15064.3, subdivision (b).

Vehicle miles traveled (VMT) refers to the amount and distance of vehicle travel attributable to a project. VMT generally represents the number of vehicle trips generated by a project multiplied by the average trip length for those trips. The California Governor's Office of Planning and Research (OPR) document Technical Advisory on Evaluating Transportation Impacts in CEQA provides general direction regarding the methods to be employed and significance criteria to evaluate VMT impacts, absent polices adopted by local agencies. Small projects (defined as a Project that generates 110 or fewer average daily vehicles trips) are presumed to have a less than significant VMT impact. The Project would develop one single-family residence and would generate far below 110 average daily trips.[9] Therefore, the Project would have a less-than-significant impact on VMT.

Transportation Finding:

(1) The addition of one single-family residence within an existing single-family neighborhood would have no impact on plans, ordinances, or policies addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities. The roadways serving the Project are already developed within the existing residential neighborhood, thus the Project would not increase hazards due to geometric design features or incompatible uses. The

[9] California Governor's Office of Planning and Research (OPR). 2018. Technical Advisory on Evaluating Transportation Impacts in CEQA, April 2018.

development of the vacant lot within the existing single-family neighborhood would not result in inadequate emergency access. Therefore, the Project would have no impact.

(2) Small projects (defined as a Project that generates 110 or fewer average daily vehicles trips) are presumed to have a less than significant VMT impact. The Project would develop one single-family residence and would generate far below 110 average daily trips. Therefore, the Project would have a less-than-significant impact on VMT.

XVIII. Tribal Cultural Resources *Would the project:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Would the Project Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resource Code § 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☐	☒	☐
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code § 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code § 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☐	☒	☐

SETTING

Archaeological, cultural, and historic resources are vetted in **Chapter 3, Section V** above. The Project site is vacant resulting from a mudslide in 1982 that moved the residence into the street. The residence was constructed in 1949 as part of the Sterling Terrace subdivision. Portions of the old foundation appear on the site. The site is relatively flat, 10 percent slope along Franklin Avenue, and rises to a 60 percent slope in the mid-and rear portions of the lot. The varying topography is predominately from cut and fill activities and slope. The site measures approximately 45 feet in width along Franklin Avenue and 70 feet at the rear, 145 feet in depth along the right side and 152 feet along the left side consisting of 8,422 square feet (see **Chapter 2, Project Description**). The site is highly disturbed from mudslides, slope instability and pervious grading.

REGULATORY FRAMEWORK

STATE

Assembly Bill 52 (AB 52)

AB52 became effective July 1, 2015 and requires notification to Native American tribes that are traditionally and culturally affiliated with the geographic location of a project that is being proposed. The Lead Agency, in this case the City of South San Francisco, is required by law to within 14 days of an application being deemed complete, provide a formal notification to the designated contact or tribal representative of traditionally and culturally affiliated California Native American tribe(s) that have requested notice.

No designated contact or tribal representative of traditionally and culturally affiliated California Native American tribes have requested to be noticed by the City pursuant to AB 52. Therefore, the City has no obligation to consult as no one has requested notification to be consulted.

IMPACTS

a)i-ii. Tribal Cultural Resources

Significance Criteria: The Project would have a significant environmental impact if it were to cause a substantial adverse change in the significance of a tribal cultural resource (TCR), defined in Public Resource Code § 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe.

Native Americans, over 5,000 years ago, typically settled along creek banks and the margins of San Francisco Bay. The Project site is upland and remote, more than a mile from historic baylands, and approximately two miles west of a known archaeological site along the historic baylands.

No historic resources are located on the Project site as defined by Public Resources Code 5024.1. The site is relatively flat, 10 percent slope along Franklin Avenue, and rises to a 60 percent slope in the mid- and rear portions of the lot. The varying topography is predominately from cut and fill activities and slope instability. The grading and paving associated with construction of the road and subdivision as well as the deep mudslides in 1955 and 1982 would have destroyed archaeological resources in the unlikely event they had once been present in the area. Project impacts associated with archaeological resources are less than significant due to the remote location of the Project, more than a mile from the historic baylands and the cut and fill and slope instability that has historically occurred on the site.

In accordance with the California Health and Safety Code, if human remains are encountered during ground-disturbing activities, the City shall immediately halt potentially damaging excavation in the area of the remains and notify the San Mateo County Coroner and a professional archaeologist to determine the nature of the remains. The Coroner is required to examine all discoveries of human remains within 48 hours of receiving notice of a discovery on private or State lands (California Health and Safety Code Section 7050.5[b]). Therefore, the Project would have a less than significant impact tribal cultural resources.

Tribal Resources Finding: No historic resources are located on the Project site as defined by Public Resources Code 5024.1. Project impacts are less than significant due to the remote location of the Project, more than a mile from the historic Baylands, and the cut and fill and slope instability that has historically occurred on the site. If human remains are encountered, the Project would be required to comply with the California Health and Safety Code. Therefore, the Project would have a less than significant impact on tribal cultural resources.

XIX. Utilities and Service Systems *Would the project:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☒	☐
b. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☒	☐
c. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☒	☐
d. Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐
e. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☒	☐

SETTING

The vacant site was once developed with a single-family residence and is part of a single-family detached neighborhood known as Sterling Terrace. The neighborhood was constructed in the late 1940s-1950s. The Project would be the infill construction of one single-family detached residence in a subdivision planned and zoned for such development.

IMPACTS

a-c) Water, Wastewater Treatment, Stormwater Drainage, Electrical Power, Natural Gas, or Telecommunications Facilities, Water Supply, and Wastewater Treatment Capacity.

Significance Criteria: The Project would have a significant environmental impact if it were to require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects. Additionally, the Project would have a significant environmental impact if insufficient water supply or wastewater treatment capacity were available to service the Project.

The Project would connect to the existing utility and service system facilities provided to the site. The Project would be subject to the South San Francisco Municipal Code includes Chapter 14.04 Stormwater Management and Discharge Control (Stormwater Ordinance), as levied through standard City conditions of project approval by the Water Quality Control Division of the Public Works Department. These measures are required by the City in compliance with their permitting authority and are designed to reduce potential water quality impacts to less than significant.

The Project is one single-family residence within an existing neighborhood and the Project site has historically been used for residential use. The addition of one residence would have a less-than-significant impact on water supply or wastewater treatment capacity.

d-e) Solid Waste

Significance Criteria: The Project would have a significant environmental impact if it were to generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals. Additionally, the Project would have a significant environmental impact if it did not comply with federal, state, and local management and reduction statutes and regulations related to solid waste.

The Project is one single-family residence within an existing neighborhood and the Project site has historically been used for residential use. The solid waste generated by one additional residence would have a negligible impact on solid waste infrastructure capacity and would not impair the attainment of solid waste reduction goals. The Project is required to comply with federal, state, and local regulations related to solid waste. The addition of one residence would have a less-than-significant impact on solid waste.

Utilities and Service Systems Finding:

(1) The Project would connect to the existing utility and service system facilities provided to the site. The Project would be subject to the South San Francisco Municipal Code includes Chapter 14.04 Stormwater Management and Discharge Control (Stormwater Ordinance), as levied through standard City conditions of project approval by the Water Quality Control Division of the Public Works Department. These measures are required by the City in compliance with their permitting authority and are designed to reduce potential water quality impacts to less than significant.

The Project is one single-family residence within an existing neighborhood and the Project site has historically been used for residential use. The addition of one residence would have a less-than-significant impact on water supply or wastewater treatment capacity.

(2) The Project is one single-family residence within an existing neighborhood and the Project site has historically been used for residential use. The solid waste generated by one additional residence would have a negligible impact on solid waste infrastructure capacity and would not impair the attainment of solid waste reduction goals. The Project is required to comply with federal, state, and local regulations related to solid waste. The addition of one residence would have a less-than-significant impact on solid waste.

XX. Wildfire *If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:*	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒
c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒
d. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

SETTING

REGULATORY FRAMEWORK

The Project site, as well as the City of South San Francisco, is not located in Very High Fire Hazard Severity Zone (VHFHSZ) as mapped by CalFire and shown on their Fire Survey Maps.[10] Cities from Burlingame, located north of Interstate 280, up the Peninsula to San Francisco are not in a VHFHSZ.

The 2040GP, Figure 44 California Fire Hazard Severity Zones (FHSZ) does identify San Bruno Mountain State and County Park, located in San Mateo County (SBMCP), and adjacent to the northern South San Francisco boundary as being within a California Fire Hazard Severity Zone. This is consistent with CalFire maps that designate SBMCP as a state responsibility area (SRA) and a moderate fire hazard zone. SBMCP is located approximately .4 mi north of the Project site.

IMPACTS

a-d) Wildfire

Significance Criteria: A significant impact would occur if the Project would substantially impede an adopted emergency response plan or emergency evacuation plan; be located in an area associated with wildland fire risks; require the installation and maintenance of road, firebreaks, etc. and expose people of structures to significant risks in or near a SRA or VHFHSZ.

The Project site is not within or near a SRA or VHFHSZ. The 2040GP, Figure 44 California Fire Hazard Severity Zones (FHSZ) does identify SBMCP in San Mateo County and adjacent to the northern South San Francisco boundary as being within a California Fire Hazard Severity Zone. This is consistent with CalFire maps that designate SBMCP as a SRA and a moderate fire hazard zone. SBMCP is located

[10] CalFire, State Responsibility Area Fire Hazard Severity Zones, June 15, 2023, https://osfm.fire.ca.gov/media/nefnkmtw/fhsz_county_sra_11x17_2022_sanmateo_2.pdf, Accessed August 14, 2023.

approximately .4 mi north of the Project site. Therefore, there would be no impacts associated with wildfire.

Wildfire Finding: The Project site is not within or near a SRA or VHFHSZ. Therefore, there would be no impacts associated with wildfire.

XXI. Mandatory Finding of Significance	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a. Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☒	☐
c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

a) Environmental Quality: All environmental impacts associated with aesthetics, agriculture and forest resources, air quality, energy, GHG emissions, cultural resources including important examples of the major periods of California history or prehistory, hazards and hazardous materials, hydrology and water quality, land use and planning, mineral resources, noise, population and housing, public services, recreation, utilities and service systems, transportation, and tribal cultural resources would be less than significant. **Mitigation Measures BIO-1** and **BIO-2** would reduce potentially significant impacts to biological resources to less than significant. Therefore, the Project within implementation of mitigation, would not substantially degrade the quality of the environment, substantially impact fish or wildlife including plant and animal communities, or eliminate important examples of the major periods of California history or prehistory.

b) Cumulative Impacts

The Project has no cumulatively considerable impacts.

c) Adverse Effects on Human Beings

Mitigation Measure GEO-1 would reduce potentially significant impacts to geology and soils associated with potential future debris flows. Therefore, the Project with implementation of mitigation, would not have environmental effects that would cause substantial adverse effects on human beings, either directly or indirectly.

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APPENDIX A

PROJECT PLAN SET

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NEW CONSTRUCTION

52 FRANKLIN AVENUE, SOUTH SAN FRANCISCO, CALIFORNIA 94080

APN: 012.039.180

GENERAL NOTES

BUILDING
1. MINIMUM CEILING HEIGHT IS 7'-6" CLEAR, FROM FINISH FLOOR TO THE FINISHED CEILING, U.O.N.
2. WINDOWS WITHIN THE TUB/SHOWER ENCLOSURE AND THE BOTTOM EXPOSED EDGE IS LESS THAN 60-INCHES ABOVE THE DRAIN INLET SHALL BE SAFETY GLAZING.
3. ALL EXPOSED WOOD MEMBERS SHALL BE PRESSURE TREATED WOOD OR REDWOOD.
4. ALL HARDWARE AND FASTENER EXPOSED TO WEATHER OR IN CONTACT WITH PRESSURE TREATED WOOD SHALL BE HOT-DIPPED GALVANIZED.

ELECTRICAL
1. A DEDICATED BATHROOM CIRCUIT IS REQUIRED, MULTIPLE BATHS ON THE SAME CIRCUIT IS ALLOWED. ALL RECEPTACLES SHALL BE GFCI PROTECTED
2. A SEPARATE 20-AMP CIRCUIT IS REQUIRED TO SUPPLY BATHROOM OUTLETS ONLY, OR A SINGLE BATHROOM
3. A MINIMUM OF TWO 20 AMP, DEDICATED KITCHEN COUNTER CIRCUITS ARE REQUIRED. ALL KITCHEN COUNTER RECEPTACLE OUTLETS SHALL BE GROUND-FAULT CIRCUIT-INTERRUPTER (GFCI) PROTECTED. THE COUNTER TOP CIRCUITS CAN ONLY BE SHARED WITH THE DINING ROOM OR A PANTRY. DISHWASHERS, GARBAGE DISPOSALS, INSTA-HOTS, COMPACTORS, BUILT IN MICROWAVE OVENS, AND THE KITCHEN LIGHTING SHALL NOT BE ON THE SAME ELECTRICAL CIRCUITS.
4. RECEPTACLES SHALL BE LOCATED SO NO APPLIANCE WILL BE FURTHER THAN 2' FROM ANY RECEPTACLE OUTLET. (4' MAX APART LOCATED ON ALL COUNTERS). COUNTER TOPS WIDER THAN 12" REQUIRE RECEPTACLE OUTLETS.
5. THE RECEPTACLES MAY NOT BE LOCATED MORE THAN 12" BELOW THE COUNTER SURFACE AND OR BELOW A COUNTER THAT EXTENDS MORE THAN 6" BEYOND A CABINETS END.
6. THE MAXIMUM LENGTH OF ELECTRICAL CORDS FOR A GARBAGE DISPOSAL IS 36" AND A DISHWASHERS REQUIRE HANDLE TIE-BARS ON THE BREAKER IN THE ELECTRICAL SERVICE PANEL.
7. ALL LIGHTING SHALL BE HIGH EFFICACY LED OR EQ.
8. ALL 120-VOLT, SINGLE PHASE, 15- AND 20- AMPERE BRANCH CIRCUITS SUPPLYING OUTLETS INSTALLED IN DWELLING UNIT FAMILY ROOMS, DINING ROOMS, LIVING ROOMS, PARLORS, LIBRARIES, DENS, BEDROOMS, SUNROOMS, RECREATION ROOMS, CLOSETS, HALLWAYS, OR SIMILAR ROOMS OR AREA SHALL BE PROTECTED BY A LISTED ARC-FAULT CIRCUIT INTERRUPTER, COMBINATION-TYPE, INSTALLED TO PROVIDE PROTECTION OF BRANCH CIRCUIT.
9. IN ALL HABITABLE AREAS, HALLWAYS, KITCHEN, BATHROOMS, GARAGES, AND AREA OUTSIDE OF THE RESIDENCE, ALL 120 VOLT, 15- AND 20- AMP RECEPTACLES SHALL BE LISTED TAMPER-RESISTANT RECEPTACLES.

PLUMBING
1. SHOWER COMPARTMENTS SHALL HAVE A MINIMUM OF 1024 SQ. INCHES AND SHALL BE CAPABLE OF ENCOMPASSING A 30-INCHES CIRCLE TO A HEIGHT AT LEAST 72-INCHES ABOVE THE THRESHOLD. VALVES, SHOWERHEAD, SOAP DISH AND SHELVES MAY PROTRUDE INTO THIS SPACE.
2. JOB-FORMED SHOWER PAN LINER MUST SLOPE¼ -INCHES PER FOOT TO WEEP HOLES IN DRAIN, AND INSPECTED UNDER TEST PRIOR TO COVERING.
3. SHOWERHEAD CANNOT DISCHARGE DIRECTLY AT ENTRANCE.
4. SHOWER DOOR SHALL OPEN OUTWARD AND SHALL BE MINIMUM 22-INCHES WIDE.
5. ALL NEW GAS PIPING SHALL BE SIZED TO SUFFICIENT GAS TO THE APPLIANCES. THE GAS PIPING SHALL BE TESTED WITH 10 LBS OF AIR PRESSURE FOR A MINIMUM OF 15 MINUTES.
6. ALL OVEN AND STOVE GAS VALVES SHALL BE READILY ACCESSIBLE AND BE WITHIN 3' OF THE APPLIANCE. FLEXIBLE GAS CONNECTORS MAY NOT BE CONCEALED OR PASS THROUGH ANY FLOOR, WALL PARTITION, CEILING OR APPLIANCE HOUSING.
7. AN AIR-GAP, ABOVE THE SIN RIM, SHALL BE INSTALLED BETWEEN THE DISHWASHER DRAINPIPE AND THE GARBAGE DISPOSAL INLET.
8. A PRESSURE-ABSORBING DEVICE (WATER HAMMAR ARRESTOR) SHALL BE INSTALLED BEFORE THE DISHWASHER ANGLE-STOP. THE DEVICE SHALL BE AN AIR-CHAMBER OR APPROVED MECHANICAL DEVICE.
9. ANY PLUMBING PIPES THAT SHOULD RUN UNDER OR THROUGH THE FOUNDATION FOR THE BRACED WALL (NON-BEARING WALL) SHALL BE SLEEVE IN A ONE SIZE LARGER PLASTIC PIPE OR FOUR FOAM WRAPS (CPC312.10)

MECHANICAL
1. BACK DRAFT DAMPERS ARE REQUIRED ON VENTILATION SYSTEMS EXHAUSTING TO EXTERIOR
2. MECHANICAL VENTILATION WILL BE REQUIRED, FAN EXHAUST SHOULD BE 3-FEET FROM BUILDING OPENINGS AND PROPERTY LINES. FOR NATURAL VENTILATION, AN OPERABLE WINDOW MINIMUM 3 SQ. FEET WITH 1.5 SQ. FEET IN VENT AREA
3. A MINIMUM VERTICAL CLEARANCE OF 30" IS REQUIRED ABOVE A RANGE OR COOK TOP TO COMBUSTIBLES MATERIALS, AND A MINIMUM VERTICAL CLEARANCE OF 24" ABOVE A RANGE OR COOK TOP TO A BUILT-IN MICROWAVE OVEN IS REQUIRED.
4. MECHANICAL VENTILATION IS REQUIRED IN THE KITCHEN IF OPERABLE WINDOWS OR OPERABLE SKYLIGHTS WITH A NET CLEAR OPENING OF AT LEAST 4% OF THE FLOOR AREA IS NOT PROVIDED, OR ADEQUATE VENTILATION CANNOT BE OBTAINED FROM AN ADJOINING ROOM.

ENERGY
1. ALL JOISTS, PENETRATION AND OTHER OPENINGS IN THE BUILDING ENVELOPE THAT ARE POTENTIAL SOURCE OF AIR LEAKAGE SHALL BE CAULK, GASKET, WEATHER-STRIPPED OR OTHERWISE SEALED TO LIMIT INFILTRATION (CEC 110.7)
2. TEMPORARY NFRC LABELS ON NEW WINDOWS AND EXTERIOR DOORS SHALL NOT BE REMOVED UNTIL AFTER FINAL INSPECTION (CEC 110.6(A).
3. THERMOSTATS SHALL HAVE SETBACK CAPABILITIES (CEC 110.2(c) & 150(i))

OTHER
1. GENERAL CONTRACTOR SHALL VERIFY THE SITE CONDITION & DIMENSION BEFORE ORDER ANY BUILDING MATERIAL.
2. GENERAL CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS AND EXISTING CONDITIONS (WHERE APPLICABLE) AT THE JOB SITE AS WELL AS THE PROVISIONS OF THE ENTIRE CONSTRUCTION DOCUMENTS AND BRING TO THE ARCHITECT'S AND ENGINEER'S ATTENTION ANY DISCREPANCY.

ABBREVIATIONS

ABV.	ABOVE
A.D.	AREA DRAIN
ADJ.	ADJUSTABLE
A.F.F.	ABOVE FINISH FLOOR
BD.	BOARD
BEL.	BELOW
BLK.	BLOCK
BLKG.	BLOCKING
BM.	BEAM
B.O.	BY OTHERS
BOT.	BOTTOM
BSMT.	BASEMENT
CAB.	CABINET
C.B.	CATCH BASIN
CEM.	CEMENT
C.I.	CAST IRON
CLG.	CEILING
CLO.	CLOSET
CLR.	CLEAR
CONC.	CONCRETE
CONT.	CONTINUOUS
CNTR.	COUNTER
CTR.	CENTER
D.	DRYER
DBL.	DOUBLE
DET.	DETAIL
DIA.	DIAMETER
DIM.	DIMENSION
DISP.	DISPOSAL
D.W.	DISH WASHER
DR.	DOOR
D.S.	DOWN SPOUT
DWG.	DRAWING
DRWR.	DRAWER
'E' OR (E)	EXISTING
EA.	EACH
EL.	ELEVATION
ELEC.	ELECTRICAL
EQ.	EQUAL
EXP.	EXPANSION
FUR.	FURNACE
F.D.	FLOOR DRAIN
FDN.	FOUNDATION
FIN.	FINISH
F.F.E.	FINISH FLOOR ELEVATION
F.F.C.	FINISH CEILING ELEVATION
FLR.	FLOOR
F.O.C.	FACE OF CONCRETE
FT.	FOOT OR FEET
FTG.	FOOTING
FURR.	FURRING
G.B.	GRAB BAR
GL.	GLASS
GRND.	GROUND
GRD.	GRADE
GYP.	GYPSUM
H.B.	HOSE BIB
HDWD.	HARDWOOD
HORIZ.	HORIZONTAL
HGT.	HEIGHT
H.S.	HABITABLE SPACE
I.D.	INSIDE DIAMETER
INSUL.	INSULATION
INT.	INTERIOR
JT.	JOINT
KIT.	KITCHEN
LAM.	LAMINATE
LAV.	LAVATORY
LT.	LIGHT
MAX.	MAXIMUM
M.C.	MEDICINE CABINET
MECH.	MECHANICAL
MIN.	MINIMUM
MIR.	MIRROR
MISC.	MISCELLANEOUS
MTL.	METAL
MDF.	MEDIUM DENSITY FIBERBOARD
'N' OR (N)	NEW
N.I.C.	NOT IN CONTRACT
NO.	NUMBER
N.T.S.	NOT TO SCALE
N.H.S.	NON-HABITABLE SPACE
O.C.	ON CENTER
O.D.	OUTSIDE DIAMETER
O.D.	OVERFLOW DRAIN
OPNG.	OPENING
OPP.	OPPOSITE
PERF.	PERFORATED
P.G.	PAINT GRADE
PL.	PLATE
PLYWD.	PLYWOOD
PR.	PAIR
PT.	POINT
R.	RADIUS
REF.	REFRIGERATOR
REINF.	REINFORCED
R.D.	ROOF DRAIN
REQ'D	REQUIRED
RESIL.	RESILIENT
RET.	RETAINING
RM.	ROOM
R.O.	ROUGH OPENING
S.	SINK
SHCED.	SCHEDULE
SHWR.	SHOWER
SHTH.	SHEATHING
SHT.	SHEET
SIM.	SIMILAR
S.D.	SMOKE DETECTOR
SPEC.	SPECIFICATION
SQ.	SQUARE
S.L.D.	SEE LANDSCAPE DRAWING
S.S.	STAINLESS STEEL
S.S.D.	SEE STRUCTURAL DRAWING
STD.	STANDARD
STL.	STEEL
STO.	STORAGE
SYM.	SYMMETRICAL
T.	TREAD
TBD.	TO BE DESIGNED
TEL.	TELEPHONE
T&G	TONGUE AND GROOVE
TYP.	TYPICAL
T.O.	TOP OF
T.O.S.	TOP OF SLAB
U.O.N.	UNLESS OTHERWISE NOTED
VERT.	VERTICAL
VEST.	VESTIBULE
V.I.F.	VERIFY IN FIELD
W.	WASHER
W/	WITH
W.H.	WATER HEATHER
W.C.	WATER CLOSET
WD.	WOOD
W.I.	WROUGHT IRON
W.I.C.	WALK-IN CLOSET
W/O	WITHOUT
W/O	WHERE OCCURS
WP.	WATERPROOF
WT.	WEIGHT
<	ANGLE
@	AT
ø	DIAMETER
#	POUND OF NUMBER

WATER CONSERVATION REQUIREMENT

1. WATER CLOSET: MAX. 1.28 GAL/FLUSH.
2. WALL MOUNTED URINALS: MAX. 0.125 GAL/FLUSH.
3. OTHER URINALS: MAX. 0.5 GAL/FLUSH.
4. MULTIPLE SHOWERHEADS: COMBINED FLOW RATE OF ALL SHOWERHEADS CONTROLLED BY A SINGLE VALVE SHALL NOT EXCEED 1.8 GPM @ 80 PSI, OR ONLY 1 SHOWER OUTLET IS TO BE IN OPERATION AT A TIME.
5. RESIDENTIAL LAVATORY FAUCETS: MAX. FLOW RATE 1.2 GPM @ 60 PSI; MIN. FLOW RATE 0.8 GPM @ 20 PSI.
6. LAVATORY FAUCETS IN COMMON AND PUBLIC USE AREAS OF RESIDENTIAL BUILDINGS: MAX. 0.5 GPM @ 60 PSI.
7. METERING FAUCETS: MAX. 0.2 GALLONS PER CYCLE.
8. KITCHEN FAUCETS: MAX. 1.8 GPM @ 60 PSI; TEMPORARY INCREASE TO 2.2 GPM ALLOWED BUT SHALL DEFAULT TO 1.8 GPM

WALLS ENCLOSING CONDITIONED SPACE

R-VALUES ON THE PLAN VIEW SHALL MATCH THE R-VALUES ON CF-1R FORM.
VALUES SHALL BE: (FOR PRESCRIPTIVE PACKAGE D, CF-1R FORMS)
R-15 IN 2x4 STUDS / R-21 IN 2x6 STUDS / R-22 IN 2x8 STUDS / R-30 IN 2x10 STUDS / R-38 IN 2x12 STUDS OR SPECIFY THE R-VALUE ON THE COMPUTER GENERATED CF-1R FORM (PERFORMANCE METHOD) (CNC STD 151 (f) 1 & TABLES 151-B, C OR D AND REFERENCE APPENDICES TABLE 4.3.1).

CEILINGS BETWEEN GARAGE AND ROOMS ABOVE, AND AT FLOORS WITH CRAWL SPACES

R-VALUES ON THE PLAN VIEW SHALL MATCH THE R-VALUES ON CF-1R FORM.
VALUES SHALL BE: (FOR PRESCRIPTIVE PACKAGE D, CF-1R FORMS)
R-13 IN 2x4 JOISTS / R-19 IN 2x6 JOISTS / R-22 IN 2x8 JOISTS / R-30 IN 2x10 JOISTS / R-38 IN 2x12 JOISTS OR SPECIFY THE R-VALUE ON THE COMPUTER GENERATED CF-1R FORM (PERFORMANCE METHOD) (CNC STD 151 (f) 1 & TABLES 151-B, C OR D AND REFERENCE APPENDICES TABLE 4.3.1).

CALGREEN REQUIREMENTS

ANY INSTALLED GAS FIREPLACE SHALL BE A DIRECT-VENT SEALED-COMBUSTION TYPE. ANY INSTALLED WOODSTOVE OR PELLET STOVE SHALL COMPLY WITH U.S. EPA NEW SOURCE PERFORMANCE STANDARDS (NSPS) EMISSION LIMITS AS APPLICABLE, AND SHALL HAVE A PERMANENT LABEL INDICATING THEY ARE CERTIFIED TO MEET EMISSION LIMITS. WOODSTOVES, PELLET STOVES, AND FIREPLACES SHALL ALSO COMPLY WITH ALL APPLICABLE LOCAL ORDINANCES.

AT THE TIME OF ROUGH INSTALLATION, DURING STORAGE ON THE CONSTRUCTION SITE AND UNTIL FINAL STARTUP OF THE HEATING, COOLING AND VENTILATING EQUIPMENT, ALL DUCT AND OTHER RELATED AIR INTAKE AND DISTRIBUTION COMPONENT OPENINGS SHALL BE COVERED. TAPE, PLASTIC, SHEETMETAL OR OTHER METHODS ACCEPTABLE TO THE ENFORCING AGENCY TO REDUCE THE AMOUNT OF WATER, DUST AND DEBRIS ENTERING THE SYSTEM MAYBE USED.

ADHESIVES, SEALANTS AND CAULKS USED ON THE PROJECT SHALL MEET THE REQUIREMENTS OF THE FOLLOWING STANDARDS UNLESS MORE STRINGENT LOCAL OR REGIONAL AIR POLLUTION OR AIR QUALITY MANAGEMENT DISTRICT RULES APPLY:
1. ADHESIVES, ADHESIVE BONDING PRIMERS, ADHESIVE PRIMERS, SEALANTS, SEALANT PRIMERS, AND CAULKS SHALL COMPLY WITH LOCAL OR REGIONAL AIR POLLUTION CONTROL OR AIR QUALITY MANAGEMENT DISTRICT RULES WHERE APPLICABLE OR SCAQMD RULE 1168 VOC LIMITS, AS SHOWN IN TABLE 4.504.1 OR 4.504.2, AS APPLICABLE. SUCH PRODUCTS SHALL ALSO COMPLY WITH THE RULE 1168 PROHIBITION ON THE USE OF CERTAIN TOXIC COMPOUNDS (CHLOROFORM, ETHYLENE DICHLORIDE, METHYLENE CHLORIDE, PERCHLOROETHYLENE AND TRICHLOROETHYLENE), EXCEPT FOR AEROSOL PRODUCTS, AS SPECIFIED IN SUBSECTION 2.
2. AEROSOL ADHESIVES, AND SMALLER UNIT SIZES OF ADHESIVES, AND SEALANT OR CAULKING COMPOUNDS (IN UNITS OF PRODUCT, LESS PACKAGING, WHICH DO NOT WEIGH MORE THAN 1 POUND AND DO NOT CONSIST OF MORE THAN 16 FLUID OUNCES) SHALL COMPLY WITH STATEWIDE VOC STANDARDS AND OTHER REQUIREMENTS, INCLUDING PROHIBITIONS ON USE OF CERTAIN TOXIC COMPOUNDS, OF CALIFORNIA CODE OF REGULATIONS (CCR), TITLE 17, COMMENCING WITH SECTION 94507.

ARCHITECTURAL PAINTS AND COATINGS SHALL COMPLY WITH VOC LIMITS IN TABLE 1 OF THE AIR RESOURCES BOARD ARCHITECTURAL SUGGESTED CONTROL MEASURE, AS SHOWN IN TABLE 4.504.3, UNLESS MORE STRINGENT LOCAL LIMITS APPLY. THE VOC CONTENT LIMIT FOR COATINGS THAT DO NOT MEET THE DEFINITIONS FOR THE SPECIALTY COATINGS CATEGORIES LISTED IN TABLE 4.504.3 SHALL BE DETERMINED BY CLASSIFYING THE COATING AS A FLAT, NONFLAT, OR NONFLAT-HIGH GLOSS COATING, BASED ON ITS GLOSS, AS DEFINED IN SUBSECTIONS 4.21, 4.36, AND 4.37 OF THE 2007 CALIFORNIA AIR RESOURCES BOARD, SUGGESTED CONTROL MEASURE, AND THE CORRESPONDING FLAT, NONFLAT, OR NONFLAT-HIGH GLOSS VOC LIMIT IN TABLE 4.504.3 SHALL APPLY.

CARPET INSTALLED IN THE BUILDING INTERIOR SHALL MEET THE TESTING AND PRODUCT REQUIREMENTS OF 1 OF THE FOLLOWING:
1. CARPET AND RUG INSTITUTE'S GREEN LABEL PLUS PROGRAM.
2. CALIFORNIA DEPARTMENT OF PUBLIC HEALTH, "STANDARD METHOD FOR THE TESTING AND EVALUATION OF VOLATILE ORGANIC CHEMICAL EMISSIONS FROM INDOOR SOURCES USING ENVIRONMENTAL CHAMBERS," VERSION 1.1, FEBRUARY 2010 (ALSO KNOWN AS SPECIFICATION 01350).
3. NSF/ANSI 140 AT THE GOLD LEVEL.
4. SCIENTIFIC CERTIFICATIONS SYSTEMS INDOOR ADVANTAGE™ GOLD.

CALGREEN REQUIREMENTS

WHERE RESILIENT FLOORING IS INSTALLED, AT LEAST 80% OF FLOOR AREA RECEIVING RESILIENT FLOORING SHALL COMPLY WITH 1 OR MORE OF THE FOLLOWING:
1. PRODUCTS COMPLIANT WITH THE CALIFORNIA DEPARTMENT OF PUBLIC HEALTH, "STANDARD METHOD FOR THE TESTING AND EVALUATION OF VOLATILE ORGANIC CHEMICAL EMISSIONS FROM INDOOR SOURCES USING ENVIRONMENTAL CHAMBERS," VERSION 1.1, FEBRUARY 2010 (ALSO KNOWN AS SPECIFICATION 01350), CERTIFIED AS A CHPS LOW-EMITTING MATERIAL IN THE COLLABORATIVE FOR HIGH PERFORMANCE SCHOOLS (CHPS) HIGH PERFORMANCE PRODUCTS DATABASE.
2. PRODUCTS CERTIFIED UNDER UL GREENGUARD GOLD (FORMERLY THE GREENGUARD CHILDREN & SCHOOLS PROGRAM).
3. CERTIFICATION UNDER THE RESILIENT FLOOR COVERING INSTITUTE (RFCI) FLOORSCORE PROGRAM.
4. MEET THE CALIFORNIA DEPARTMENT OF PUBLIC HEALTH, "STANDARD METHOD FOR THE TESTING AND EVALUATION OF VOLATILE ORGANIC CHEMICAL EMISSIONS FROM INDOOR SOURCES USING ENVIRONMENTAL CHAMBERS," VERSION 1.1, FEBRUARY 2010 (ALSO KNOWN AS SPECIFICATION 01350).

HARDWOOD PLYWOOD, PARTICLEBOARD AND MEDIUM DENSITY FIBERBOARD COMPOSITE WOOD PRODUCTS USED ON THE INTERIOR OR EXTERIOR OF THE BUILDING SHALL MEET THE REQUIREMENTS FOR FORMALDEHYDE AS SPECIFIED IN THE AIR RESOURCES BOARD'S AIR TOXICS CONTROL MEASURE FOR COMPOSITE WOOD (17 CCR 93120 ET SEQ.), AS SHOWN IN TABLE 4.504.5.

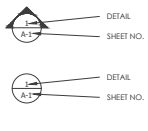
CONCRETE SLAB FOUNDATIONS OR CONCRETE SLAB-ON-GROUND FLOORS REQUIRED TO HAVE A VAPOR RETARDER BY THE CALIFORNIA BUILDING CODE, CHAPTER 19, OR THE CALIFORNIA RESIDENTIAL CODE, CHAPTER 5, RESPECTIVELY, SHALL ALSO COMPLY WITH THIS SECTION.

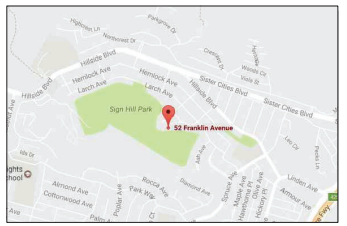
BUILDING MATERIALS WITH VISIBLE SIGNS OF WATER DAMAGE SHALL NOT BE INSTALLED. WALL AND FLOOR FRAMING SHALL NOT BE ENCLOSED WHEN THE FRAMING MEMBERS EXCEED 19% MOISTURE CONTENT. MOISTURE CONTENT SHALL BE VERIFIED IN COMPLIANCE WITH THE FOLLOWING:
1. MOISTURE CONTENT SHALL BE DETERMINED WITH EITHER A PROBE-TYPE OR A CONTACT-TYPE MOISTURE METER. EQUIVALENT MOISTURE VERIFICATION METHODS MAY BE APPROVED BY THE ENFORCING AGENCY AND SHALL SATISFY REQUIREMENTS IN SECTION 101.8.
2. MOISTURE READINGS SHALL BE TAKEN AT A POINT 2 FEET TO 4 FEET FROM THE GRADE STAMPED END OF EACH PIECE TO BE VERIFIED.
3. AT LEAST 3 RANDOM MOISTURE READINGS SHALL BE PERFORMED ON WALL AND FLOOR FRAMING WITH DOCUMENTATION ACCEPTABLE TO THE ENFORCING AGENCY PROVIDED AT THE TIME OF APPROVAL TO ENCLOSE THE WALL AND FLOOR FRAMING. INSULATION PRODUCTS WHICH ARE VISIBLY WET OR HAVE A HIGH MOISTURE CONTENT SHALL BE REPLACED OR ALLOWED TO DRY PRIOR TO ENCLOSURE IN WALL OR FLOOR CAVITIES. MANUFACTURERS' DRYING RECOMMENDATIONS SHALL BE FOLLOWED FOR WET-APPLIED INSULATION PRODUCTS PRIOR TO ENCLOSURE.

EACH BATHROOM SHALL BE MECHANICALLY VENTILATED AND SHALL COMPLY WITH THE FOLLOWING:
1. FANS SHALL BE ENERGY STAR COMPLIANT AND BE DUCTED TO TERMINATE OUTSIDE THE BUILDING.
2. UNLESS FUNCTIONING AS A COMPONENT OF A WHOLE HOUSE VENTILATION SYSTEM, FANS MUST BE CONTROLLED BY A HUMIDITY CONTROL.
   A. HUMIDITY CONTROLS SHALL BE CAPABLE OF MANUAL OR AUTOMATIC ADJUSTMENT BETWEEN A RELATIVE HUMIDITY RANGE OF ≤ 50% TO A MAXIMUM OF 80%.
   B. A HUMIDITY CONTROL MAY BE A SEPARATE COMPONENT TO THE EXHAUST FAN AND IS NOT REQUIRED TO BE INTEGRAL OR BUILT-IN.

HVAC SYSTEM INSTALLERS SHALL BE TRAINED AND CERTIFIED IN THE PROPER INSTALLATION OF HVAC SYSTEMS AND EQUIPMENT BY A RECOGNIZED TRAINING OR CERTIFICATION PROGRAM. EXAMPLES OF ACCEPTABLE HVAC TRAINING AND CERTIFICATION PROGRAMS INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
1. STATE CERTIFIED APPRENTICESHIP PROGRAMS.
2. PUBLIC UTILITY TRAINING PROGRAMS.
3. TRAINING PROGRAMS SPONSORED BY TRADE, LABOR OR STATEWIDE ENERGY CONSULTING OR VERIFICATION ORGANIZATIONS.
4. PROGRAMS SPONSORED BY MANUFACTURING ORGANIZATIONS.5. OTHER PROGRAMS ACCEPTABLE TO THE ENFORCING AGENCY.

DRAWING SYMBOLS





VICINITY MAP

N.T.S.

PROPERTY INFORMATION

PLANNING DATA

OWNER / REPRESENTATIVE	JUAN PEDRO DIAZ
ADDRESS	52 FRANKLIN AVENUE, SSF, CA 94080
APN	012.039.180
ZONING DISTRICT	RL-B
LOT AREA	8,422 S.F.
MAX. LOT COVERAGE	50% (4,211 S.F.)
PROPOSED LOT COVERAGE	30% (2,528 S.F.)
MAX. F.A.R.	50% (4,211 S.F.)
PROPOSED F.A.R.	39.64% (3,316 S.F.)

	ALLOW	PROPOSED
BUILDING HEIGHT	28'-0"	27'-5"
NUMBER OF UNITS	N/A	1
NUMBER OF STORIES	2	2
OFF STREET PARKING SPACE	2	2

BUILDING DATA	PROPOSED	NOTES
CONSTRUCTION TYPE	V-B	
OCCUPANCY GROUP	R-3	
FIRE SPRINKLER*	NO	
FIRE ALARM*	NO	

BUILDING AREA PER FLOOR**	INCREASE / DECREASE	PROPOSED
1ST FLOOR - ATTACHED GARAGE	788 S.F.	788 S.F.
1ST FLOOR - CONDITIONAL	0 S.F.	0 S.F.
2ND FLOOR - CONDITIONAL	2,528 S.F.	2,528 S.F.
GROSS BUILDING AREA		3,316 S.F.
GROSS FLOOR AREA (CONDITIONAL SPACE ONLY)		2,528 S.F.

*ANY MODIFICATION TO FIRE SPRINKLER SYSTEM OR INSTALL NEW FIRE SPRINKLER SYSTEM SHALL OBTAIN UNDER SEPARATE PERMIT

**OWNER/REPRESENTATIVE UNDERSTANDS THAT ANY REFERENCE TO SQUARE FOOTAGE STATED HEREIN IS APPROXIMATE ONLY AND SHALL VERIFY THE MEASUREMENT FOR ACCURACY. OWNER/REPRESENTATIVE WAIVE ANY CLAIM AGAINST THE COMPANY REGARDING THE ACCURACY OF ANY SUCH MEASUREMENT.

APPLICABLE CODE

2022 CALIFORNIA BUILDING, ELECTRICAL, ENERGY, MECHANICAL, FIRE, PLUMBING, RESIDENTIAL, GREEN BUILDING STANDARDS CODE

SCOPE OF WORK

ERECT TWO - STORY SINGLE FAMILY BUILDING

LIST OF DRAWINGS

ARCHITECTURAL

A0.0	COVER SHEET, GENERAL NOTES, ABBREVIATIONS & PROPERTY INFORMATION
A1.0	SITE PLANS AND PHOTOGRAPHS
A1.1	CUT/FILL DIAGRAM AND LANDSCAPE PLAN
A2.0	PROPOSED 1ST FLOOR PLAN
A2.1	PROPOSED 2ND FLOOR PLAN
A2.2	PROPOSED ROOF PLAN
A4.0	ELEVATIONS
A4.1	ELEVATIONS
A4.2	RENDERINGS
A5.0	SECTIONS
A6.0	DOOR SCHEDULE
A6.1	WINDOW SCHEDULE

INNOVATIVE CONSULTING ENGINEER
338 N. Canal Suite # 20
S. San Francisco, CA 94080
(650) 741-6968
(650) 741-6966
info@icedesigninc.com

OWNER / REPRESENTATIVE:

JUAN PEDRO DIAZ

52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO,
CA 94080

SHEET TITLE:

PROJECT DATA, DRAWING INDEX, DRAWING ABBREVIATIONS, SYMBOLS AND GENERAL NOTES

PROJECT ADDRESS:

52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO,
CA 94080

APN: 012.039.180

PROJECT DESCRIPTION:

ERECT NEW TWO-STORY SINGLE FAMILY

REGISTERED PROFESSIONAL ENGINEER
JEFF T. CHOW
C 81252
EXP. 09/30/2025
CIVIL
STATE OF CALIFORNIA

NOTES	BY
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△	
△	
△	
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DATE	03/15/2022
SCALE	AS NOTED
DRAWN	J.H.
JOB	220207
SHEET	A0.0
	OF SHEETS

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PHOTO #1

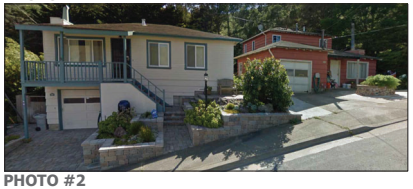


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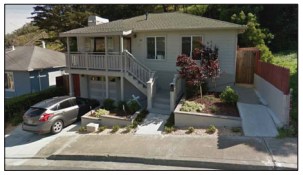


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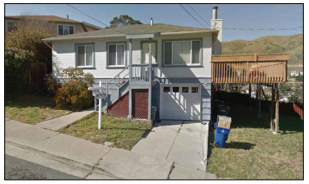
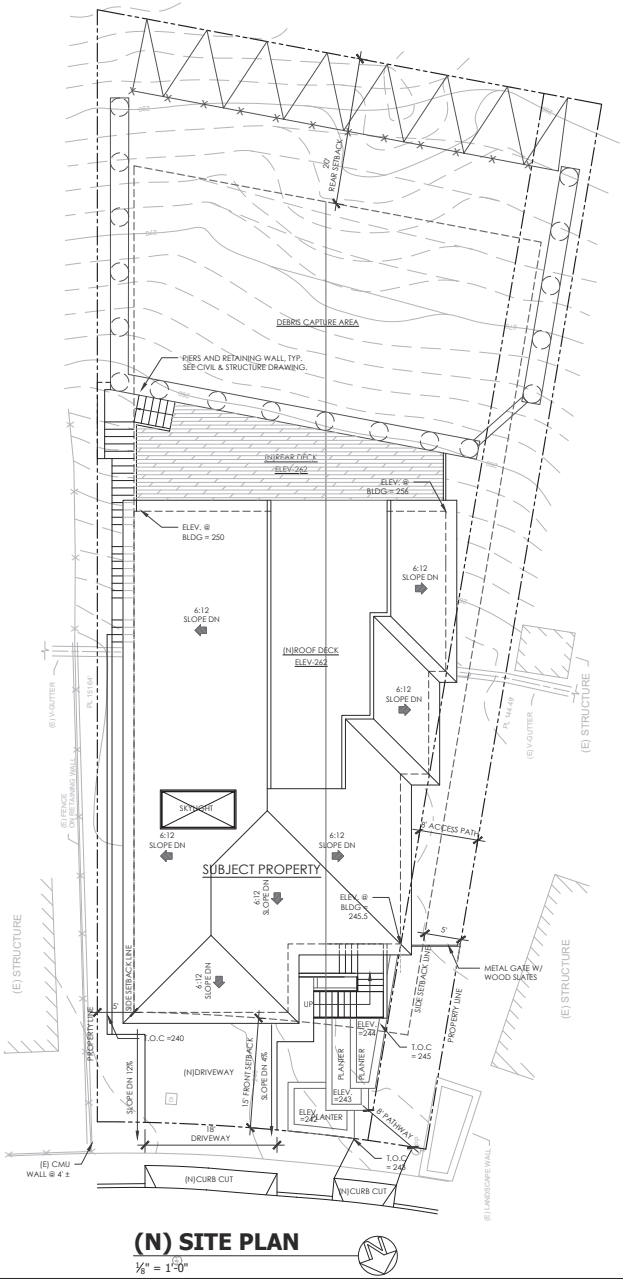


PHOTO #4



(E) SITE PLAN

1/8" = 1'-0"



(N) SITE PLAN

1/8" = 1'-0"

INNOVATIVE CONSULTING ENGINEER

338 N. Canal Suite # 20
S. San Francisco, CA 94080
(650) 741-6968
(650) 741-6966
info@icedesigninc.com

OWNER / REPRESENTATIVE:

JUAN PEDRO DIAZ

52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO,
CA 94080

SHEET TITLE:

SITE PLANS & PHOTOGRAPHS

PROJECT ADDRESS:

52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO,
CA 94080

APN: 012.039.180

PROJECT DESCRIPTION:

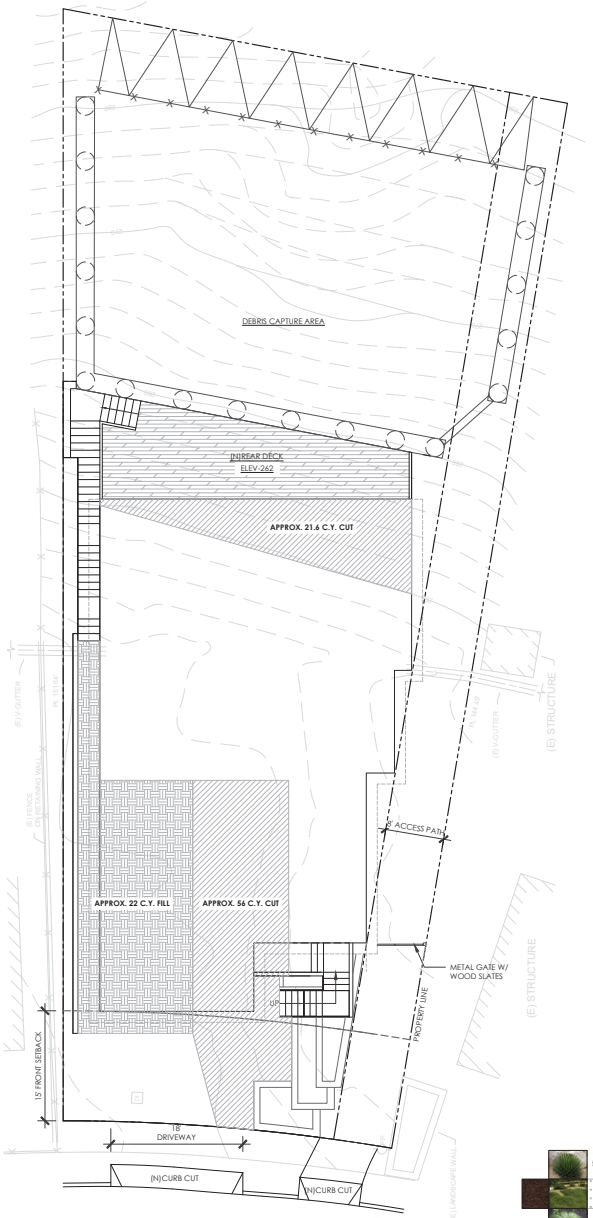
ERECT NEW TWO-STORY SINGLE FAMILY

REGISTERED PROFESSIONAL ENGINEER
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C 81252
EXP. 09/30/2025
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STATE OF CALIFORNIA

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JOB	220207
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CUT/FILL DIAGRAM

1/8" = 1'-0"

FRONT SETBACK LANDSCAPE REQUIREMENT

(EXCEPT WITH PLANNING CODE SEC. 155) PROVIDE 20% OF UNPAVED AREA LANDSCAPE OF THE FRONT SETBACK WITH MINIMUM OF 2(35) LANDSCAPING AND PERMEABLE SURFACES. THE SUBJECT SITE HAS 694 SQUARE FEET OF THE SETBACK AREA FOR THE SUBJECT SITE IS 694 SQUARE FEET, AND THE REQUIRED DEBRIS LANDSCAPING REQUIREMENT WOULD BE 694 SQUARE FEET.

FRONT SETBACK LANDSCAPE CALCULATION	SQUARE FEET
TOTAL FRONT SETBACK AREA	694 FT
TOTAL ACCESS PATH AREA	133 FT
TOTAL REMAINING AREA	561 FT
TOTAL YARD LANDSCAPE AREA	
50% T.F.Y. 561 SQFT = 347.5 SQFT	
50% T.F.Y. 694 FT = 347.5 FT	694 > 348

FRONT SETBACK LANDSCAPE CALCULATION

TOTAL FRONT YARD	=694 SQ.FT.
8'0 ACCESS PATH AREA	=133 SQ.FT.
FRONT YARD LANDSCAPE REQUIRED	=50% OF T.F.Y. =694 x 50% =347 SQ.FT.
LANDSCAPE PROVIDED	=394 SQ.FT. > REQUIRED

IMPERVIOUS AREA CALCULATION

TOTAL LANDSCAPE AREA	=1,075 SQ.FT.
GROUND COVER (DEBRIS CAPTURE AREA)	=2,956 SQ.FT.
GRAVEL AREA	=688 SQ.FT.
PERMEABLE PAVER	=479 SQ.FT.
TOTAL PERVIOUS AREA	=5,198 SQ.FT.
TOTAL IMPERVIOUS AREA	=3,224 SQ.FT.
LOT AREA	=8,422 SQ.FT.

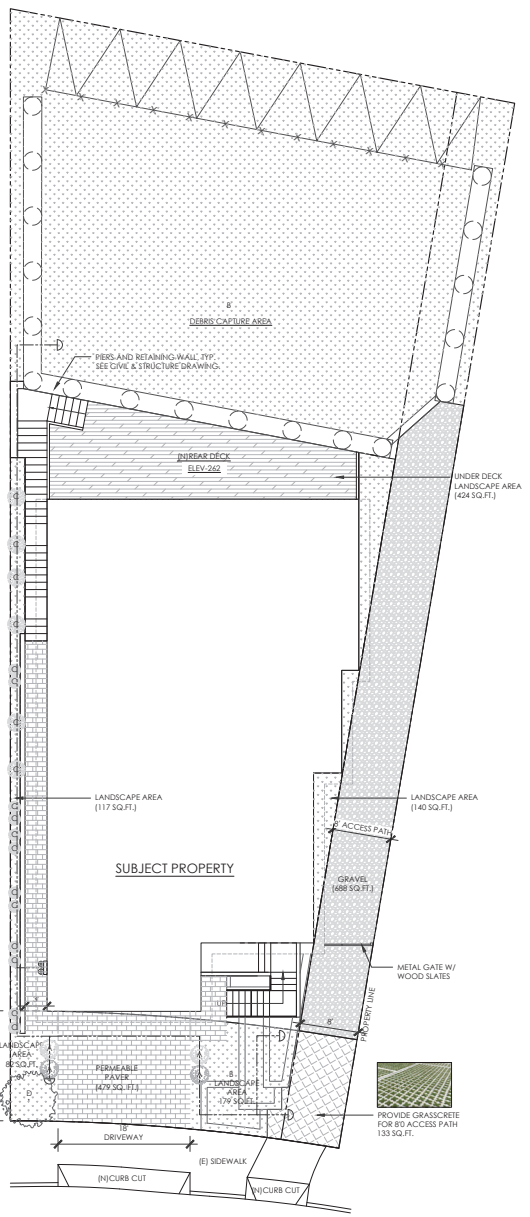
PERVIOUS AREA 61.7% PROVIDED
> 50% LOT AREA

DRIP IRRIGATION SYSTEM
DRIP IRRIGATION SYSTEM
PRESSURE GAUGE
END CAP

PLANTS

SYMBOL	BOTANICAL NAME	PLANT TYPE	GROWTH RATE	WATER USE	PLANT FACTOR RANGE
A	AGAVE AMERICANA	PLANT	SLOW	VERY LOW	<0.1
B	BACCHARIS PILLURARIS & MULCH	GROUND COVER	MODERATE	LOW	N/A
C	CAREX ALBULA 'FROSTY CURLS'	PLANT	FAST	MEDIUM	N/A
D	TREE	TREE	SLOW	LOW	N/A





LANDSCAPE PLAN

1/8" = 1'-0"

INNOVATIVE CONSULTING ENGINEER
338 N. Canal Suite # 20
S. San Francisco, CA 94080
(650) 741-6968
(650) 741-6966
info@icedesigninc.com

OWNER / REPRESENTATIVE:

JUAN PEDRO DIAZ

52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO,
CA 94080

SHEET TITLE:

CUT/FILL DIAGRAM & LANDSCAPE PLAN

PROJECT ADDRESS:

52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO,
CA 94080

APN: 012.039.180

PROJECT DESCRIPTION:

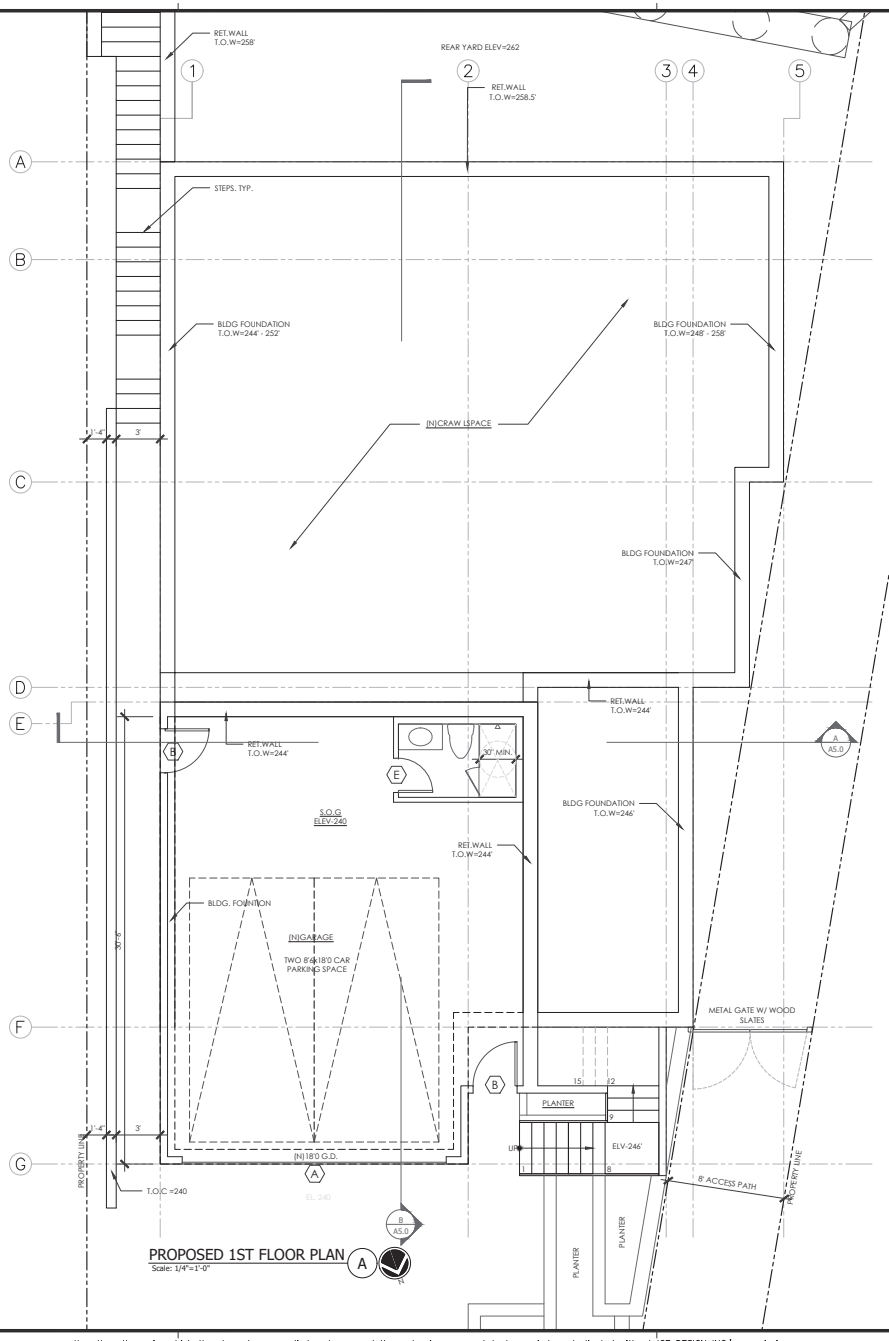
ERECT NEW TWO-STORY SINGLE FAMILY

REGISTERED PROFESSIONAL ENGINEER
JEFF T. CHOW
C 81252
EXP. 09/30/2023
CIVIL
STATE OF CALIFORNIA

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ENGINEER

338 N. Canal Suite # 20
S. San Francisco, CA 94080
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JUAN PEDRO DIAZ

52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO,
CA 94080

SHEET TITLE:

PROPOSED 1ST FLOOR PLAN

PROJECT ADDRESS:

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CA 94080

APN: 012.039.180

PROJECT DESCRIPTION:

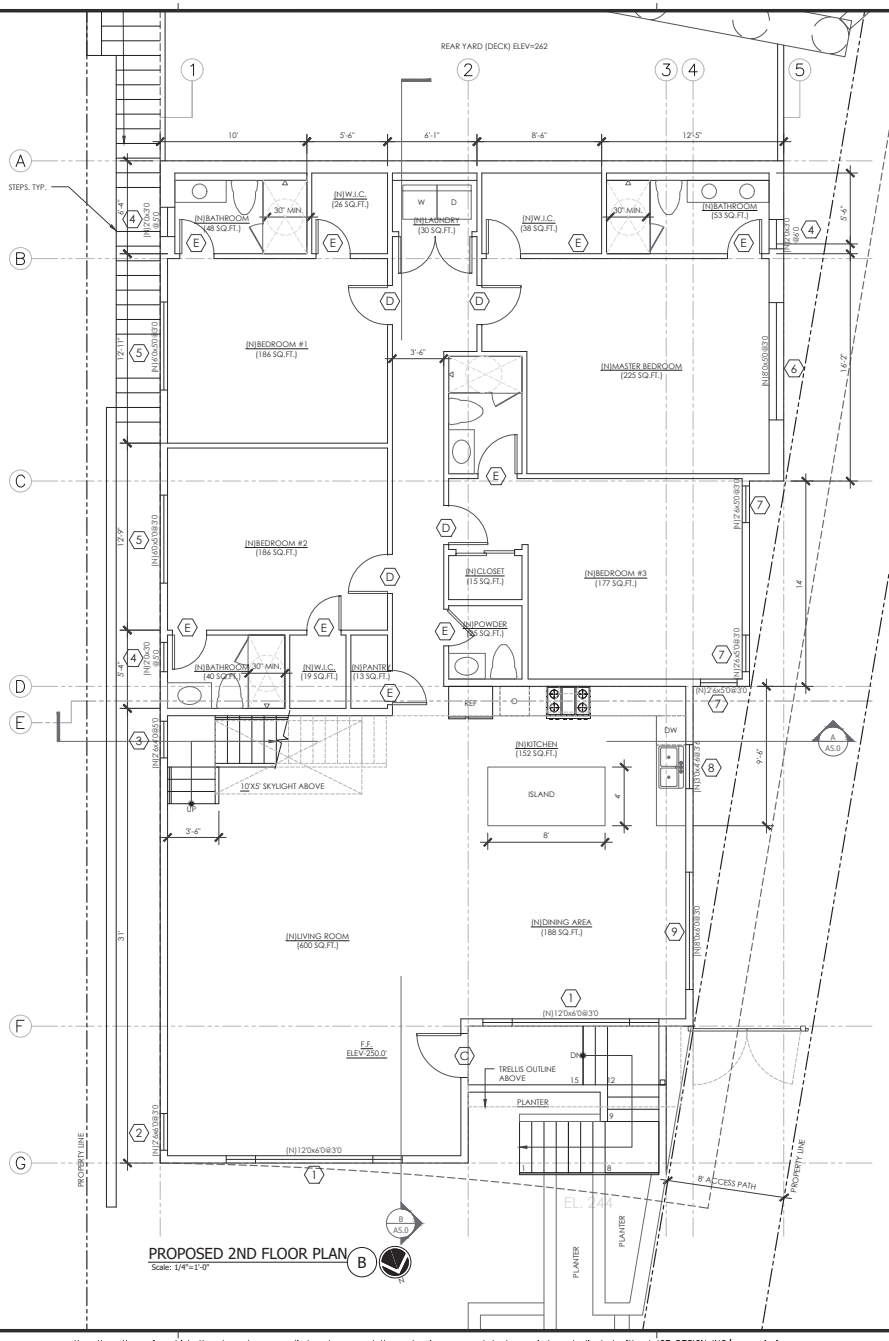
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info@icedesigninc.com

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JUAN PEDRO DIAZ

52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO,
CA 94080

SHEET TITLE:

FLOOR PLAN AND NOTES

PROJECT ADDRESS:

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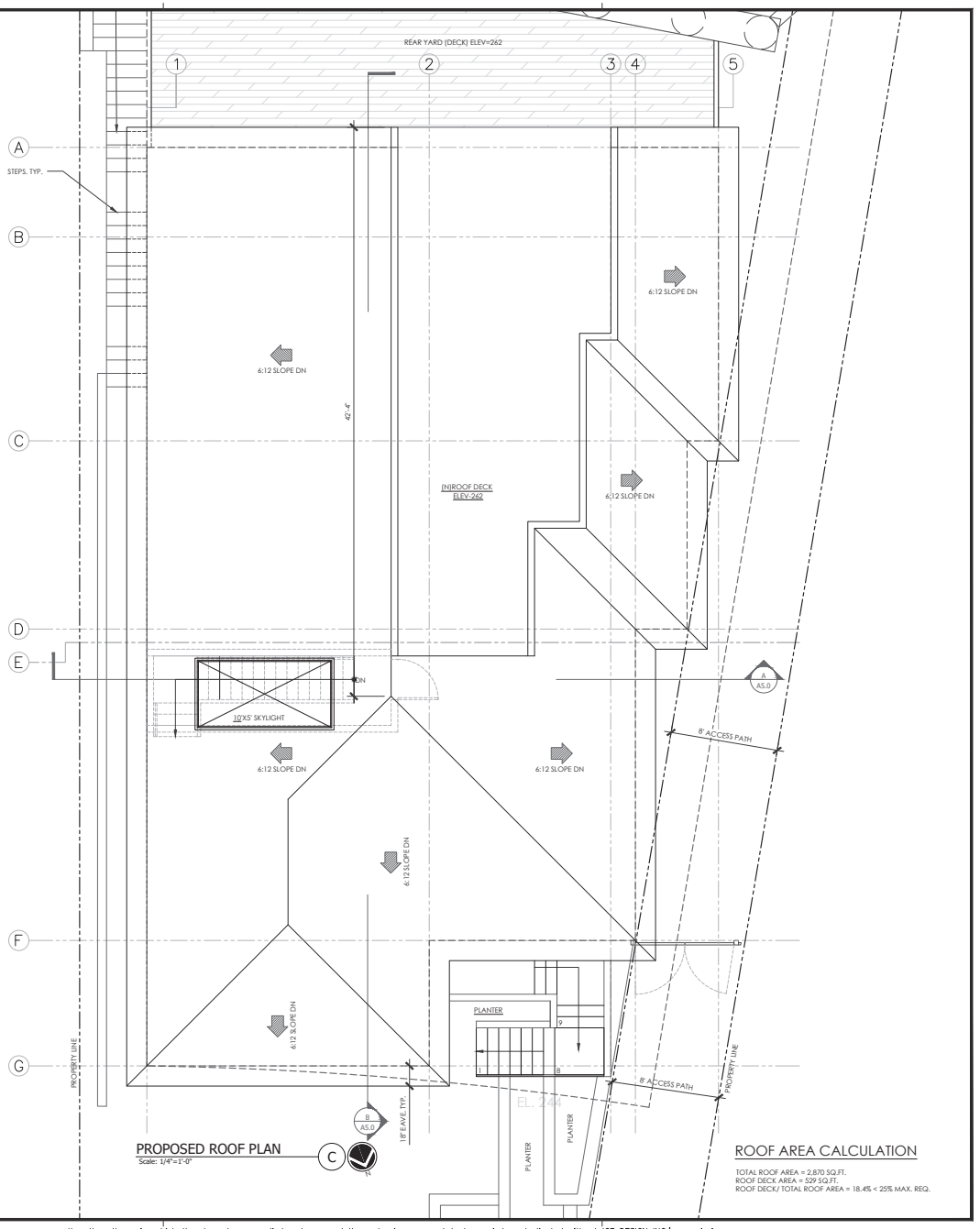
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SHEET	A2.1
	OF SHEETS



PROPOSED ROOF PLAN
Scale: 1/4"=1'-0"

ROOF AREA CALCULATION

TOTAL ROOF AREA = 2,870 SQ.FT.
ROOF DECK AREA = 529 SQ.FT.
ROOF DECK/ TOTAL ROOF AREA = 18.4% < 25% MAX. REQ.

INNOVATIVE CONSULTING ENGINEER
338 N. Canal Suite # 20
S. San Francisco, CA 94080
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JUAN PEDRO DIAZ

52 FRANKLIN AVENUE
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CA 94080

SHEET TITLE:

PROPOSED ROOF PLAN

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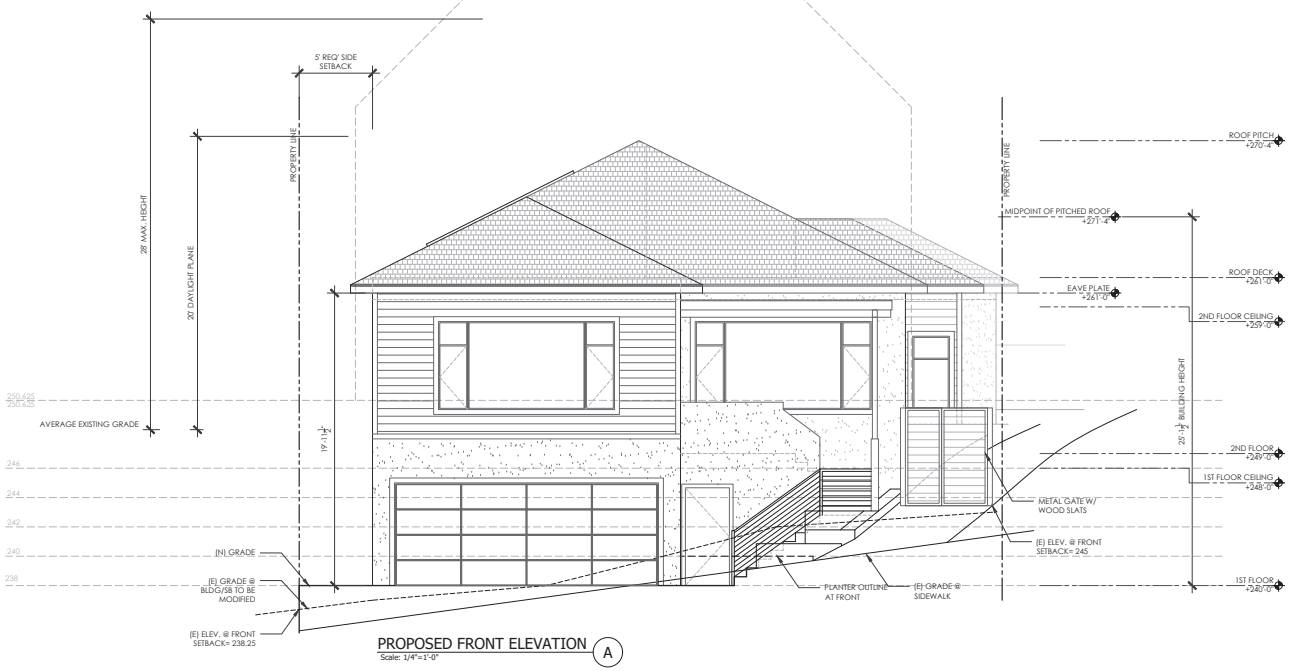
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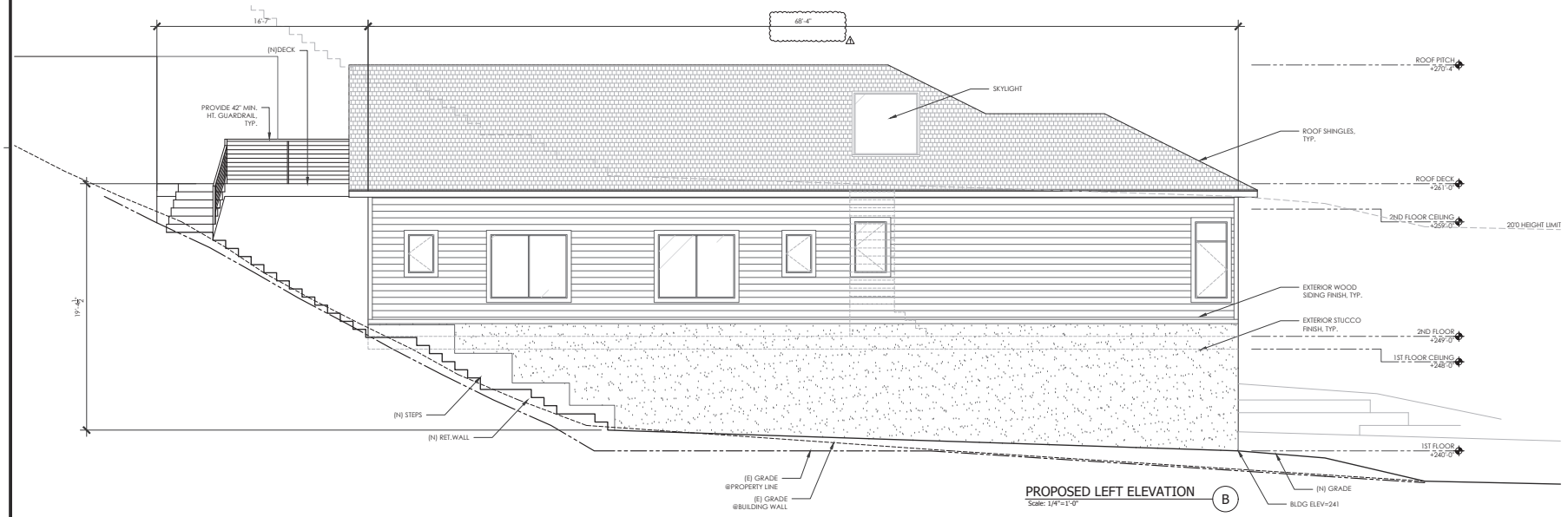
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JOB	220207
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PROPOSED FRONT ELEVATION (A)
Scale: 1/4"=1'-0"



PROPOSED LEFT ELEVATION (B)
Scale: 1/4"=1'-0"

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338 N. Canal Suite # 20
S. San Francisco, CA 94080
(650) 741-6968
(650) 741-6966
info@icedesigninc.com

OWNER / REPRESENTATIVE:

JUAN PEDRO DIAZ

52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO,
CA 94080

SHEET TITLE:

ELEVATIONS

PROJECT ADDRESS:

52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO,
CA 94080

APN: 012.039.180

PROJECT DESCRIPTION:

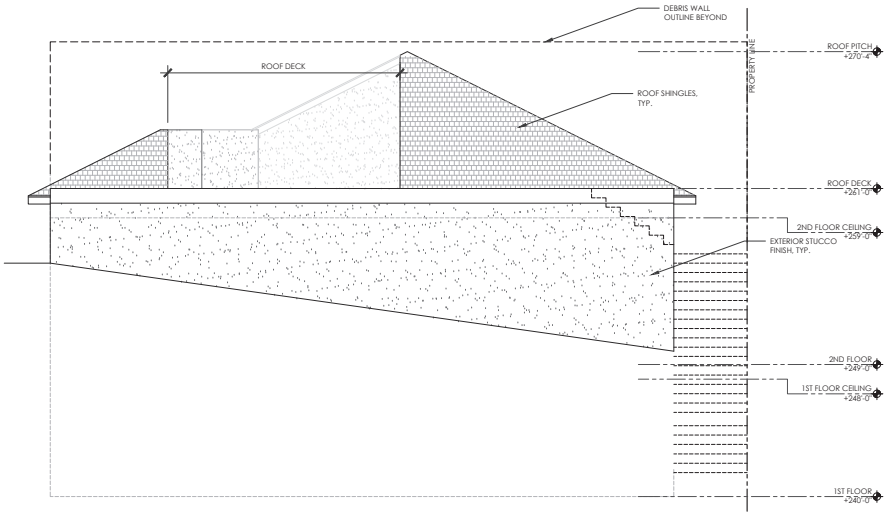
ERECT NEW TWO-STORY SINGLE FAMILY

REGISTERED PROFESSIONAL ENGINEER
JEFF T. CHOW
C 81252
EXP. 09/30/2025
CIVIL
STATE OF CALIFORNIA

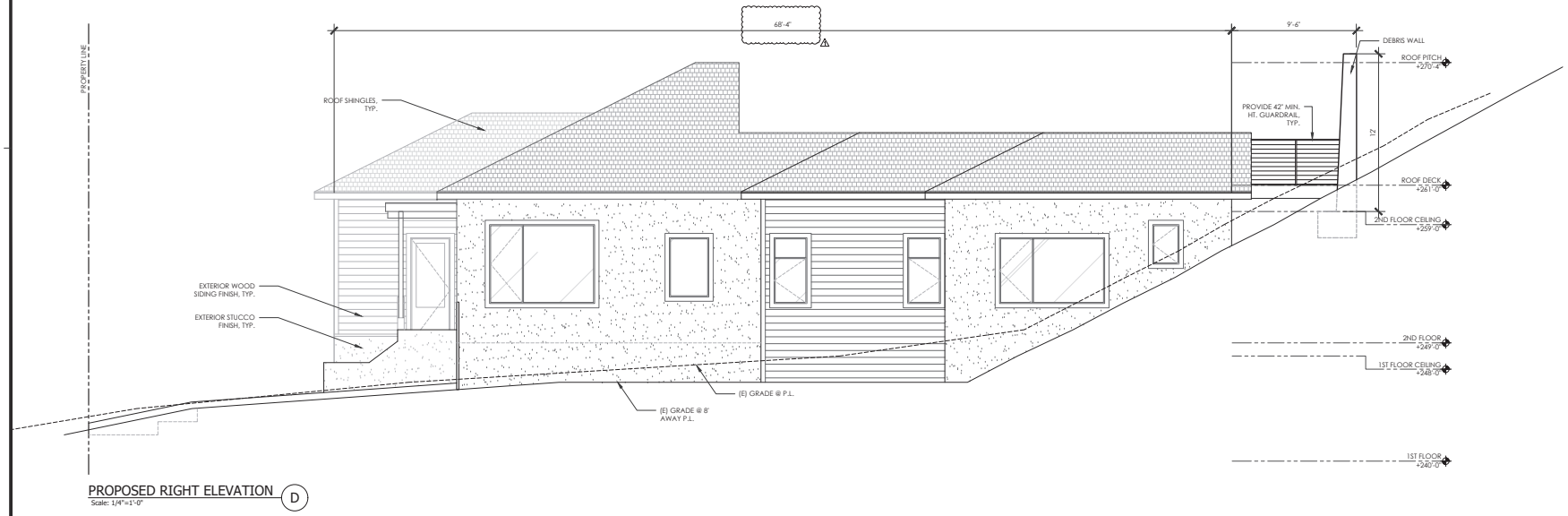
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PROPOSED REAR ELEVATION (C)
Scale: 1/4"=1'-0"



PROPOSED RIGHT ELEVATION (D)
Scale: 1/4"=1'-0"

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CA 94080

SHEET TITLE:

ELEVATIONS

PROJECT ADDRESS:

52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO,
CA 94080

APN: 012.039.180

PROJECT DESCRIPTION:

ERECT NEW TWO-STORY SINGLE FAMILY

REGISTERED PROFESSIONAL ENGINEER
JEFF T. CHOW
C 81252
EXP. 09/30/2025
CIVIL
STATE OF CALIFORNIA

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52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO,
CA 94080

SHEET TITLE:

RENDERINGS

PROJECT ADDRESS:

52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO,
CA 94080

APN: 012.039.180

PROJECT DESCRIPTION:

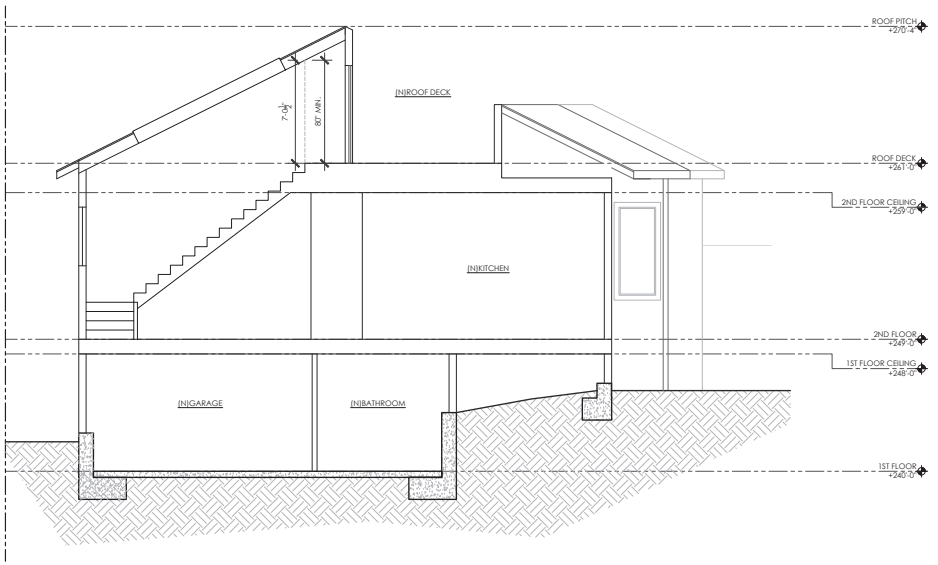
ERECT NEW TWO-STORY SINGLE FAMILY

REGISTERED PROFESSIONAL ENGINEER
JEFF T. CHOW
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STATE OF CALIFORNIA

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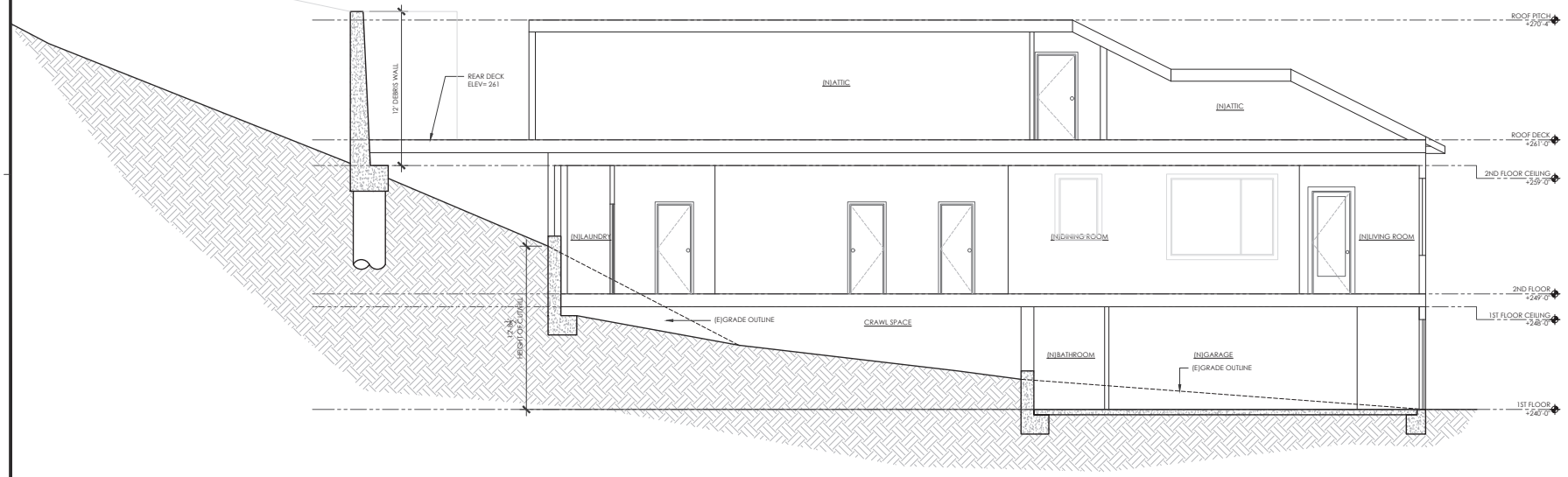
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PROPOSED LATITUDINAL SECTION (A)

Scale: 1/4"=1'-0"



PROPOSED TRANSVERSE SECTION (B)

Scale: 1/4"=1'-0"

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52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO,
CA 94080

SHEET TITLE:

SECTIONS

PROJECT ADDRESS:

52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO,
CA 94080

APN: 012.039.180

PROJECT DESCRIPTION:

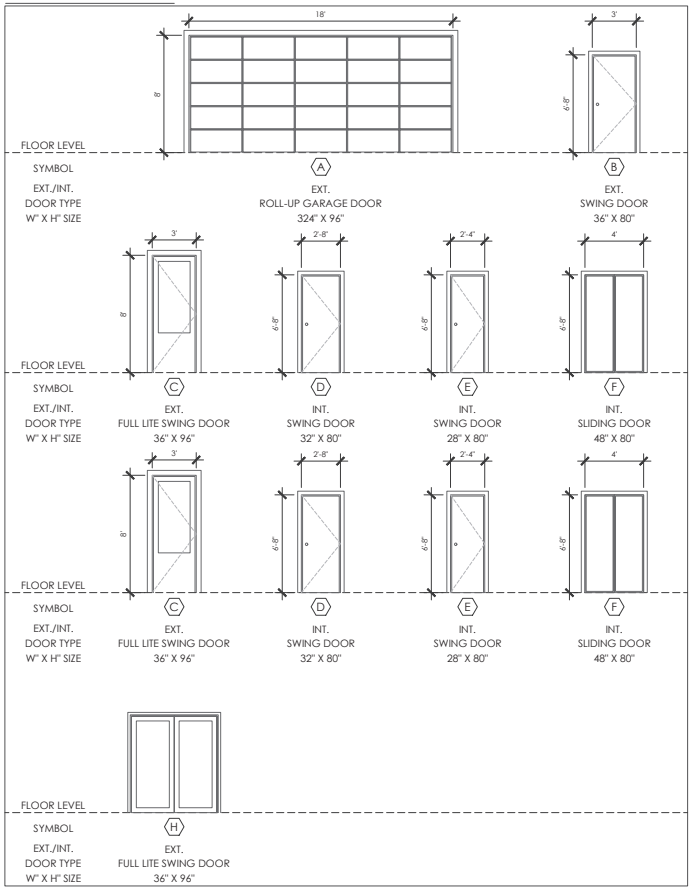
ERECT NEW TWO-STORY SINGLE FAMILY

REGISTERED PROFESSIONAL ENGINEER
JEFF T. CHOW
C 81252
EXP. 09/30/2025
CIVIL
STATE OF CALIFORNIA

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JOB	220207
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OF	SHEETS

DOOR SCHEDULE



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338 N. Canal Suite # 20
S. San Francisco, CA 94080
(650) 741-6968
(650) 741-6966
info@icedesigninc.com

OWNER / REPRESENTATIVE:

JUAN PEDRO DIAZ

52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO,
CA 94080

SHEET TITLE:

DOOR SCHEDULE

PROJECT ADDRESS:

52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO,
CA 94080

APN: 012.039.180

PROJECT DESCRIPTION:

ERECT NEW TWO-STORY SINGLE FAMILY

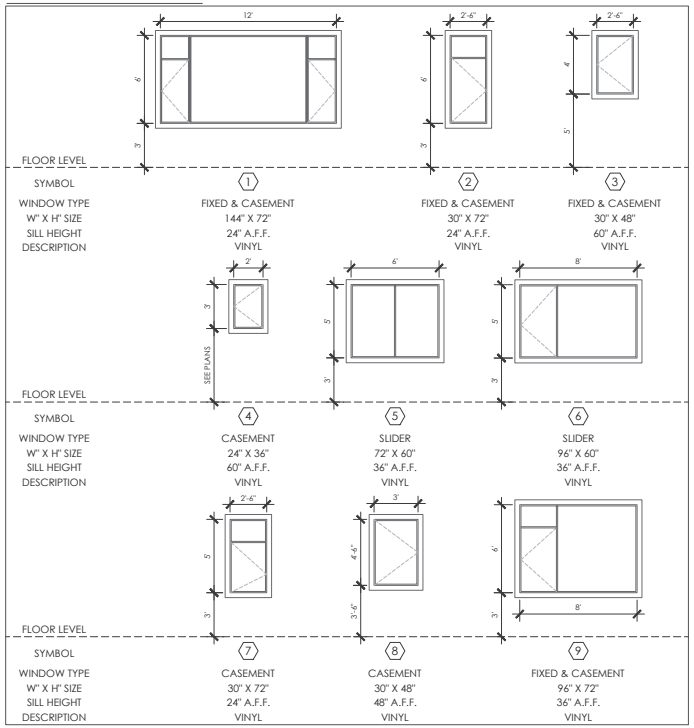
REGISTERED PROFESSIONAL ENGINEER
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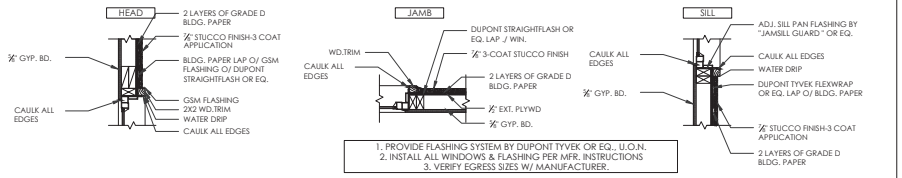
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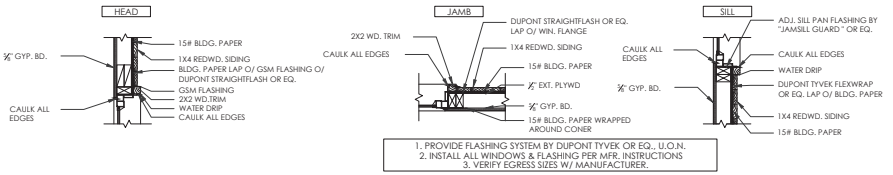
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WINDOW SCHEDULE





WINDOW DETAIL - STUCCO — SCALE 3/4" = 1'-0" — 1



WINDOW DETAIL - SIDING — SCALE 3/4" = 1'-0" — 2

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338 N. Canal Suite # 20
S. San Francisco, CA 94080
(650) 741-6968
(650) 741-6966
info@icedesigninc.com

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JUAN PEDRO DIAZ

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CA 94080

SHEET TITLE:

WINDOW SCHEDULE

PROJECT ADDRESS:

52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO,
CA 94080

APN: 012.039.180

PROJECT DESCRIPTION:

ERECT NEW TWO-STORY SINGLE FAMILY



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Proposed Residence
52 Franklin Avenue
South San Francisco, California

Biological Resources Assessment

for
Allison Knapp Wollam Consulting

prepared by

Michael Marangio
Biological Consultant
5446 Sutter Avenue
Richmond, CA 94804

November 10, 2015

Introduction

The purpose of this biological resource assessment is to evaluate a site proposed for construction of a residence in sufficient detail to determine if the proposed project (Project) may affect threatened, endangered, or other sensitive animal or plant species as well as important habitats such as wetlands. The Project location is at 52 Franklin Avenue in South San Francisco, California (see Figure 1). This biological assessment provides information that is intended for use in environmental documents under CEQA.

Description of the Proposed Action

The proposed Project would consist of a two-story, 1 family residence, anticipated to be approximately 2959 square feet in floor area with associated landscaping and access ways. The Project lot covers 8422 square feet (0.19 acres). Major grading of the site is anticipated to stabilize steep and eroding slopes.

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REGULATORY FRAMEWORK

Local, State, and federal regulations have been enacted to provide for the protection and management of sensitive biological resources. The following section outlines the key federal, State, and local and regulations that apply to these resources.

FEDERAL

The U.S. Fish and Wildlife Service (USFWS) is responsible for protection of listed terrestrial and freshwater organisms through implementation of the federal Endangered Species Act (ESA) and the Migratory Bird Treaty Act (MBTA). The U.S. Army Corps of Engineers (Corps) has primary responsibility for protecting wetlands under Section 404 of the Clean Water Act (CWA).

STATE

The California Department of Fish and Wildlife (CDFW) is responsible for administration of the California Endangered Species Act (CESA), and for protection of streams and water bodies through the Streambed Alteration Agreement process under Section 1600 of the California Fish and Game Code.

Certification from the California Regional Water Quality Control Board (RWQCB) is also required when a proposed activity may result in discharge into navigable waters, pursuant to Section 401 of the CWA and EPA Section 404(b)(1) Guidelines. The RWQCB also has jurisdiction over waters of the State not regulated by the Corps under the Porter-Cologne Act. The following discusses in more detail how State and federal regulations address special-status species, wetlands and other sensitive natural communities.

SPECIAL-STATUS SPECIES

Special-status species are plants and animals that are legally protected under the State and/or federal ESAs (Endangered Species Acts), the Migratory Bird Treaty Act, the California Fish and Game Code (sections 3503, 3503.5, 3511, 3513, 3515, and 4700), or other regulations.[1] In addition, pursuant to CEQA Guidelines Section 15380, special-status species also include other species that are considered rare enough by the scientific community and trustee agencies to warrant special consideration, particularly with regard to protection of isolated populations, nesting or denning locations, communal roosts and other essential habitat. Species with legal protection under the federal and

[1] Special-status species include: designated (rare, threatened, or endangered) and candidate species for listing by the CDFW; designated (threatened or endangered) and candidate species for listing by the USFWS and NOAA Fisheries; species considered to be rare or endangered under the conditions of Section 15380 of the California Environmental Quality Act Guidelines, such as those identified on lists 1A, 1B, and 2 in the California Native Plant Society (CNPS) *Inventory of Rare and Endangered Plants of California (2001)*; and possibly other species which are considered sensitive due to limited distribution or lack of adequate information to permit listing or rejection for state or federal status, such as those included on list 3 in the CNPS *Inventory* or identified as "California Species of Special Concern (SSC) by the CDFW. Species designated as a SSC have no legal protective status under the California Endangered Species Act but are of concern to the CDFW because of severe decline in breeding populations and other factors.

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State ESAs may represent major constraints to development, particularly when they are wide ranging or highly sensitive to habitat disturbance and where proposed development would result in a take of these species.

SENSITIVE NATURAL COMMUNITIES

Protecting habitat on an ecosystem-level is increasingly recognized as vital to the protection of natural diversity in the State, in addition to species-oriented management. Protecting habitat on an ecosystem-level is considered the most effective means of providing long-term protection of ecologically viable habitat, and can include whole watersheds, ecosystems and sensitive natural communities. Providing functional habitat connectivity between natural areas is essential to sustaining healthy wildlife populations and allowing for the continued dispersal of native plant and animal species.

Although sensitive natural communities have no protected legal status under the State or federal Endangered Species Acts, they are provided some level of protection under CEQA. The CEQA Guidelines identify potential impacts on a sensitive natural community as one of six significance criteria. Where determined to be significant under CEQA, the potential impact would require mitigation through avoidance, minimization of disturbance or loss, or some type of compensatory mitigation when unavoidable.

LOCAL REGULATIONS

Several policies in the City of *South San Francisco General Plan* pertain to the protection of sensitive biological and wetland resources. Following is a description of the key policy documents and regulations that are applicable to the site.

City of South San Francisco General Plan

The Open Space and Conservation Element of the City of *South San Francisco General Plan* contains a number of policies related to protection of sensitive biological and wetland resources that are applicable to the site. The policies are:

- 7.1-G-1: Protect special status species and supporting habitats within South San Francisco, including species that are State or federally listed as Endangered, Threatened, or Rare.
- 7.1-G-2: Protect and, where reasonable and feasible, restore salt marshes and wetlands.
- 7.1-I-2: As part of the Park, Recreation and Open Space (PROS) Master Plan update, institute an ongoing program to remove invasive plant species from ecologically sensitive areas, including Sign Hill Park, Colma Creek Linear Park, Bayfront Linear Park, and other City-owned open space, as depicted in Figure 7-1.[References to figures refers to those in the General Plan.]

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- 7.1-I-3: As part of development approvals on sites that include ecologically sensitive habitat designated in Figure 7-2, require institution of an on-going program to remove and prevent the re-establishment of the invasive species and restore the native species.
- 7.1-I-4: Require development on the wetlands delineated in figure 7-1 to complete assessments of biological resources.
- 7.1-I-5: Work with private, non-profit conservation, and public groups to secure funding for wetland and marsh protection and restoration projects.

Municipal Code

South San Francisco Municipal Code Section 13.30.020 defines a "Protected Tree" as one with a circumference of 48" or more when measured 54" above natural grade; a tree or stand of trees designated by the Director of Parks and Recreation as one of uniqueness, importance to the public due to its location or unusual appearance, historical significance or other factor; or a stand of trees that the Director of Parks and Recreation has determined each tree is dependent on the others for survival.

Special Status Species

On the basis of a review of the California Natural Diversity Data Base report from the California Department of Fish and Wildlife for the project area (CNDDB, 2015; CNPS, Rare Plant Program, 2015) and general knowledge of special status species of plants and animals in the San Francisco Bay area, a table was developed of the potential special status plants and animals known from the vicinity of the Project (Tables A and B). All listed potential animal species such as fishes requiring permanent aquatic habitats were eliminated from further impact analysis since suitable aquatic habitat is not present on the project site. Additionally, plants and animals requiring marshlands were also eliminated from further analysis because such habitats are also not present on the Project site. Most of the species on the lists have specialized habitat requirements that are not present on the project site, and therefore would not be expected to be located there.

The issues of special status species, migratory birds, protected trees, and sensitive plant species are evaluated for potential Project impacts. Following is a summary of the biology of these species and issues including a discussion of the potential for their presence within the project area and the potential impacts of the projects on these resources. To provide a more thorough analysis, several special status wildlife species known within 1-2 mile of the Project or which are otherwise deemed to be potentially present in the Project vicinity are further discussed below.

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Table A: Special-Status Plants With Potential to Occur in the Project Area						
Common and Scientific Name	**Status (Fed/State/CNPS)**	**USGS Quad**	**Blooms**	**Habitats**	**Elevation Range (Meters above MSL)**	**Likelihood of Occurrence on Project Site**
San Bruno Mtn. manzanita *Arctostaphylos imbricata*	_/_/1B.2	San Francisco South	Feb.- May	•Chaparral (rocky) •coastal scrub	275-365	None. Site survey revealed no manzanita species.
Pacific manzanita *Arctostaphylos pacifica*	_/E/1B.2	San Francisco South	Feb.- May	•Coastal scrub/chaparral	1000- 1045ft	None. Site survey revealed no manzanita species.
San Francisco Collinsia *Collinsia multicolor*	_/_/1B.2	San Francisco South	March - May	•Coastal scrub	30 -250 m	Unlikely. No suitable habitat is present
Fragrant fritillary *Fritillaria liliacea*	_/_/1B.2	San Francisco South	Feb. - April	•Coastal scrub •Valley and foothill grassland /often serpentinite	3 - 410 m	Unlikely. No suitable habitat is present
Diablo helianthella *Helianthella castanea*	_/_/1B.2	San Francisco South	April - June	Upland Forest, Chaparral, Coastal Scrub, Grassland	60 - 1300 m	Unlikely. None observed during field survey
White seaside tarplant *Hemizonia congesta ssp. congesta*	_/_/1B.2	San Francisco South	April - Oct.	•Coastal scrub •Valley and foothill grassland	25 - 365 m	Unlikely. None observed during field survey. Disturbed habitat
White-rayed Pentachaeta *Pentachaeta bellidiflora*	_/_/1B.1	San Francisco South	March - May	•Valley and Foothill Grassland •Cismontane woodland /rocky	35 - 620 m	Unlikely. Low value, disturbed habitat
San Francisco Campion *Silene verecunda verecunda*	_/_/1B.2	San Francisco South	March - August	• Coastal Scrub •Valley and Foothill Grassland	30-645m	Unlikely. Limited disturbed habitat.
San Francisco Owl's Clover	_/_/1B.2	San Francisco South	April - June	•Valley and Foothill Grassland	10-160 m	Unlikely. Highly disturbed habitat

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Triphysaria floribunda						
Key to Status Abbreviations						
Federal						
E =	listed as endangered under the federal Endangered Species Act					
T =	listed as threatened under the federal Endangered Species Act					
_ =	no listing					
State						
E =	listed as endangered under the California Endangered Species Act					
R =	listed as rare under the California Native Plant Protection Act					
_ =	no listing					
California Native Plant Society (CNPS)						
1A =	List 1A species: presumed extinct in California					
1B =	List 1B species: rare, threatened, or endangered in California and elsewhere					
2 =	List 2 species: rare, threatened, or endangered in California but more common elsewhere					
3 =	List 3 species: plants about which more information is needed to determine their status					
0.1 =	seriously endangered in California					
0.2 =	fairly endangered in California					
0.3 =	not very endangered in California					

Table B: Special-Status Wildlife Species in the Project Region

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Common and Scientific Name	Status (Federal/State)	Habitats		Likelihood of Occurrence on Project Site
Invertebrates				
San Bruno elfin butterfly *Incisalia (Callophrys) mossii bayensis*	E/-	Rocky outcrops and cliffs in coastal scrub on the San Francisco peninsula. Known from 2 miles NW.		Unlikely. No host plant presence
Bay checkerspot *Euphydryas editha bayensis*	T/-	Native grassland generally located on large serpentine outcroppings. Primary host plant dwarf plantain, as well as purple owl's clover or exerted Indian paintbrush.		Low. Disturbed habitat; unsuitable for host plants
San Francisco Forktail Damselfly *Ishnura gemina*	-/-	Permanent freshwater marshes or other aquatic habitats		None. No suitable habitat onsite.
Mission Blue *Plebejus icarioides missionensis*	E/-	Host plants are silver *lupine* (*Lupinus albifrons*), summer *lupine* (*Lupinus* formosus), and varicolor *lupine* (*Lupinus variicolor*). Nectar plants include *Eriogonum latifolium* and *Brodiaea pulchella*.		Low. Known from Sign Hill but habitat on Project site has no host or nectar sources
Callippe Silverspot Butterfly *Speyeria callippe callippe*	E/-	Found on native grasslands. Fly mid-May to mid July. Larval host plant is *Viola pedunculata*. North and East facing slopes. Nectar sources are *Carduus* spp., and other non-native thistles, as well as *Cirsium quercetorum*, *Silybum marianum*, *Monardella villosa*, *Heterotheca villosa*, *Eriogonum latifolium*, and *Aesculus californica*.		Low. Known from Sign Hill. Project contains scattered nectar plants, poor habitat for rearing
Amphibians				
California red-legged frog *Rana aurora draytoni*	T/ SSC	Permanent and semi-permanent aquatic habitats, such as creeks and ponds with emergent and submergent vegetation. Disperses into upland habitats during dry periods and may aestivate in rodent burrows and cracks.		None; no known breeding habitat on site or within 3 miles
Birds				
Alameda Song Sparrow	-/- / SSC	Restricted to tidal salt marshes along San Francisco Bay. Nests in Grindelia and Salicornia plants		None. No suitable habitat onsite.
Mammals				
Hoary bat *Lasiurus cinereus*	-/- / SSC	Generally roosts in dense foliage of medium to large trees, hidden from above.		Low; limited tree cover on Project site

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Key to Status Abbreviations				
Federal				
E =	listed as endangered under the federal Endangered Species Act			
T =	listed as threatened under the federal Endangered Species Act			
– =	no listing			
State				
E =	listed as endangered under the California Endangered Species Act			
T =	listed as threatened under the California Endangered Species Act.			
FP =	fully protected under the California Fish and Game Code.			
SSC =	species of special concern in California.			
– =	no listing			

The San Francisco Forktail damselfly

General Background. The **San Francisco forktail damselfly**, (*Ishnura gemina*), has no protection under Federal or State statutes. It is found in very localized urban areas. Several small populations have gone extinct since their discovery.

Occurrence in the Project Vicinity. A documented location (CNDDB 2015) indicates its presence about 2.7 mi SSE of the Project site. Historically some populations have been extirpated due to urbanization and some habitat has naturally converted from small shallow ponds to dry pond beds. The species is associated with marshy aquatic habitat, none of which is present at the Project site. Therefore the project would not have any significant impact on this species.

California red-legged frog

General Background. The **California red-legged frog** (*Rana draytonii*) (CRLF) is listed by the USFWS as Threatened and is classified by the CDFW as a Species of Special Concern. It breeds primarily in ponds, but will also breed in slow moving streams, or deep pools in intermittent streams. (It is seldom found in brackish waters.) Inhabited ponds are typically permanent, at least 2 feet (0.6 meters) in depth, and contain emergent and shoreline vegetation.

Occurrence in the Project Vicinity. CNDDB (2015) documents the presence of this protected species about 2.7 miles SSE. Since no aquatic habitat is present on the Project site, nor is any suitable aquatic habitat nearby, the site would not provide suitable habitat, either aquatic or upland. As a result, no impacts to the CRLF would result from the proposed Project construction.

Callippe Silverspot Butterfly

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General Background. The **Callippe silverspot butterfly** (*Speyeria callippe callippe*) is listed as federally endangered. The historic range of Callippe silverspot included the inner Coast Ranges on the eastern edge of the San Francisco Bay from northwestern Contra Costa County south to Castro Valley in Alameda County and from San Francisco south to La Honda in San Mateo County on the west side of the Bay. This butterfly has been found at San Bruno Mountain and Sign Hill in San Mateo County, in the hills near Pleasanton in Alameda County, at Sears Point in Sonoma County, and in the hills between Vallejo and Cordelia in Solano County (USFWS 2008).

Callippe silverspot butterfly occurs mainly in native grassland. Female butterflies lay their eggs on its larval foodplant, Johnny jump-up (*Viola pedunculata*). After 1 week the larvae hatch and shelter within ground litter where they spend the summer and winter. In the spring the larvae eat the leaves of Johnny jump-up, pupate, and emerge as butterflies between mid-May and mid-July. The main causes of this species' decline is the loss and fragmentation of habitat due to urban development. Nectar sources include Italian thistle (*Carduus pycnocephalus*), milk thistle (*Silybum marianum*), coyote mint (*Monardella villosa*), hairy false goldenaster (*Heterotheca (Chrysopsis) villosa*), coast buckwheat (*Eriogonum latifolium*), mourning bride (*Scabrosa atropurpurea*), buckeye (*Aesculus californica*), Narrow leaf mule-ears (*Wyethia angustifolia*), and California Horkelia (*Horkelia californica).*

Occurrence in the Project Vicinity. This species is known from Sign Hill (CNDDB 2015). However, the habitat on the Project site is for the most part unsuitable for Callippe Silverspot Butterfly. Much of the site is dominated by non-native grasses, weedy annuals, and introduced vines and non-native trees. Very small patches of non-native Italian thistle were noted scattered within the northern portion of the site associated with other non-native plant species. Estimated coverage of this plant, known to provide nectar for this butterfly, was about 80 sq ft. These annual plants would be removed as part of the construction. The amount of habitat that would be removed would be too small to be considered environmentally significant.

San Bruno Elfin Butterfly

General Background. The **San Bruno Elfin Butterfly** (*Incisalia mossii bayensis*) is federally endangered. It inhabits rocky outcrops and cliffs in coastal scrub on the San Francisco peninsula. Its patchy distribution follows the location of its host plant, stonecrop (*Sedum spathulifolium*). Adults of this butterfly emerge in early spring, in February and March. They mate soon thereafter and deposit eggs on the stonecrop plants. The eggs typically hatch within a week. By June most will have completed their larval development, at which time they leave the host plant to pupate in ground litter. They lie dormant as pupae until the following spring. Nectar sources include common Lomatium (*Lomatium utriculatum)*, buttercup (*Ranunculus californicus)*, and Achillea (*Achillea millefolium).*

Typical habitat includes steep, north-facing slopes in foggy locations. The San Bruno Elfin is restricted to a few small populations, the largest of which occurs on San Bruno Mountain to the north of the Project. Its habitat has been reduced in the past by quarrying, off-road recreation, and urban development. To protect this as well as the Mission Blue Butterfly, a Habitat Conservation Plan has been implemented on San Bruno Mountain, in which the lower slopes were opened for development while the higher areas were protected.

Occurrence in the Project Vicinity.

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The closest known documentation of the presence of this butterfly is about 3 mi to the N (CNDDB 2015). Suitable habitat conditions including host and nectar plants are not present on the Project site. Therefore no significant impacts to this species would result.

Bay Checkerspot Butterfly

General Background. The **Bay Checkerspot** (*Euphydryas editha bayensis*) has a life cycle which may include several different host plants. Following mating in mid-spring, the female butterflies lay their eggs on a native plantain, *Plantago erecta*. If the plantain is not sufficient for development the larvae may move onto one of two species of owl's clover (*Castilleja (Orthocarpus) densiflorus* or *C. exserta*). Generally, one season is insufficient for completion of development and the larvae must enter dormancy until the following winter when the rains allow plant growth to begin again. The larvae then emerge to feed for a little longer, pupating in late winter. The adults emerge shortly thereafter. Habitat is often found on outcrops of serpentine soil. Nectar plants include goldfields (*Lasthenia californica*), tidy tips (*Layia* spp.), serrated onion (*Allium serra*), seaside muilla (*Muilla maritima*), and Lomatium (*Lomatium* spp). Populations of the Bay Checkerspot historically inhabited numerous areas around the San Francisco Bay including the San Francisco peninsula, the mountains near San Jose, the Oakland hills, and several locations in Alameda County. Populations are now known only from San Mateo and Santa Clara counties. Changing disturbance regimes (i.e. fire, grazing) as well as introduced grassland plants have caused declines in host plant populations.

Occurrence in the Project Vicinity.

The closest known population is located about 1.0 mile N of the proposed Project site. The Project site provides unsuitable habitat with no evidence of the presence of habitat for host plants (owl's clover) or nectar plants. As a result, it is not suitable habitat for Bay Checkerspot Butterflies. Therefore no impacts would result from construction of the proposed residence.

Mission Blue Butterfly

General Background. The Mission Blue Butterfly (*Icaricia icarioides missionensis*) was formerly relatively widespread on the San Francisco and Marin peninsulas. It is now restricted to a few sites in these areas. On San Bruno Mountain, in San Mateo Co., 2000 acres of habitat for the butterfly is being managed by the county department of Parks and Recreation.

The butterfly's required habitat is coastal scrub. Larvae of the Mission Blue emerge from a dormant state in early spring. Host plants consist mainly of perennial lupines (*Lupinus albifrons*, *L. variicolor*, and *L. formosus*). Nectar plants include *Eriogonum latifolium* and *Brodiaea pulchella*. The larvae eventually enter the ground to pupate. Several weeks later, the adult butterflies emerge to feed on lupine nectar, mate and lay eggs. The eggs hatch within a few days and the larvae eat for a few weeks before they enter dormancy until the following spring when they will complete their development.

Occurrence in the Project Vicinity. This butterfly is documented to be present on Sign Hill (CNDDB 2015). They are also known from nearby San Bruno Mountain to the North. Habitat providing suitable host and nectar plants is not present on the Project site. As a result, the proposed residence construction would not result in impacts to this species.

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Field Survey

Biological Impact Assessment

Regulatory Framework - Impacts

Federal and State Special Status Species and Sensitive Habitats
The disturbed nature of the site resulting from previous construction, unstable soil conditions, and the spread of invasive weed species to the site from outside and adjacent sources has resulted in the elimination of the original native vegetation, which probably consisted of grassland and coastal scrub. The spread of invasive weedy species and the historic construction activities on the site greatly reduces the potential for the presence of federal and state protected plants. The lack of native vegetative cover also greatly reduces the potential for the presence of federal and state protected animal life. None of the existing vegetation includes any sensitive habitats.

Federal and State Wetlands
Generally speaking, wetlands are legally defined as areas that are suitable for retention or flow of water, have soils that indicate the presence of water, and have plants that mostly require the presence of water. A formal protocol for wetland analysis was not done as part of this investigation. However, general observations revealed that the ground surface of the Project site was disturbed but no suitable basins or other depressions were noted where water would likely pool during the winter rainy season. A constructed ditch presently draining water off the steep hillside provided no evidence of hydraulic processes that indicate wetland hydrology or vegetation. Therefore no federal or state-protected wetlands are present. Further wetland analysis regarding jurisdictional evaluation is not required.

Local
The Open Space and Conservation Element of the City of *South San Francisco General Plan* contains a number of policies related to protection of sensitive biological and wetland resources that are applicable to the site. All of these policies would be followed.

Municipal Code
Since there are no trees present with a diameter greater than 48 inches dbh on the site, South San Francisco Municipal Code Section 13.30.020 covering "Protected Trees" will not need to be considered.

Wildlife Movement Corridors - Impacts

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Wildlife movements include migration (i.e., usually one way per season), inter-population movement (i.e., long-term genetic flow) and small travel pathways (i.e., daily movement within an animal's territory). While small travel pathways usually facilitate movement for daily home range activities, such as foraging or escape from predators, they also provide connection between outlying populations, permitting an increase in gene flow among populations.

These linkages among habitat types can extend for miles from primary habitat areas and occur on a large scale throughout California. Habitat linkages facilitate movement between populations located in small discrete areas and populations located within larger habitat areas. The mosaic of habitats found within a large-scale landscape results in wildlife populations that consist of discrete sub-populations comprising a large single population, which is often referred to as a meta-population. Even where patches of pristine habitat are fragmented, the movement between wildlife populations is facilitated through habitat linkages, migration corridors and movement corridors. Potentially low frequency genetic flow may lead to complete isolation and, if pressures promoting mortality are strong, potential extinction.

The proposed Project would result in the construction of a residence on a 0.19 acre site where houses are present immediately to the west, north, and east on similar-sixed lots. To the South lies undeveloped open space. The Project in its undeveloped state does not presently provide linkages to other suitable habitat since residential development generally surrounds the site to the west, north, and east. Therefore the project would have no significant impact on biological resources with regard to movement corridors.

Plant Species of Special Concern - Impacts

The Project site is highly disturbed. The plants that dominate the site consist mainly of introduced invasive annual plants, along with non-native trees and shrubs. A reconnaissance survey was conducted on October 3, 2015. No habitat for special status species of plants were observed and would not be expected because of the general lack of suitable habitat and the disturbed nature of the site. No sensitive plant species would be affected by the proposed project.

Animal Species of Special Concern- Impacts

Observation of animals on the site was limited to several common birds including American Crow, and House finch, all known to be adaptable to urban conditions. The dominance of introduced non-native annual plants limits the value of the habitat to only "generalist" species that can tolerate disturbed conditions and utilize common food sources. As a result of the small size of the parcel (0.19 acres) and the dominance of non-native annual plant species, the Project site would be highly unlikely to support any special status species (which are generally "specialist" species that require certain plants for cover and food that are not present). About 40 square feet of Italian thistle plants that are nectar sources for the Callippe Silverspot butterfly were observed on the site. The removal of this small amount of potential nectar source would not result in a significant impact.

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Birds under the Migratory Bird Treaty Act and California Fish and Game Code - Impacts

General Background. The Migratory Bird Treaty Act (MBTA) protects all common wild birds found in the United States except certain introduced species and certain game birds. Disturbances that causes nest abandonment and/or loss of reproductive effort or the loss of habitats upon which these birds depend would be in violation of the MBTA. California Fish and Game (CFG) Code 3503 also makes it illegal to destroy any birds' nest or any birds' eggs that are protected under the MBTA. CFG Code 3503.5 further protects all birds of prey, such as hawks and owls) and their eggs and nests from any form of take.

Occurrence in the Project Vicinity. Although no nesting birds were observed, the large trees and brushy areas may provide suitable cover for nesting of birds, including birds of prey, during the spring and summer seasons. Nest disturbance as a result of proposed tree and brush removal would be considered a breach of MBTA regulations and would be a significant environmental impact.

Mitigations

Potential disturbance to nesting birds protected under federal and state regulations

Because there are several large trees on the steep slope of the southern portion of the property that are planned for removal, there is the potential for raptors (birds of prey) and other protected birds) to nest on and adjacent to the site. These birds are protected under the Migratory Bird Treaty Act and Fish and Game Code 3503.5. Disturbance of nesting birds that results in loss of nestlings would be a significant environmental impact.

Mitigation 1

If project construction activities occur during the nesting season (approximately March 1 to August 31), for birds protected under the California Fish and Game Code and Federal (MBTA) the applicant shall retain a qualified biologist to conduct a preconstruction survey for protected birds on the site and in the immediate vicinity. The survey shall be done no more than 15 days prior to the initiation to construction activities. In the event that nesting birds are found on the project site or in the immediate vicinity, the developer shall locate and map the nest site(s) within three days and submit a report to the City and California Department of Fish and Wildlife ("CDFW"), establish a no-disturbance buffer of 250-feet, and conduct on-going weekly surveys to ensure the no-disturbance buffer is maintained. In the event of destruction of a nest with eggs, or if a juvenile or adult raptor should become stranded from the nest, injured or killed, the

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qualified biologist shall immediately notify the CDFW. The qualified biologist shall coordinate with the CDFW to have the injured bird either transferred to a raptor recovery center or, in the case of mortality, transfer it to the CDFW within 48 hours of notification. These procedures reduce the potential for the disturbance of nesting birds or the destruction of active nests. Implementation of this mitigation would reduce the potential impacts from significant to mitigable.

Tree removal outside of the nesting season would preclude the need for any other mitigation activities related to protected birds.

Literature Cited

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CNPS, Rare Plant Program. 2015. Inventory of Rare and Endangered Plants (online edition, v8-02). California Native Plant Society, Sacramento, CA. Website http://www.rareplants.cnps.org [accessed 31 May 2014

CNDDB, 2014. CDFG. California Natural Diversity Data Base overlay for San Francisco South 7.5 minute quadrangle.

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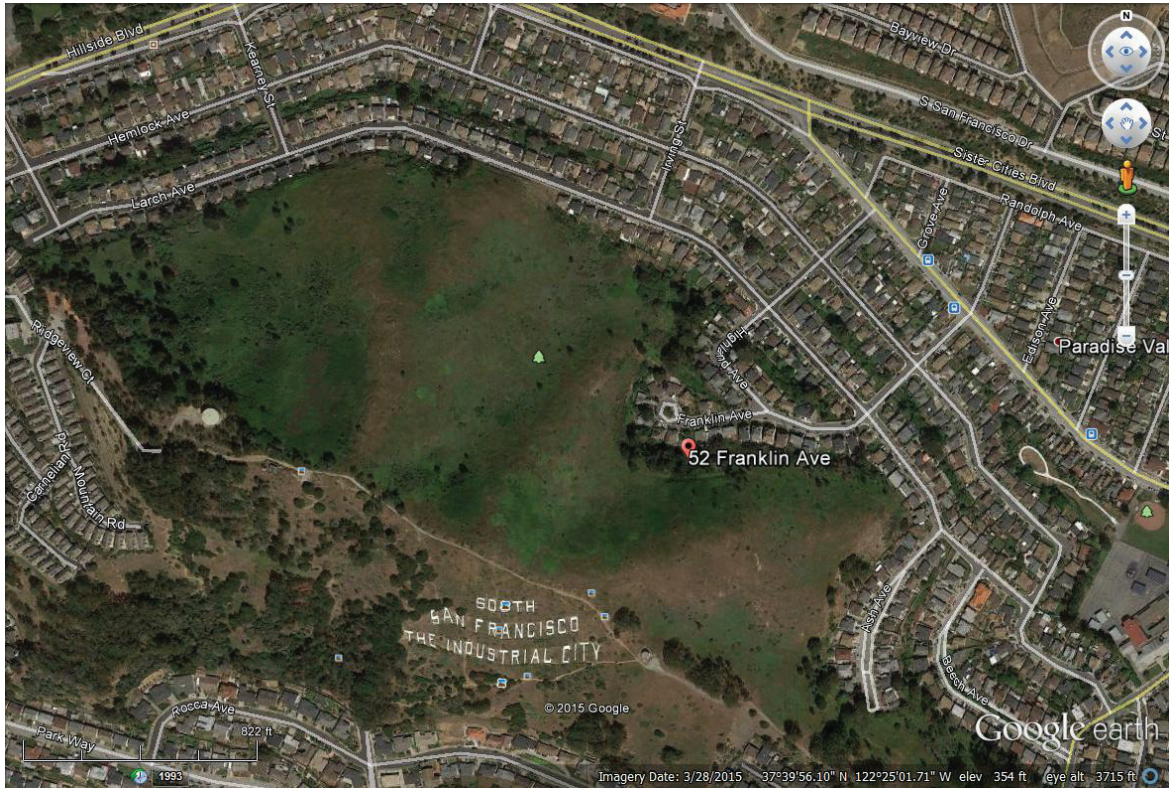


Figure 1. Project location

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Figure 2. Steep hillside on Southern portion of site

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WOOD BIOLOGICAL CONSULTING
PO Box 1569
El Granada, CA 94018
(415) 254-4835
chris@wood-biological.com
www.wood-biological.com

DATE: September 6, 2023
TO: Allison Knapp Wollam Consulting
CC: Paul Miller, RCH Group
FROM: Chris Rogers
SUBJECT: Biological Resources Assessment - Update
52 Franklin Avenue
South San Francisco, California

This technical memorandum summarizes the results of an assessment of biological resources in support of proposed redevelopment of residential parcel to determine if the proposed project (Project) may affect threatened, endangered, or other sensitive animal or plant species as well as important habitats such as wetlands. The Project location is at 52 Franklin Avenue in South San Francisco, California. This biological assessment provides information that is intended for use in preparation of environmental documents under CEQA. This report is an update of a previous biological resources assessment prepared in 2015[1], and includes re-evaluation of special status plant and animal species and sensitive natural communities that may occur on or adjacent to the project parcel.

PROJECT LOCATION AND SETTING

The Project site is located in the northern portion of the City of South San Francisco ("City"), in an area known as the Paradise Valley/Terrabay planning sub-area. The Project is in the western portion of the planning area in a single-family neighborhood known as "Sterling Terrace". The Project site is located at the northeastern edge of the looped portion of Franklin Avenue, approximately 300 feet from the intersection of Highland and Franklin Avenues and 700 feet from the intersection of Larch and Franklin Avenues.

The project parcel is an empty residential lot. Approximately two-thirds of the lot area (the northern portion) is relatively level where it fronts Franklin Avenue. The lot is unpaved but the remains of the previous house foundation are still present. This portion of the site supports mainly weedy annual grasses and herbaceous plants. The rear one-third of the lot slopes steeply uphill from the lower building site. A narrow earthen ditch runs across the property at the toe of the slope, carrying stormwater runoff from adjacent backyards from west to east. Dense trees and brush transitions to native grassland and scrub on the open space of Sign Hill, a public park and recreational open space preserve that abuts the south parcel boundary.

[1] Michael Marangio. 2015. *Biological Resource Assessment, Proposed Residence, 52 Franklin Avenue, South San Francisco, CA.* Report prep. for Allison Knapp Wollam Consulting. Nov. 10.

PROPOSED PROJECT

The Project proposes a two-story residence with garage located on the front two-thirds of the lot. Landscaping is proposed in the front, side and portions of the rear of the property. A four-foot-high retaining wall is proposed approximately five feet from the rear of the residence. The rear one-third of the parcel would be excavated and reconstructed to ensure geotechnical stability of the steep slope.

METHODS

Wood Biological Consulting (WBC) conducted a reconnaissance-level survey of biological resources on the project parcel and accessible adjacent land on February 9, 2023. During the survey, all plant and wildlife species observed were documented and existing vegetation types were mapped, with particular focus on identifying suitable habitat for special-status plants and wildlife. Vegetation types on the parcel were mapped on an aerial photograph.

Prior to the survey, WBC queried databases for potential presence of special-status plants in the vicinity of the project parcel using the South San Francisco 7.5-minute USGS quadrangles[2,3]. In addition, the Information for Planning and Consultation (IPaC)[4] also was queried for federally-listed species. WBC also reviewed recent documentation of laws and policies regulating waters of the U.S. and of the state, including federal and state-protected wetlands.

The results of the database queries and field survey were compared with the 2015 biological resource assessment to determine if any changes had occurred, *i.e.*, newly listed special-status species, changes in protection status species previously considered to have potential to occur on or near the project site, or changes in the regulatory framework for biological resources and jurisdictional waters.

[2] California Natural Diversity Database (CNDDB). 2023. Version 5.2.14. Query of San Francisco North and San Francisco South USGS 7.5-minute Quadrangles. California Department of Fish and Wildlife, Biogeographic Data Branch. Sacramento, California. Information January 31.

[3] California Native Plant Society (CNPS). 2023. *Inventory of Rare and Endangered Plants* (online edition, v8-02). Query of San Francisco North and San Francisco South USGS 7.5-minute Quadrangles. California Native Plant Society, Sacramento, CA. Accessed February 15 at www.rareplants.cnps.org/

[4] United States Fish and Wildlife Service (USFWS). 2023. *IPaC Trust Resource Report for 52 Franklin Avenue.* Information for Planning and Conservation. Report generated Jan. 31 at https://ecos.fws.gov/ipac/

REGULATORY FRAMEWORK

Federal, state and local laws, codes and policies that apply to biological resource and wetlands and other waters are as follows:

FEDERAL

- **Federal Endangered Species Act (FESA).** Species listed or proposed for listing as Threatened or Endangered or candidates for possible future listing as Threatened or Endangered under the FESA (50 CFR §17.12).
- **Migratory Bird Treaty Act (MBTA).** Protection is afforded to bird species, administered by the USFWS, which makes it unlawful, unless expressly authorized by permit pursuant to federal regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export at any time, or in any manner, any migratory bird, or any part, nest, or egg of any such bird." This includes direct and indirect acts, with the exception of harassment and habitat modification, which are not included unless they result in direct loss of birds, nests or eggs. Most bird species occurring within California fall under the protection of the MBTA (16 U.S.C. 703-712).
- **Bald Eagle Protection Act (BEPA).** The BEPA (16 U.S.C. 668-668d, 54 Stat. 250) as amended, provides protection for the bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) by prohibiting the taking, possession and commerce of such birds, their nests, eggs or feathers unless expressly authorized by permit pursuant to federal regulations.
- **Federal Clean Water Act (CWA).** Section 404 of the CWA prohibits the discharge of dredged or fill material into "waters of the United States" without a permit from the U.S. Army Corps of Engineers (USACE). The definition of waters of the U.S. includes rivers, streams, estuaries, the territorial seas, ponds, lakes and wetlands. Wetlands are defined as those areas "that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3 7b). Tributaries to "waters of the United States" and adjacent wetlands would also be included (33 CFR §328.3). The U.S. Environmental Protection Agency (USEPA) also has authority over wetlands and may override an USACE permit.

  Some intermittent streams may be "waters of the United States," depending on connection to navigable waters. Both wetlands and non-wetland waters can be included within the regulated area. Within non-wetlands that are classified as waters of the U.S., the USACE maintains jurisdiction to the limit of the "Ordinary High Water Mark (OHWM)," which is defined as a "line on the shore established by the fluctuations. of

water and indicated by physical. characteristics such as clear, natural line." If wetlands are present that meet the criteria established by the USACE, the limit of jurisdiction is the OHWM or the limit of the adjacent or associated wetland, whichever is greater. If waters are determined to be under the jurisdiction of the USACE, the RWQCB would be the state permitting authority. At the discretion of the USACE, impacts to these areas could require a permit, depending on the type and size of the activity within USACE jurisdiction.

Substantial impacts to wetlands may require an individual permit. Projects that only minimally affect wetlands may meet the conditions of one of the existing Nationwide Permits. A Water Quality Certification or waiver pursuant to Section 401 of the CWA is required for Section 404 permit actions; this certification or waiver is issued by the Regional Water Quality Control Board (RWQCB).

STATE

- **California Endangered Species Act (CESA).** Listed[5] or candidates for listing by the State of California as Threatened or Endangered. A species, subspecies, or variety of plant is **endangered** when the prospects of its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over-exploitation, predation, competition, disease, or other factors (CFGC § 2062). A plant is **threatened** when it is likely to become endangered in the foreseeable future in the absence of special protection and management measures (CFGC § 2067).

- **California Fish and Game Code (CFGC)**. §3503 prohibits the take, possession, or needless destruction of the nest or eggs of any bird; §3503.5 prohibits the take, possession, or needless destruction of any nests, eggs or birds in the orders Falconiformes (new world vultures, hawks, eagles, ospreys and falcons, among others) or Strigiformes (owls); §3511 prohibits the take or possession of fully protected birds; and §3513 prohibits the take or possession of any migratory nongame bird or part thereof as designated in the MBTA.

- **California Native Plant Protection Act (CNPPA).** (§ 1900, *et seq*) A plant is **Rare** when, although not presently threatened with extinction, the species, subspecies, or variety is found in such small numbers throughout its range that it may be endangered if its environment worsens (CFGC § 1901).

- **California Environmental Quality Act (CEQA)** §15380. Species that may meet the definition of Rare or Endangered include the following:
    - Species with California Rare Plant Rank of 1A, 1B, and 2, considered to be "rare, threatened or endangered in California";
    - Species that may warrant consideration on the basis of local significance or recent biological information;
    - Some species included on the California Natural Diversity Database's (CNDDB) *Special Plants, Bryophytes, and Lichens List* or *Special Animals List.*

[5] Refer to current online published lists available at: https://wildlife.ca.gov/Data/CNDDB/Plants-and-Animals.

Although sensitive natural communities have no protected legal status under the State or federal Endangered Species Acts, they are provided some level of protection under CEQA. The CEQA Guidelines identify potential impacts on a sensitive natural community as one of six significance criteria. Where determined to be significant under CEQA, the potential impact would require mitigation through avoidance, minimization of disturbance or loss, or some type of compensatory mitigation when unavoidable.

- **Locally significant species,** that is, a species that is not rare from a statewide perspective but is rare or uncommon in a local context such as within a county or region (CEQA §15125 [c]), or is so designated in local or regional plans, policies, or ordinances (CEQA Guidelines, Appendix G). Examples include a species at the outer limits of its known range or a species occurring on an uncommon soil type.
- **Clean Water Act Section 401 and Porter Cologne Water Quality Control Act.** The State of California regulates water quality related to discharge of fill material into waters of the State pursuant to Section 401 of the CWA. Section 401 compliance is a federal mandate implemented by the State. The local RWQCB has jurisdiction over all those areas defined as jurisdictional under Section 404 of the CWA and regulates water quality for all waters of the State. These waters may include isolated wetlands as defined under the California Porter-Cologne Water Quality Control Act (Porter Cologne; California Water Code, Div. 7, §13000 et seq.). Regulated discharges include those that can affect water quality, even if there is no significant nexus to a traditional navigable water body required for USACE determination of jurisdiction over waters of the U.S.

LOCAL REGULATIONS

City of South San Francisco 2040 General Plan (2040GP)

The 2040GP identifies biologically sensitive areas and policies to improve the City's biological health and diversity. Chapter 15 Environmental and Cultural Stewardship (p 339, 2040GP) identifies policies and action items to protect habitat, promote tree cover connectivity and protect ecologically sensitive areas. Figure 48: Existing Habitat and Protected Areas (p 344, 2040GP) identifies habitat and protection areas throughout South San Francisco. The Project site is not identified as a habitat or protected area. Figure 49: Connectivity (p 344, 2040GP) identifies areas that contain tree cover. The Project site is shown with sparse tree cover. Figure 50: Ecologically Sensitive Areas (p 345, 2040GP) identifies environmentally sensitive areas. The Project site is not identified as an ecologically sensitive site.

The 2040GP identifies goals to improve habitat and quality of life. These goals, not specific to endangered or threatened species, are applicable to urban open spaces and tree removal.

> "GOAL ES-1: The City supports nature in South San Francisco to encourage healthy ecosystems, improve air and water quality, improve public health, and adapt to a changing climate. INTENT: To foster urban ecology in South San Francisco including open space and connectivity, habitat diversity, urban forestry, planting and vegetation, and land and vegetation management (p 357, 2040GP).

GOAL ES-4: An abundant, robust urban forest that contributes to South San Francisco's quality of life as it combats the effects of climate change. INTENT: To enhance South San Francisco's environmental quality and the mental and physical health of its residents, while bringing significant economic benefits through increased property values. To make the city more resilient to the impacts of climate change and provide habitat for wildlife (p 358, 2040GP).

Policy ES-4.2: Avoid tree removal. Avoid removing trees whenever possible. When removals are warranted, replace each removed tree with three new trees (p 358, 2040GP)."

Municipal Code -- Protected Trees

South San Francisco Municipal Code Section 13.30.020 defines a "Protected Tree" as one with a circumference of 48" or more when measured 54" above natural grade; a tree or stand of trees designated by the Director of Parks and Recreation as one of uniqueness, importance to the public due to its location or unusual appearance, historical significance or other factor; or a stand of trees that the Director of Parks and Recreation has determined each tree is dependent on the others for survival.

VEGETATION AND WILDLIFE HABITAT

The project parcel supports predominantly non-native vegetation, with herbaceous annual species on the lower building site, and a mix of non-native trees, shrubs and herbaceous species on the upper slope. Conditions are generally consistent with the vegetation as described in 2015.

RUDERAL HERBACEOUS

The lower proposed building site adjacent to Franklin Avenue supports ruderal[6] vegetation typical of long-abandoned lots with recurring weed management, which consists of non-native grasses and other herbaceous plants that re-establish following annual mowing. Plants observed on this portion of the site include Bermuda buttercup (*Oxalis pes-caprae*), slender oat (*Avena barbata*), wild radish (*Raphanus sativus*), bristly ox-tongue (*Helminthotheca echioides*), cheeseweed (*Malva parviflora*), fennel (*Foeniculum vulgare*), and cut-leaf geranium (*Geranium dissectum*). The lower area also formerly supported some woody plants including non-native blackwood acacia (*Acacia melanoxylon*) and native coast live oak (*Quercus agrifolia*), evident as re-sprouting stumps and brush piles on the site.

During the site reconnaissance survey in February, 2023, a small topographic depression in the level building site was saturated and supported one plant species, iris-leaved rush (*Juncus xiphioides*) that opportunistically occupies wet soil conditions, in addition to other plants characteristic of the upland ruderal vegetation on the site (bristly ox-tongue, cut-leaf geranium, and

[6] Ruderal vegetation consists of plants growing in disturbed areas, including sites where the vegetation is frequently or routinely removed, such as for weed management.

miner's lettuce); these latter species are very common in disturbed areas. The shallow depression is surrounded by dry land and is not connected to the drainage ditch at the toe of the slope.

RUDERAL WOODLAND

The steep slope supports ruderal woodland dominated by large trees, including Monterey cypress (*Hesperocyparis macrocarpa*), knobcone bine (*Pinus attenuata*), and Bishop pine (*Pinus muricata*). Although native to California, these trees are regarded as introduced in the region, often introduced or establishing on sites in response to disturbance or absence of management. The vegetation conforms most closely to *Hesperocyparis macrocarpa* Ruderal Woodland alliance described by the California vegetation mapping program[7]. The understory is a mix of non-native shrubs, vines and herbaceous plants, including Algerian ivy (*Hedera canariensis*), white-ramping fumitory (*Fumaria capreolata*), French broom (*Cytisus scoparius*), periwinkle (*Vinca major*), and cotoneaster (*Cotoneaster* sp.), which also establish and persist in response to periodic vegetation management and possibly slope movement. Native California blackberry (*Rubus californicus*) and California rose (*Rosa californica*) also are present. Recent removal of some weedy understory was apparent. The topography is irregular, with slumps and gullies indicating past soil movement or erosion.

At the southern parcel boundary, a road cut forms a bench along the contour. Upslope of the boundary, the vegetation transitions to native grassland and coastal scrub dominated by native plant species and few trees.

WILDLIFE

Wildlife or their sign observed on the site include raven (*Corvus corvax*), mourning dove (*Zenaida macroura*), California scrub jay (*Aphelocoma californica*), American robin (*Turdus migratorius*), Anna's hummingbird (*Calypte anna*), chestnut-backed chickadee (Poecile rufescens). Red-tailed hawk (*Buteo jamaicensis*) was observed soaring overhead, but there is no evidence of nesting on the parcel or in trees adjacent to it. Urban-adapted birds previously observed on the site[8] include house finch (*Carpodacus mexicanus*), American crow (*Corvus brachyrhynchos*), and bushtits (*Psaltriparus minimus*)). Several common species of salamander including slender salamander (*Batrachoseps attenuatus*) and arboreal salamander (*Aneides lugubris*) would also be expected to be present.

A coyote den was reported on the neighboring property, upslope and southwest of the project parcel. Biologists for the City are using a motion-detecting trail camera to monitor an active wildlife trail that crosses the parcels approximately mid-slope above the adjoining back yards.

[7] https://wildlife.ca.gov/Data/VegCAMP/Natural-Communities#natural%20communities%20lists
[8] M. Marangio. *Ibid.*

SPECIAL-STATUS SPECIES

Plant and animal species are considered to have special status is they are listed or proposed for listing under the federal or State endangered species acts, meet the definition of Rare or Endangered under California Environmental Quality Act (CEQA), listed as a Special Plant or Animal by CDFW, or are considered rare locally. Certain natural plant communities, wildlife habitats, landscape features are considered to have special status due to their restricted occurrence in the State, their tendency to support rare plant or animal species, or because impacts are restricted or otherwise regulated under federal, State, or local laws or ordinances. Pursuant to the guidelines of CEQA, any project that could result in significant adverse effects on special-status biological resources must, in most cases, incorporate measures to reduce potential impacts to a less-than-significant level.

SPECIAL-STATUS PLANTS

Three special-status plant species have been recorded on Sign Hill, within 0.2 mile of the study area. During the survey for this report, coast rock cress (*Arabis blepharophylla*) was observed in its typical rock outcrop habitat just 150 feet from the southern parcel boundary. However, this species has a California Rare Plant Rank of 4.3, is not tracked by CNDDB, and does not warrant consideration under CEQA. Furthermore, the specialized habitat characteristics are not present on the project site. Coast iris (*Iris longipetala*) also occurs in coastal scrub habitat on Sign Hill, but its CRPR 4.2 rank also does not warrant consideration under CEQA. No perennial iris plants were observed on the project parcel. Scouler's catchfly (*Silene scouleri* ssp. *scouleri;* CRPR 2.3) occurs on the Sign Hill ridge top.

Twenty-five other special-status plant species have been documented from the project vicinity, many from San Bruno Mountain or from historic collections that preceded extensive development of the San Francisco Peninsula. Of these, 23 species have been eliminated from further consideration because they are associated with specialized habitat conditions, such as serpentine or sandy soils, wetlands, beaches, dunes, or are large perennial plants that would have been detected on the project site if present.

The two remaining special-status plants with potential to occur on the project site, based on known occurrence in the region and marginally suitable habitat, are San Francisco onion (*Allium peninsulare* var. *franciscanum*) and San Francisco collinsia (*Collinsia multicolor*). Both species can grow in woodland habitats on shaded north-facing slopes. The habitat suitability on the project parcel is considered marginal for these species because of periodic vegetation management and the high density of non-native plants in the understory. Although more species are considered here than in the 2015 biological report, the conclusion remains that special-status plants are unlikely to occur on the project parcel. Additional focused floristic surveys in support of CEQA are not warranted.

SPECIAL-STATUS ANIMALS

Based on location information contained in the CNDDB, 20 special-status animal species have been recorded within three miles of the project site. Of these, 12 are considered to have no potential to occur on or near the project site because suitable habitat is absent. Seven species of insects and one mammal are considered to have low to moderate potential to occur on the project site, and are discussed in detail below. In addition to the four endangered or threated butterflies and one bat

species that were evaluated in the 2015 biological report, three additional species of special-status bees are summarized below.

The USFWS Information for Planning and Consultation (IPaC)[9] database identifies an additional 22 species of migratory birds with potential to occur on or near the project site. These species are considered Birds of Conservation Concern and are protected by the Migratory Bird Treaty Act. Of these species, 17 have little to no potential to use the project site because they are waterfowl or shorebirds restricted to aquatic and wetland habitats of San Francisco Bay, or utilize habitats not present on the project site. The remaining five species that could use trees and dense vegetation on the southern portion of the parcel for nesting are Allen's hummingbird (*Selasphorus sasin*), Belding's savannah sparrow (*Passerculus sandwichensis beldingi*), Nuttall's woodpecker (*Picoides nuttallii*), oak titmouse [*Baeopholus inornatus*], and wrentit (*Chamaea fasciata*).

Callippe Silverspot Butterfly

The callippe silverspot butterfly (*Speyeria callippe callippe*) is listed as federally listed as endangered. The historic range of callippe silverspot included the inner Coast Ranges on the eastern edge of the San Francisco Bay from northwestern Contra Costa County south to Castro Valley in Alameda County and from San Francisco south to La Honda in San Mateo County on the west side of the Bay. This butterfly has been found at San Bruno Mountain and Sign Hill in San Mateo County, in the hills near Pleasanton in Alameda County, at Sears Point in Sonoma County, and in the hills between Vallejo and Cordelia in Solano County (USFWS 2008).

Callippe silverspot butterfly occurs mainly in native grassland. Female butterflies lay their eggs on its larval foodplant, Johnny jump-up (*Viola pedunculata*). After one week, the larvae hatch and shelter within ground litter where they spend the summer and winter. In the spring the larvae eat the leaves of Johnny jump-up, pupate, and emerge as butterflies between mid-May and mid-July. The main causes of this species' decline are the loss and fragmentation of habitat due to urban development. Nectar sources include Italian thistle (*Carduus pycnocephalus*), milk thistle (*Silybum marianum*), coyote mint (*Monardella villosa*), hairy goldenaster (*Heterotheca villosa*), coast buckwheat (*Eriogonum latifolium*), pincushions (*Scabiosa atropurpurea*), California buckeye (*Aesculus californica*), narrow leaf mule ears (*Wyethia angustifolia*), and California horkelia (*Horkelia californica).*

Callippe silverspot butterfly is known from Sign Hill (CNDDB 2023). However, the habitat on the project site is unsuitable for callippe silverspot butterfly. The site is dominated by non-native and weedy grasses and other herbaceous plants, and invasive vines and non-native trees. No host plants (Johnny jump-up) are present on the parcel. The dense wooded portion of the upper slope presents a movement barrier to butterflies seeking or opportunistically encountering potential nectar plants on the project parcel. Non-native Italian thistle and milk thistle, which are potential host plants, are scattered on northern level area and the lower slope with other non-native plant species. Estimated coverage of these species was less than 20 sq ft. These annual plants would be removed as part of the construction and likely replaced as part of landscaping around the proposed residence. The amount of potential habitat that would be

[9] USFWS. 2023. *Ibid.*

removed would be an incrementally small proportion of the available habitat on Sign Hill, and would not result in a significant adverse effect on the species.

San Bruno Elfin Butterfly

The San Bruno elfin butterfly (*Callophrys mossii bayensis*) is federally listed as endangered. It inhabits rocky outcrops and cliffs in coastal scrub on the San Francisco Peninsula. Its patchy distribution follows the location of its host plant, stonecrop (*Sedum spathulifolium*). Adults of this butterfly emerge in early spring, in February and March. They mate soon thereafter and deposit eggs on the stonecrop plants. The eggs typically hatch within a week. By June most will have completed their larval development, at which time they leave the host plant to pupate in ground litter. They lie dormant as pupae until the following spring. Nectar sources include common lomatium (*Lomatium utriculatum)*, buttercup (*Ranunculus californicus)*, and yarrow (*Achillea millefolium)*.

Typical habitat includes steep, north-facing slopes in foggy locations. The San Bruno Elfin is restricted to a few small populations, the largest of which occurs on San Bruno Mountain to the north of the Project. Its habitat has been reduced in the past by quarrying, off-road recreation, and urban development. To protect this species as well as the Mission blue butterfly, a Habitat Conservation Plan has been implemented on San Bruno Mountain, in which the lower slopes were opened for development while the higher areas were protected.

The closest known documentation of the presence of this butterfly is about three miles north of the project parcel (CNDDB 2023). Suitable habitat conditions including host and nectar plants are not present on the Project site. Therefore, the proposed project would not result in significant adverse impacts to this species.

Bay Checkerspot Butterfly

The Bay checkerspot butterfly (*Euphydryas editha bayensis*) is federally listed as threatened. Its life cycle may include several different host plants. Following mating in mid-spring, the female butterflies lay their eggs on dwarf plantain (*Plantago erecta*). If the plantain is not sufficient for development the larvae may move onto one of two species of owl's clover (*Castilleja densiflorus* or *C. exserta*). Generally, one season is insufficient for completion of development and the larvae must enter dormancy until the following winter when the rains allow plant growth to begin again. The larvae then emerge to feed for a little longer, pupating in late winter. The adults emerge shortly thereafter. Habitat is often found on outcrops of serpentine soil. Nectar plants include goldfields (*Lasthenia californica*), tidy tips (*Layia* spp.), serrated onion (*Allium serra*), seaside muilla (*Muilla maritima*), and lomatium (*Lomatium* spp). Populations of Bay checkerspot historically inhabited numerous areas around the San Francisco Bay including the San Francisco Peninsula, the mountains near San Jose, the Oakland hills, and several locations in Alameda County. Populations are now known only from San Mateo and Santa Clara counties. Changing disturbance regimes (*i.e.*, fire, grazing) as well as introduced grassland plants have caused declines in host plant populations.

The closest known population is located about one mile north of the proposed project site (CNDDB 2023). The project site provides no suitable habitat with no host plants (dwarf plantain or owl's clover) or nectar plants. As a result, it is not suitable habitat for Bay checkerspot

butterflies. Therefore, the proposed project would not result in significant adverse impacts to this species.

Mission Blue Butterfly

The Mission blue butterfly (*Icaricia icarioides missionensis*) is a federally listed endangered species. It was formerly relatively widespread on the San Francisco and Marin peninsulas. It is now restricted to a few sites in these areas, including managed habitat on San Bruno Mountain in San Mateo County.

The butterfly's required habitat is coastal scrub. Larvae of the Mission blue emerge from a dormant state in early spring. Host plants consist mainly of perennial lupines (*Lupinus albifrons*, *L. variicolor*, and *L. formosus*). Nectar plants include coast buckwheat (*Eriogonum latifolium*) and blue dicks (*Dipterostemon capitatus).* The larvae eventually enter the ground to pupate. Several weeks later, the adult butterflies emerge to feed on lupine nectar, mate and lay eggs. The eggs hatch within a few days and the larvae eat for a few weeks before they enter dormancy until the following spring when they will complete their development.

This butterfly is documented to be present on Sign Hill (CNDDB 2023). They are also known from nearby San Bruno Mountain. Coastal scrub habitat and host and nectar plants are not present on the project site. Therefore, the proposed project would not result in significant adverse impacts to this species.

Obscure Bumble Bee

Obscure bumble bee (*Bombus caliginosus*) has a State Rarity rank of S1S2, which indicates a species that is extremely rare and of conservation concern[10], and warrants consideration under CEQA. It ranges along the Pacific Coast from British Columbia to Southern California. Some occurrences have been reported from the eastern side of the Central Valley. Food plants include coyote brush (*Baccharis pilularis*), thistles (*Cirsium* spp.), lupines (*Lupinus* spp.), lotus (*Lotus* spp, *Acmispon* spp.*)*, gumplant (*Grindelia* spp.) and phacelia (*Phacelia* spp). The obscure bumble bee was historically recorded from Alameda, Contra Costa, Del Norte, Humboldt, Marin, Mendocino, Monterey, San Luis Obispo, San Mateo, Santa Barbara, and Sonoma counties. The closest observations to the project site are from San Bruno Mountain (2004) and Fort Funston (1960). Bumble bee species are considered underrepresented in CNDDB and other databases, and absence of recent recorded occurrences may not accurately reflect their potential for occurrence within the region.

The only food plants present on the project site are few scattered bull thistles (*Cirsium vulgare*) on the lower slope in the area subject to periodic weed management activities. Effects of the proposed project on special-status bees would be less than significant based on the small increment of food plants that would be removed as a result of the project in contrast with the abundance of these plants in the region, including on Sign Hill.

Western Bumble Bee

[10] California Department of Fish and Wildlife. 2023d. *Special Animals List.* Natural Diversity Database. July. 137pp. Available online at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406&inline

Western bumble bee (*Bombus occidentalis*) is a Candidate for state listing as an endangered species[7]. It was historically a very common bee species in the western U.S. and western Canada, but populations from British Columbia to Central California have become extirpated or are severely declining. Food plants consist of thistle (*Cirsium* spp.), star-thistle (*Centaurea* spp.), sweet clover (*Melilotus* sp.), clover (*Trifolium* spp.), rabbitbrush (*Chrysothamnus* spp.), and buckwheat (*Eriogonum* spp.). It is also an important pollinator for various flowering plants and commercial food crops including avocados, peppers, tomatoes, cranberries, and various other berry crops. The closest observations to the project site are somewhat dated, including the Westborough neighborhood of South San Francisco (in 1996), San Bruno Mountain (1968), Twin Peaks (1960), Lake Merced (1968), and in San Francisco[11].

The only food plants observed on the project site are few scattered bull thistles (*Cirsium vulgare*) on the lower slope in the area subject to periodic weed management activities. Other food plants, a such as clover and yellow star-thistle, could be present during spring and summer, but would also be subject to removal during annual weed maintenance. Effects of the proposed project on special-status bees would be less than significant based on the small increment of food plants that would be removed as a result of the project in contrast with the abundance of these plants in the region, including on Sign Hill.

Stage's Dufourine Bee

Stage's dufourine bee (*Dufourea stagei*) is a California Special Animal[12]. It is a solitary ground-nesting bee in coastal scrub habitat presumed to be endemic to the San Francisco and San Mateo counties. Little is known of this species' specific life history and habitat needs. The only known occurrence in the project region is from San Bruno Mountain in 1961 and 1962[13]. It is unlikely the project site provides suitable habitat for this species, or that any persisitent population occurs there. Therefore, the proposed project would not result in significant adverse impacts to this species.

Hoary Bat

The hoary bat (*Lasiurus cinereus*) is considered a CDFW Special Animal[14]. It is the most widespread of all North American bats and it is ubiquitous throughout California. It is a large bat with frosted fur, golden coloration around the face, and rounded ears. Hoary bats are solitary and typically roost near the ends of branches of coniferous and deciduous trees usually at the edge of a clearing[15]. Although thought to be highly migratory, wintering sites have not been well documented, and no specific migration routes have been identified. Hoary bats are often found flying in waves of large groups during autumn migration; spring migration is apparently less organized. They forage in small to large groups on large prey such as moths, beetles, flies, grasshoppers, termites, dragonflies and wasps. Predators include snakes, scrub-jays, and raptors such as hawks, kestrels, and owls.

Large trees on the woodland slope provide suitable roosting habitat within the project site and adjacent to it. Although no hoary bats or their sign were observed during the reconnaissance survey,

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11 CNDDB. 2023. *Ibid.*
12 CDFW. 2023d. *Ibid.*
13 CNDDB. 2023. *Ibid.*
14 CDFW. 2023d. *Ibid.*
15 Bolster, B.C. 2005a. *Hoary Bat* (*Lasiurus cinereus*). *Species Account*. Western Bat Working Group. http://wbwg.org/species_accounts.htm#LABL.

the potential exists for the species to occur at any time of year. The nearest records of hoary bat to the project site are in San Bruno (1990), Daly City (1969), Pacifica (1955), and San Francisco (1951, 1987)[16].

If active roosting is underway at the time of construction, direct or indirect impacts to breeding behavior or success could result. Such effects would be deemed a significant adverse impact pursuant to the statutes and guidelines of CEQA; impacts should be addressed in environmental review documents. Impact avoidance measures are warranted, as outlined below.

WATERS OF THE U.S. AND OF THE STATE

Wetland and riparian habitats are considered by federal and State regulatory agencies to represent a sensitive and declining resource. Under certain circumstances, non-vegetated channels, drainages, swales, ponds and lakes, and other bodies of water also receive regulatory protection under federal, State or local laws or policies.

The small topographic depression in the level building site supports an obligate wetland plant species, iris-leaved rush (*Juncus xiphioides*), growing in saturated soil at the time of the reconnaissance survey in February, 2023. Soils in the small depression did not exhibit hydric conditions. The depression soil is fill material with sandy loam texture and no redoximorphic features, and soil color was 2.5Y 4/3[17], which does not indicate prolonged saturated conditions. The depression was saturated to the surface, and groundwater stood at three inches below the surface. The shallow depression is surrounded by dry land and is not connected to the drainage ditch at the toe of the slope.

In contrast, a representative soil sample from the surrounding ruderal vegetation (with 50% cover of Bermuda buttercup) was clay loam with colors of 2.5Y 3/3 and 2.5Y 5/6, also too pale to suggest any persistent saturation. At depth, the soil is also wet, but not saturated.

These conditions were observed during an exceptionally wet winter with rainfall greatly exceeding historic averages. Although the depression would this would meet the vegetation criterion for federal jurisdictional wetlands (*i.e.*, dominated by a wetland indicator plant species), the soil criterion is not met, and hydrology on the site appears to be in response to localized accumulation of surface water.

In addition, the small topographic depression would be exempt from federal regulatory jurisdiction under the federal Clean Water Act due to its creation incidental to reclamation of the site following removal of the previous structure[18]. Similarly, the shallow depression does not provide the important biological habitat functions and values that are typically associated with federally- or state- protected wetlands, and therefore, do not demonstrate beneficial use characteristics, as

[16] CNDDB. 2023. *Ibid.*
[17] Munsell Color Co., Inc., 1988, *Munsell soil color charts*. Baltimore.
[18] 33 CFR Part 328.3(7).

ascribed by the Regional Water Quality Control Board under the San Francisco Basin Plan[19]. Additionally, the depression lacks bed and bank characteristics, and is therefore not a stream subject to regulation by California Department of Fish and Wildlife under Section 1600 of the California Fish and Game Code.

BIOLOGICAL IMPACT ASSESSMENT

a) Special Status Species. The proposed project would not affect special-status butterflies or their habitat. Some of these species have been documented occurring on Sign Hill in high-quality and relatively undisturbed coastal scrub and grassland habitat. These habitats do not occur on the project site, and would be protected by limiting the project construction activities to the project parcel. Based on the distance and isolation from suitable habitat for these butterflies, removal of a small number of non-native thistles that are potential nectar sources would not result in a significant impact to these species.

Nesting migratory birds and raptors could be present in trees and shrubs on the slope. If construction begins during nesting season (February 15-August 31), a pre-construction nesting survey is recommended, as described in the mitigation measure below.

Hoary bat could roost in trees on the upper slope. A pre-construction roosting bat survey is recommended, as described in the mitigation measure below.

b) Riparian or other sensitive natural communities. No sensitive natural communities are present on the project site. Native habitat that supports special status plants and wildlife occurs adjacent to the project site in Sign Hill Park. The proposed project would be limited to the project parcel at 52 Franklin Avenue, and would not have direct or indirect impacts on sensitive natural communities.

c) Wetlands. No federal or state protected wetlands are located on the proposed project site.

d) Wildlife movement. The proposed house construction would occur on a previously occupied home site adjacent to other homes. While it would reduce the opportunities for urban-adapted wildlife (*i.e.*, coyote, deer, raccoon) to access Franklin Avenue from the open space of Sign Hill, this is not a critical movement pathway, and other routes will continue to exist. The wildlife trail that crosses east-west through the upper slope (currently being monitored for use by coyotes) would be interrupted by construction and geotechnical repair of the slope. However, wildlife will continue to have uninterrupted access to the slope above the repair and into Sign Hill Park. The proposed project will not have a significant impact to wildlife movement.

e) Local plans and policies. The proposed project would be consistent with the Open Space and Conservation element of the South San Francisco General Plan. The proposed project would not result in the removal of trees requiring permits from the City of South San Francisco.

[19] https://www.waterboards.ca.gov/sanfranciscobay/basin_planning.html

f) **Habitat Conservation Plan.** The proposed project is not located within any Habitat Conservation Plan or Natural Community Conservation Plan areas.

MITIGATIONS

POTENTIAL DISTURBANCE TO NESTING BIRDS

Because there are several large trees on the steep slope of the southern portion of the property that are planned for removal, there is the potential for raptors (birds of prey) and other protected birds) to nest on and adjacent to the site. These birds are protected under the Migratory Bird Treaty Act and Fish and Game Code 3503.5. Disturbance of nesting birds that results in loss of nestlings would be a significant environmental impact.

Mitigation 1

If project construction activities occur during the nesting season (approximately February 15 to August 31), for birds protected under the California Fish and Game Code and Federal (MBTA) the applicant shall retain a qualified biologist to conduct a preconstruction survey for protected birds on the site and in the immediate vicinity. The survey shall be done no more than 14 days prior to the initiation to construction activities. If nesting birds are found on the project site or in the immediate vicinity, the developer shall locate and map the nest site(s) within three days and submit a report to the City and California Department of Fish and Wildlife ("CDFW"), establish a no-disturbance buffer of 250-feet, and conduct on-going weekly surveys to ensure the no-disturbance buffer is maintained. In the event of destruction of a nest with eggs, or if a juvenile or adult raptor should become stranded from the nest, injured or killed, the qualified biologist shall immediately notify the CDFW. The qualified biologist shall coordinate with the CDFW to have the injured bird either transferred to a raptor recovery center or, in the case of mortality, transfer it to the CDFW within 48 hours of notification. These procedures reduce the potential for the disturbance of nesting birds or the destruction of active nests. Implementation of this mitigation would reduce the potential impacts from significant to mitigable. Tree removal outside of the nesting season would preclude the need for any other mitigation activities related to protected birds.

POTENTIAL DISTURBANCE TO ROOSTING BATS

Large trees on the upper slope of the southern portion of the property that are planned for removal could be used by hoary bat for roosting. Roosting bats are protected under Fish and Game Code. Disturbance of roosting bats would be a significant environmental impact.

Mitigation 2

Removal or pruning of trees could result in the destruction of bat roosts or disruption of breeding of special-status bats such as the hoary bat. In addition, disturbance during the maternity roosting season could result in potential roost abandonment and mortality of young. Prior to the removal or pruning any trees or the commencement of construction activities within 100 ft of mature trees, the following avoidance measures should be performed.

1. Bat Habitat Assessment. If work is to take place during the bat breeding season (April 1 through August 31), a qualified biologist should conduct a survey of the project site

and vicinity to determine if active maternity roosts are present. This survey should be conducted no more than 14 days prior to the initiation of work.

2. Maternal Roosts. If any trees or structures are determined to support or potentially support maternal bat roosts, work may not proceed if it would destroy or disrupt breeding. Maternal bat roost sites may only be removed or demolished after coordination with the CDFW and/or the USFWS. Passive exclusion of roosting bats would be required and this may only be performed during the non-breeding season (i.e., between October 1 and March 30).

3. Pre-construction Survey. A pre-construction survey should be conducted by a qualified biologist to identify suitable bat roosting sites. The study area should include an area extending up to 100 ft of the limits of work, access permitting.

4. Protocol for Observations of Live Bats. If live bats are detected in the work area, work may not proceed until CDFW has been consulted. Contractor or others may not attempt to disturb (e.g., shake, prod) roosting features to coax bats to leave. Such actions would constitute "harassment" under the CCR.[20]

5. Day or Night Roosts. Any trees or structures present on site and determined to provide suitable day or night roosting sites for bats should be identified and marked on site plans. If no suitable roost sites or evidence of bat roosting are identified, impact minimization measures are not warranted. If suitable roosting sites or evidence of bat roosting are identified, the following measures should be conducted in coordination with CDFW:

    a. A qualified biologist should survey suitable roost sites immediately prior to the removal or significant pruning of any of the larger trees, or demolition or significant renovation of any structures suspected or known to support bat roosts.

    b. If the project biologist identifies suitable day or night roost sites or evidence of bat occupation, the following steps should be followed to discourage use of the sites by bats and to ensure that any bats present are able to safely relocate.

        For trees:

        a. Tree limbs smaller than three inches in diameter should be removed and any loose bark should be peeled away.
        b. Any competing limbs that provide shelter around the potential roost site should be removed to create as open of an area as possible.
        c. The tree should then be alone to allow any bats using the tree/snag to find another roost during their nocturnal activity period.
        d. Trees should be re-surveyed 48 hours after trimming.
        e. If no bats are present, work may proceed.
        f. If bats remain on site, additional measures would be prescribed by the biologist.

[20] 14 CCR § 251.1 states: Except as otherwise authorized in these regulations or in the Fish and Game Code, no person shall harass, herd or drive any game or nongame bird or mammal or furbearing mammal. For the purposes of this section, harass is defined as an intentional act which disrupts an animal's normal behavior patterns, which includes, but is not limited to, breeding, feeding or sheltering.

Michelucci & Associates, Inc.
Geotechnical Consultants

Joseph Michelucci, G.E.
joe@michelucci.com

Richard Quarry
rich@michelucci.com

March 3, 2025
Job No. 23-5138

Via e-mail only: karenlisettediaz@gmail.com

Karen Diaz
23 Carlsbad Court
South San Francisco, CA 94080

Re: Seocnd Review of Plans for Proposed New Residence
52 Franklin Avenue
South San Francisco, California

Dear Ms. Diaz:

We reviewed the geotechnical related details on the latest of the foundation and retaining wall plans for the referenced residence. These are the plans for the residence. We previously reviewed plans for the slope protection measures associated with previous on and off- site instability. The latest plans for the proposed home are dated February 25, 2025, and were prepared by Innovative Consulting Engineer.

The results of our review of an initial set of plans are described in our February 27, 2025 letter. The letter outlined recommendations for foundation and retaining wall design; as such, the February 27, 2025 letter is a supplement to our July 11, 2023 report for the residence project.

In our opinion, the February 25, 2025 foundation and retaining wall plans generally comply with the February 27, 2025 letter and July 11, 2023 recommendations.

Please contact us with any questions or comments.

Very truly yours,
MICHELUCCI & ASSOCIATES, INC.



Joseph Michelucci
Geotechnical Engineer #593
(Expires 3/31/25)

CC: Innovative Consulting Engineer (info@icegroupinc.com)

Michelucci & Associates, Inc.
Geotechnical Consultants

Joseph Michelucci, G.E.
joe@michelucci.com

Richard Quarry
rich@michelucci.com

January 27, 2025
Job No. 23-5138

Via e-mail only: karenlisettediaz@gmail.com

Karen Diaz
23 Carlsbad Court
South San Francisco, CA 94080

Re: Review of Plans for Residence
52 Franklin Avenue
South San Francisco, California

Dear Ms. Diaz:

As requested, we have reviewed plans and calculations for the structural details of the house foundations and retaining walls for the new house to be built on the referenced site, The plans and calculations are dated March 15, 2022, and December 24, 2024, respectively. Both plans and calculations were prepared by Innovative Consulting Engineer.

The purpose of our review was to assess whether the plans and calculations incorporated the foundation and retaining wall design criteria presented on pages 7 through 12 in our July 11, 2023geotechnical engineering report for the house portion of the site improvement project. We previously reviewed plans for the slope protection portion of the project.

The project site is on the southerly side of Franklin Avenue. The site is relatively flat (although on different levels) between the street and base of the upsloping hillside on the remainder of the property. The hillside is inclined at about 1 ½ horizontal to 1 vertical.

The plans indicate that the house will extend from near the street and be fitted into an excavation made to into the base of the hillside. Retaining walls will support the excavation at the rear of the house and for a section along the house westerly side.

The plans show that the house and wall foundations will consist of cast-in-place reinforced concrete piers. The retaining walls will also be reinforced concrete. Judging from the existing elevation contours shown on the foundation plan, the rear retaining wall height will rise in from about 4 feet at the southeast corner to about 10 feet at the southwest corner.

Our current assessment of the subject plans and calculations are presented in the following paragraphs.

1.The table on page 10 of our July 11, 2023 report lists the lateral ("active") pressures recommended for the design of retaining walls. Among other items the design values are a function of the inclination of the slope being supported by the wall. As noted above, the inclination of the hillside above the house rear wall is approximately 1 ½ horizontal to 1 vertical. The design lateral pressure of a 1 ½ horizontal to 1 vertical slope angle is not listed on the table; At this time, we recommend a lateral pressure value of 75 psf per foot of depth for the design of the house rear wall. The recommended seismic increment should be added to this soil related lateral pressure.

The ground behind the segment along the house westerly side will be relatively level. Therefore, that segment of wall should be designed for a combination of a lateral pressure of 40 psf per foot of depth and the recommended seismic increment.

2. The planned retaining wall foundations consist of two rows of piers connected by reinforced concrete caps. The calculations show that the caps were designed as footings bearing on the soil at the wall locations. Our July 11, 2023 report did not provide recommendations for footings.

We believe that the relatively rigid caps will transmit the vertical loads due to the weight of the wall and caps, and the overturning moment on the caps to the piers and not to the ground beneath the caps, i.e. the ground should not be counted on for support.

Accordingly, we recommend that the wall foundation design assume that all the vertical loads will be transmitted to the piers. Piers beneath the caps leading edge would then be subjected to downward directed (compressive") loads, from both the weight of the wall and caps and from the overturning moment. In contrast, the trailing piers would be subject to upward directed ("tension) loads from the overturning moment and downward directed loads from the weight of the wall and caps.

The resistance to the vertical loads on the piers will be through skin friction between the sides of the piers and the adjoining soil. We recommend a skin friction of 500 psf for downward directed loads, and 375 psf for upward directed loads. We note that these skin frictions are allowable values.

The reaction to the lateral loads transmitted to the caps will be resisted by passive pressure generated against the caps leading faces and also by passive pressure against the upper part of the Innovative Consulting Engineer piers. For those piers beneath the leading edges, the passive pressure can be taken as an allowable value of 400 psf per foot of depth. For those piers beneath the trailing edges, the passive pressure can be taken as an allowable value of 200 psf per foot of depth. In the case of the piers, the passive pressure can be resolved over two pier diameters. It would be reasonable to determine the shears and bending moments in the piers based on the distribution of the passive pressure on the piers, and noting there would be some fixity as a result of the piers being embedded in the caps.

Judging from the ground surface contours shown on the foundation plan, the rear wall height will vary from 4 to 5 feet at the west end to about 10 feet at the east end (not including the planned freeboard). The side wall segment will vary in height as well. We suggest that consideration be given to preparing a few separate wall and foundation designs to account for this anticipated change in heights in the event that cost savings could accrue with lesser volumes of concrete and reinforcing.

Lastly, our July 11, 2023 report notes that, in our opinion, it would be acceptable to use a factor of safety of 1.1 for overturning of walls when considering the combined effect of static and seismic loading.

3. The plans indicate that all the piers supporting grade beams are to be 15 feet long. Our July 11, 2023 report recommends that house piers have a minimum length of 12 feet where soil is encountered, based on discounting support from the upper 4 feet of soil, and a minimum depth of 8 feet below the discounted soil. Thus an 18-inch diameter, 12 foot long pier in soil would have an allowable load carrying capacity of about 19 kips. Perhaps in some cases, the combination of the grade beam weight and the design building loads are less than 19 kips, in which case the pier lengths could be reduced to 12 feet.

As noted in the July 11, 2023 report, at those locations where rock is encountered the discount depth is 1 foot. We anticipate providing observation of the pier shaft drilling operations, and can assist the foundation contractor in determining final depths when rock is encountered, based on our observations.

In our opinion the plans and calculations should be revised/updated to reflect the above items.

We are pleased to continue to be of service to you. Please contact us with any questions or comments.

Very truly yours,
MICHELUCCI & ASSOCIATES, INC.



Joseph Michelucci
Geotechnical Engineer #593
(Expires 3/31/25)



CC: Innovative Consulting Engineer (info@icegroupinc.com)

Michelucci & Associates, Inc.
Geotechnical Consultants

Joseph Michelucci, G.E.
joe@michelucci.com

Richard Quarry
rich@michelucci.com

August 2, 2023
Job No. 23-5138

Karen Diaz
23 Carlsbad Court
South San Francisco, CA 94080

Re: Responses To Cotton Shires Peer Review Letter
52 Franklin Avenue
South San Francisco, CA

Dear Ms. Diaz:

We received and reviewed Cotton, Shires and Associates, Inc. (CSA) letter of July 24, 2023 that outlines their peer review of our July 11, 2023 report regarding the referenced property.

The following paragraphs present our responses to their requests in the letter for additional information and clarification of some of our recommendations. The requests are listed by numbers; the responses given below follow the same format.

Request No. 1

This request asks for the Michelucci and Associates, Inc., (M&A) input and output files for CSA review, and for clarification of what parameters were used to model the underlying bedrock.

Response to Request No. 1

CSA should specify what input and output files are requested. We will then transmit the specified input and output files to them.

We used the approach described in the Gabr et al., reference (reference No.1 in our report) and the rock compressional velocities measured by JR Associates to develop p-y curves for the rock. JR Associates reported two different types of rock – "highly weathered bedrock" and "weathered bedrock", and we followed this classification system in our estimate of the p-y curves of the two rock types.

The Gabr et al., method requires as input the rock Geological Strength Index (GSI) and the rock compressive strength from which the other input factors are computed.

We estimated the GSI of the two rock types from plots in the Marinos et al., paper, reference 6 in the paper. The Gabr et al., method includes a formula for calculating the rock modulus of elasticity using as input the rock compressive strength. As there are no reported measured rock compressive strengths, we first calculated the rock modulus of elasticity from the measured rock compressional velocities and then by trial and error, back computed the rock compressive strengths until the computed moduli of elasticity matched the measured moduli. Lastly, we checked the computed rock p-y values to verify that they were sensibly larger than those used for the soil overlying the "highly weathered bedrock".

The depths to surface of the "highly weathered bedrock" and the "weathered bedrock" were 7 feet and 20 feet, respectively in our model.

Request No. 2

This request notes that the plot of the lateral wall upper end pier bending moments was omitted from the report. A copy of the lateral wall upper end pier bending moments plot is attached as Figure 7A.

Response to Request No.2

A copy of Figure 7A is attached.

Request No. 3

This request asks for "recommended passive pressures and the beginning depth for passive resistance for the Lateral and Cross Lot Walls".

Response to Request No. 3

Geotechnical engineers commonly provide recommended passive pressures for structural engineers to use in estimating the distribution of soil and/or rock lateral resistance developed against piers subjected to lateral loads and overturning moments. Presumably, in most cases, the structural engineers determine depths to which piers should extend by formulas in Chapter 18 of the Building Code, although how to determine the maximum shear forces and maximum bending moments in the piers is unclear in the Code.

The p-y analysis is an alternative method for estimating the distribution of soil and/or rock lateral resistance developed against piers subjected to lateral loads and overturning moments. The p-y analysis results in not only the distribution of soil and/or rock lateral resistance developed against piers subjected to lateral loads and overturning moments (similar to passive pressures) but also the maximum shear force and bending moment in the piers.

The plots of shear and bending moment distributions on the figures included in our report were based upon our estimate of forces that a debris flow would exert on both the cross lot wall and the lateral walls. There are two criteria for these forces; an impact force, caused by the momentum of a moving debris flow, and a static force caused by unmoving, static deposit of debris against the walls.

Because the report shear and bending moment distributions are based on the estimated forces, the structural engineer does not require recommended passive pressures. Instead, the structural engineer simply can use the distributions for designing the 30-inch diameter pier structural details (concrete strength, reinforcing amounts etc.).

The p-y curves attached to our report and to this letter (Figure 7A) are for the specific case of 30-inch diameter piers spaced at 3 diameters apart.

Request No.4

Given that the soils overlying the bedrock have been logged as landslide debris, fill, and colluvium, M&A should provide justification to support their assumption that this material is suitable for skin friction and passive resistance, below a depth of 4 feet for the house pier foundation design.

Response to Request No. 4

Our report stated (Page 5), "Drilled piers should be designed on the basis of a skin friction value of 500 psf beginning at the top of supporting material. In this case, the top of supporting material should be assumed to begin at a depth of 4 feet below grade, 1 foot below the top of bedrock, or as defined by the "Rule of Ten" criteria illustrated on the attached Figure 9, whichever is deeper."

Using the above criteria, landslide debris, fill, and colluvium would not be relied upon for frictional support and frictional support would be within bedrock.

Request No. 5

This request asks for Cross Section A-A'.

Response to Request No. 5

A copy of cross section A-A' is attached.

Request No. 6

"M&A should clarify anticipated depth to bedrock for the Lateral and Cross Lot Walls. Based on Figure 3, depth to highly weathered sandstone varies between 3.5 feet and 8 feet. M&A should also clarify if "highly weathered" sandstone is bedrock."

Response to Request No. 6

The soil and rock profile for the design of piers supporting the Cross Lot and Lateral Walls is described in Response No. 1 above. We note that if the soil at individual wall pier locations is thinner than the design assumption of 7 feet, the net resistance distribution would be stiffer than the design distributions, and therefore, the design would be conservative at those pier locations. We would consider 'highly weathered" rock to be sandstone.

Request No 7

"Please clarify whether the p-y analysis is for free or fixed head conditions. Based on Figures 4 through 8, the moments at the top of the moment profiles (Figures 4 and 6), suggest fixed conditions, while the report text states free conditions were assumed. We note that where both free and fixed conditions may be applicable, it is typical to analyze both conditions."

Response to Request No.7

All our p-y analyses are for free head conditions, and the plots of shear force and overturning moments reflect this design basis. The plots do not suggest fixed head conditions. As noted above, our p-y analyses were made for specific wall design impact and static forces and the associated overturning moments. The analyses included these design impact and static forces and the associated overturning moments; they were applied to the tops of the piers as input. The plots show the applied shear forces and overturning moments at the zero depth ordinate.

We note that both the walls and the grade beam connecting the tops of the piers probably will cause a measure of fixity, but we neglected this effect partly because it is conservative, and partly to account for the possibility that the Cross Lot Wall would be located on the slope a short distance above the (level) building area.

We trust that the above has answered many of the peer reviewer questions. We are available to provide further responses, as necessary.

It is a pleasure working with you on this project. If you have any questions or comments, please feel free to contact our office.

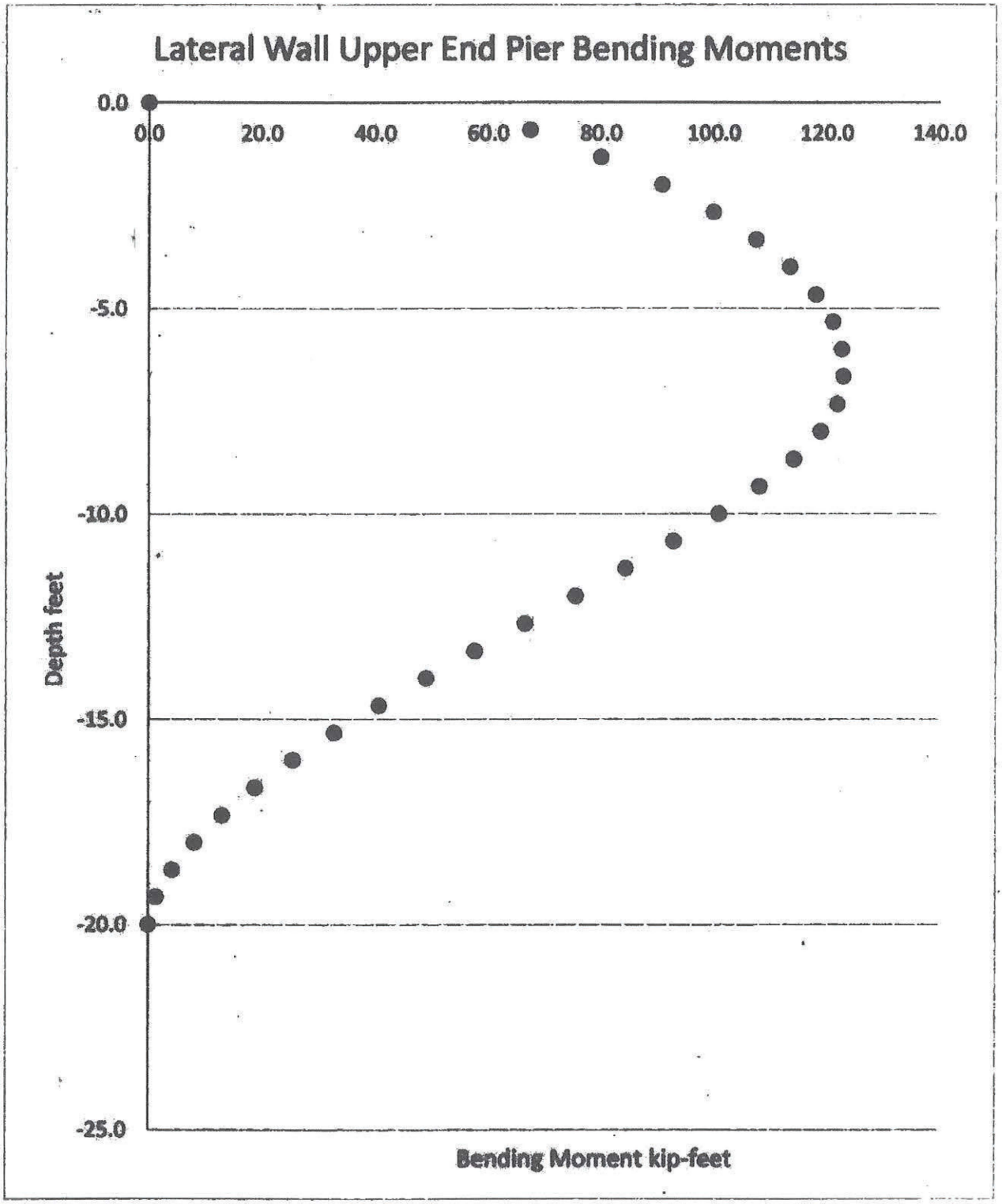
Very truly yours,
MICHELUCCI & ASSOCIATES

John Petroff
Project Geologist

Joseph Michelucci
Geotechnical Engineer #593
(Expires 3/31/25)

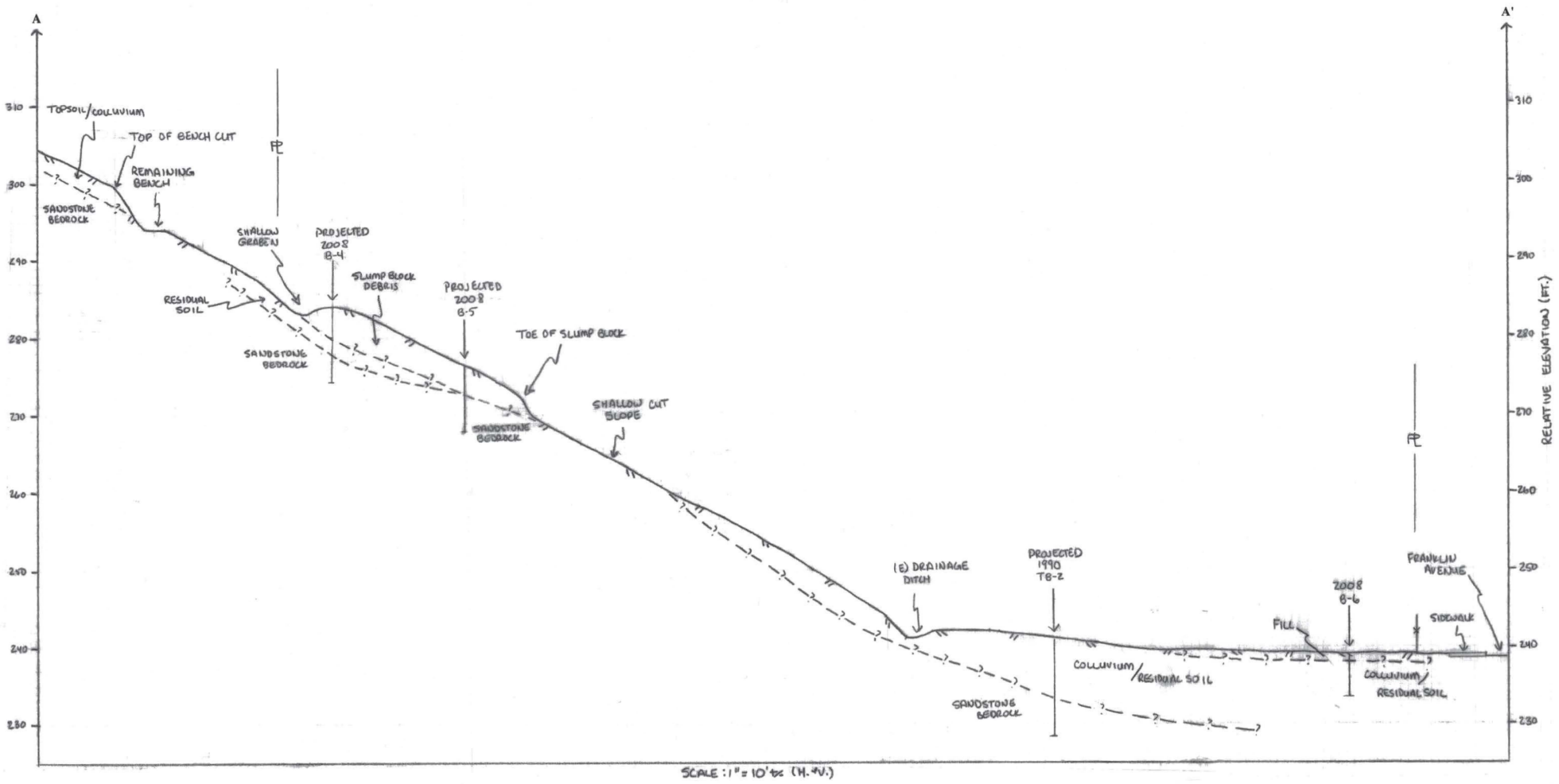


cc: Allison Knapp (aknapp@ix.netcom.com)
Mark Berns (mberns@bernsinfrastructure.com)
David Schhrier (dschrier@cottonshires.com)
C.E. Design Inc. (info@icedesigninc.com)



Job No. 23-5138	Michelucci & Associates, Inc.	Figure 7A

TYPICAL PROFILE A-A'



**Topography based on contours shown on the topographic survey prepared by GL & A Civil Engineers, titled, "Boundary, Utility, and Topographic Survey & Lot 19, Block 7, Sterling Terrace No. 2, South San Francisco, California," dated March 1990.*

TYPICAL PROFILE A-A'*

52 Franklin Avenue
South San Francisco, California

Scale: 1"=10'± (H. & V.)	Approved: D. H. & J. M.	Drawn By: J. P.
Date: 8-6-08		Revised:

Michelucci & Associates, Inc.

Job No. **06-3601**		Figure **10**

Michelucci & Associates, Inc.
Geotechnical Consultants

Joseph Michelucci, G.E.
joe@michelucci.com

Richard Quarry
rich@michelucci.com

July 11, 2023
Job No. 23-5138

Via e-mail only: karenlisettediaz@gmail.com

Karen Diaz
23 Carlsbad Court
South San Francisco, CA 94080

Re: Geotechnical Consultation
Mitigation of Debris Flow Potential and
Construction of New Residence
52 Franklin Avenue
South San Francisco, California

Dear Ms. Diaz:

Introduction

In early January 1982, during an historic rainfall event, a debris flow arising from the hillside above the house on the referenced property destroyed the residence. The property has remained vacant since 1982. At this time, it is proposed to construct a new house on the property, essentially in the same area on which the original house was located. The subject property is shown on the attached Site Vicinity Map, Figure 1.

Geotechnical engineering and engineering geologic investigations carried out by our firm and other consultants between 1989 and 2023 concluded that the potential for another debris flow exists, derived from susceptible soils on the steeper, upper portions of the property and the hillside above the rear property line. The potential hazard for a new house built on the property, associated with potential future debris flows, would be similar to the 1982 debris flow unless mitigative measures are undertaken.

This report presents the results of analysis of the size of a future debris flow, and recommendations for mitigating the debris flow hazard by capturing the debris flow within a constructed basin, preventing the flow from reaching the building area. The report also provides geotechnical recommendations and design criteria for the proposed new structure.

Previous Investigations

Michelucci and Associates investigated the site soil and geologic conditions on and above the property in 1990 and 2008. Our investigations included research of published geologic information, field geologic reconnaissance work, test borings, and laboratory testing of soil and rock samples obtained from the borings.

We prepared two reports outlining our investigation findings. The reports included an estimate of the volume of a potential future debris flow along with recommended mitigation. The reports also provided recommendations for the type and design criteria for new house foundations.

Earth Systems also investigated the site soil and geologic conditions, focusing on the debris flow hazard. They prepared three reports between 2016 and 2023, documenting their estimate of the volume of a potential debris flow. Earth Systems also logged test borings that were drilled on the property and carried out laboratory tests on samples retrieved from the borings. They also performed direct shear laboratory tests on reconstituted specimens derived from bulk samples of soils recovered from the site.

Earth Systems retained J R Associates to conduct a seismic refraction survey along survey lines on the hillside above and to the west of the property. Measured compression wave velocities were included in J R Associates report submitted to Earth Systems.

Earth Systems recommended mitigating the debris flow hazard by constructing a basin on the hillside above the building area to act as a barrier to capture a possible debris flow. The basin would consist of a rectangular enclosure, formed by three retaining walls, with one cross-lot wall extending the width of the property, and two lateral walls extending uphill of the cross-lot wall. The retaining walls would be designed to withstand the forces a potential debris flow would impose on the walls.

Current Investigation

We recently re-examined the site and viewed surface soil conditions and outcrops of rock where exposed on and above the rear property line.

We analyzed the mechanics of a potential debris flow, using as a basis the estimated debris flow volume and the topography between the area of the mapped debris flow source and the location of the walls comprising the debris flow enclosure. The enclosure location is shown on Figure 2, and described in more detail below. Recommendations for the design of the barrier walls that form the enclosure, and the wall foundations, are also given below. These recommendations are based on our analyses.

CONCLUSIONS AND DISCUSSION

As noted, Earth Systems recommended constructing a "U" shaped debris barrier, consisting of retaining walls, to form a basin that would capture and enclose a potential debris flow onto the subject site. We agree with this recommendation. The recommended barrier location is displayed on Figure 2.

The following paragraphs outline the results of our analyses of the size of the walls and wall foundations, and present recommendations for the wall foundation and foundation design. Suggestions for the changes and amendments to the Earth Systems design criteria are also discussed below.

The Michelucci and Associates (M&A) and Earth Systems (ES) estimates of the potential future debris flow volume of approximately 400 and 500 cubic yards, respectively. Our recommendations account for debris barrier adequate to enclose a volume of approximately 500 cubic yards.

We chose a representative soil and rock profile for the drilled, cast in place concrete piers that we recommend comprise the wall foundations. This profile is based on test borings drilled in, or close to the defined debris basin and logged, by both M&A and ES. All the borings made by both firms, and the refraction survey conducted by J R Associates indicate that the piers will penetrate through surface soils and into what J R Associates characterized as "highly weathered bedrock" and "weathered bedrock" (believed to be predominantly sandstone). This profile is illustrated on the attached sketch, Figure 3.

RECOMMENDATIONS

1. Retaining Walls

We estimated the future debris flow height, velocity and impact force on the cross-lot wall from equations recommended by Hungr and Morgan (1984). The estimated height (i.e., thickness) was approximately 2 meters, and the estimated velocity was slightly less than 6 meters per second. As the debris flow momentum is likely to cause the leading edge of the flow to rise upward on the cross-lot wall face, the wall height should be made higher than the estimated final resting debris flow height (i.e., 10 feet); we suggest a total height of 12 feet.

To adequately capture the estimated debris flow volume, we recommend that the two side walls each be 50 feet long. The wall heights can taper from a height of 12 feet at and near the cross-lot wall connection to 7 feet at their upper (south) ends.

The cross-lot wall will be subjected to two forces – an impact force when the debris flow strikes the wall and a static force when the debris comes to rest. The lateral walls will be subjected only to static forces.

We recommend two design criteria for the structural detailing of the cross-lot wall - an impact force equal to 8.5 kips per foot, distributed uniformly over a height of 6.6 feet (2 meters), and/or a static force derived from an equivalent fluid pressure of 124 psf per foot of depth applied over a height of 10 feet.

We recommend that static forces on the lateral walls also derived from an equivalent fluid pressure of 124 psf per foot, applied over a height of 10 feet at the downhill (north) ends, and 7 feet at the uphill (south) ends. The lateral wall heights will vary from the upper (south) to ends to the downhill (north) ends. Design forces at intermediate heights can be determined using a lateral pressure of 124 psf per foot of depth, applied over heights between interpolated linearly from a minimum of 7 feet at the upper ends to 10 feet at the lower ends.

2. Barrier Wall Foundations

We recommend that the retaining walls be supported by drilled, cast-in-place reinforced concrete pier foundations. Piers should have a minimum diameter of 30 inches and be spaced a maximum of 3 diameters apart (i.e., 7-½ feet center to center).

We used a “p-y” analysis to estimate the distribution of deflection, shear force and bending moment in 30-inch diameter piers, spaced 7-½ feet apart. The “p” refers to the distribution of pressure generated in the soil and rock surrounding the pier when shear forces and overturning moments are applied to the top of the pier. The “y” refers to the distribution of deflection that would occur along the length of the pier.

We developed curves that describe the p-y distribution for the surface soils at the pier locations, based on data from laboratory tests performed on boring samples (by both M&A and ES) and on reconstituted bulk samples of site soils (by ES). The strength of the surface soils is one of the required inputs for the soil p-y curve development; we used as input the soil strength derived from the results of ES direct shear tests performed on reconstituted samples. ES carried out two tests; we chose the test for which the reported friction angle was 30 degrees, and the reported cohesion (intercept) was 787 psf. However, we chose a friction angle of 30 degrees and reduced the input cohesion to one quarter of the reported value, i.e., to 190 psf for calculating the soil p-y curves to account for the downslope at the leading edge of the downslope piers. The depth of soil was estimated from logs of borings drilled in the hillside above the building area.

The p-y curves for both the “highly weathered” and” weathered” rock (these characterizations were reported by J R Associates) were determined from our estimates of the Geologic Strength Indices (GSI) for these two types of rock. We used the compression velocities measured by J R Associates, test boring data and visual examination of rock outcrops uphill of the subject property to arrive at these GSI estimates.

The representative soil and rock profile for our pier response analyses is displayed on the attached diagram, Figure 3. As noted, the depth of the surface soil was based on the thicknesses of soil encountered in the borings drilled above the building area. The thicknesses of the "highly weathered bedrock" and "weathered bedrock" were selected from the J R Associates report survey profile 1.

The results of the p-y analyses are displayed on the shear and bending moment diagrams, Figures 4 through 8. Figures 4 and 5 relate to the cross-lot wall; the distributions shown on the figure are for the cross-lot wall and account for the impact force and overturning moment on the wall. Figures 5 and 6 display the distribution of shear force and bending moment for those piers supporting the lateral walls at and near the downhill (north) ends. Figures 7 and 8 display the distribution of shear force and bending moment for those piers supporting the lateral walls at the uphill (south) ends.

We recommend these diagrams be used to design the pier reinforcement for 30-inch diameter piers spaced 3 diameters apart. The design shear forces and bending moments for piers at other locations between the two ends of the lateral walls can be estimated by linear interpolation between Figures 5 and 8.

Piers supporting the cross-lot wall and the lateral walls at and near the connection with the cross-lot wall should a minimum of 25 feet long. Piers at the upper ends of the lateral walls should be a minimum of 20 feet long. Minimum lengths for piers supporting the lateral walls between the two ends can be estimated by linear interpolation between these two depths. All piers should extend a minimum of 15 feet into rock.

We note that the diagrams are plots of the p-y analyses that assumed the piers tops would be free to deflect. This assumption should be conservative if the tops of the piers are structurally connected to a grade beam at the base of the walls and/or to the walls themselves to provide a measure of fixity at the pier tops.

3. Other Planning Considerations

We judge that the debris basin, as configured on Figure 2 has sufficient volume to enclose the entire volume of a future debris flow without having to excavate an additional 4 feet, provided that the "slump block" delineated on the Figure 2 is excavated and the excavated material moved to an offsite location. The bottom of the "slump block" excavation should match with the existing grades of the low areas on either side of the "slump block".

In our opinion, the dissipation piers recommended by ES are not warranted and do not need to be installed in the debris basin. However, we suggest that a flexible debris barrier be installed between the rear property line and the barrier to replace the redundancy that would have been provided by the dissipation piers. Flexible debris flow barriers are coarse steel mesh fences, attached to strong vertical posts and connected to cables tied back into the hillside to add lateral resistance. They would be similar to barriers used elsewhere in South San Francisco, e.g., at the base of the nearby San Bruno Mountain. We anticipate the barrier would be designed by the barrier supplier and/or installer.

ES recommended leaving a gap between the down end of the west lateral wall and the west end of the cross-lot to allow for access for equipment to remove debris captured within the debris basin. ES also recommended providing an 8-foot-wide setback along the west property line, between the street and the gap in the walls, for the same purpose. We agree with these recommendations.

We anticipate that storm water runoff will accumulate behind the cross-lot wall during winter months. Means for collecting and discharging this runoff from behind the cross-lot should be included in the project plans.

4. Construction Observations

We recommend that our personnel be called to the site when operations to excavate the "slump block" are underway to observe the exposed soil and rock conditions and to assist in determining the excavation depth and extent.

5. General Recommendations for New House

The following recommendations are contingent upon our firm being retained to review the development plans and to observe the geotechnical aspects of construction. We should also be provided the opportunity to "fine-tune" our recommendations as plans are being prepared. Supplemental recommendations may also be necessary based upon conditions exposed during construction.

A. Seismic Criteria Per CBC

It is our opinion that the subject site can be classified as Site Class "C" for the purpose of structural engineering calculations as defined in Chapter 20 found in ASCE 7-16.

It is important that the structural engineer verify the coefficients indicated on the following seismic criteria data sheet.

52 Franklin Avenue

Print

52 Franklin Ave, South San Francisco, CA 94080, USA
Latitude, Longitude: 37.665031, -122.415921

Date	6/30/2023, 3:54:09 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	C - Very Dense Soil and Soft Rock

Type	Value	Description
S_S	1.947	MCE_R ground motion. (for 0.2 second period)
S_1	0.801	MCE_R ground motion. (for 1.0s period)
S_{MS}	2.336	Site-modified spectral acceleration value
S_{M1}	1.122	Site-modified spectral acceleration value
S_{DS}	1.557	Numeric seismic design value at 0.2 second SA
S_{D1}	0.748	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	E	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	1.4	Site amplification factor at 1.0 second
PGA	0.836	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	1.003	Site modified peak ground acceleration
T_L	12	Long-period transition period in seconds
SsRT	2.294	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	2.572	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.947	Factored deterministic acceleration value. (0.2 second)
S1RT	0.955	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	1.085	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.801	Factored deterministic acceleration value. (1.0 second)
PGAd	0.836	Factored deterministic acceleration value. (Peak Ground Acceleration)
PGA_{UH}	1.025	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
C_{RS}	0.892	Mapped value of the risk coefficient at short periods

Seismic Design Criteria: Presented at https://siesmicmaps.org (OSHPD 2023)

B. Grading

In general, all site flatwork and any future slab-on-grade construction should be supported upon a layer of compacted select engineered fill. The engineered fill should be placed upon strong undisturbed soil that occurs below any slide debris, fill, weak naturally occurring soil or foundations associated with the structure that was destroyed by the 1982 debris flow. As a minimum, all existing foundations, soil disturbed by the foundation removal, brush, trees, and their roots system should be overexcavated and removed. Level benches should be excavated in any areas that are to receive future slabs-on-grade, garage slabs or other structural features. The overexcavation should remove the weak material as described above and expose strong residual soil or bedrock. At this level, the soil should be scarified, mixed with water or aerated to promote proper compaction, and then compacted to a minimum degree of 90* percent based upon ASTM D 1557. Select nonexpansive fill having of a plasticity index of 8 or less could then be imported to the site, placed in thin lifts, mixed with water or aerated as necessary and compacted to a minimum degree of 95 percent based upon ASTM D 1557, latest revision.

As discussed earlier in this report, it is recommended that the peninsula/slump block shown on Figure 2 be removed exposing residual soil and/or bedrock. It is also recommended that any overgrown over-steepened areas on the property also be trimmed back to more stable inclinations.

*95 percent for granular material.

C. Foundations

In our opinion, the proposed residence should be constructed upon drilled, cast-in-place, reinforced concrete pier and grade beam foundations.

Drilled piers should be designed on the basis of a skin friction value of 500 psf beginning at the top of supporting material. In this case, the top of supporting material should be assumed to begin at a depth of 4 feet below grade, 1 foot below the top of bedrock, or as defined by the "Rule of Ten" criteria illustrated on the attached Figure 9, whichever is deeper. The depth may be modified by our representative during construction, especially if very dense bedrock areas are encountered.

Piers depths should be based upon actual design loads. However, as a minimum, the piers should extend 8 feet below the top of supporting material. Therefore, it is anticipated that average pier depths will be on the order of at least 12 feet below existing grade.

Reinforcing for the piers should be determined by the structural engineer based upon anticipated loading.

D. Retaining Walls-New Residence Area

Retaining walls for the new residence (not the barrier walls above the home) should be constructed upon foundations designed in accordance with Section C above. All retaining walls should be designed to resist the active equivalent fluid pressures tabulated below.

WALL BACKSLOPE INCLINATION (H:V)	EQUIVALENT FLUID PRESSURE (pcf)
Level	40
4h: 1v	45
3h: 1v	50
2h: 1v	60

Interpolation can be used to determine pressures for intermediate inclinations. When walls are to be rigidly restrained from rotation, a uniform surcharge pressure of 75 psf should be added to the design values.

In addition to static soil earth pressure as outlined above, the retaining walls should (if code or local jurisdiction required) be designed to resist short-term seismic loading. The retaining walls should be designed for a seismic loading increment (in pounds per foot) equal to 8 times the height of the wall (in feet) squared. The seismic component, as defined above, should be considered as a line load acting at a point 0.33 times H above the base of the retaining wall, where H is the wall height. It is noted that the seismic component should be added to the static earth pressure loading. In our opinion, it is acceptable to use a factor of safety of 1.1 for overturning when considering the combined effect of static and seismic loading.

Passive resistance can begin at the top of supporting material, as defined above, and can be taken as a value of 400 pcf. This value can be projected over 2 pier diameters. In areas where spread footings are appropriate, a friction factor of 0.35 can be incorporated into the design.

It is important that adequate subdrainage be constructed behind retaining walls. We have included a Typical Subdrain Detail as the attached Figure 10. In addition, moisture proofing should be provided in areas where moisture migration through retaining walls would be undesirable.

E. Slab-On-Grade Construction

The slabs should be reinforced with steel bars and cast upon select engineered fill as described is the grading section. It is recommended that some type of moisture retardant be provided beneath the slabs. We have included a commonly used treatment on the attached Figure 11.

F. Surface Drainage

We recommend that the site be fine-graded to direct water to flow away from the building foundations. As a general requirement, storm water should not be allowed to pond or flow in concentrated streams or channels on the site.

It is further recommended that all roof downspouts be led into tightline disposal pipes that deposit water well away from building foundations and into a suitable disposal area.

G. Subdrainage

As noted, subdrainage should be constructed behind retaining walls as illustrated on Figure 10.

In order to mitigate the potential for water to seep into the building "crawl areas" or slab vapor barriers, it is also recommended that a foundation drain be constructed along all sides of the structure as is illustrated on Figure 12. If the uphill foundation wall is a retaining wall, the wall subdrain will serve this purpose.

Subdrains should be constructed in accordance with the specifications for retaining wall subdrainage included on Figure 10. In our opinion, it would also be prudent to construct an "outlet" through the footing or grade beam at a low point within any crawl spaces. Such outlets would allow any moisture that entered the subfloor area to be dissipated.

H. Review of Plans and Construction Observations

It is important that all of the plans related to our recommendations be submitted to our office for review. The purpose of our review will be to verify that our recommendations are understood and reflected on the plans, and to allow us to provide supplemental recommendations, if necessary. We should be provided the plans well in advance of construction. We will provide plan review letters as appropriate.

It is important that our firm be retained to provide observation and testing services during construction. Our observations and tests will allow us to verify that the materials encountered are consistent with those found during our study, and will allow us to provide supplemental, on-site recommendations, as necessary.

We will require at least 72 hours notice so that the appropriate personnel may be scheduled. If we are not called to the site prior to the completion of items that require our observation or testing, our recommendations should be considered voided.

LIMITATIONS

The conclusions and opinions expressed in this report are based upon the exploratory borings that were previously drilled on the site, spaced as shown on the Site Plan, Figure 2. While in our opinion these borings adequately disclose the soil conditions across the site, the possibility exists that abnormalities or changes in the soil conditions, which were not discovered by this investigation, could occur between borings.

This study was not intended to disclose the locations of any existing utilities, septic tanks, leaching fields, hazardous wastes, or other buried structures. The contractor or other people should locate these items, if necessary.

Michelucci & Associates, Inc. does not practice in the field of moisture vapor transmission evaluation/mitigation. Therefore, we recommend that a qualified person/firm be engaged/consulted with to evaluate the general and specific moisture vapor transmission paths and any impact on the proposed construction. This person/firm should provide recommendations for mitigation of potential adverse impact of moisture vapor transmission on various components of the structure as deemed appropriate.

The passage of time may result in significant changes in technology, economic conditions, extraordinary weather events, global warming, sea level rises, or site variations that could render this report inaccurate. Accordingly, neither Karen Diaz nor any other party shall rely on the information or conclusions contained in this report after 12 months from its date of issuance without the express written consent of Michelucci & Associates, Inc. Reliance on this report after such period of time shall be at the user's sole risk. Should Michelucci & Associates, Inc. be required to review the report after 12 months from its date of issuance, Michelucci & Associates, Inc. shall be entitled to additional compensation at then-existing rates or such other terms as may be agreed upon between Michelucci & Associates, Inc. and Karen Diaz.

This report was prepared to provide engineering opinions and recommendations only. It should not be construed to be any type of guarantee or insurance.

It has been a pleasure working with you on this project to date.

Very truly yours,
MICHELUCCI & ASSOCIATES, INC.

Joseph Michelucci
Geotechnical Engineer #593
(Expires 3/31/25)



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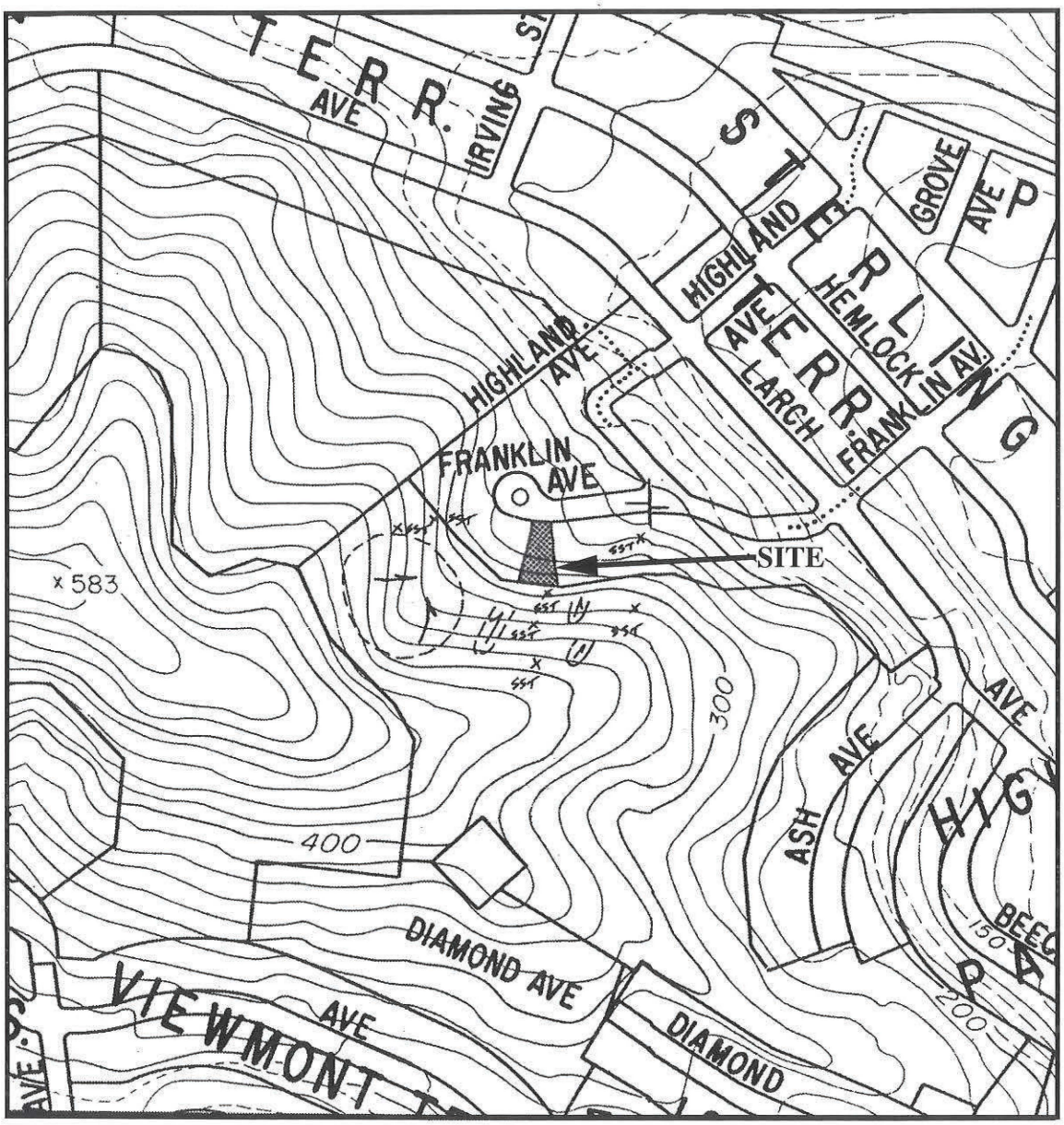
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SITE VICINITY MAP*

52 Franklin Avenue

South San Francisco, California



EXPLANATION

x sst — SANDSTONE BEDROCK OUTCROP

DEBRIS FLOW (APPROXIMATELY LOCATED)

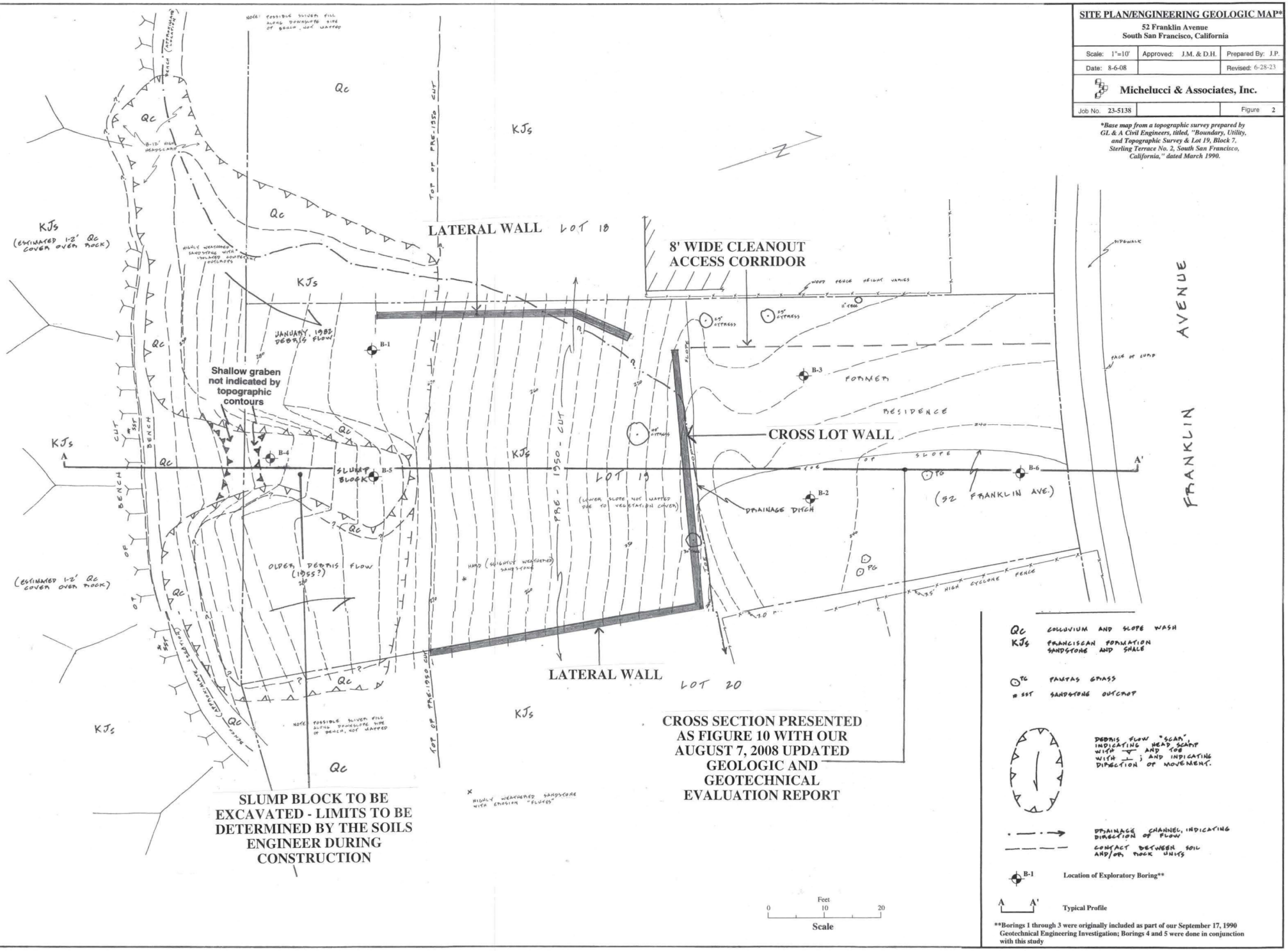
SITE

0 400' 800'

Scale

*BASE MAP FROM COUNTY OF SAN MATEO CADASTRAL TOPOGRAPHIC SERIES, SHEETS 3C AND 3D, 1973 (BOTH REVISED 1-1-86).

Job No. 23-5138	Michelucci & Associates, Inc.	Figure 1



SITE PLAN/ENGINEERING GEOLOGIC MAP*

52 Franklin Avenue
South San Francisco, California

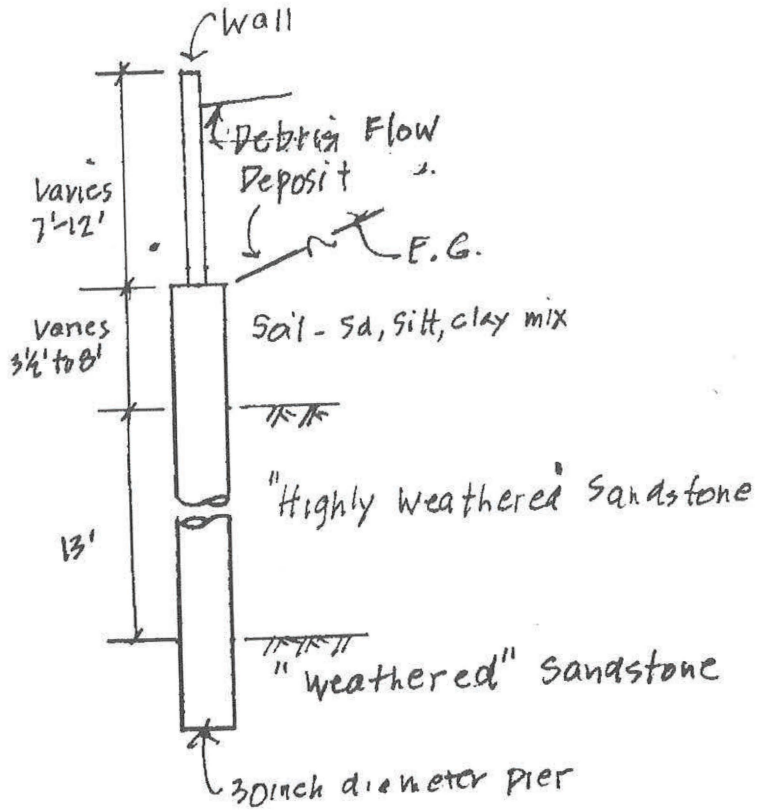
Scale: 1"=10'	Approved: J.M. & D.H.	Prepared By: J.P.
Date: 8-6-08		Revised: 6-28-23

Michelucci & Associates, Inc.

Job No. 23-5138 Figure 2

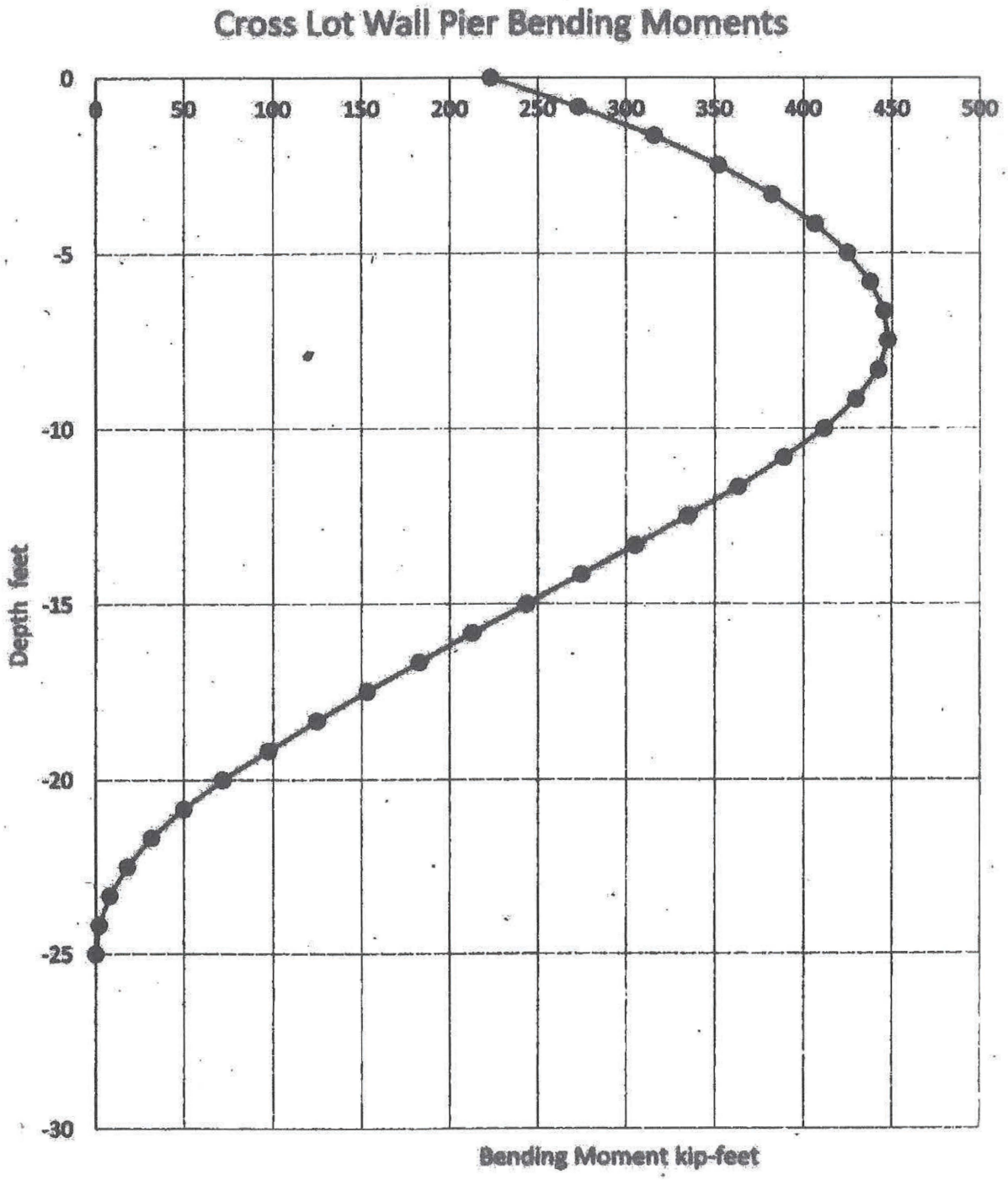
*Base map from a topographic survey prepared by GL & A Civil Engineers, titled, "Boundary, Utility, and Topographic Survey & Lot 19, Block 7, Sterling Terrace No. 2, South San Francisco, California," dated March 1990.

**Borings 1 through 3 were originally included as part of our September 17, 1990 Geotechnical Engineering Investigation; Borings 4 and 5 were done in conjunction with this study

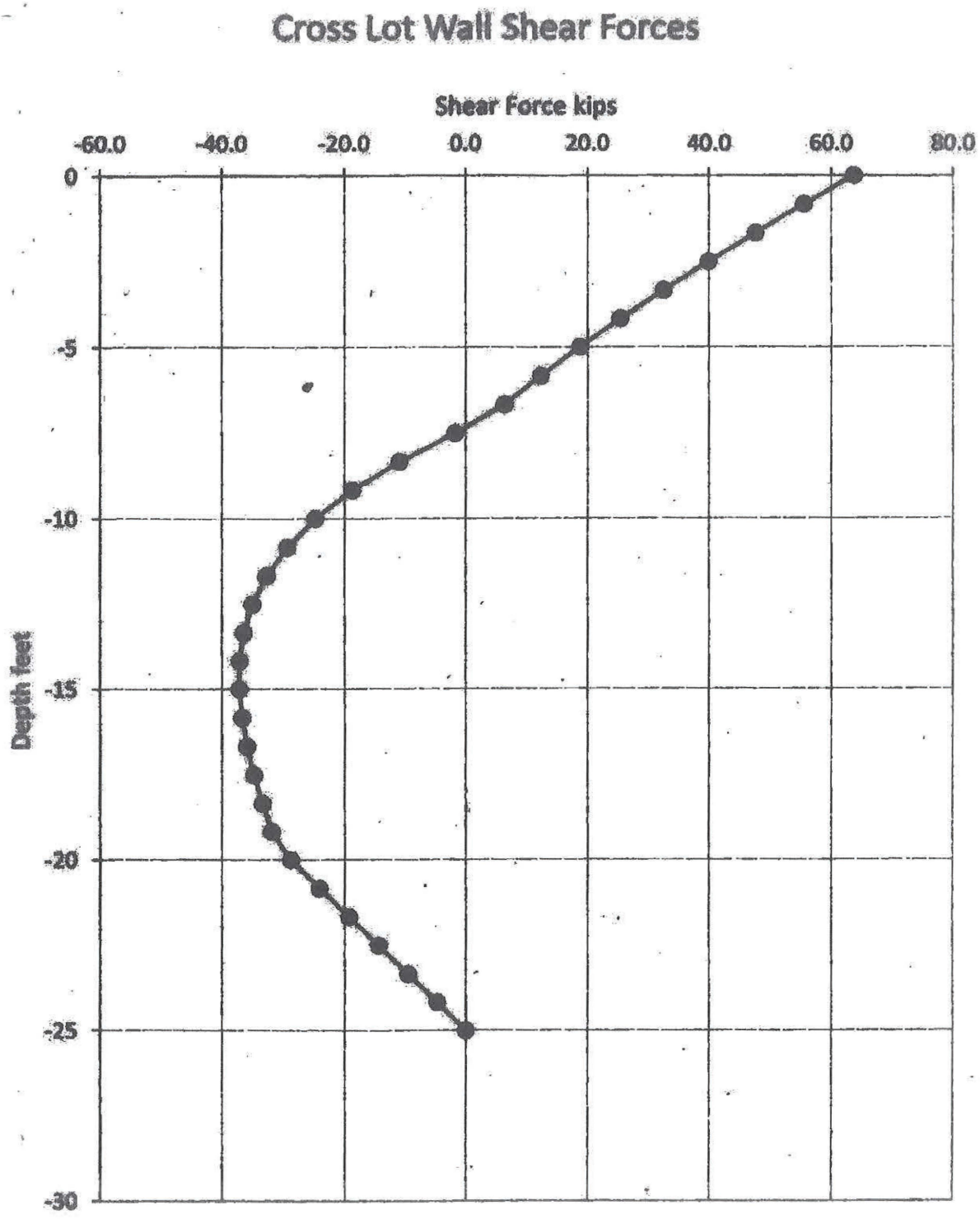


Soil & Rock Profile for Pier Response to Debris Flow Loading

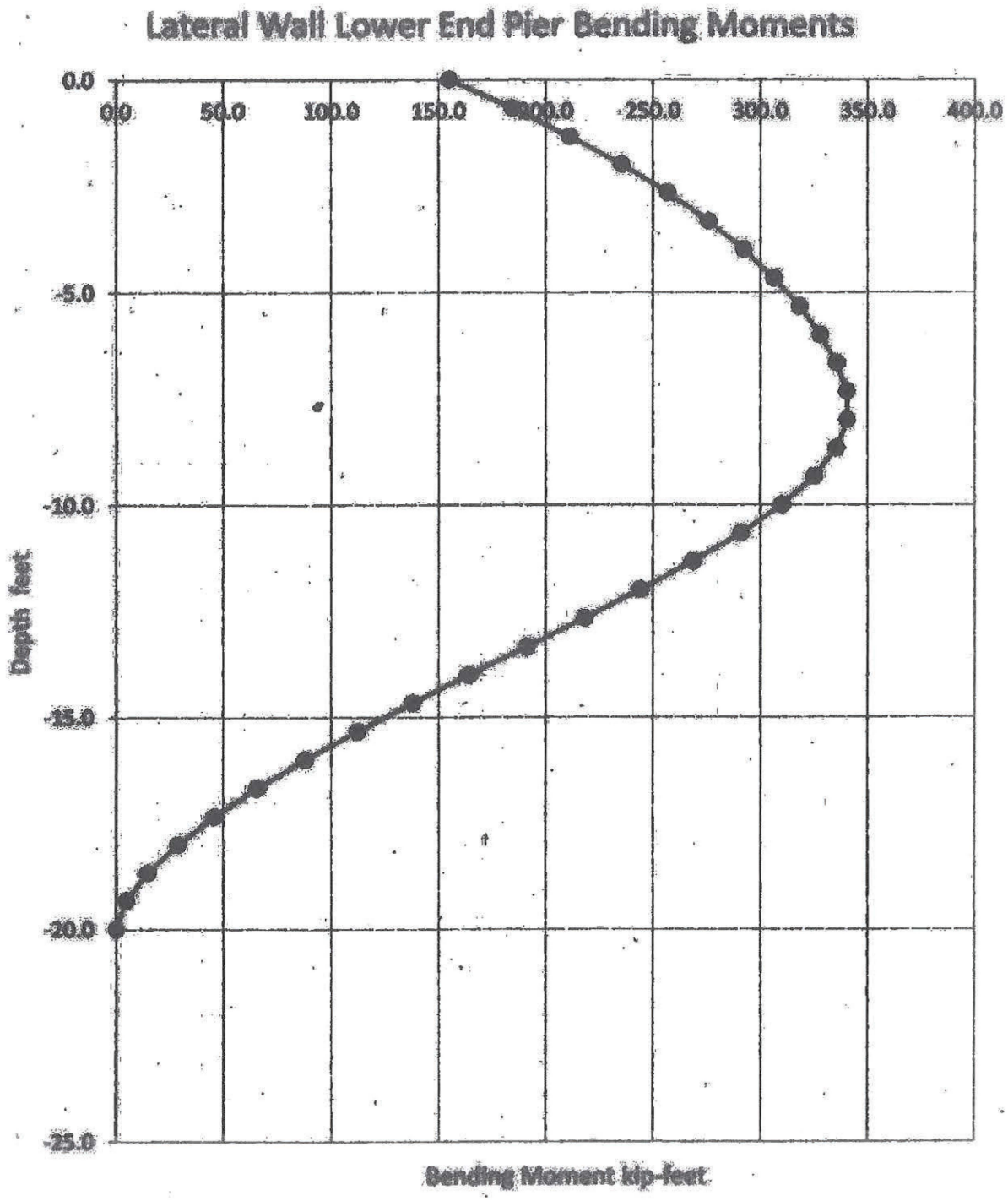
Job No. 23-5138	Michelucci & Associates, Inc.	Figure 3



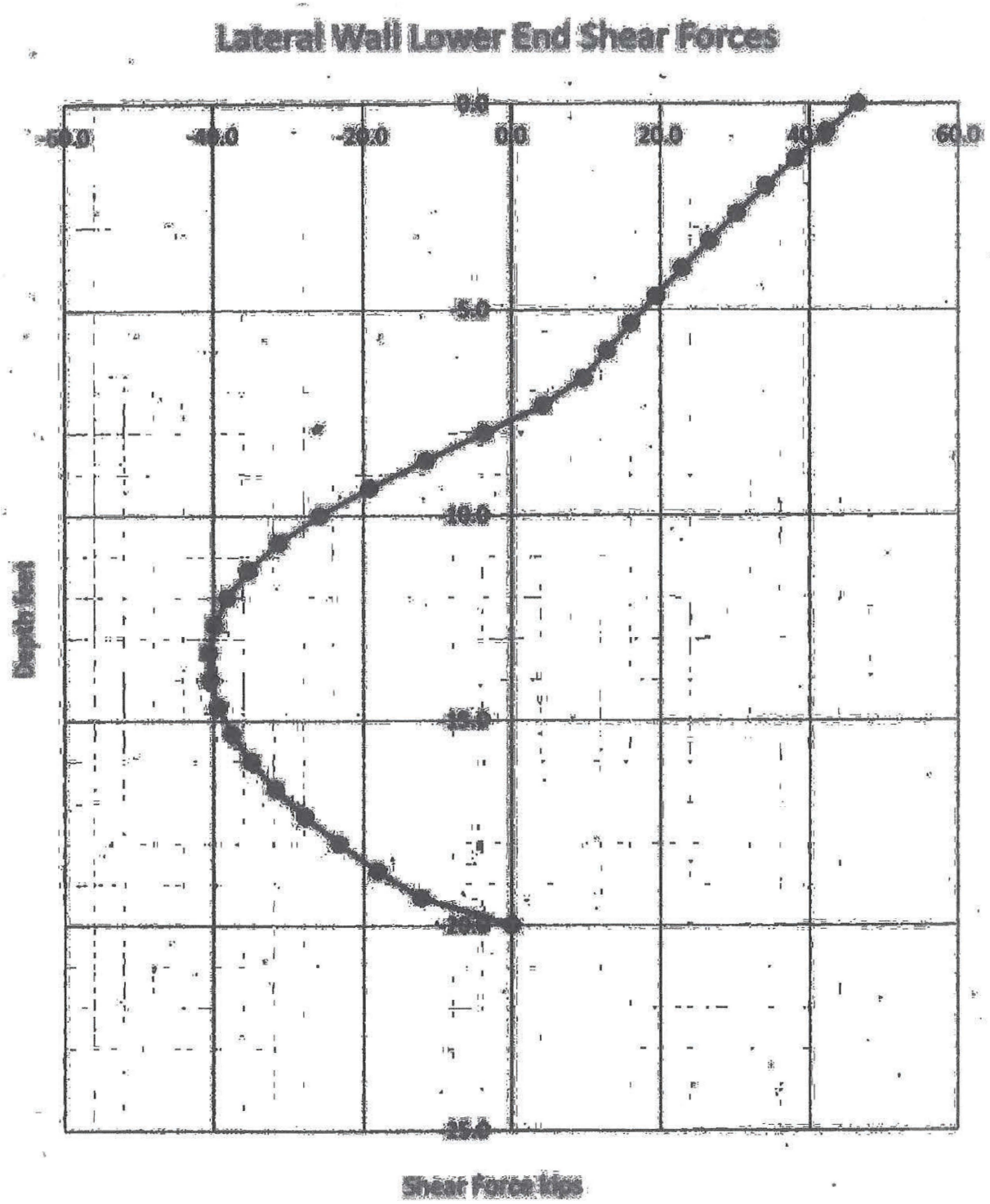
Job No. 23-5138	Michelucci & Associates, Inc.	Figure 4



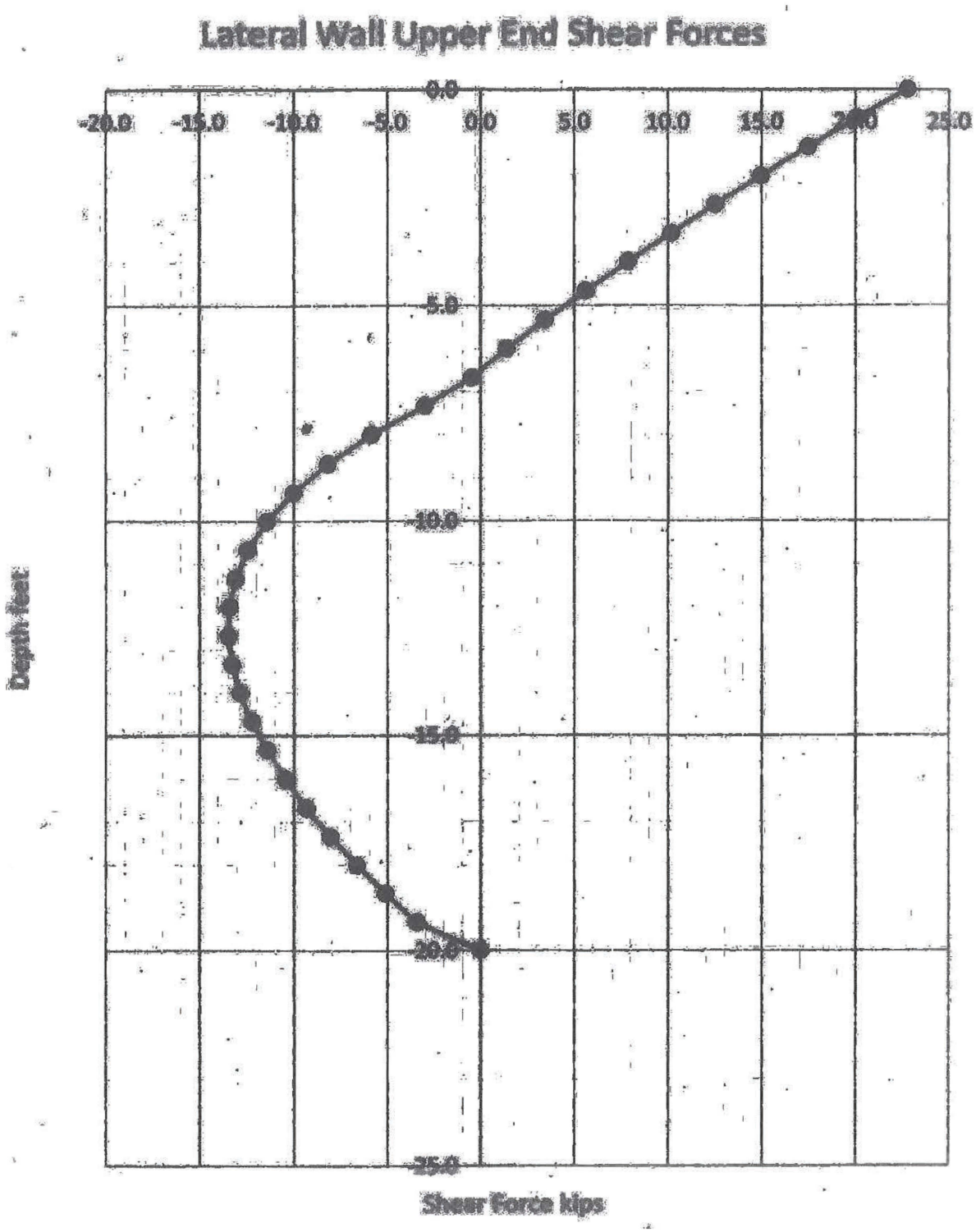
Job No. 23-5138	Michelucci & Associates, Inc.	Figure 5



Job No. 23-5138	Michelucci & Associates, Inc.	Figure 6



Job No. 23-5138	Michelucci & Associates, Inc.	Figure 7

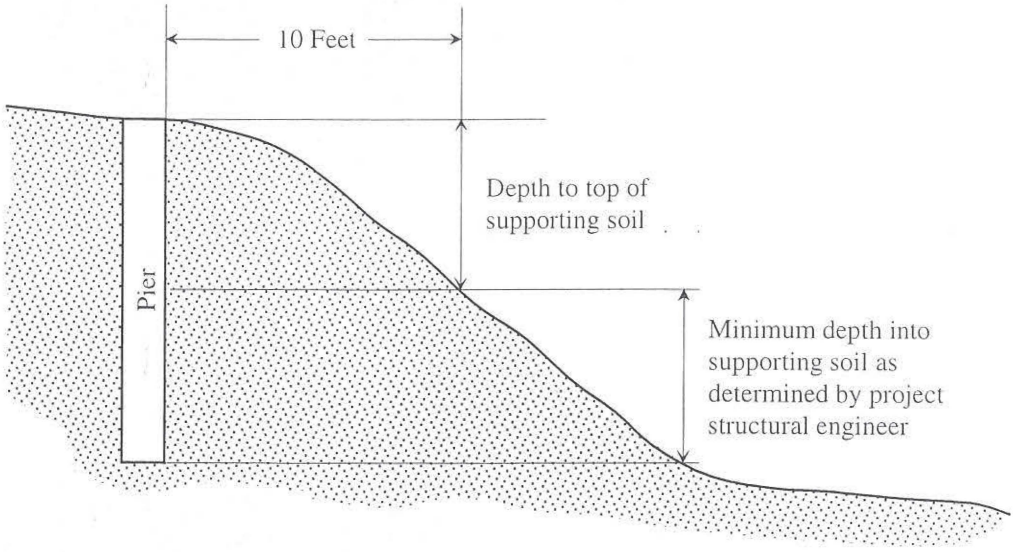


Job No. 23-5138	Michelucci & Associates, Inc.	Figure 8

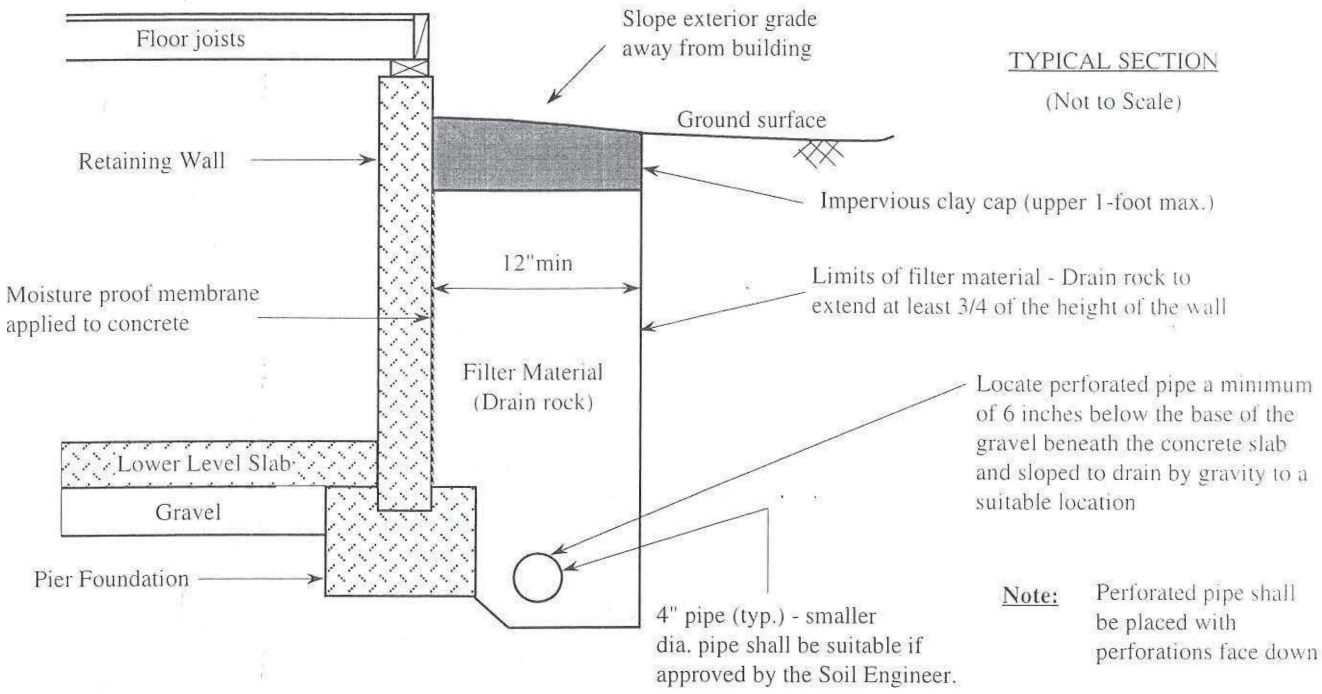
THE "RULE OF TEN"

HORIZONTAL CONFINEMENT FOR FOUNDATIONS ON OR NEAR SLOPES

DRILLED PIER FOUNDATIONS



SPECIFICATIONS FOR SUBDRAINS BEHIND RETAINING WALLS



Subdrain pipe shall be manufactured in accordance with the following requirements:

a. Acrylonitrile-butadiene-styrene (ABS) plastic pipe shall conform to the specifications for ABS plastic pipe given in ASTM Designation D2282 and ASTM Designation D2751. ABS pipe shall have a minimum pipe stiffness of 45 psi at 5% deflection when measured in accordance with ASTM Method D2412.

b. Polyvinyl chloride (PVC) pipe shall conform to AASHTO Designation M278. PVC pipe shall have a minimum pipe stiffness of 50 psi at 5% deflection when measured in accordance with ASTM Method D2412 except that pipe conforming to F758 shall be suitable. Schedule 40 PVC pipe shall be suitable. SDR-35 PVC pipe conforming to ASTM D3034 shall be suitable when the thickness of pipe cover does not exceed 12 feet.

Filter material for use in backfilling trenches around and over subdrain pipes and behind retaining walls shall consist of clean coarse sand and gravel or crushed stone conforming to the following requirements:

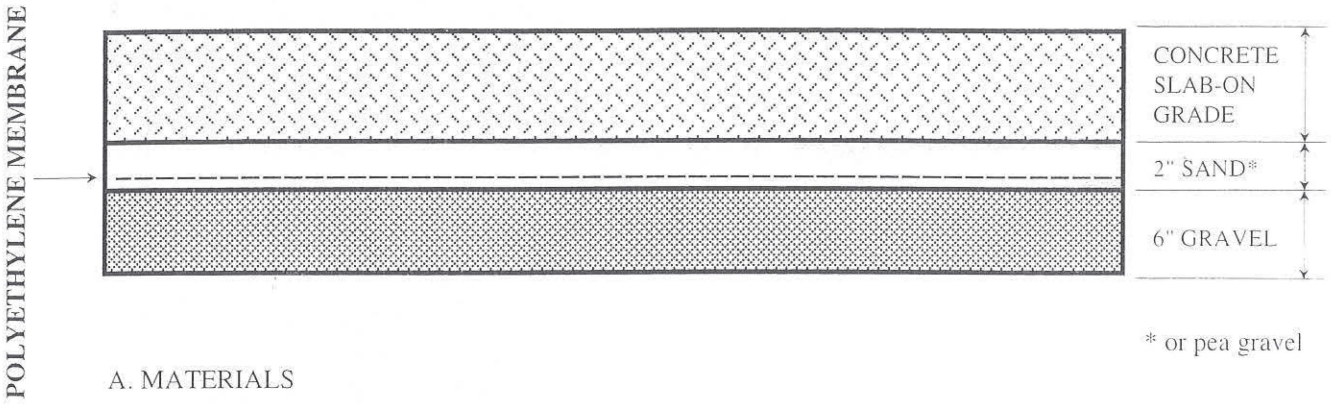
Sieve Size	% Passing Sieve
2"	100
3/4"	70 to 100
3/8"	40 to 100
#4	25 to 50
#8	15 to 45
#30	5 to 25
#50	0 to 20
#200	0 to 3

a. Class 2 " Permeable Material" conforming to the State of California Department of Transportation Standard Specifications, latest edition, Section 68-1.025 shall be suitable.

b. Clean, coarse gravel ("drain rock") shall also be suitable, provided that it is wrapped in an acceptable geotextile ("filter fabric") such as Mirafi 140 N.

MOISTURE RETARDANT BENEATH CONCRETE SLABS

TYPICAL SECTION



* or pea gravel

A. MATERIALS

The mineral aggregate for use under floor slabs shall consist of clean rounded gravel and sand. The aggregate shall be free from clay, organic matter, loam, volcanic tuff, and other deleterious substances.

B. GRADATIONAL REQUIREMENTS

The mineral aggregate shall consist of such sizes that the percentage composition by dry weight as determined by laboratory sieve (U.S. Series) will conform to the following gradation:

	Percentage Passing	
Sieve Size	Gravel	Sand
1"	100	
3/4"	90-100	
No. 4	0-5	100
No. 50		0-30

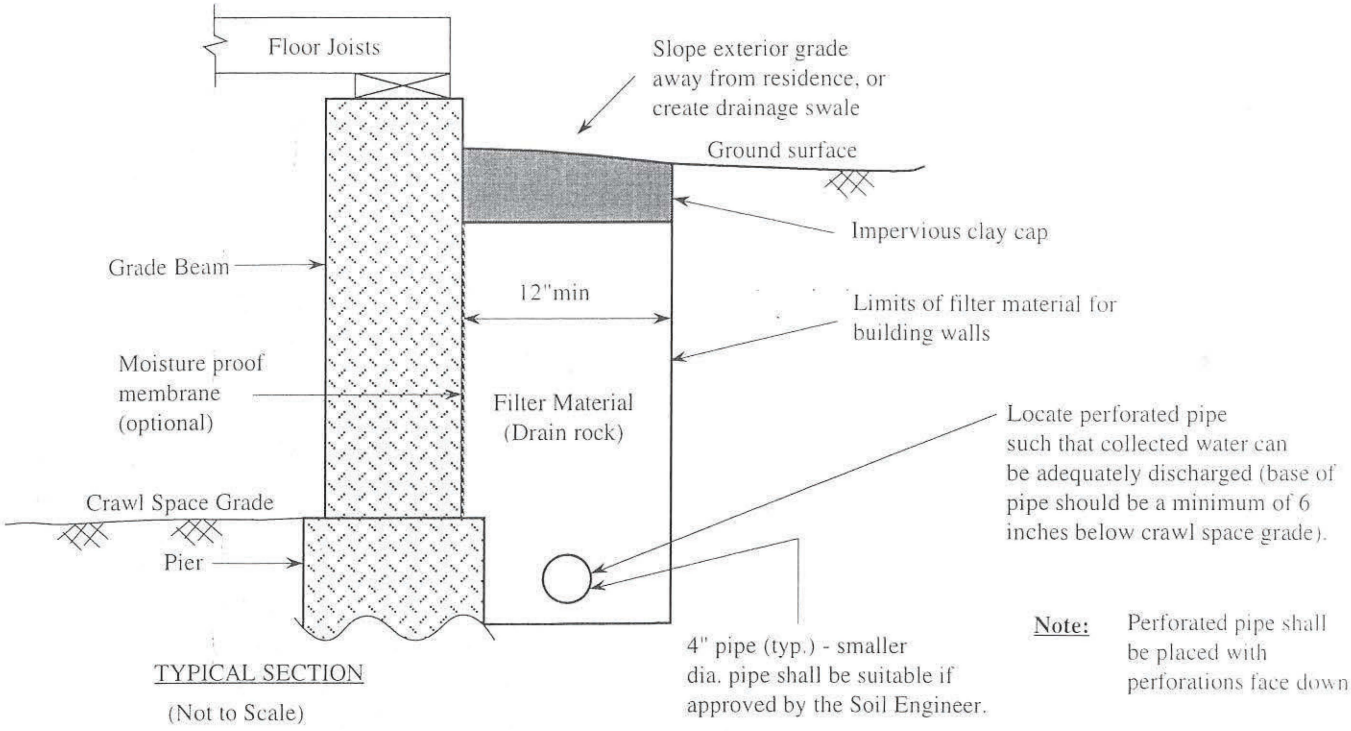
NOTES:

1. The polyethylene membrane should be adequately thick so that it will not be easily damaged during construction. It should be adequately detailed so that there are little or no openings around plumbing at conduit points and near foundations. The membrane should be adequately lapped and sealed at any seams.

2. The sand covering is not a part of the moisture retardant treatment. It is a normally used optional component that gives some protection to the membrane and also aids in curing the concrete. Pea gravel may be used as a substitute for sand.

3. The final moisture retardant detail is to be determined by the project architect.

GUIDE SPECIFICATIONS FOR SUBDRAINS ALONG PIER AND GRADE BEAM FOUNDATIONS



TYPICAL SECTION

(Not to Scale)

Note: Perforated pipe shall be placed with perforations face down

Subdrain pipe shall be manufactured in accordance with the following requirements:

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3/4"	70 to 100
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#4	25 to 50
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a. Class 2 " Permeable Material" conforming to the State of California Department of Transportation Standard Specifications, latest edition, Section 68-1.025 shall be suitable.

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Earth Systems
48511 Warm Springs Boulevard, Suite 210 | Fremont, CA 94539 | 510.353.3833 | www.earthsystems.com

January 31, 2023 File No.: 301218-002

Mr. Juan Pedro Diaz
480 Maiden Springs Lane
Gilroy, CA 95037

PROJECT: 52 FRANKLIN AVENUE RESIDENCE
52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO, CALIFORNIA

SUBJECT: Conceptual Debris Flow Management Plan and Geotechnical Engineering Evaluation

REFS.: Supplemental Geologic and Geotechnical Engineering Evaluation, Proposed Single Family Residence, 52 Franklin Avenue, South San Francisco, California, by Earth Systems Pacific, dated April 25, 2017

Geologic Hazards Evaluation and Geotechnical Engineering Study, Proposed Single Family Residence, 52 Franklin Avenue, South San Francisco, California, by Earth Systems Pacific, dated June 17, 2016

Dear Mr. Diaz:

Earth Systems Pacific (Earth Systems) prepared this conceptual debris flow management plan and supplemental geotechnical engineering recommendations for design of debris catchment walls and dissipation piers for the property at 52 Franklin Avenue in South San Francisco. The previous residence at the site was severely damaged and subsequently removed following a debris flow that occurred in 1982. These supplemental recommendations have been developed to manage potential future debris flows of up to 500 cubic yards using concrete walls and some grading improvements in the catchment area. Because this plan is preliminary and conceptual in nature, it is expected that modifications will be made based on civil engineering, City planning, and geotechnical peer review needs.

Debris Flow Catchment Area

From a conceptual standpoint, Earth Systems proposes to create space for storage of 500 cubic yards of mudflow by making minor grading improvements in the catchment area and adding dissipators and a debris wall. The grading activities within the catchment area would involve making minor cuts and will involve removing mostly the recently deposited soil on the slope following the 1982 debris flow. The proposed cuts in the rear portion of the property will be on the order of 6 feet and the resulting ground surface slope will have an inclination of 1.7:1 (horizontal to vertical). A row of dissipator piers extending 5 feet above the ground surface in

the graded area and a 10-foot-high concrete debris wall are proposed at the locations shown on the attached Conceptual Site Plan and Updated Cross Section A-A'. All retaining walls including the dissipator piers will be supported on drilled, cast-in-place reinforced concrete piers with variable depths of the piers. To keep future debris from flowing on to the adjacent properties, lateral containment walls should be incorporated in the design.

To facilitate equipment access for debris removal following a debris flow event, we recommend leaving a cleanout access corridor with a minimum width of 8 feet along the property boundary. Tentative location of the cleanout corridor is shown on attached Site Plan.

Debris Wall and Dissipator Piers

The debris walls should be supported by reinforced cast-in-place concrete piers. These piers would also function to assist in stabilizing the slope. To develop preliminary recommendations for the design of the piers an engineering analysis was performed which is discussed below.

LPile Analysis

In order to evaluate the size and the depth of piers required to provide vertical and lateral support to the debris walls required to support future debris flows, we performed engineering analysis using the computer program – Lpile. For the analysis we assumed the debris walls would be supported by cast-in-place reinforced concrete piers and the dissipator piers would also use cast-in-place piers. The piers should be structurally connected at the surface using a grade beam. For the analysis, we modeled 24-inch diameter piers spaced three pier diameters center to center (6 feet apart), embedded a minimum of 24 feet below the ground surface (minimum 10 feet into the underlying bedrock). The piers were assumed to be reinforced with ten Grade 60, No. 6 rebar. The analysis took into the account the highest planned wall of 10 feet. The debris flow deposits were assumed to have a fluid weight of 125 pcf. The soil layer parameters used in our LPile analysis are summarized below:

Material Name	LPile p-y Curve Type	Effective Unit Weight	Undrained Cohesion	Friction Angle
Debris Flow Deposits - Qhdf	Soft Clay	37 pcf	660 lbs/ft2	N/A
Colluvium – Qc	API Sand	58 pcf	N/A	33
Bedrock – fs	API Sand	135 pcf	N/A	40

For the loading conditions, we modeled the total lateral earth load from the mudflow deposits as an equivalent triangular load distribution.

P_{max}	Lateral Pile Deflection (in)	Deflection of Wall Height (10 feet)
Load Case 1 574.8 lbs/in (unfactored)	0.8	0.6%
Load Case 2 862.2 lbs/in (FS 1.5)	2.3	1.7%

Plots showing results of the analysis are attached.

Retaining Walls

The conceptual debris flow management plan includes a retaining wall at the upper portion of the catchment area and lateral containment walls as shown on the attached Conceptual Site Plan. Geotechnical engineering recommendations for retaining walls are presented below:

1. The retaining walls can be supported on a drilled pier and grade beam foundation system with the piers extending a minimum of 10 feet below the grade beam or 5 feet into the underlying bedrock, whichever is deeper. The piers should be a minimum of 16 inches in diameter and designed for an allowable skin friction of 600 psf for supporting vertical dead plus live loads. This value may be increased by one-third to include short term wind and seismic effects. The piers should contain reinforcing steel full depth. A skin friction value of 400 psf should be applied when the piers are in tension.

2. To resist lateral loads, a passive equivalent fluid pressure of 300 pcf applied to the pier below finish pad grade may be assumed. Passive resistance may begin at a point on the foundation pier where there is at least 5 feet of horizontal cover to the slope face. This passive design pressure may be increased by one third when including short term forces from wind and seismic forces. The passive resistance may be applied over two pier diameter tributary area.

3. Piers should be structurally connected at the surface with grade beams. The actual design of the piers, their reinforcement, depth, size and spacing will depend upon actual building loads and should be determined by the architect/ engineer responsible for the foundation design. The grade beams should penetrate at least 12 inches into the prepared building pad at the residence.

4. Foundation piers should be drilled under the observation of a representative from Earth Systems who will verify the proper penetration depth into bedrock, and provide additional recommendations if unanticipated conditions are encountered during pier drilling operations.

Slope Stability

To evaluate stability of the proposed debris flow management plan, slope stability analyses were performed using the computer program Slide2 by Rocscience and discussed below.

Updated Slope Stability Analysis

The updated slope stability analyses were performed using the same geologic profile for the analyses presented in the referenced 2017 report. Cross Section A-A' showing conceptual plan for debris flow containment is attached.

Adjustments made to the slope stability analyses are presented below:

1. The soil strength parameter phi was adjusted for colluvium (Qc) to approximate the soil's residual strength based on revaluation of laboratory test results. The phi angle used in our current models is 33 degrees rather than the previous 40 degrees. Cohesion remained unchanged. A copy of the revaluated laboratory test result is attached.

2. The seismic coefficient K_{eq} was adjusted upward from 0.323g to 0.337g for evaluating the slope stability under dynamic conditions. This change was based on the 10% in 50 year USGS mapped (Edition 4.2.0, 2014) peak ground acceleration (PGA) for Site Class C of 0.541g and guidance in California Geological Survey Special Publication 117A (SP117A), modified from Blake et al, 2002 (5cm displacement), for determining the K_{eq} used in our analysis.

3. The piers as discussed above were included in the analysis.

4. Both saturated and unsaturated conditions were modeled.

Earth Systems analyzed the revised slopes using the Bishop, Janbu, and Spencer methods in accordance with CGS SP117A (2008) and ASCE/SCEC (2002) guidelines. Our revised analysis resulted in static factors of safety greater than 1.5 and dynamic factors of safety greater than 1.1 and are summarized below:

Summary of Slope Stability Analyses Factors of Safety

	Static	Dynamic
Earth Systems (2016)	2.905	1.769
Earth Systems (2017)	2.140	1.272
Earth Systems (this study)		
Unsaturated	2.495	1.544
Saturated	1.764	1.171

Based on the above results, it appears that the slopes at the site are stable under both static and dynamic (earthquake-induced) conditions. Copies of the slope stability analysis plots are attached.

Closure

This report is valid for conditions as they exist at this time for the type of project described herein. No representation, warranty, or guarantee is either expressed or implied. This report is intended for the exclusive use by the client. Application beyond the stated intent is strictly at the user's risk.

If changes with respect to the project type or location become necessary, if items not addressed in this report are incorporated into plans, or if any of the assumptions stated in this report are not correct, Earth Systems should be notified for modifications to this report. Any items not specifically addressed in this report should comply with the California Building Code and the requirements of the governing jurisdiction.

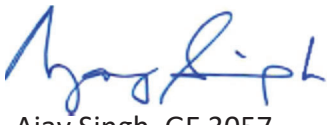
The preliminary recommendations of this report are based upon the geotechnical conditions encountered during the previous investigation and may be augmented by additional requirements of the architect/engineer, or by additional recommendations provided by Earth Systems based on conditions exposed at the time of construction.

This document, the data, conclusions, and recommendations contained herein are the property of Earth Systems. This report should be used in its entirety, with no individual sections reproduced or used out of context. Copies may be made only by Earth Systems, the client, and their authorized agents for use exclusively on the subject project. Any other use is subject to federal copyright laws and the written approval of Earth Systems.

Thank you for this opportunity to have been of service. Please feel free to contact this office at your convenience if you have any questions regarding this report.

Sincerely,

Earth Systems Pacific





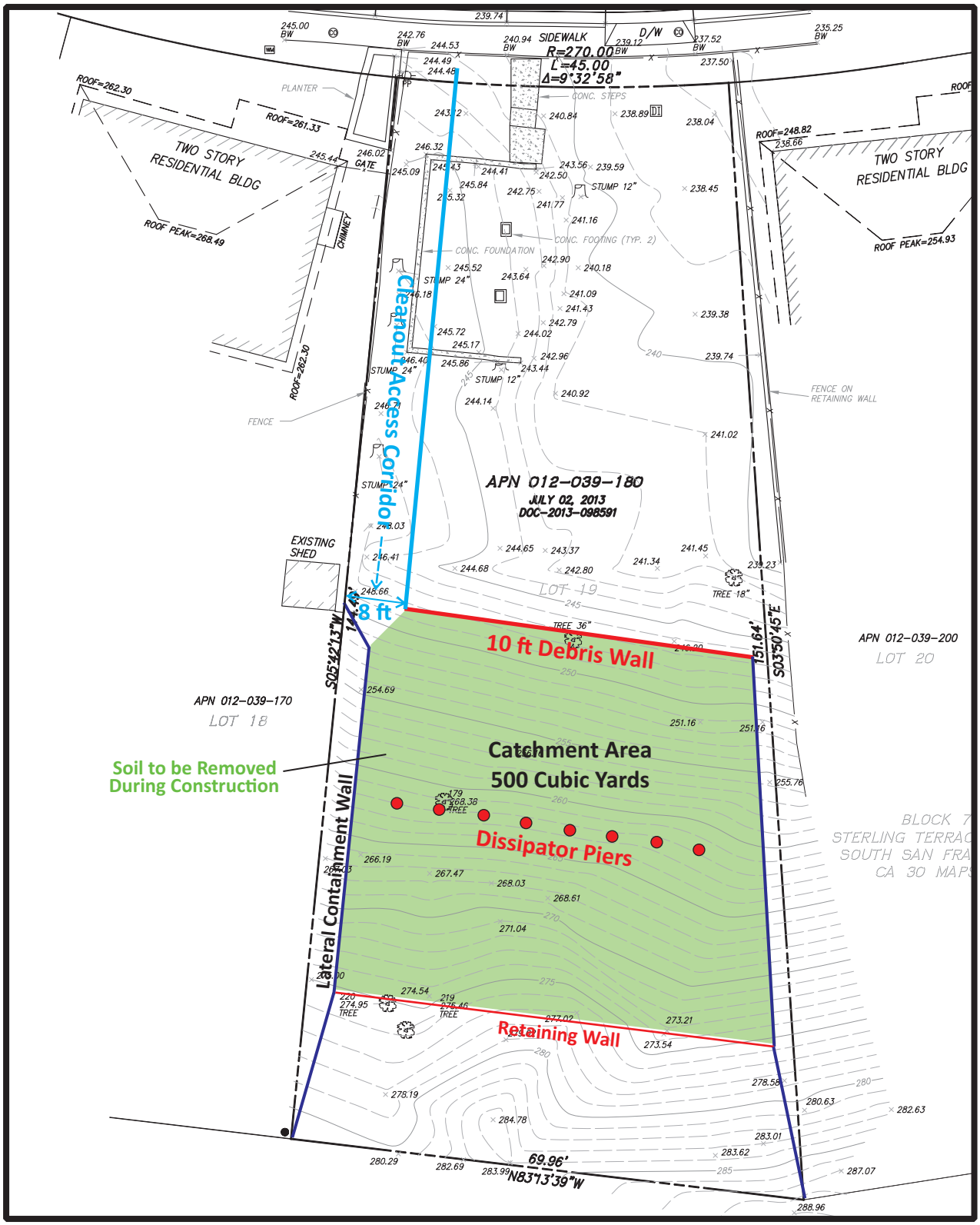
Ajay Singh, GE 3057
Principal Engineer





Brett Faust, CEG 2386
Senior Geologist

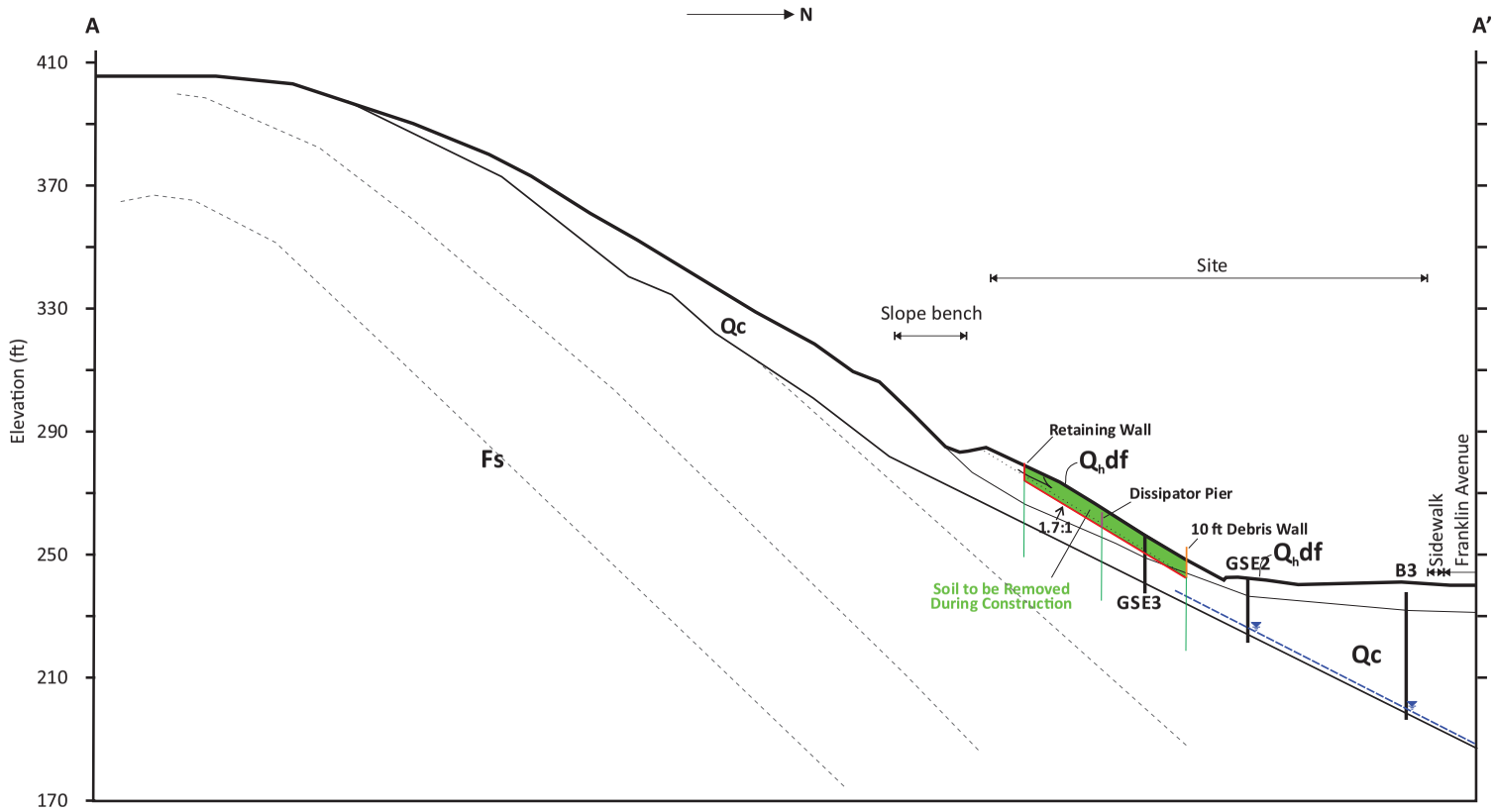
Attachments:
- Conceptual Site Plan
- Update Cross Section A-A'
- LPile Analyses Plots (3)
- Reinterpreted Direct Shear
- Slope Stability Analysis Plots (2)



0 20 40 60

Approximate Scale in Feet

Earth Systems Pacific	Proposed Single Family Residence 52 Franklin Avenue South San Francisco, California	Conceptual Site Plan 301218-002



NOTE: Previous versions of this graphic shown the Quaternary colluvium (Qc) as Quaternary slope debris (Qsd). This label has been changed to match the Qc used in the attached figures to this report.

Q_hdf	Holocene debris flow deposits		Geologic contact, dashed where approximate, queried where uncertain
Qc	Quaternary slope debris/colluvium		Groundwater surface
fs	Franciscan sandstone		Bedding orientation (shown schematically)

40 0 40 80

Approximate Scale in Feet (H=V)

B3 Boring Location (Earth Systems, this study)

G3 Boring Location (Globe Soil Engineers, 1996)

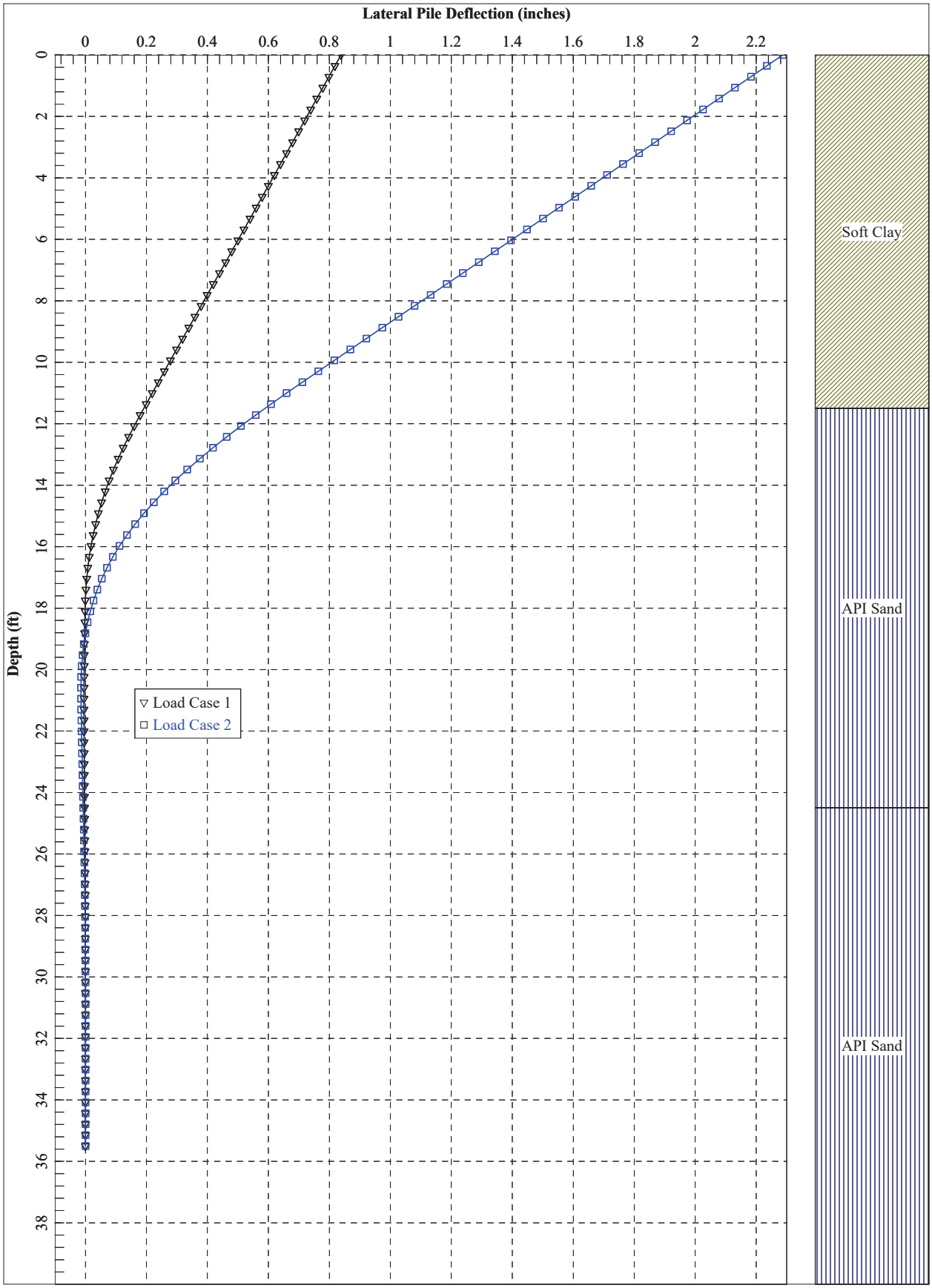
Proposed 24-inch dia. piers

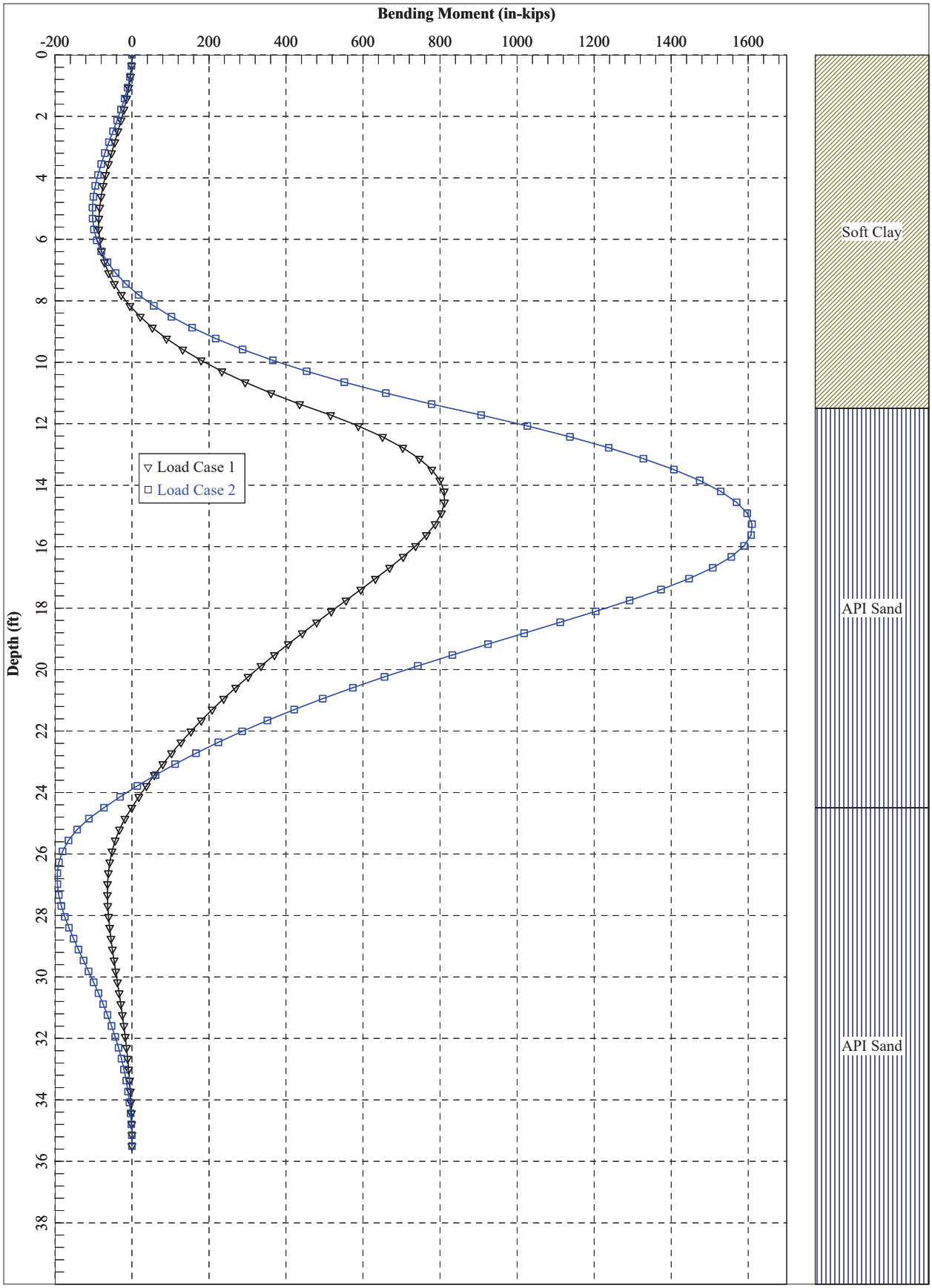
Earth Systems Pacific

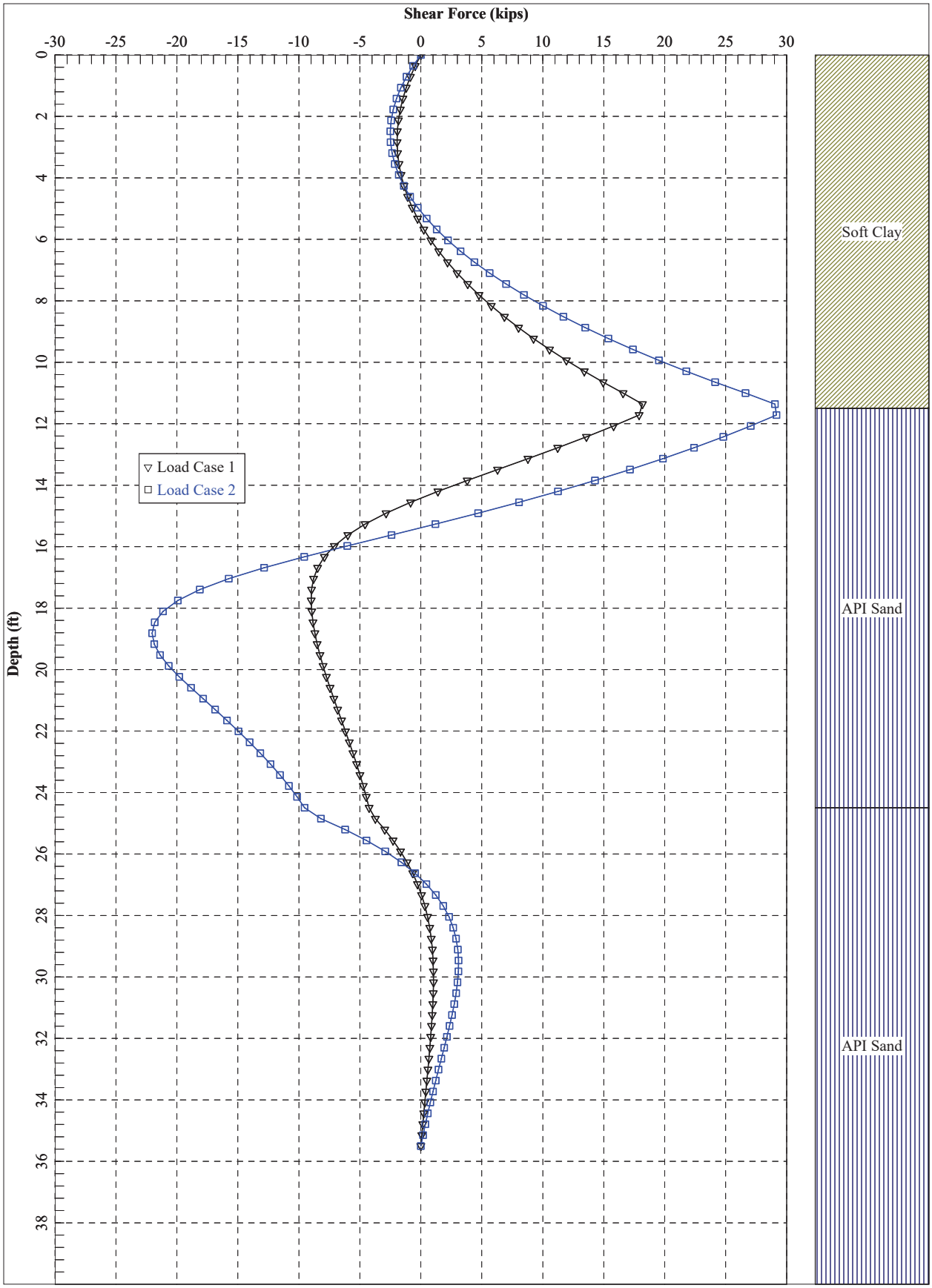
Proposed Single Family Residence
52 Franklin Avenue
South San Francisco, California

Updated Cross-Section A-A'

301218-002


Lateral Pile Deflection (inches)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
Load Case 1
Load Case 2
Soft Clay
API Sand
API Sand


Bending Moment (in-kips)
-200
0
200
400
600
800
1000
1200
1400
1600
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
Load Case 1
Load Case 2
Soft Clay
API Sand
API Sand


Shear Force (kips)
-30
-25
-20
-15
-10
-5
0
5
10
15
20
25
30
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
Load Case 1
Load Case 2
Soft Clay
API Sand
API Sand

52 Franklin Avenue

SH-13000-SA

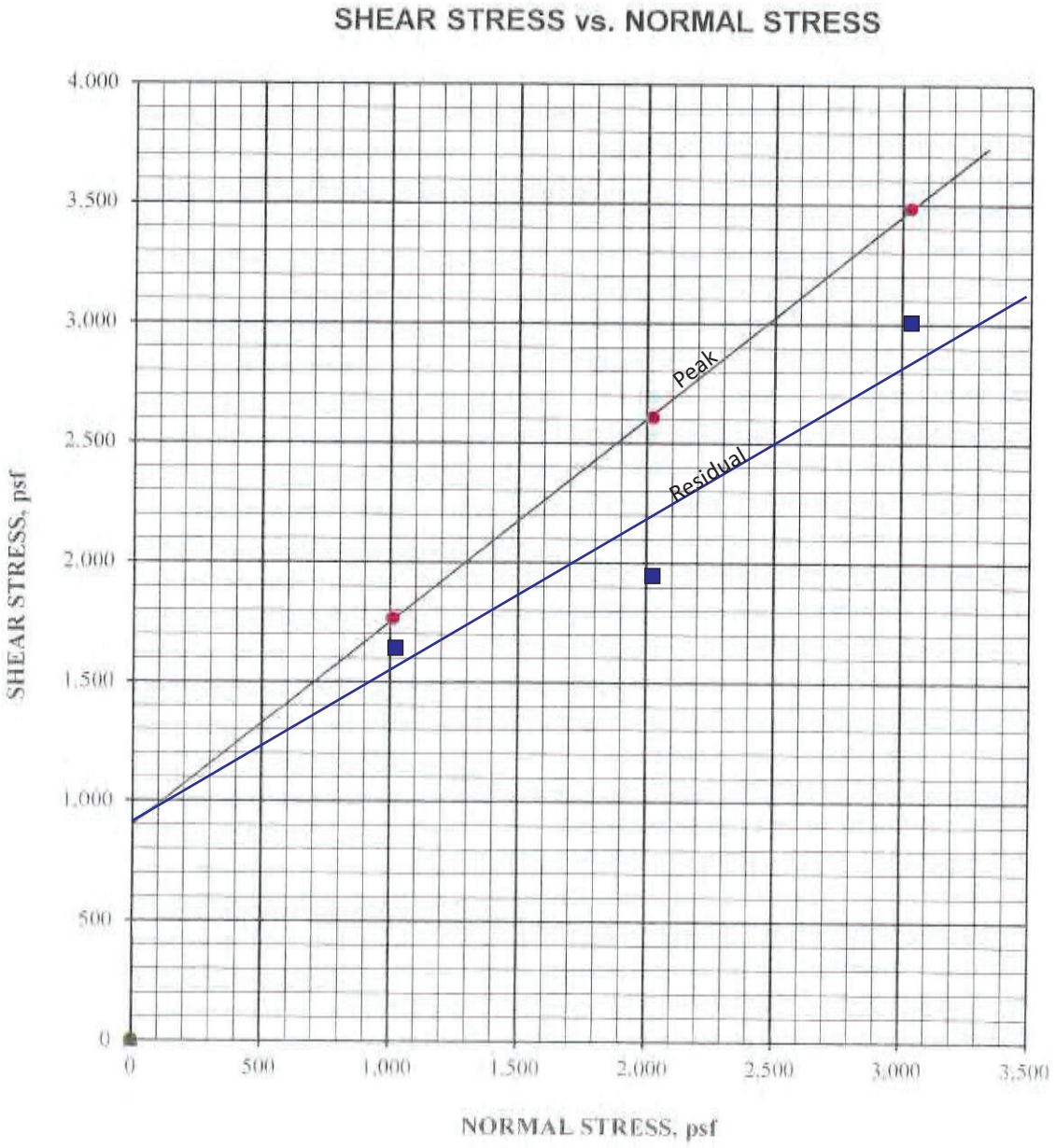
DIRECT SHEAR

ASTM D 3080-11 (modified for consolidated, undrained conditions)

May 16, 2016

Boring #3 @ 14.5 - 15.0'
Dark Yellowish Brown Clayey Sand (SC)
Undisturbed, Saturated

INITIAL DRY DENSITY: 122.4 pcf
INITIAL MOISTURE CONTENT: 15.0 %
PEAK SHEAR ANGLE (Ø): 40°
COHESION (C): 900 psf
Residual Shear Angle: 33°



DIRECT SHEAR continued

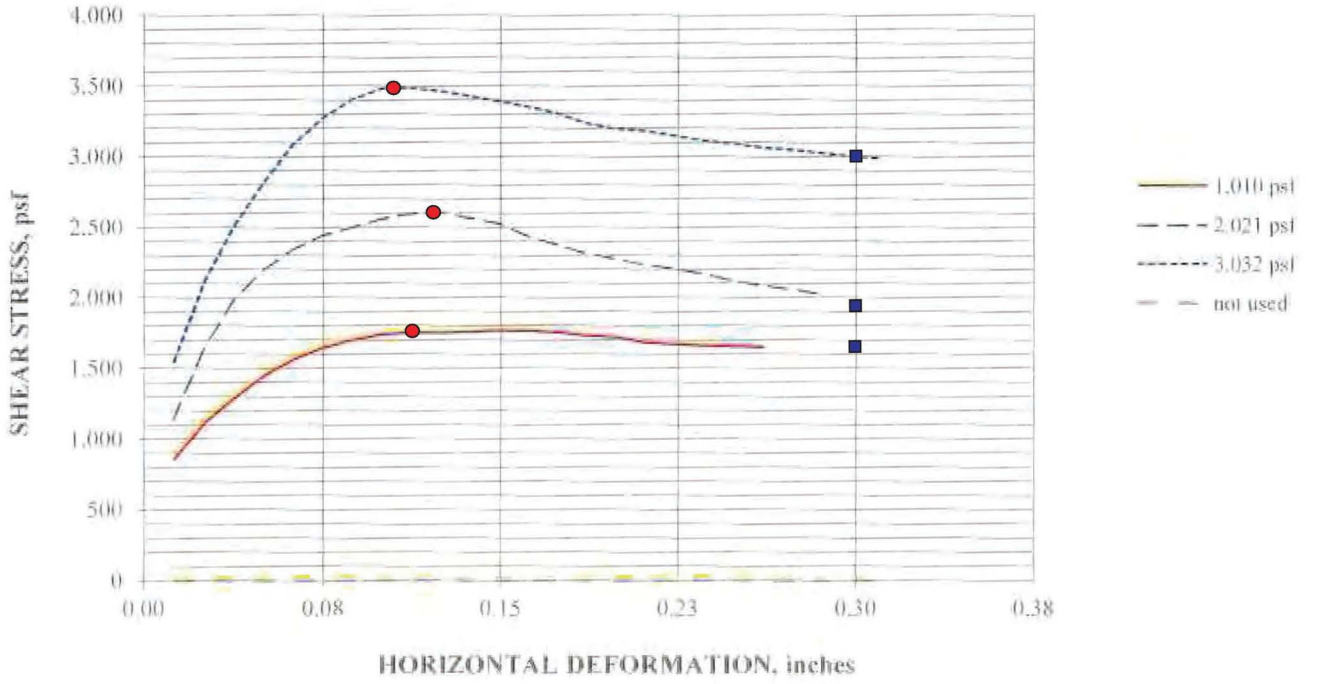
ASTM D 3080-11 (modified for consolidated, undrained conditions)

Boring #3 @ 14.5 - 15.0' May 16, 2016

Dark Yellowish Brown Clayey Sand (SC)

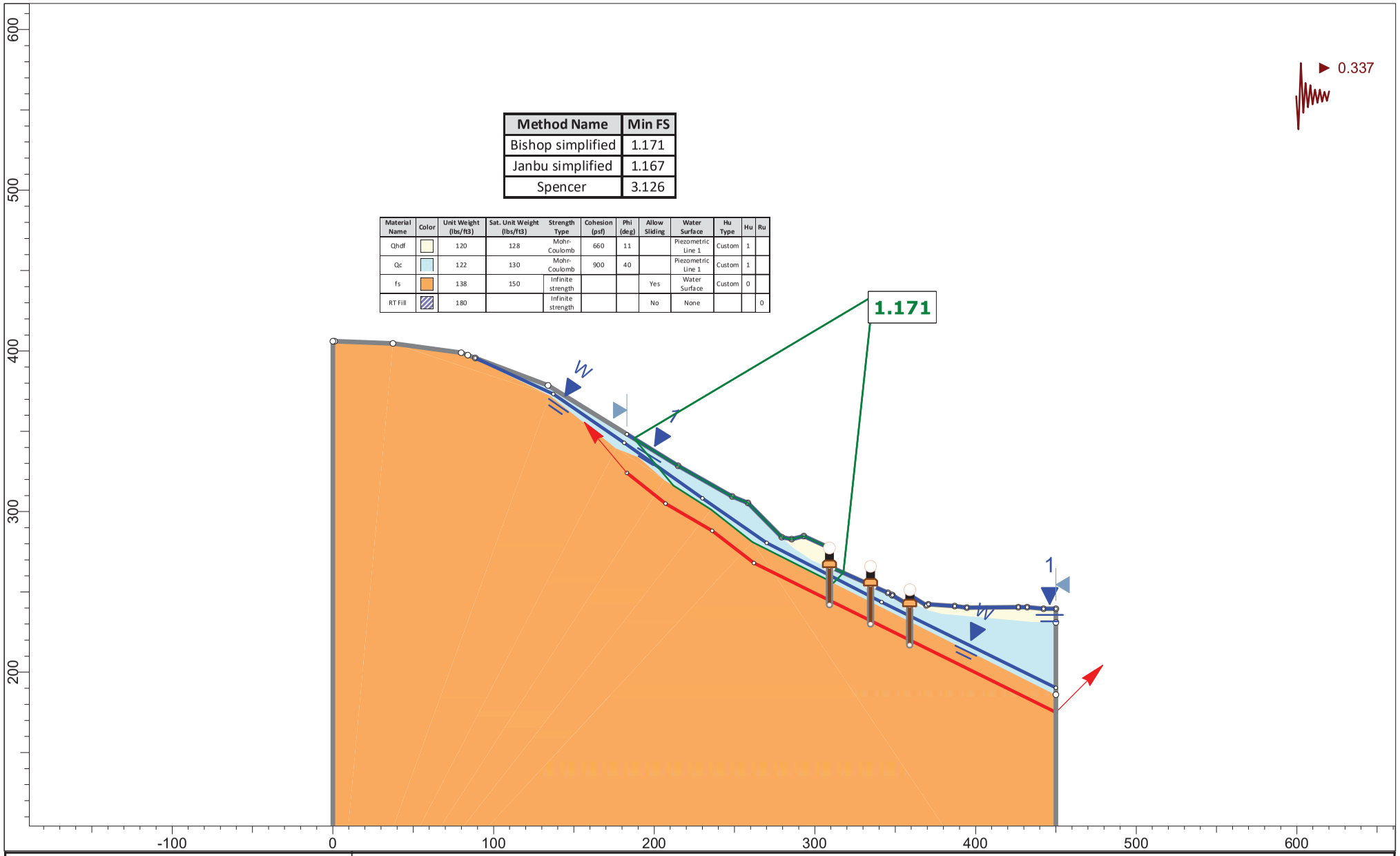
Undisturbed, Saturated SPECIFIC GRAVITY: 2.65 (assumed)

SAMPLE NO.:	1	2	3	AVERAGE
INITIAL				
WATER CONTENT, %	15.0	15.0	15.0	15.0
DRY DENSITY, pcf	121.7	121.6	123.9	122.4
SATURATION, %	110.8	110.5	118.8	113.4
VOID RATIO	0.359	0.360	0.334	0.351
DIAMETER, inches	2.370	2.370	2.370	
HEIGHT, inches	1.00	1.00	1.00	
AT TEST				
WATER CONTENT, %	15.5	15.6	15.4	
DRY DENSITY, pcf	118.7	121.2	123.0	
SATURATION, %	100.0	100.0	100.0	
VOID RATIO	0.393	0.364	0.344	
HEIGHT, inches	1.02	1.00	1.01	



Method Name	Min FS
Bishop simplified	1.171
Janbu simplified	1.167
Spencer	3.126

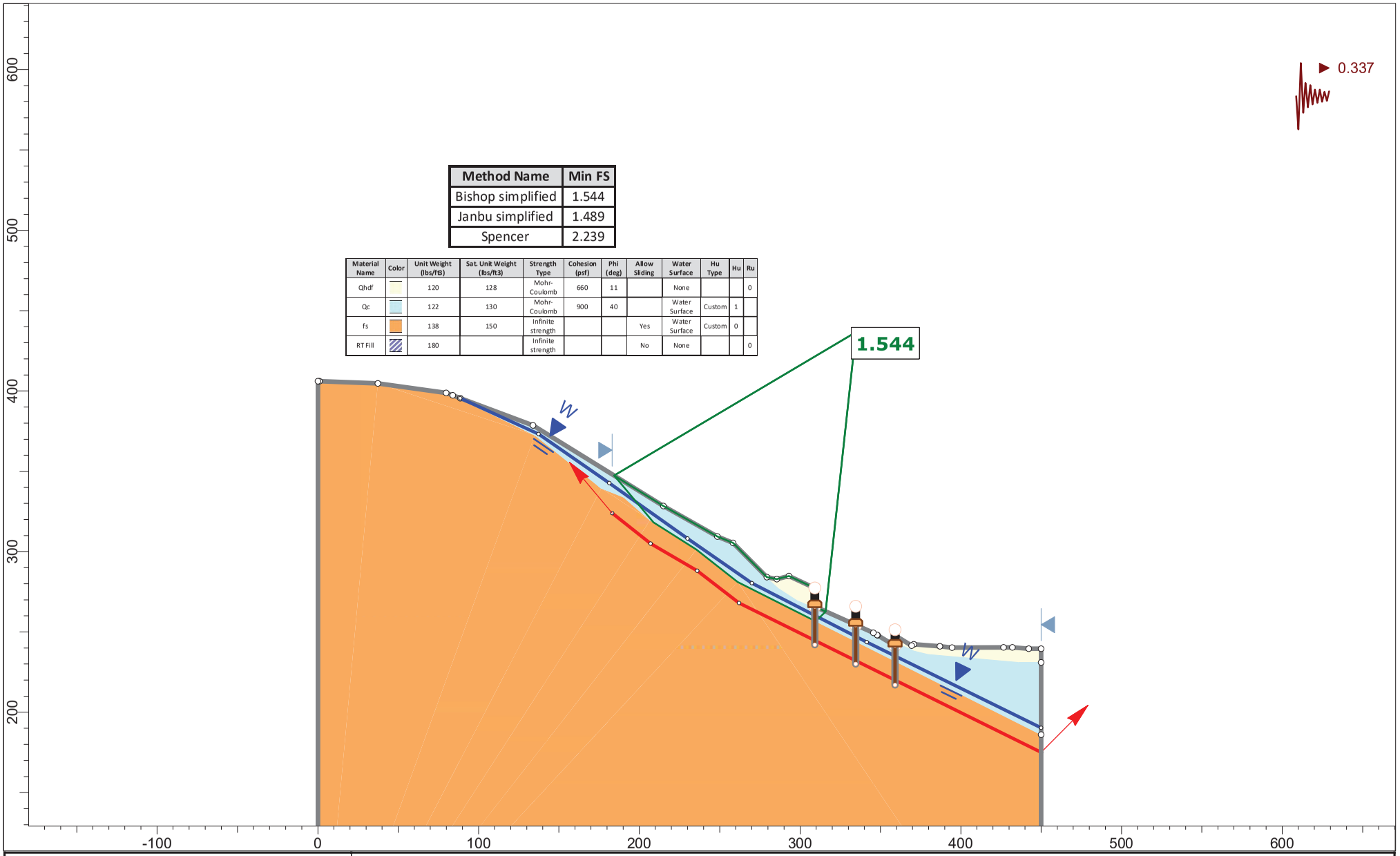
Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Allow Sliding	Water Surface	Hu Type	Hu	Ru
Qhdf		120	128	Mohr-Coulomb	660	11		Piezometric Line 1	Custom	1	
Qc		122	130	Mohr-Coulomb	900	40		Piezometric Line 1	Custom	1	
fs		138	150	Infinite strength			Yes	Water Surface	Custom	0	
RT Fill		180		Infinite strength			No	None			0



rocscience

SLIDEINTERPRET 9.024

Project	Proposed Single Family Residence		
Group	Group 1	Scenario	Master Scenario
Drawn By	J. Woodard	Company	Earth Systems Pacific
Date	01/23/2023	File Name	52 Franklin - Sat_Dyn_0.337g - 01.23.23.slmd

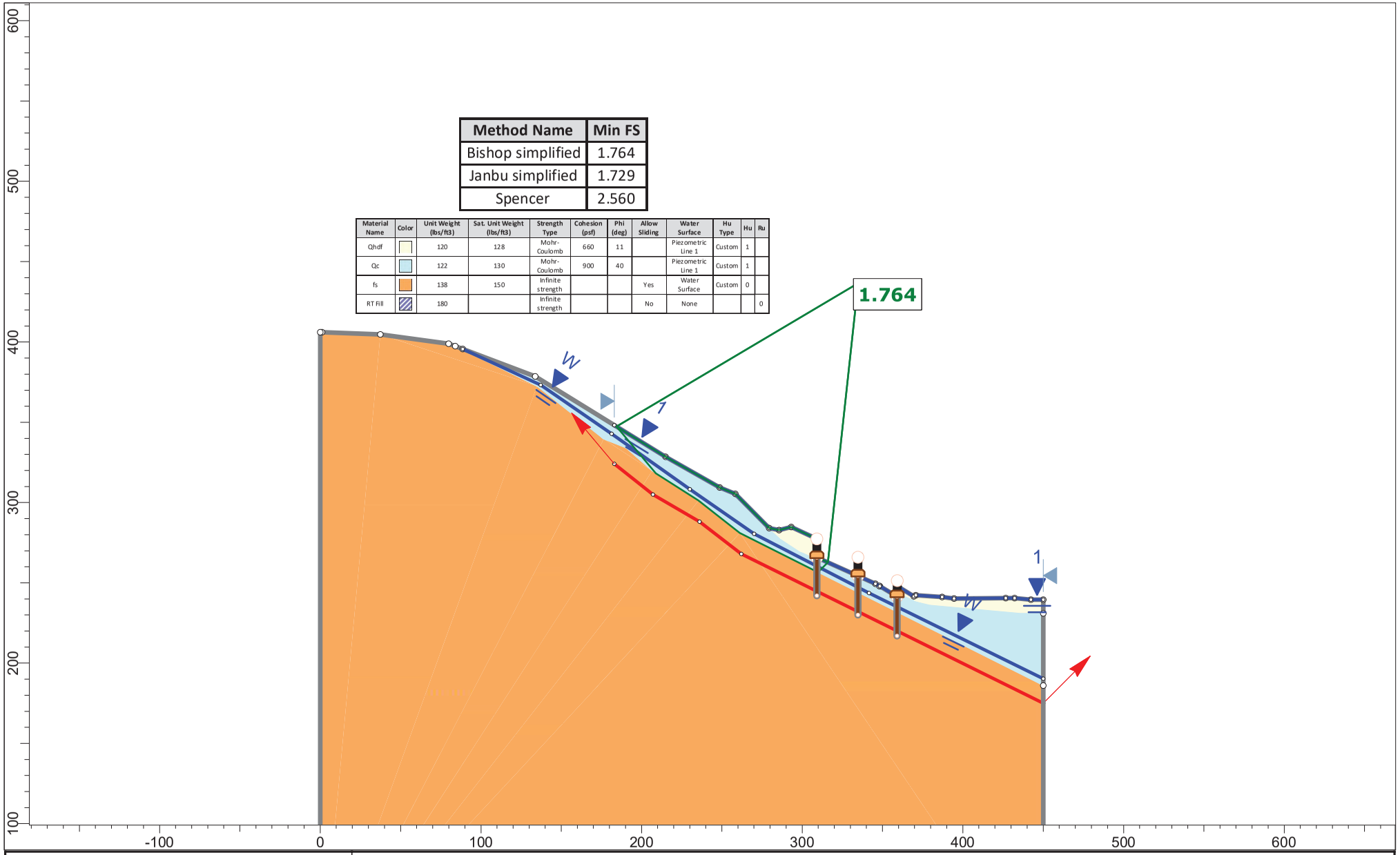


rocscience	*Project*	Proposed Single Family Residence	
	Group	Group 1	*Scenario* Master Scenario
	Drawn By	J. Woodard	*Company* Earth Systems Pacific
	Date	01/23/2023	*File Name* 52 Franklin - Unsat_Dyn_0.337g - 01.23.23.slmd

SLIDEINTERPRET 9.024

Method Name	Min FS
Bishop simplified	1.764
Janbu simplified	1.729
Spencer	2.560

Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Allow Sliding	Water Surface	Hu Type	Hu	Ru
Qhdf		120	128	Mohr-Coulomb	660	11		Piezometric Line 1	Custom	1	
Qc		122	130	Mohr-Coulomb	900	40		Piezometric Line 1	Custom	1	
fs		138	150	Infinite strength			Yes	Water Surface	Custom	0	
RT Fill		180		Infinite strength			No	None			0



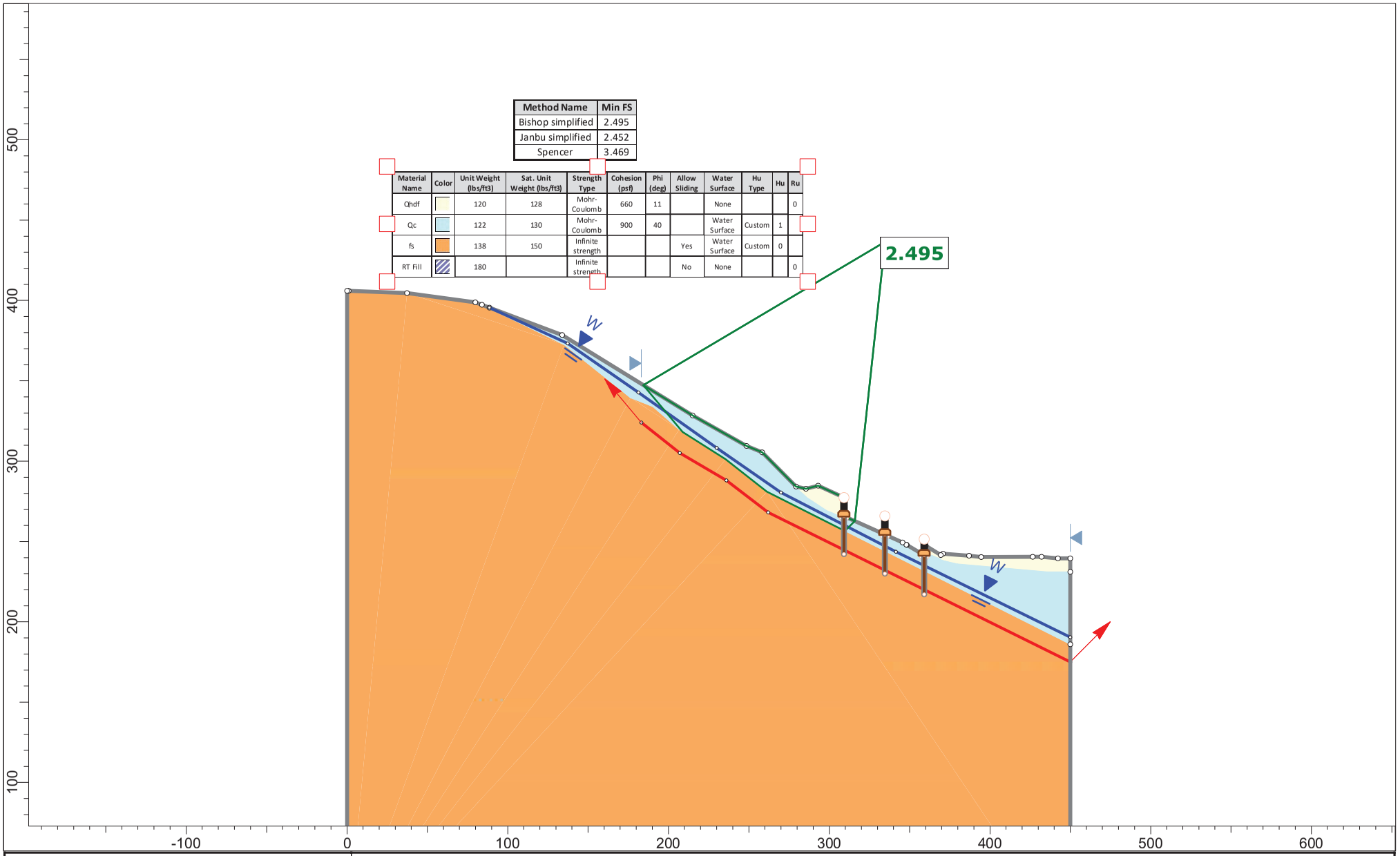
rocscience

SLIDEINTERPRET 9.024

Project	Proposed Single Family Residence		
Group	Group 1	Scenario	Master Scenario
Drawn By	J. Woodard	Company	Earth Systems Pacific
Date	01/23/2023	File Name	52 Franklin - Sat_Static_0.337g - 01.23.23.slmd

Method Name	Min FS
Bishop simplified	2.495
Janbu simplified	2.452
Spencer	3.469

Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Allow Sliding	Water Surface	Hu Type	Hu	Ru
Qhdf		120	128	Mohr-Coulomb	660	11		None			0
Qc		122	130	Mohr-Coulomb	900	40		Water Surface	Custom	1	
fs		138	150	Infinite strength			Yes	Water Surface	Custom	0	
RT Fill		180		Infinite strength			No	None			0



rocscience

SLIDEINTERPRET 9.024

Project	Proposed Single Family Residence		
Group	Group 1	Scenario	Master Scenario
Drawn By	J. Woodard	Company	Earth Systems Pacific
Date	01/23/2023	File Name	52 Franklin - Unsat_Static_0.337g - 01.23.23.slmd

Earth Systems
Pacific

48511 Warm Springs Blvd., Ste. 210
Fremont, CA 94539-7746
Ph: 510-353-3833
Fx: 888-567-4292
esp@earthsystems.com
www.earthsystems.com

October 24, 2017 File No. SH-13000-SA

Mr. Alan C. Chan
4125 Kirkham Street
San Francisco, CA 94122-2944

PROJECT: PROPOSED SINGLE FAMILY RESIDENCE
52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO, CALIFORNIA

SUBJECT: Rear Yard Grading and Drainage Plan Review

REF.: Geologic Hazards Evaluation and Geotechnical Engineering Study, Proposed Single Family Residence, 52 Franklin Avenue, South San Francisco, California, by Earth Systems Pacific, dated June 17, 2016;

Supplemental Geologic and Geotechnical Engineering Evaluation, Proposed Single Family Residence, 52 Franklin Avenue, South San Francisco, California, by Earth Systems Pacific, dated April 25, 2017.

Dear Mr. Chan:

As you authorized, Earth Systems Pacific (Earth Systems) has completed review of the Rear Yard Retaining walls, Drainage, and Grading Plan for the proposed residence at 52 Franklin Avenue in South San Francisco, California. The purpose of this review was to verify that the plan and details had been completed in conformance with the recommendations of the referenced geologic hazards and geotechnical engineering reports.

The plans were prepared by Berns Infrastructure, PLC. The pertinent sheets reviewed included:

- Sheet C-001 – General Information, dated 10/19/17
- Sheet C-002 – General Specifications, dated 10/19/17
- Sheet C-101 – Grading Plan, dated 10/19/17
- Sheet C-102 – RW Foundation Plan, dated 10/19/17
- Sheet C-103 – Retaining Wall Elevations, dated 10/19/17
- Sheet C-104 – Retaining Wall Details, dated 10/19/17
- Sheet C-105 – Drainage Plan, dated 10/19/17
- Sheet C-106 – Drainage Details, dated 10/19/17

Sheet C-101 indicates a retaining wall debris flow capacity volume of 70 cubic yards. This is less than the 500 cubic yards specified within our supplemental geologic and geotechnical engineering report. However, the report does allow that if this design volume cannot be reasonably achieved, the system should be designed to divert remaining volumes around the proposed residence and to the street without affecting neighboring properties. Based on our review of the plans and proposed debris flow mitigation measures (ring-net debris barrier, impact wall, check-dams, and diversion channels), it is our opinion that the proposed mitigation measures meet our recommendations and would be protective of the proposed structure without affecting neighboring properties.

Based on our review, it is our opinion that the Rear Yard Retaining Walls, Drainage, and Grading plans and details have been prepared in general conformance with our recommendations. The plans were reviewed specifically with respect to geotechnical and engineering geologic considerations. We make no representation as to the accuracy of the dimensions, calculations, or other aspects of the design.

It has been a pleasure to be of service to you. If you have questions, or if we can be of further service, please contact our office.

Sincerely,

Earth Systems Pacific

REGISTERED PROFESSIONAL ENGINEER
GIRMAY WELDEGIORGIS
GE3099
GEOTECHNICAL
STATE OF CALIFORNIA

Girmay Weldegiorgis, GE 3099
Senior Engineer

PROFESSIONAL GEOLOGIST
CHRISTOPHER M. CECILE
No. 8991
STATE OF CALIFORNIA

Christopher Cecile, PG 8991
Project Geologist

Copy to: ICE Design
Berns Infrastructure, PLC

Doc. No.: 1710.043.LTR/kt

Earth Systems
Pacific

48511 Warm Springs Blvd., Ste. 210
Fremont, CA 94539-7746
Ph: 510-353-3833
Fx: 888-567-4292
esp@earthsystems.com
www.earthsystems.com

April 25, 2017 File No. SH-13000-SA

Mr. Alan C. Chan
4125 Kirkham Street
San Francisco, CA 94122-2944

PROJECT: PROPOSED SINGLE FAMILY RESIDENCE
52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO, CALIFORNIA

SUBJECT: Supplemental Geologic and Geotechnical Engineering Evaluation

REFs:
1) Geologic Hazards Evaluation and Geotechnical Engineering Study, Proposed Single Family Residence, 52 Franklin Avenue, South San Francisco, California, by Earth Systems Pacific, dated June 17, 2016;

2) Supplemental Geotechnical Peer Review, Chan Residence, 52 Franklin Avenue, by Cotton, Shires & Associates, Inc., dated July 1, 2016.

Dear Mr. Chan:

As you authorized, Earth Systems Pacific (Earth Systems) has prepared this letter to address the concerns raised by Cotton, Shires and Associates, Inc. (CSA), in their geotechnical peer review letter for the City of South San Francisco, dated July, 2016.

CSA, on behalf of the City of South San Francisco, recommended the following supplemental work be performed at the site.

1) A detailed topographic survey of the property including the hillside and area above the property.

2) Supplemental geotechnical evaluations including,

   a. A map of potential landslide/debris flow source areas that could generate flows directed towards the site,

   b. A discussion of the potential for surface water or debris to be directed toward the property by the upslope bench and a discussion of the benefits of improved drainage controls along the bench,

   c. An explanation for the basis of the mobilization of 300 cubic yards of offsite debris, and

   d. Collection of data to characterize depth and properties of colluvial swale deposits upslope of the site.

3) Revised development plans incorporating updated topography and recommendations presented in our 2016 report for the site.

4)

Responses

Items #1 and #3 were addressed by ICE Design and have been incorporated into our updated calculations for the site.

Item 2a

Earth Systems has prepared overhead and oblique maps showing potential landslide and debris flow source areas that could generate flows directed towards the site and how the existing slope bench could direct channel flows onto the site. See Figures 1 and 2, respectively.

Item 2b

The topographic bench located above the site and described in our previous report, slopes downhill to the east. Given the orientation of this bench, surface water or debris flows originating up slope and or west of the site, could be forced to travel along this bench and be directed onto the site. As the bench is located offsite, Earth Systems did not make recommendations for the mitigation of this condition. Instead, Earth Systems recommended on-site mitigation methods including the installation of a debris wall designed for minimum impact loads of 125 pcf (equivalent fluid pressure) and suggested that a ring-net structure be installed near the top of the site to guard against debris flows originating off site.

Additional Recommendations: The following additional recommendations should be incorporated into the design of the project. Earth Systems concurs with CSA in their assessment that improved drainage control along the bench would ameliorate the potential for uncontrolled runoff leading to debris flows to affect the site by diverting drainage along a controlled drainage path. Previous consultants have suggested mitigation measures including the installation of a concrete-lined V-ditch on the bench (Michelucci & Associates, Inc.; MAI, 1993). Per MAI (1993), and concurred with herein, the V-ditch should be extended no less than 50 feet west of the edge of the 1982 failure or ½ the distance across the upslope lot length (whichever is greater). Additionally, the V-ditch should drain to a tight-line system and direct water to an approved discharge point along Franklin Avenue. Significant grading would also be necessary in order to re-establish the slope bench above the site and control off-site drainage.

The grading for the slope bench should be founded on a base key, no less than 10 feet wide and founded at least 2 feet into competent bedrock at the site. The base key should include a subdrain to minimize the development of excess pore pressures within the fill. The subdrain should discharge to an approved point along Franklin Avenue. Backfill and soil compaction should be performed in accordance with geotechnical recommendations presented in our June, 2016 report. All hillside grading should be performed under the

observation of Earth Systems personnel. A geologist from our firm should observe all cuts and keyway excavations.

Item 2c

Earth Systems calculated a volume of 300 cubic yards of offsite debris that could be mobilized from the slopes above the site in our 2016 report. As stated in the report, this was based on the USGS Volume model for the Intermountain Intermountain Western United States (Gartner and others, 2008; Cannon and others, 2010). Earth Systems applied a factor of safety of 1.5 to our calculations. The calculated volume was based on an assumed hourly rainfall of 12 mm (0.5 inches) per hour, consistent with observations during the Jan 3 to 5, 1982, storm which triggered the damaging debris flow at the site. Our calculations also assumed a tributary area of 4.5×10^{-3} km^2. This area was defined by extending a wedge above the site to the top of the slope.

The formula used to estimate debris flow volume is based on evaluating burned areas and, in our opinion, is representative of conditions most susceptible to debris flows. The formula in the above referenced study is presented as follows:

For recently burned areas in the Intermountain Intermountain western United States, debris-flow volume is calculated as:

$$\ln(V) = 7.5 + (0.6 \times \ln(Slp30_{km})) + (0.7 \times sqrt(HM_{km})) + (0.2 \times sqrt(r60))$$

Where

- $Slp30_{km}$ is the area upstream that has slope gradients in excess of 30 percent (in km^2),
- HM_{km} is the area upstream of the calculation point that was burned at high or moderate severity (in km^2), and
- r60 is the spatially averaged 60-minute rainfall accumulation for the design storm in the upstream watershed (in mm)

For our calculations:
$Slp30_{km} = 4.5x10^{-3}$ km^2
$HM_{km} = 4.5x10^{-3}$ km^2
r60 = 12 mm

The resulting volume was calculated to be 148 m^3 or approximately 200 cubic yards. Using a factor of safety of 1.5 our final estimate was 300 cubic yards.

Item 2d

Colluvial Soil Properties

Earth Systems visited the site on February 14, 2017, and collected bulk samples from debris swales above the site for laboratory testing to determine physical properties of the colluvial swale deposits. At the time of our site visit the soils at the site were soft and very moist due to winter rains. The concrete-lined V-ditch at the base of the steep ascending slope at the rear of the lot appears to have been cleaned out and water was flowing within it. The sloping portion of the lot was heavily overgrown with brush, poison, oak, and shallowly rooted young trees. Earth Systems accessed the slopes above the lot by climbing the hillside portion of the lot. The existing drainage bench was also grown over to varying degrees with weeds and native grasses. The topography at the existing debris scar funnels moisture from the bench down and northward towards the site. There were numerous areas of colluvial deposits and debris fans above the site. Five samples of colluvial material were collected from the approximate locations indicated on Figure 3.

The collected bulk samples were analyzed in our laboratory to determine their Atterberg limits and their grain-size distribution. Plasticity indices ranged from 3 to 14 and the samples classified as silty sands (SM) or silty sands with gravel (SM+G) based on their grain-sizes. This is consistent with the colluvial material derived from Franciscan sandstone bedrock above the site. The results of our supplemental laboratory testing are included herein.

Based on the Atterberg limits and grain-size analyses, as well as observed water contents of the site soils collected in April of 2016 (Earth Systems, 2016), the soils collected from the slopes above the site fall within Case B of Ellen & Fleming (1984; see review of literature below); where the water content must be increased in order to initiate flows. As such the soils are moderately susceptible to mobilization as a debris flow. Using estimates of saturated water contents of 16 to 20 percent, the apparent mobility indices (AMI) of the debris samples range from 0.3-0.61 to 0.47-0.77. Per Ellen & Fleming (1984) soils with an AMI of less than 0.45 did not mobilize during the 1982 storm.

Geophysical survey

Earth Systems also retained the services of a licensed geophysicist (Jim Rezowalli and Associates; JRA, 2017 – report included herein) to help profile depths to competent material within existing colluvial swales above the site. JRA performed 4 seismic refraction profiles within colluvial swales above the site (see Appendix B). The refraction profiles identified four distinct velocity ranges at the site, corresponding to surficial colluvium and varying degrees of bedrock weathering. The thickness of surficial colluvium most susceptible to mobilization (layer 1) ranged from 5 to 17 feet below the ground surface and had a P-wave velocity of 1200 to 1500 feet per second (fps), corresponding to approximately 365 to 460 meters per second (m/s). The report of JRA

(attached) presents seismic velocities in terms of compressional wave velocity (Vp). Earth Systems converted the velocities to meters per second and used relationships of Pickett (1963), Castagna et al. (1985), Uyanik (2010), and Maleki (2014) to calculate approximate shear wave velocities (Vs) for each layer. The calculated shear wave velocities are presented in the table below.

Layer	Description (JRA, 2017)	Vp (m/s) – measured	Vs (m/s) - calculated
1	Colluvium	365-460	170-306
2	Saturated soils or highly weathered bedrock	1,250	790-960
3	Weathered bedrock	1,860-2,040	1,175-1,325
4	Competent bedrock	2,740	1,650-1,735

SUPPLEMENTAL ANALYSES

Slope Stability

Earth Systems incorporated the new site topographic survey provided to us by ICE (See Figure 4) and the results of the geophysical survey into our slope stability model. Our revised cross section A-A' is attached to this update (Figure 5). Earth Systems analyzed the revised slopes using Spencer's method in accordance with CGS SP117A (2008) and ASCE/SCEC (2002) guidelines. Our revised analysis resulted in overall lower factors of safety than our previous analysis under both static and dynamic conditions as shown below:

Summary of Slope Stability Analyses Factors of Safety

	Static	Dynamic	Figure
Earth Systems (2016)	2.905	1.769	-
Earth Systems (this study)	2.140	1.272	6, 7

Based on the above results, it appears that the slopes at the site are stable under both static and dynamic (earthquake-induced) conditions. Our revised analysis indicated that under saturated conditions, the static factor of safety is reduced to 1.0 when the effective cohesion is reduced to 293 psf.

Debris Flows

As indicated above, Earth Systems employed the USGS Volume model for the Intermountain Western United States (Gartner and others, 2008). The spatially averaged 60-minute rainfall accumulation for the design storm was selected as 12 mm/hr based on the storm which initiated the debris flow which previously affected the site.

To more fully evaluate potential rainfall, Earth Systems revised this estimate using 90% point precipitation frequency data from the National Oceanographic and Atmospheric Administration (NOAA, 2017) data for a 100-year storm and a 60 minute duration. The 60-minute rainfall intensity in this case is 1.17 in/hr or 29.8 mm/hr (this is approximately 2.5 times the previous estimate employed in our calculations).

Areas Above Slope Bench

USGS Model

Again, for recently burned areas in the Intermountain Western United States, debris-flow volume is calculated using USGS Volume model equation 5 (as shown below). We have revised our model inputs and re-calculated our estimate as follows:

(5) $\ln(V) = 7.5 + (0.6 \times \ln(Slp30_{km})) + (0.7 \times sqrt(HM_{km})) + (0.2 \times sqrt(r60))$

Where

- $Slp30_{km}$ is the area upstream that has slope gradients in excess of 30 percent (in km^2),
- HM_{km} is the area upstream of the calculation point that was burned at high or moderate severity (in km^2), and
- r60 is the spatially averaged 60-minute rainfall accumulation for the design storm in the upstream watershed (in mm)

For our calculations:

$Slp30_{km} = 1.6x10^{-2}$ km^2 (overall basin area above bench)
$HM_{km} = 3.8x10^{-3}$ km^2 (assumes 25% of $Slp30_{km}$; however area is overgrown with dense brush)
r60 = 29.8 mm

The resulting volume was calculated to be 470 m^3 or approximately 614 cu yd. Using our original rainfall estimate of 12mm/hr. and the above basin and burnt areas the result is 318 cu yd .

US Army Corps of Engineers LA District Model

For comparison, Earth Systems employed the US Army Corps LA District Debris Method (2000) using Equation 1 for watersheds from 0.1 to 3.0 mi^2.

(1) $\log D_y = 0.65(\log P) + 0.62 (\text{Log RR}) + 0.18(\text{Log A}) + 0.12(FF)$

Where

- D_y is the unit yield (in yd^3/mi^2),
- P is the maximum 1 hr rainfall intensity (in inches times 100),
- RR is the relief ratio (in ft/mi),
- A is the drainage area (in acres), and
- FF is a unitless Fire Factor variable

For our calculations:

P = 1.17 in x 100 = 117
RR = 2000 ft/mi (basin averaged)
A = 3.95 ac
FF = 3.0 (unburned condition; max = 6.5 for total burn or desert condition).

The resulting volume was calculated to be 45 cubic yards per foot. This value multiplied by the average thickness of surficial deposits (9.5 ft) provides an estimate of 430 cubic yards.

Historic Debris Flows

Earth Systems reviewed satellite imagery for past debris flows on the slopes. Based on our review, debris flows of 60 to 110 cubic yards are common (occurring every 2 to 3 years) from the slopes above the bench down onto the bench. However, observed flow paths from the center of the basin, west of the site, in November of 2010 and 2011, had approximate volumes of 1,000 cubic yards and 625 cubic yards, respectively, using a nominal flow thickness of 5 feet (the minimum for surficial deposits from the geophysical survey of JRA (2017)). Flows originating from this area are obstructed from directly reaching the bench below by existing old debris fans. These fans have calculated volumes between 1,000 and 1,200 cubic yards based on a nominal 5-foot average fan thickness.

In a February 2012 image a possible debris flow channel is visible above the subject site with an approximate flow path length of 144 feet and an average width of +/- 10 feet. Based on our geophysical survey the soils in this area are 5 to 17 feet in thickness. A similar channel would then be capable of generating on the order of 265 to 900 cubic yards of debris.

Review of Literature

Significant study into debris flow processes, hazards, and mitigation was performed and compiled following the Jan 3-5, 1982 storm in the San Francisco Bay region. The Geological Society of America (GSA) devoted an entire volume (Reviews in Engineering Geology – Vol. VII; 1987) to the subject.

Earth Systems reviewed literature for the San Francisco Bay area with respect to debris flows which occurred as a result of the Jan 3-5, 1982 storm. The papers reviewed are included in the references cited section at the end of this letter. Per Wieczorek (1984, in GSA, 1987) debris flow events in the Santa Cruz Mountains generally fell under one of three classifications; deep (1-3 m thick), shallow (0.3-1.0m thick), and very shallow (0.2-0.5m thick). The thickness of the failure was dependent on slope angle position. The hillside above the slope bench at the site would likely produce shallow or very shallow failures based on this classificiation; this would seem to favor lower volume calculations in the 200-300 cubic yard range. Conversely, Shelmon et al, (1984, also in GSA, 1987) analyzed a debris flow which occurred on Oddstadt Drive in Pacifica and

found 5 debris flow deposits in a 5m thick trench. They determined that the pre-failure geometry of the failure indicated that approximately 2,477 m^3 (~3,200 cubic yards) of colluvium was present within a filled swale and that most of that volume found its way down the slope in the event.

Our literature review found that mitigative measures for slope stability should include impact walls capable of retaining more than 150 m^3 (~200 cubic yards), additional mitigation measures include rip-rap near the source area, check-dams, baffles, slope grading and drainage, impact walls, and debris basins and diversion channels.

Discussion

MAI (1992) originally calculated a volume of 440 cubic yards of debris could be mobilized from the slopes above the site. Our original estimate of debris from above the bench was approximately 300 cubic yards. This was based on an hourly rainfall of 12 mm (or 0.47 in/hr). Using the 100-year storm intensity, our revised calculations predicted 430 to 615 cubic yards of material could be mobilized. Our calculations appear to fall within a median range for observed debris flow volumes for the site and vicinity. Observable debris tracks from satellite imagery indicate that flows of 60 to 110 cubic yards are common, but that flows between 265 and 750 cubic yards are possible. Older debris fans within the main swale have approximate volumes of at least 1,000 to 1,200 cubic yards. Assuming that a failure similar to the Oddstadt flow were to occur above the site, and given that the topographic relief is about one-third that of the elevation difference at Oddstadt, a flow of up to 1,000 cubic yards could reasonably be expected. This is consistent with our calculated volumes for observed large debris fans within the bowl west of the site and above the bench.

Based on our observations and calculations, and the calculations of others, it appears that our original estimate (Earth Systems, 2016) of up to 500 cubic yards would need to be retained or diverted away from the proposed structures is well within probable ranges.

Conclusions

Earth Systems has reviewed the proposed plans provided to us by ICE and prepared by Berns Infrastructure, PLC (2017). The plans indicate that the proposed retaining wall system has a storage capacity of 103 cubic yards. While this volume appears generally sufficient for a short return interval storm, it does not provide sufficient storage capacity for a 100-year storm debris flow volume. Additionally, the walls, as designed are straight across the rear of the property and would divert flows onto adjacent properties. The walls should be designed to prevent flows from affecting adjacent properties. The design of the walls should also be altered to meet a minimum retention volume of 500 cubic yards. The rear walls of the residence should also be designed as retaining walls capable of withstanding an impact load of 125 pcf. If a design volume of 500 cubic

yards cannot be reasonably achieved, the system should be designed to divert remaining volumes around the proposed residence and to the street, without affecting neighboring properties in the process.

The Architectural Topographic Survey by Transamerica Engineers (2017) is much improved over the survey provided for our initial study, however, it lacks distinct features such as the channel scar on the southwest portion of the property (See Earth Systems, 2016 – Figure 11) which are important considerations for design of protection for the site.

Earth Systems suggests that the residence be moved toward the street in order to provide accommodation space for possible debris flows.

The proposed re-grading of the slope should be performed in accordance with the recommendations in our original report. The bench above the site should be repaired as discussed in Item 2b, above.

A protective ring-net system, such as those produced by GeoBrugge should be installed near the upper property line of the parcel in order to mitigate the potential for a debris flow to affect the subject residence and retain larger, more damaging cobbles and boulders. .

The mitigative barriers should be routinely inspected and cleaned, at least annually and following periods of intense rainfall or debris collection. Successive flows should not be allowed to accumulate within the catchment areas.

CLOSURE

The scope of our services did not include an environmental assessment or observation for the presence or absence of hazardous or toxic materials in the soil, surface water, groundwater or air, on, below, or around the site.

This report is valid for conditions as they exist at this time for the type of project described herein. Our intent was to perform the analysis in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the locality of this project under similar conditions. No representation, warranty, or guarantee is either expressed or implied. This report is intended for the exclusive use by the client as discussed in the Scope of Services section. Application beyond the stated intent is strictly at the user's risk.

The conclusions in this report are based upon the geologic and geotechnical conditions encountered during the analysis. If changes with respect to the project type or location become necessary, if items not addressed in this report are incorporated into the plans, or if any of the

assumptions stated in this report are not correct, Earth Systems Pacific should be notified for modifications to this report.

This document, the data, conclusions, and recommendations contained herein are the property of Earth Systems Pacific. This report shall be used in its entirety, with no individual sections reproduced or used out of context. Copies may be made only by Earth Systems Pacific, the client, and his authorized agents for use exclusively on the subject project. Any other use is subject to federal copyright laws and the written approval of Earth Systems Pacific.

Thank you for this opportunity to have been of service. Please feel free to contact this office at your convenience if you have any questions regarding this report.

Sincerely,
Earth Systems Pacific

Christopher M. Cecile, PG 8991
Project Geologist

Brett Faust, CEG 2386
Senior Geologist

Girmay Weldegiorgis, CE 74044
Senior Engineer

Bill E. Zehrbach, GE 926
Principal Engineer

Copy to: ICE Design

Attachments:
Figure 1 – Debris Flow Source Areas (overhead)
Figure 2 – Debris Flow Source Areas (oblique)
Figure 3 – Debris fans and sample location map
Figure 4 – Site Geologic Map
Figure 5 – Cross Section A-A'
Figure 6, 7 – Results of Supplemental Slope Stability Analysis
Appendix A - Results of Laboratory Testing
Appendix B - JRA (2017) Seismic Refraction Survey

Doc. No.: 1704-052.LTR/jo

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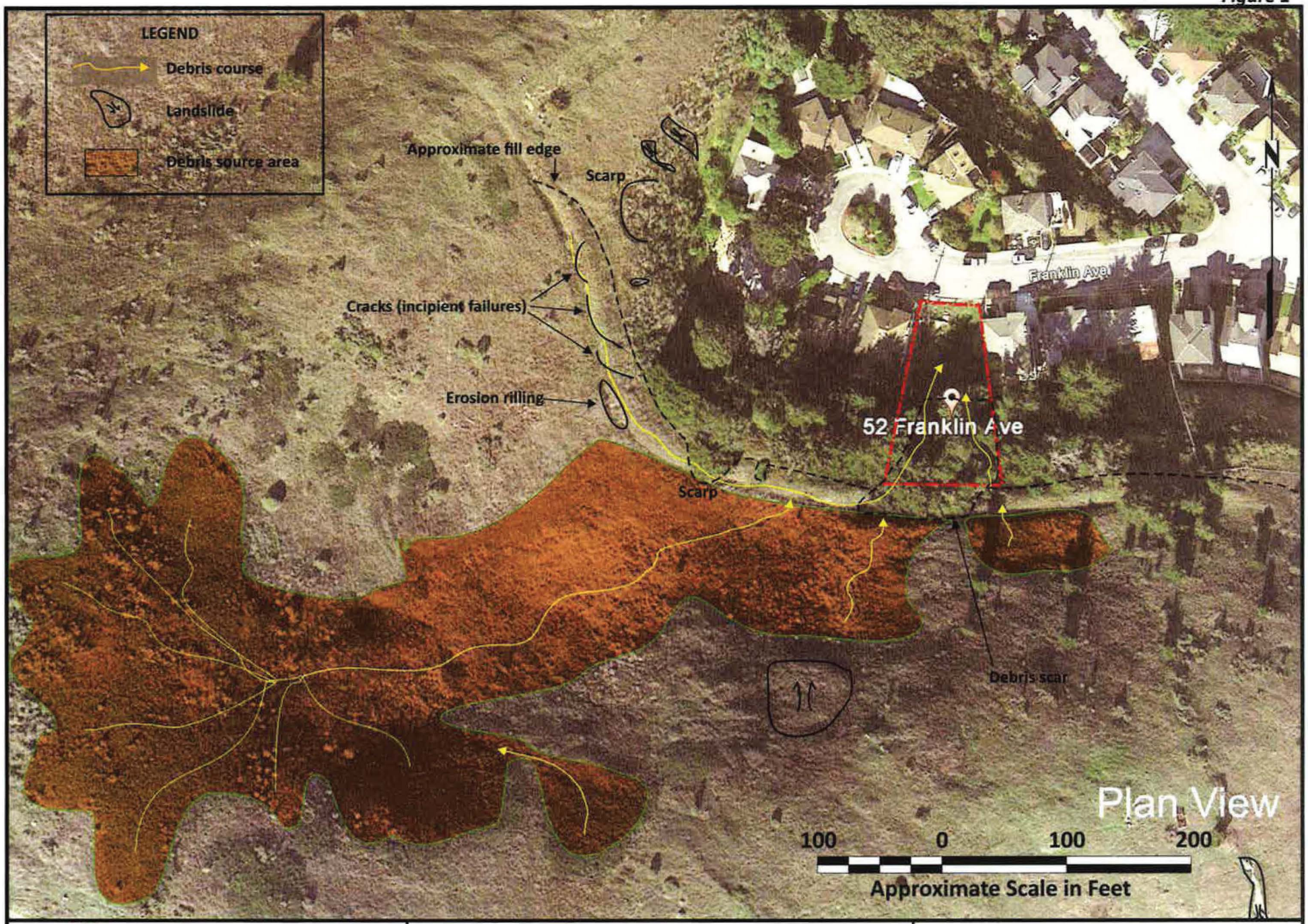
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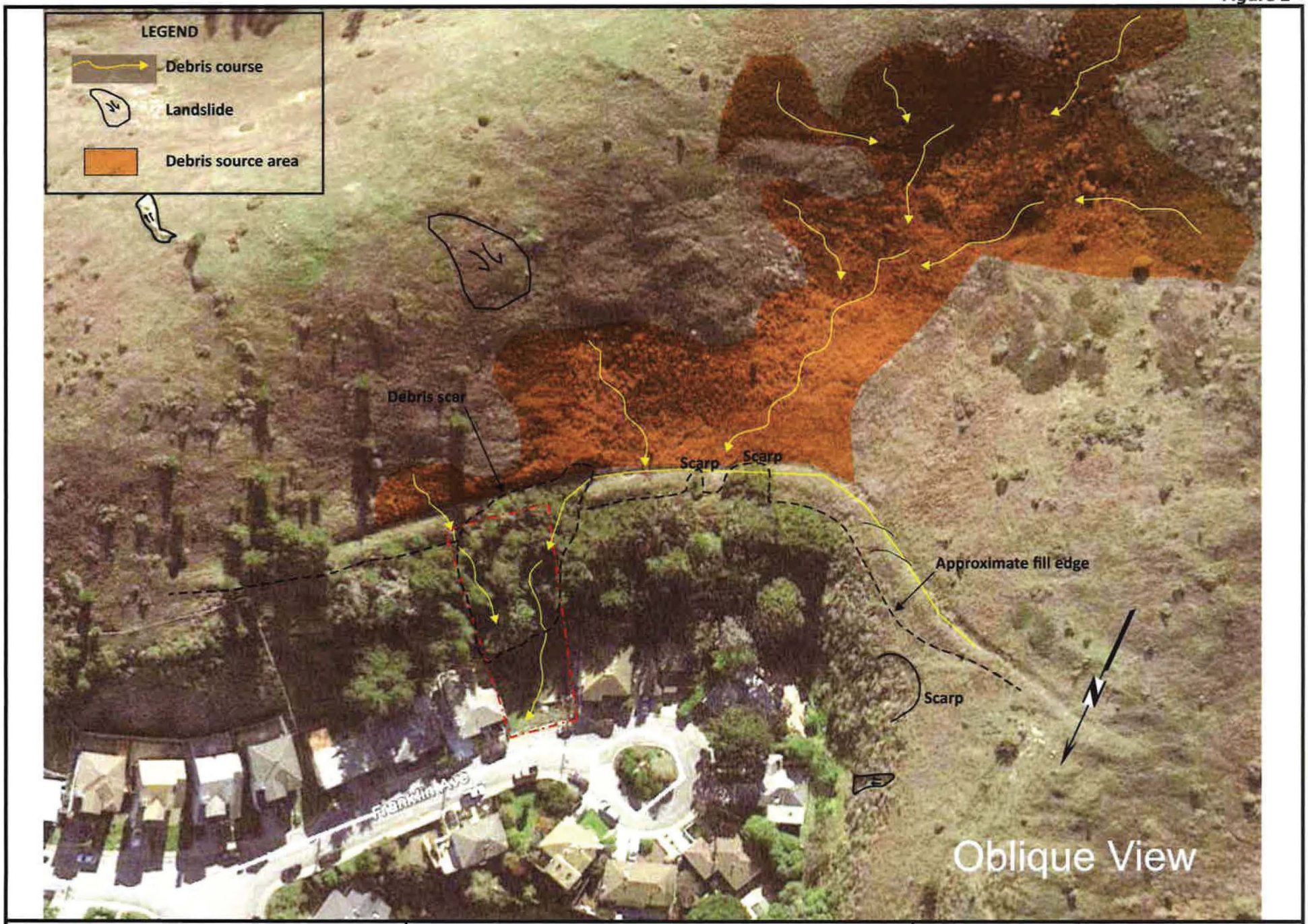
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Figure 1



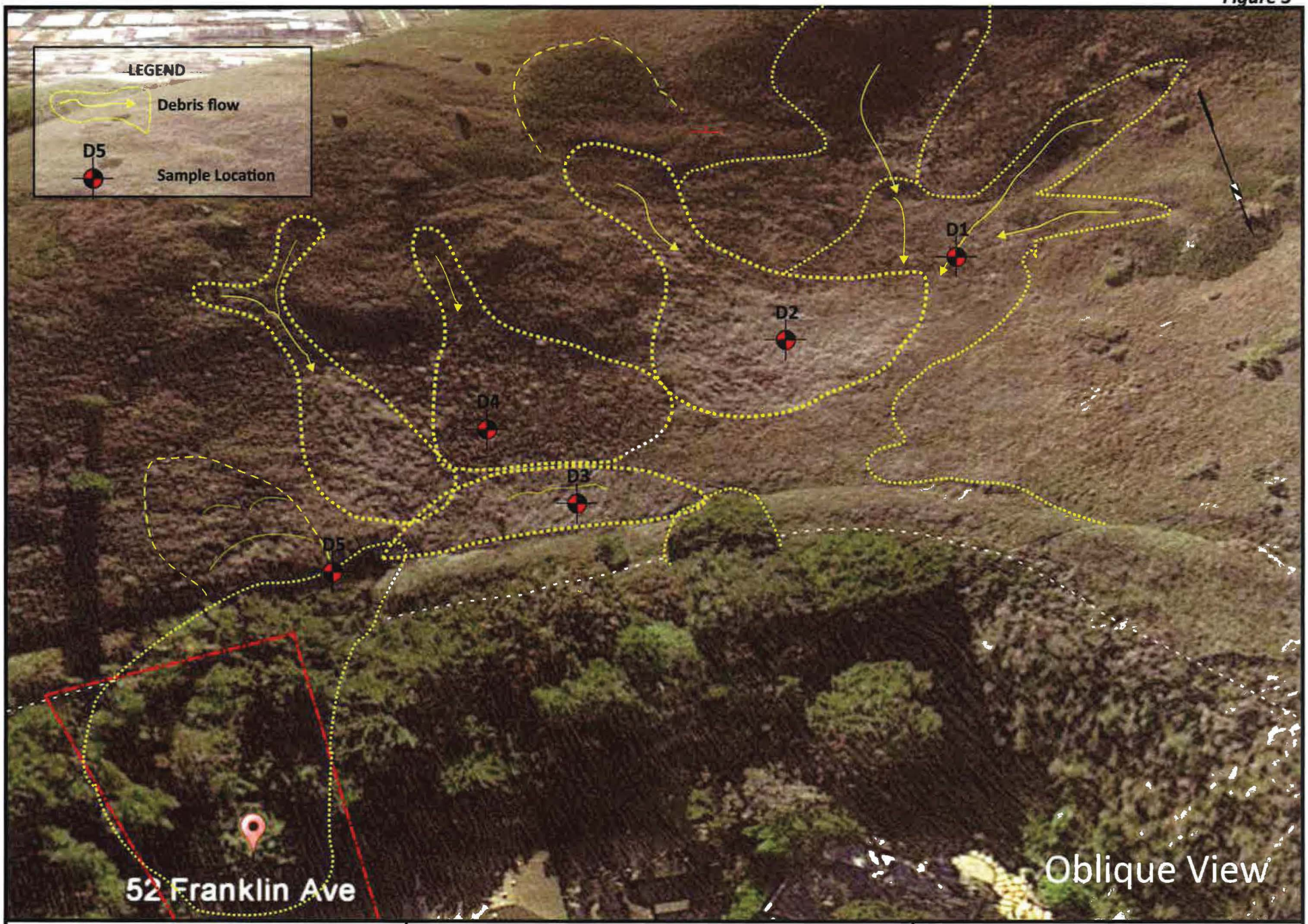
Earth Systems Pacific	Proposed Residence 52 Franklin Avenue South San Francisco, California	Debris Flow Source Areas SH-13000-SA

Figure 2



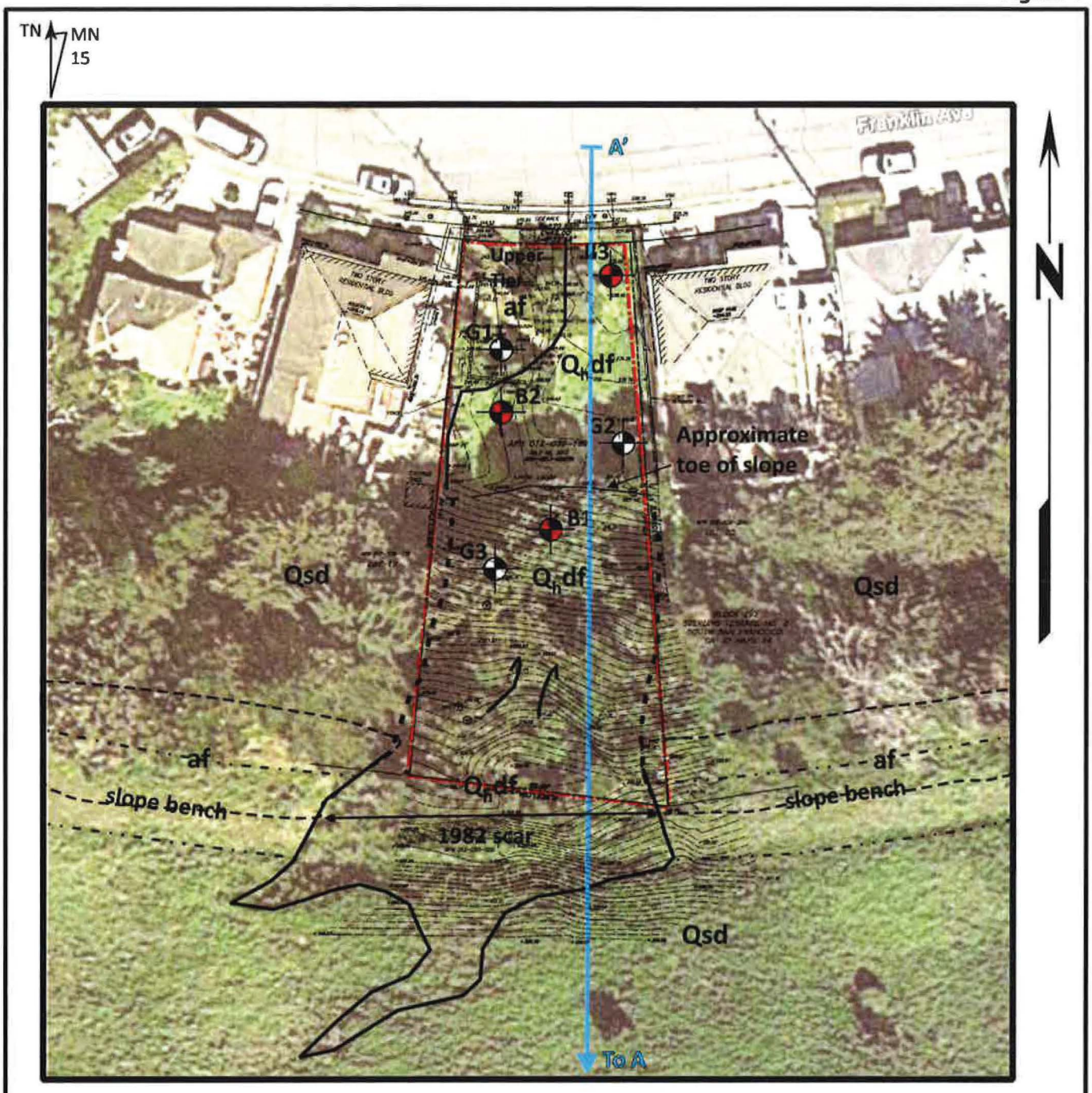
Earth Systems Pacific	Proposed Residence 52 Franklin Avenue South San Francisco, California	**Debris Flow Source Areas** SH-13000-SA

Figure 3



Earth Systems Pacific	Proposed Residence 52 Franklin Avenue South San Francisco, California	**Debris Flow and Sample Location Map** SH-13000-SA

Figure 4



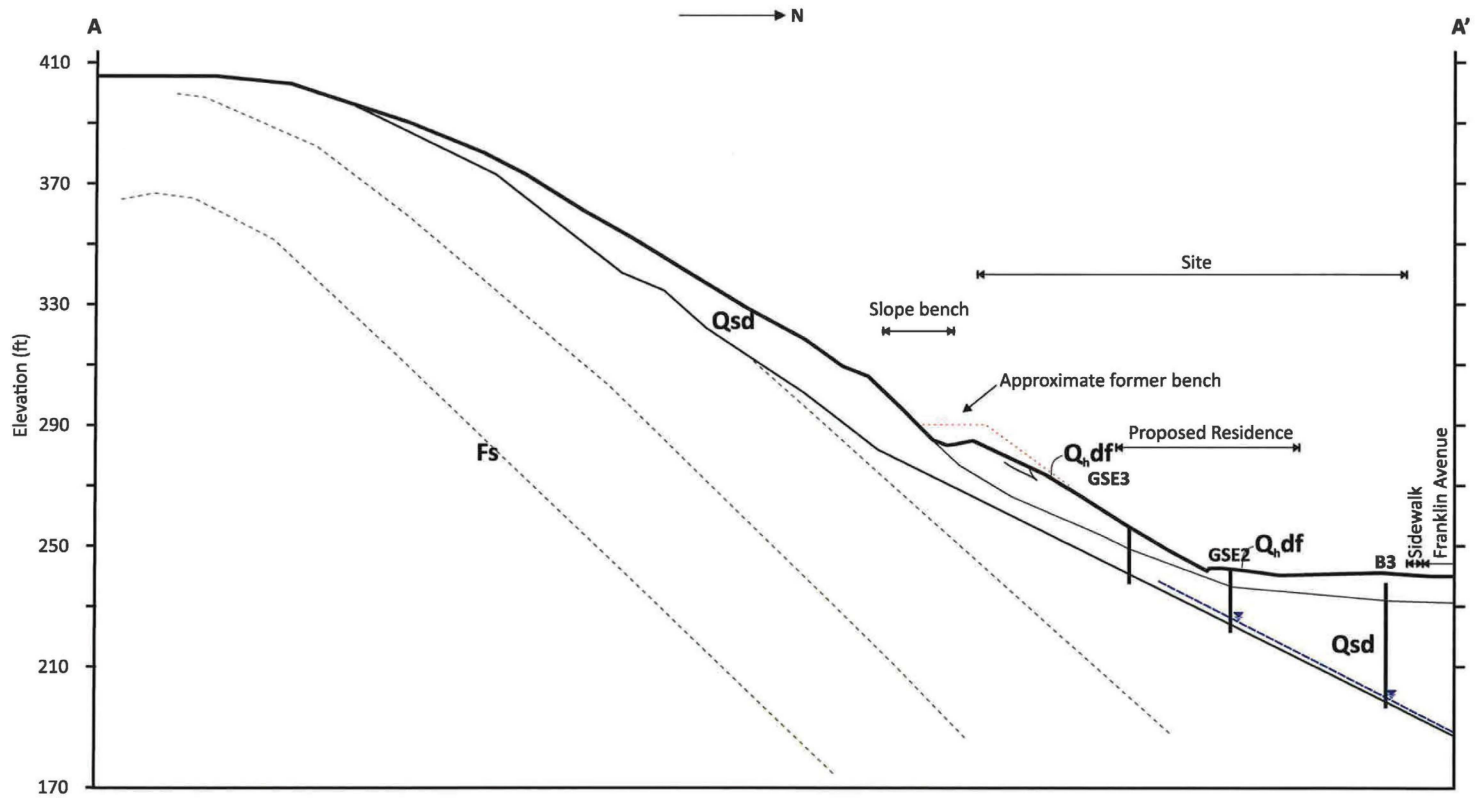
0 40 80 120

Approximate Scale in Feet

af	artificial fill
$Q_h$df	Holocene debris flow deposits
Qsd	Quaternary slope debris deposits
A — A'	Cross section location
	Site boundary
B3	Approximate boring location (this study)
G3	Approximate boring location (GSE , 1996)

Base: Google Earth (2016); Transamerican Engineers (2017)

Earth Systems Pacific	Proposed Single Family Residence 52 Franklin Avenue South San Francisco, California	**Site Geologic Map** SH-13000-SA



$Q_h df$ Holocene debris flow deposits

Qsd Quaternary slope debris/colluvium

Fs Franciscan sandstone

Geologic contact, dashed where approximate, queried where uncertain

Groundwater surface

Bedding orientation (shown schematically)

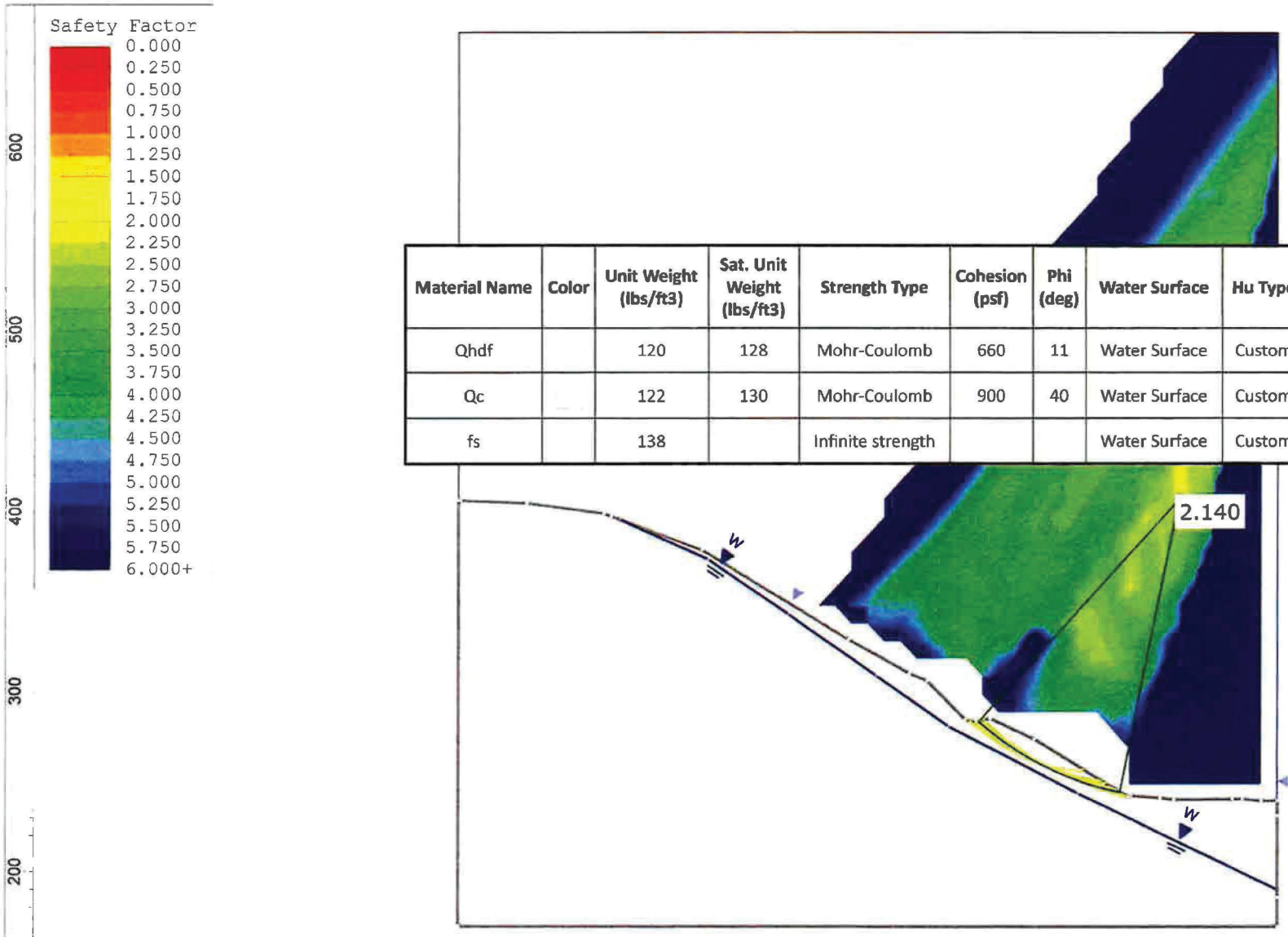
40 0 40 80

Approximate Scale in Feet (H=V)

B3 Boring Location (Earth Systems, this study)

G3 Boring Location (Globe Soil Engineers, 1996)

Earth Systems Pacific	Proposed Single Family Residence 52 Franklin Avenue South San Francisco, California	Cross Section A-A' SH-13000-SA

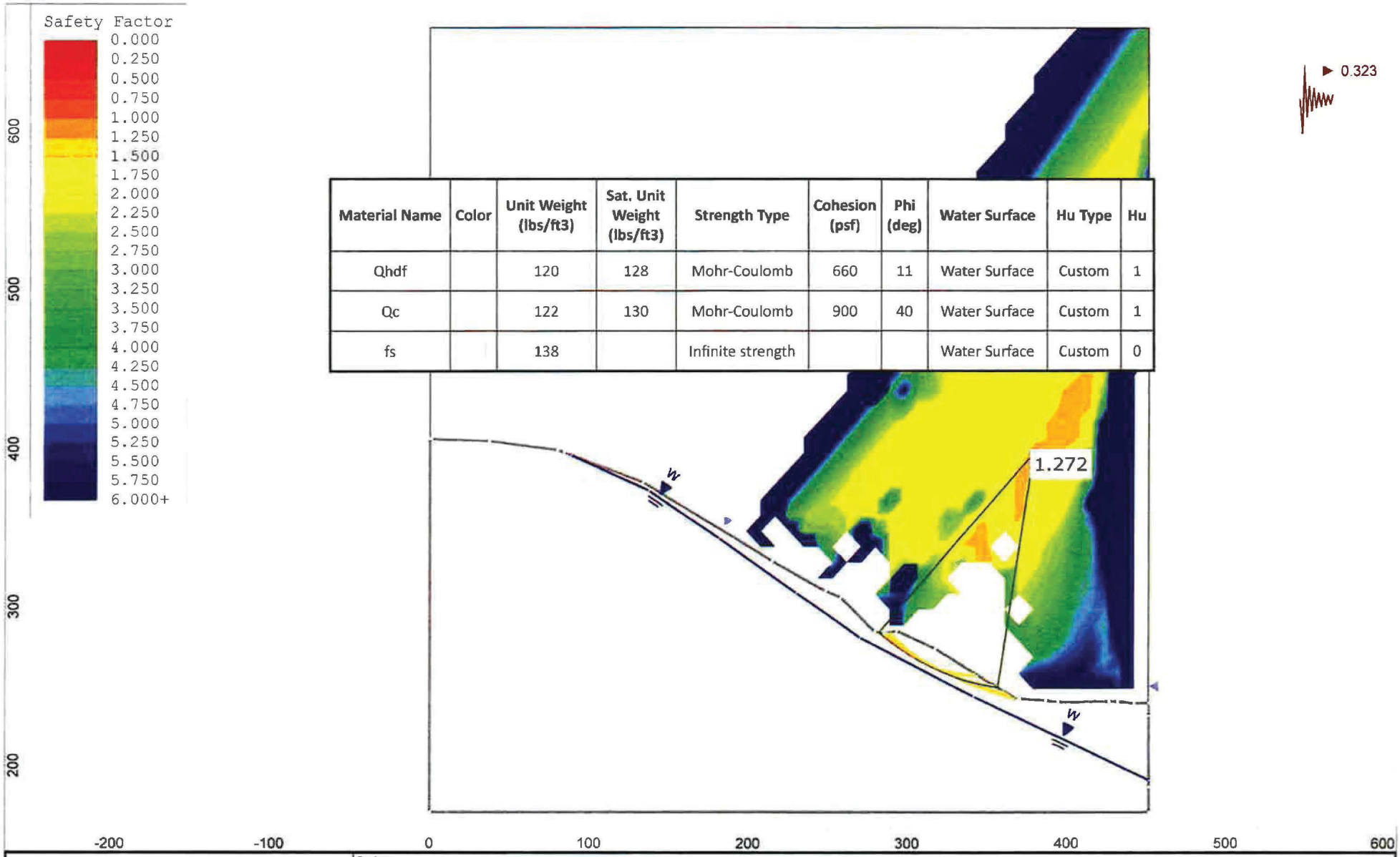


Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type	Hu
Qhdf		120	128	Mohr-Coulomb	660	11	Water Surface	Custom	1
Qc		122	130	Mohr-Coulomb	900	40	Water Surface	Custom	1
fs		138		Infinite strength			Water Surface	Custom	0

Earth Systems Pacific

SLIDEINTERPRET 7.022

Project	52 Franklin Avenue		
Analysis Description	A-A' (static)		
Drawn By		Scale 1:1000	Company
Date	4/26/2017		File Name a-a - static.slim



Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type	Hu
Qhdf		120	128	Mohr-Coulomb	660	11	Water Surface	Custom	1
Qc		122	130	Mohr-Coulomb	900	40	Water Surface	Custom	1
fs		138		Infinite strength			Water Surface	Custom	0

Earth Systems Pacific

SLIDEINTERPRET 7.022

Project	52 Franklin Avenue		
Analysis Description	A-A' (dynamic)		
Drawn By		Scale 1:1000	Company
Date	4/26/2017		File Name a-a - dynamic.slim

APPENDIX A

Laboratory Test Results

52 Franklin Ave. SH-13000-SA

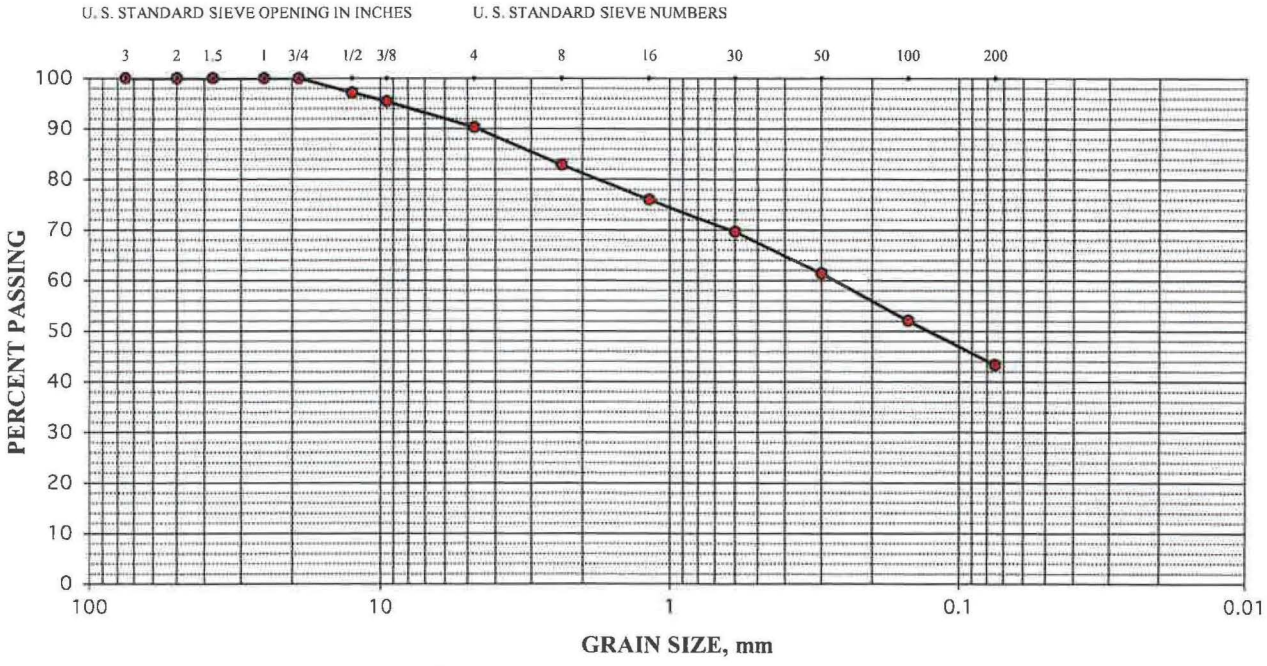
PARTICLE SIZE ANALYSIS

ASTM D 422-63/07; D 1140-14

Boring #D1 @ 0.0 - 3.0' March 2, 2017
Dark Brown Silty Sand(SM)

LL = 26; PL = 23; PI = 3

Sieve size	% Retained	% Passing
3" (75-mm)	0	100
2" (50-mm)	0	100
1.5" (37.5-mm)	0	100
1" (25-mm)	0	100
3/4" (19-mm)	0	100
1/2" (12.5-mm)	3	97
3/8" (9.5-mm)	5	95
#4 (4.75-mm)	10	90
#8 (2.36-mm)	17	83
#16 (1.18-mm)	24	76
#30 (600-µm)	30	70
#50 (300-µm)	39	61
#100 (150-µm)	48	52
#200 (75-µm)	57	43



52 Franklin Ave. SH-13000-SA

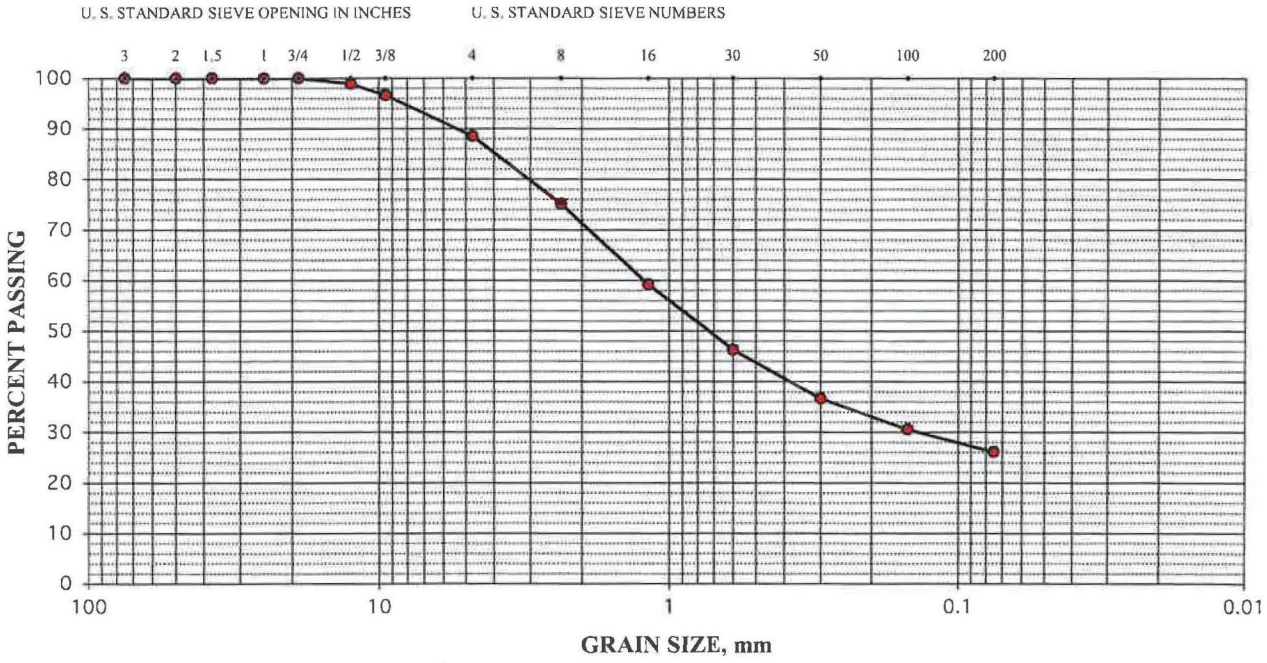
PARTICLE SIZE ANALYSIS

ASTM D 422-63/07; D 1140-14

Boring #D2 @ 0.0 - 3.0' March 2, 2017
Black Silty Sand (SM)

LL = 42; PL = 30; PI = 12

Sieve size	% Retained	% Passing
3" (75-mm)	0	100
2" (50-mm)	0	100
1.5" (37.5-mm)	0	100
1" (25-mm)	0	100
3/4" (19-mm)	0	100
1/2" (12.5-mm)	1	99
3/8" (9.5-mm)	3	97
#4 (4.75-mm)	12	88
#8 (2.36-mm)	25	75
#16 (1.18-mm)	41	59
#30 (600-µm)	54	46
#50 (300-µm)	63	37
#100 (150-µm)	69	31
#200 (75-µm)	74	26



52 Franklin Ave. SH-13000-SA

PARTICLE SIZE ANALYSIS

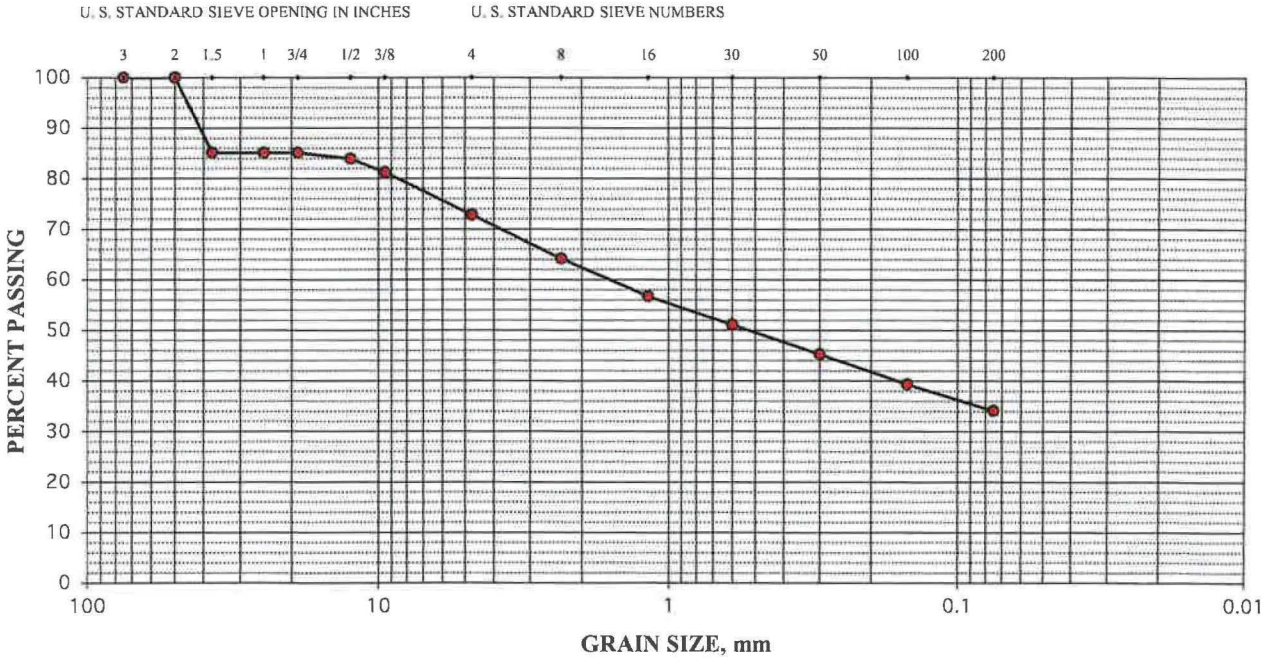
ASTM D 422-63/07; D 1140-14

Boring #D3 @ 0.0 - 3.0' March 2, 2017

Very Dark Brown Silty Sand with Gravel (SM)

LL = 38; PL = 28; PI = 10

Sieve size	% Retained	% Passing
3" (75-mm)	0	100
2" (50-mm)	0	100
1.5" (37.5-mm)	15	85
1" (25-mm)	15	85
3/4" (19-mm)	15	85
1/2" (12.5-mm)	16	84
3/8" (9.5-mm)	19	81
#4 (4.75-mm)	27	73
#8 (2.36-mm)	36	64
#16 (1.18-mm)	43	57
#30 (600-µm)	49	51
#50 (300-µm)	55	45
#100 (150-µm)	61	39
#200 (75-µm)	66	34



52 Franklin Ave. SH-13000-SA

PARTICLE SIZE ANALYSIS

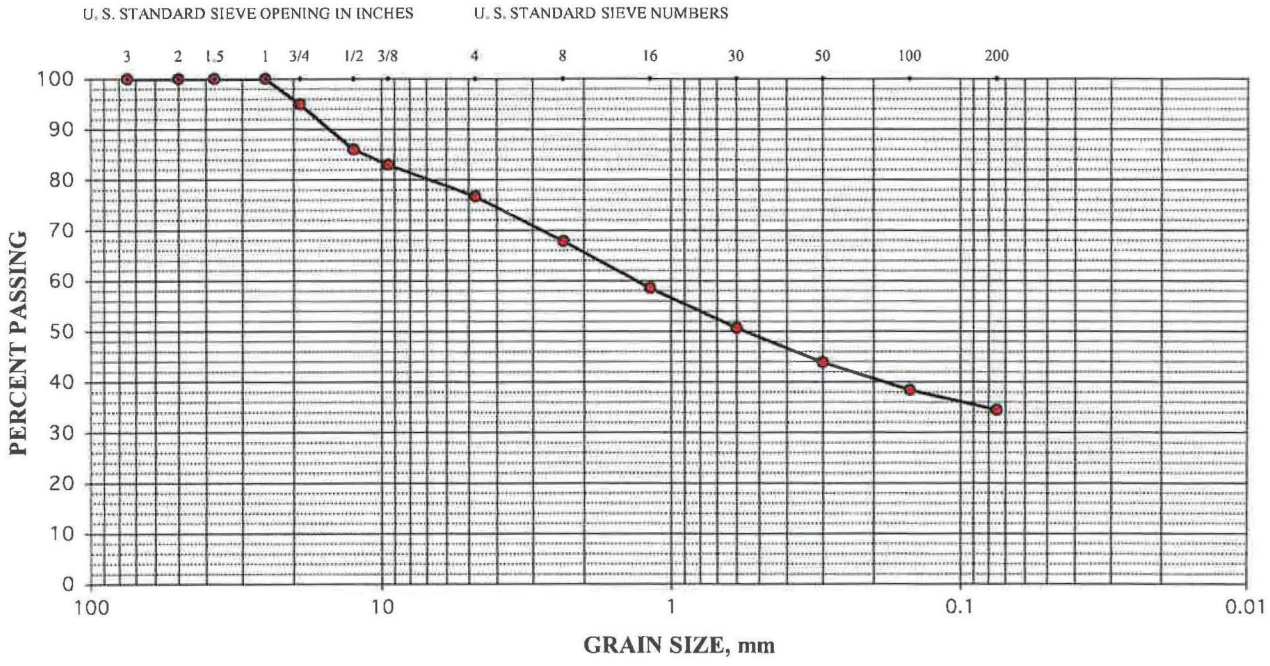
ASTM D 422-63/07; D 1140-14

Boring #D4 @ 0.0 - 3.0' March 2, 2017

Very Dark Brown Silty Sand with Gravel (SM)

LL = 42; PL = 28; PI = 14

Sieve size	% Retained	% Passing
3" (75-mm)	0	100
2" (50-mm)	0	100
1.5" (37.5-mm)	0	100
1" (25-mm)	0	100
3/4" (19-mm)	5	95
1/2" (12.5-mm)	14	86
3/8" (9.5-mm)	17	83
#4 (4.75-mm)	23	77
#8 (2.36-mm)	32	68
#16 (1.18-mm)	41	59
#30 (600-µm)	49	51
#50 (300-µm)	56	44
#100 (150-µm)	62	38
#200 (75-µm)	66	34



52 Franklin Ave. SH-13000-SA

PARTICLE SIZE ANALYSIS

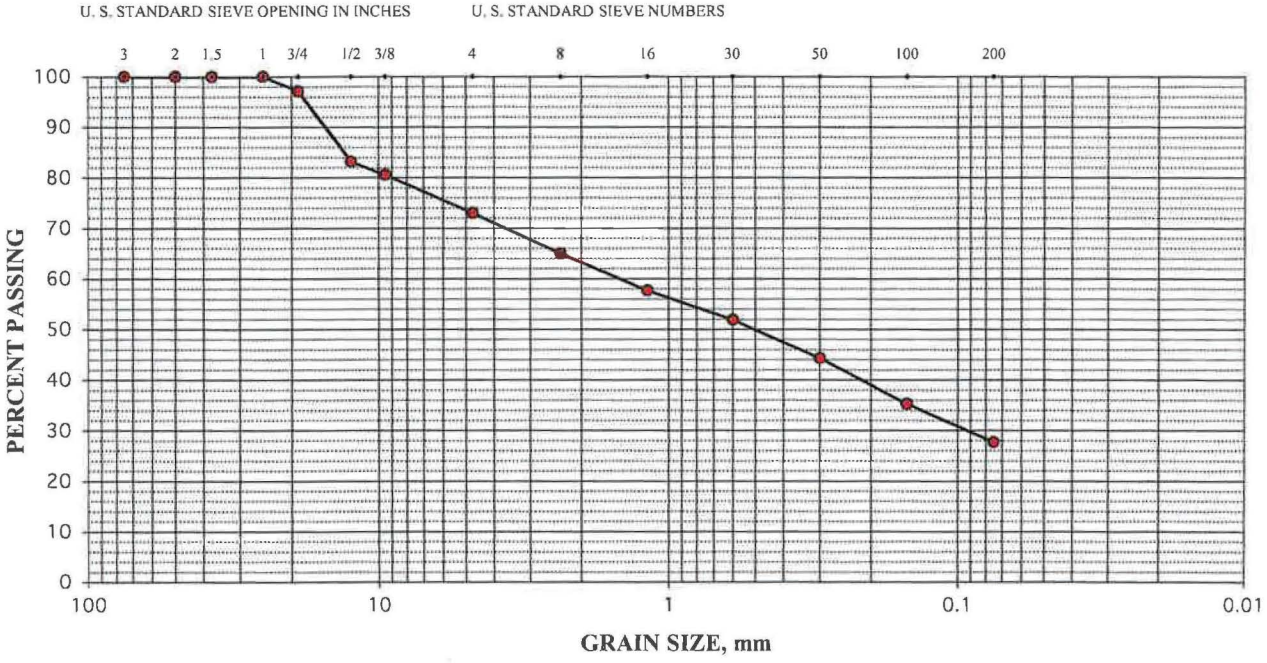
ASTM D 422-63/07; D 1140-14

Boring #D5 @ 0.0 - 3.0' March 2, 2017

Very Dark Brown Silty Sand with Gravel (SM)

LL = 30; PL = 24; PI = 6

Sieve size	% Retained	% Passing
3" (75-mm)	0	100
2" (50-mm)	0	100
1.5" (37.5-mm)	0	100
1" (25-mm)	0	100
3/4" (19-mm)	3	97
1/2" (12.5-mm)	17	83
3/8" (9.5-mm)	19	81
#4 (4.75-mm)	27	73
#8 (2.36-mm)	35	65
#16 (1.18-mm)	42	58
#30 (600-µm)	48	52
#50 (300-µm)	56	44
#100 (150-µm)	65	35
#200 (75-µm)	72	28



52 Franklin Ave. SH-13000-SA

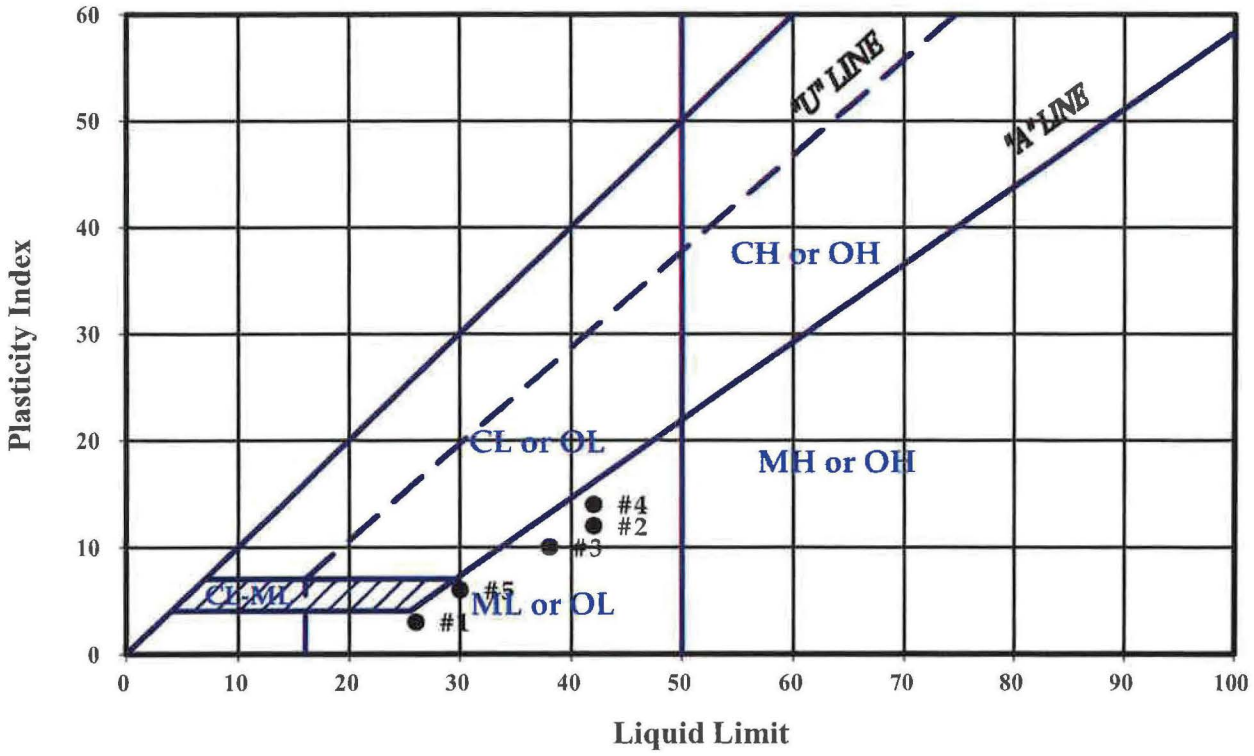
PLASTICITY INDEX

ASTM D 4318-10

March 2, 2017

Test No.:	1	2	3	4	5
Boring No.:	D1	D2	D3	D4	D5
Sample Depth:	0.0 - 3.0'	0.0 - 3.0'	0.0 - 3.0'	0.0 - 3.0'	0.0 - 3.0'
Liquid Limit:	26	42	38	42	30
Plastic Limit:	23	30	28	28	24
Plasticity Index:	3	12	10	14	6

Plasticity Chart



APPENDIX B

JRA (2017) – Seismic Refraction Survey

J R ASSOCIATES

Engineering Geophysics
17040 Oak Leaf Drive
Morgan Hill, CA 95037
(408) 293-7390

SEISMIC REFRACTION SURVEY AT 52 FRANKLIN AVENUE SOUTH SAN FRANCISCO, CALIFORNIA

March 3, 2017

for

Earth Systems Pacific
48511 Warm Springs Blvd., Suite 210
Fremont, CA 94539

by

James Rezowalli, GP-921

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I INTRODUCTION

This report presents the results of a seismic refraction investigation performed above a residential lot at 52 Franklin Avenue in South San Francisco, California. The investigation was performed for Earth Systems Pacific by J R Associates. The purpose of the investigation was to measure the depth to bedrock on a hillside above the property. James Rezowalli, Principal Geophysicist, and Brian Rezowalli, Technician, of J R Associates performed the field work in February of 2017.

A. Site Conditions

The site is a grass and brush cover moderately sloping hillside on the west side of Franklin Avenue (Drawing 1). We ran seismic refraction lines up the hillside to determine the depth of the colluvium and the seismic velocity of the bedrock.

II METHODOLOGY

A. Field Procedures

We collected refraction data along four seismic refraction lines (Drawing 2). Line 1 was 110 feet long and lines 2, 3, and 4 were 200 feet long. Each line contained twenty-four geophones and three shot points. The shot points were at the beginning, the end, and the middle of the lines. A twelve-pound sledge hammer striking an aluminum plate was used to create P-waves at the shot point locations.

B. Instrumentation

Litton LRS-1011 14-Hz geophones detected the seismic signals. A cable connected the geophones to a Geometrics Geode seismograph. The Geode filtered, stacked, and recorded the signals. Stacking (adding) signals from multiple shots at the same shot point location improved the signal to noise ratio of the seismograph recordings. Typically eight to sixteen recordings at each shot point location were stacked. A PC displayed the seismograph recordings in the field for quality control and stored the records for later processing.

C. Data Reduction

Data reduction began by picking the arrival times from the seismograph recordings. An arrival time is the time a P-wave spent traveling from shot point to geophone. The wave could either travel along the ground surface or be refracted from an interface between materials. For a refraction to occur, the materials below the interface must have a greater P-wave velocity than

the materials above the interface. The arrival times were entered into a computer program with elevation, location, and layer control information. The absolute surface elevations above sea level were obtained from a USGS topographic map and are approximate.

The interpretation program, FSIP, performs a first approximation delineation of the refracting horizons using a delay-time method. The approximation is then tested and improved by the program's ray-tracing procedure in which ray travel times computed for the model are compared against measured travel times. The model is subsequently adjusted iteratively to minimize the discrepancy between the computed and measured travel times. A Bureau of Mines Report of Investigation describes the program[1].

[1]Scott, James H., Computer Analysis of Seismic Refraction Data, BuMines RI 7595, 1972.

III RESULTS

The results of the computer analysis of the refraction data are presented in Drawing 3 and Table 1. The drawing contains two-dimensional diagrams profiling the seismic layering and layer velocities measured along the refraction lines. Table 1 summarizes the results presented in the drawing.

Table 1. Summary of Refraction Results

Line Numbers	Depth to Layer 2 (feet)	Depth to Layer 3 (feet)	Layer 1 Velocity (fps)	Layer 2 Velocity (fps)	Layer 3 Velocity (fps)
1	13 to 17	--	1200	6700	--
2	5 to 14	--	1300	6100	--
3	7 to 22	44 to 71	1500	4100	9000
4	6 to 15	8 to 37	1200	4400	9000

A. Seismic Layering

We found four different seismic layers at the site. The layers were distinguished by their compressional (P) wave velocities. Layer 1 included the ground surface and had a P-wave velocity ranging between 1200 and 1500 feet per second (fps). The P-wave velocities suggest the first seismic layer consisted of dry to partially saturated colluvium.

The second seismic layer was found beneath all four lines. Beneath lines 1 and 2 the second seismic layer had a P-wave velocity between 6100 and 6700 fps. The depth to the top of the second seismic layer beneath lines 1 and 2 ranged from 5 feet to 17 feet. The velocity of the

second seismic layer beneath lines 1 and 2 suggest it is composed of a weathered and fractured bedrock. The seismic data indicated that beneath lines 1 and 2 there is a 5 to 17-foot think layer of colluvium overlying weathered and fractured bedrock.

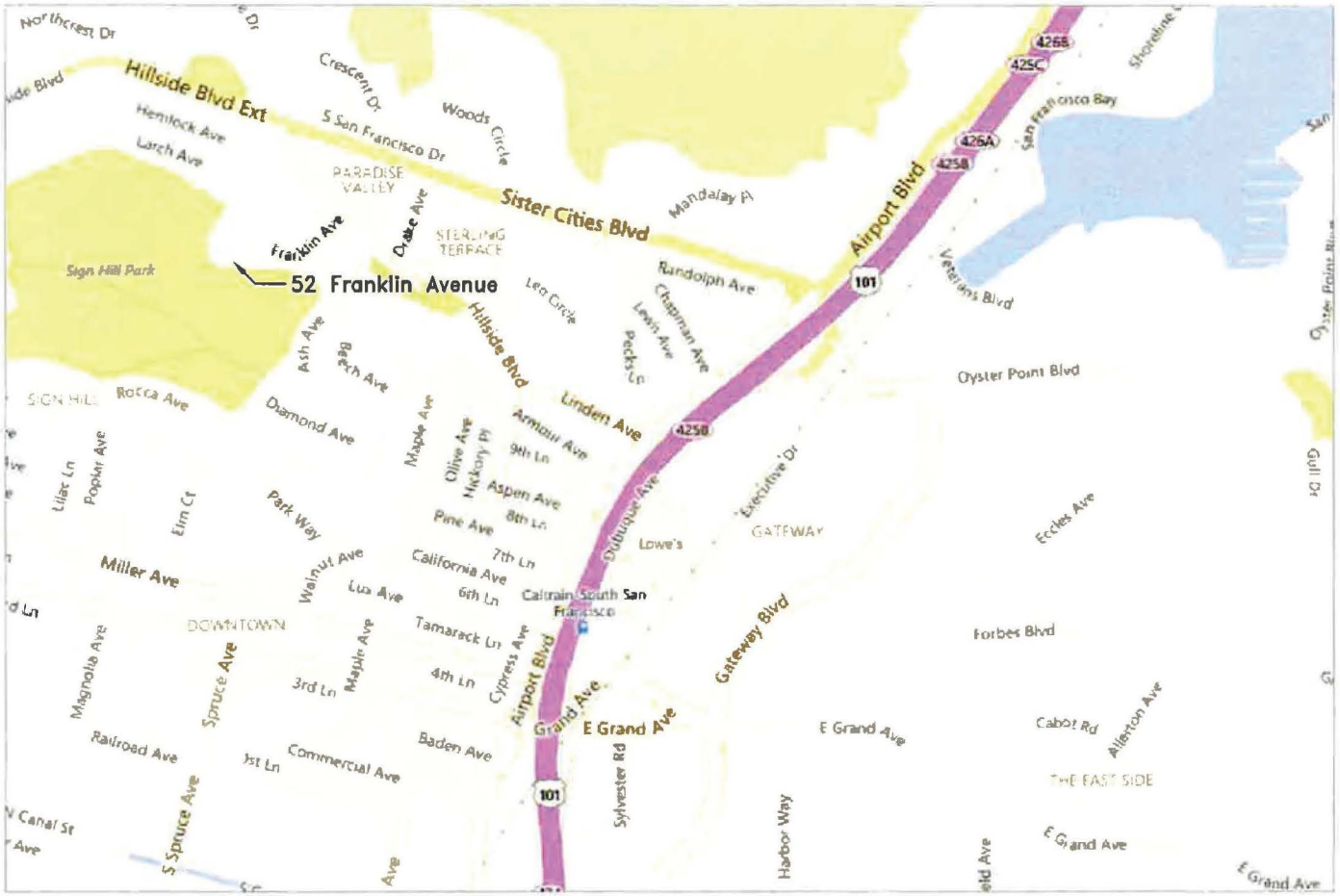
Beneath lines 3 and 4 the second seismic layer had a P-wave velocity between 4100 and 4400 fps. The depth to the top of the second seismic layer beneath lines 3 and 4 ranged from 6 feet to 22 feet and was up to 60 feet thick beneath line 3 (Drawing 3). The velocity of the second seismic layer beneath lines 3 and 4 suggest it varied from a dense saturated soil to a highly weathered and fractured bedrock. Line 3 was centered up a swale in the hillside (Drawing 2) and the data suggest the colluvium and highly weathered bedrock is thickest in the swale.

A third seismic layer was found beneath lines 3 and 4. The P-wave velocity of the third seismic layer was 9000 fps. The depth to the top of the third seismic layer was from 8 to 71 feet. It was deepest in the swale beneath line 3. The velocity of the third seismic layer suggest it is composed of moderately weathered or moderately fractured bedrock.

B. Limitations

Seismic layers do not always correspond directly to lithologic changes that might be found in borehole or trenching data. A seismic layer is an interface between materials with different P-wave velocities. Factors such as weathering, cementation, induration, and saturation as well as lithologic changes can create changes in seismic velocities. Also, there can be lithologic changes without velocity changes. However, our field experience indicates that seismic layers often correspond to major changes in lithology or saturation to within ±20% of the depth to the interface.

IV DRAWINGS

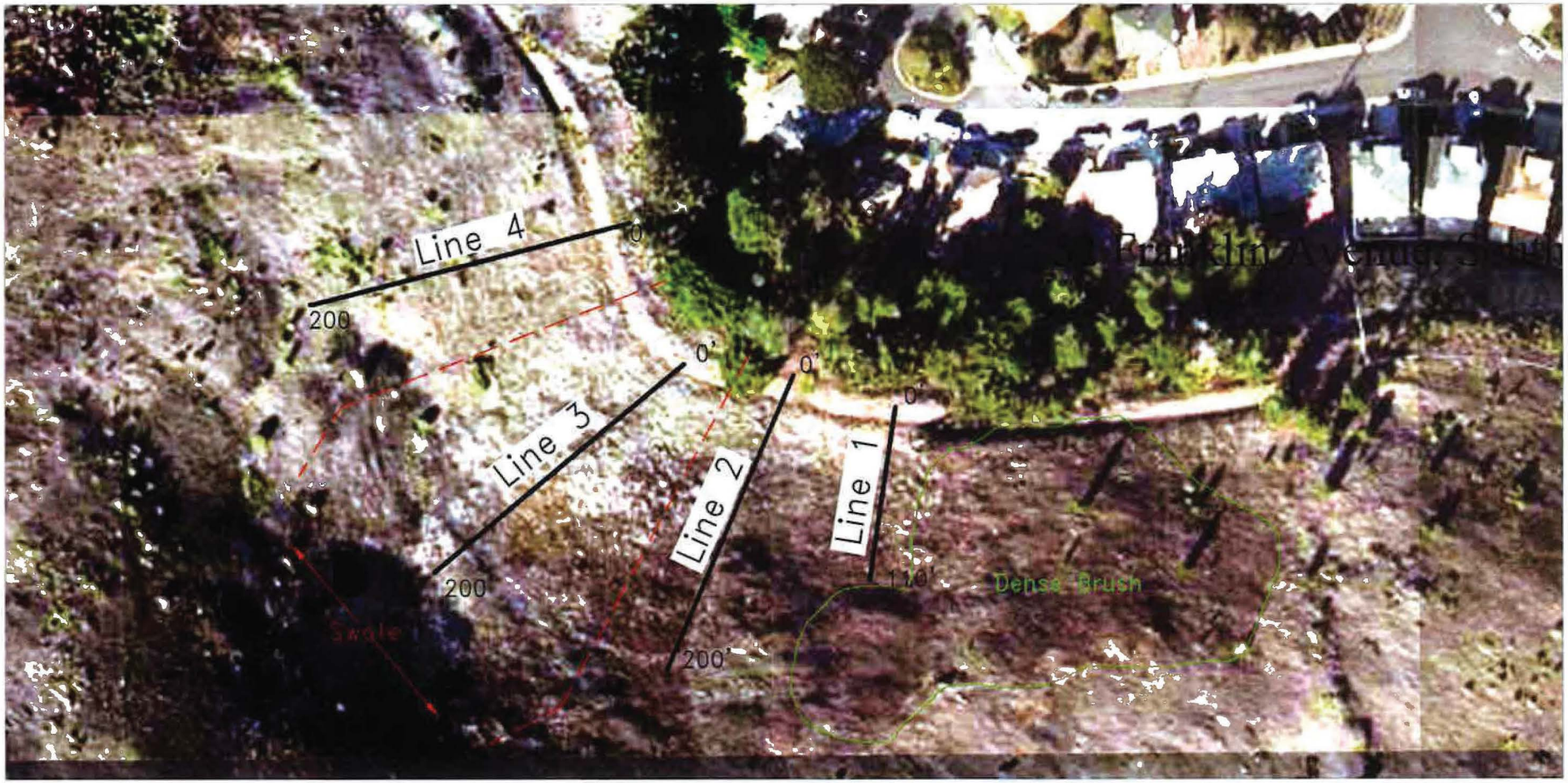


Vicinity Map- Seismic Refraction Investigation
52 Franklin Avenue
South San Francisco, California

SCALE: No Scale		DRAWN BY: J.J.R.
DATE: 3-01-2017	JOB NUMBER: 114-137-17	REVISED:

J R Associates Civil and Environmental Geophysics
1886 Emory Street, San Jose, CA (408) 293-7390

DRAWING NUMBER: 1



Explanation:

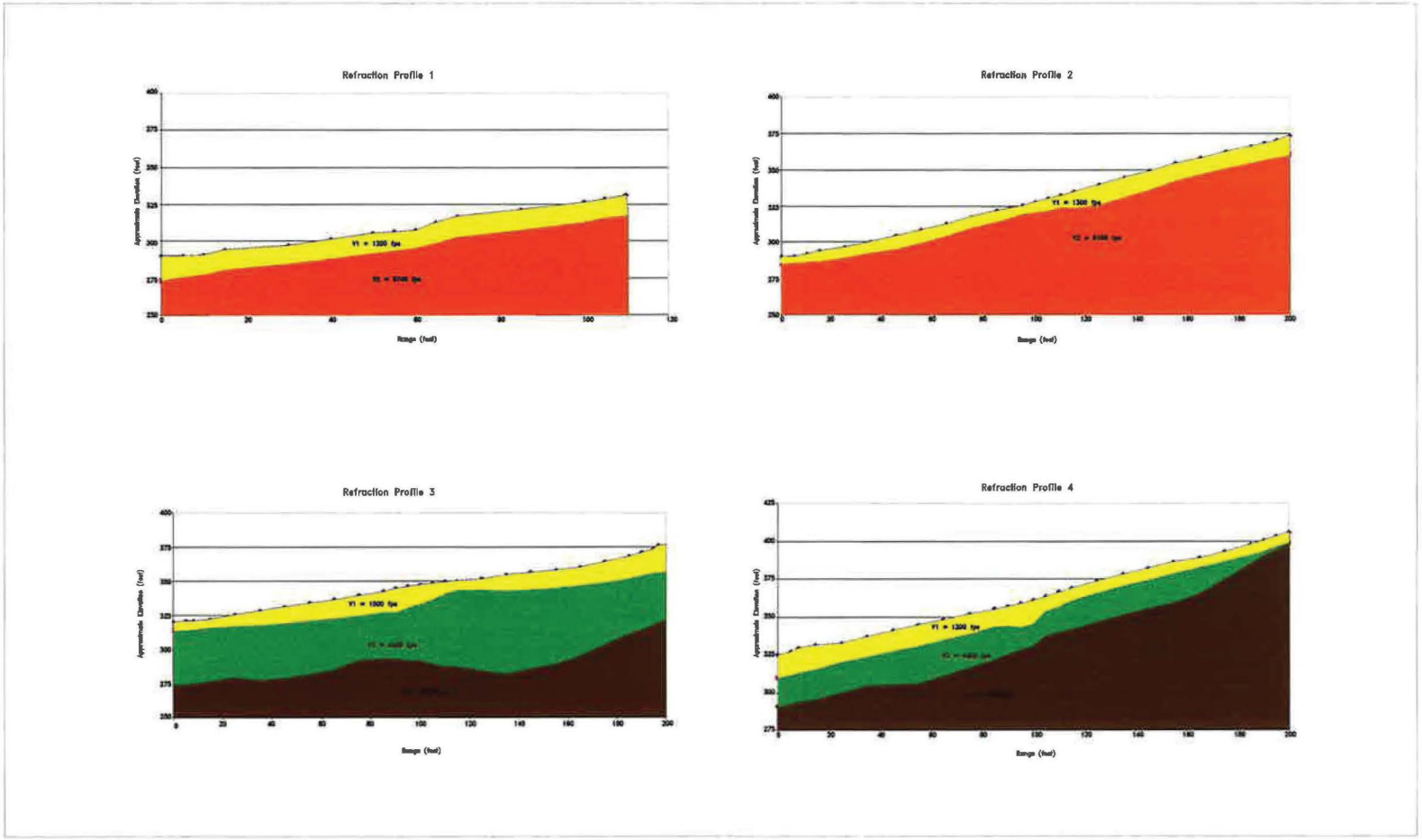
Seismic Refraction Line

Site Map- Seismic Refraction Investigation
52 Franklin Avenue
South San Francisco, California

SCALE: 1" = 60'		DRAWN BY: J.J.R.
DATE: 3-01-2017	JOB NUMBER: 114-137-17	REVISED:

J R Associates Civil and Environmental Geophysics
1886 Emory Street, San Jose, CA (408) 293-7390

DRAWING NUMBER: 2



Explanation:

- Colluvium
- Saturated Soils and/or Highly Weathered Bedrock
- Weathered Bedrock
- Competent Bedrock

Refraction Profiles Seismic Refraction Investigation
52 Franklin Avenue
South San Francisco, California

SCALE: See Diagrams			DRAWN BY: J.J.R.
DATE: 3-01-2017	JOB NUMBER:	114-137-17	REVISED:

J R Associates Civil and Environmental Geophysics
1886 Emory Street, San Jose, CA (408) 293-7390

DRAWING NUMBER: 3

GEOLOGIC HAZARDS EVALUATION AND GEOTECHNICAL ENGINEERING STUDY PROPOSED SINGLE FAMILY RESIDENCE 52 FRANKLIN AVENUE SOUTH SAN FRANCISCO, CALIFORNIA

June 17, 2016

Prepared for

Alan Chan
4125 Kirkham Street
San Francisco, CA 94122-2944

Prepared by

Earth Systems Pacific
48511 Warm Springs Boulevard, #210
Fremont, CA 94539

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Earth Systems
Pacific

48511 Warm Springs Blvd., Ste. 210
Fremont, CA 94539-7746
Ph: 510-353-3833
Fx: 888-567-4292
esp@earthsystems.com
www.earthsystems.com

June 17, 2016

Mr. Alan C. Chan
4125 Kirkham Street
San Francisco, CA 94122-2944

File No. SH-13000-SA

PROJECT: PROPOSED SINGLE FAMILY RESIDENCE
52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO, CALIFORNIA

SUBJECT: Geologic Hazards Evaluation and Geotechnical Engineering Study

REFERENCE: Proposal for a Geologic Hazards Evaluation and Geotechnical Engineering Investigation, Zheng Residence, 52 Franklin Avenue, South San Francisco, California, by Earth Systems Pacific, dated March 10, 2016.

Dear Mr. Chan:

In accordance with your authorization of the above referenced proposal, this Geologic Hazards Evaluation and Geotechnical Engineering Study has been prepared by Earth Systems Pacific (Earth Systems) for use in the development of plans and specifications for the proposed construction of the subject project. The recommendations contained herein should be considered preliminary and revised as necessary by Earth Systems Pacific once detailed plans for the new residence become available.

We appreciate the opportunity to have provided services for this project and look forward to working with you again in the future. Please do not hesitate to contact this office if there are any questions concerning this report.

Respectfully submitted,

Earth Systems Pacific

PROFESSIONAL GEOLOGIST · CHRISTOPHER M. CECILE No. 8991 · STATE OF CALIFORNIA

Christopher M. Cecile, PG 8991
Project Geologist

PROFESSIONAL GEOLOGIST · BRETT D. FAUST No. 2386 CERTIFIED ENGINEERING GEOLOGIST · STATE OF CALIFORNIA

Brett Faust, CEG 2386
Senior Geologist

REGISTERED PROFESSIONAL ENGINEER · GIRMAY WELDEGIORGIS No. C74044 CIVIL · STATE OF CALIFORNIA

Girmay Weldegiorgis, CE 74044
Senior Engineer

REGISTERED PROFESSIONAL ENGINEER · BILL E. ZEHRBACH GE 926 EXP 93017 GEOTECHNICAL · STATE OF CALIFORNIA

Bill E. Zehrbach, GE 926
Principal Engineer

Copy to: ICE Design Inc.; Attn: Derek Vinh

Doc. No.: 1606-045.SER/ls

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Geologic Hazards Evaluation and Geotechnical Engineering Study

1.0 INTRODUCTION

Site Setting

The subject site is located at 52 Franklin Avenue in South San Francisco, California. The center of the proposed project area is located at approximately 37.6652°N latitude and 122.4159°W longitude on the United States Geological Survey's San Francisco South 7.5-Minute Quadrangle (Figure 1). The property is accessed via Franklin Avenue from Hillside Boulevard in South San Francisco, California. The site is situated in an older neighborhood constructed in a hillside hollow bordering the southern edge of Paradise Valley and located at the mouth of a topographic swale. Topographically, the site has a tiered, graded building pad at the base of a steep north facing slope. The slope ascends to a small ledge and again to a graded bench just outside the southern property boundary. Bench fill soil is present along the southern property boundary.

Remnant foundation elements from a previous house are present on the site. It is our understanding that the house was severely damaged by a debris flow and subsequently removed. Current site conditions are shown on Figure 2.

Planned Development

Only architectural drawings were available for our use at the time of the preparation of this report. It is anticipated that the proposed residence will be a two-story structure of wood or steel frame construction. No basements or swimming pools are planned. The residence will be stepped up the hill. An approximately 4 foot high retaining wall is planned for the rear of the property.

Scope of Services

Earth Systems Pacific (Earth Systems) performed this Geologic Hazards Evaluation and Geotechnical Engineering Study for Mr. Alan Chan for the subject site located at 52 Franklin Avenue in South San Francisco, California. The purpose of the study is to evaluate the potential geologic and seismic conditions which may affect development of the site and to provide design-level geotechnical engineering recommendations for the proposed project. The geologic portions of our work were focused on the potential effects of seismicity and slope stability.

The scope of work for the Geologic Hazards Evaluation included a review of published and unpublished geologic literature, review of geologic mapping and aerial photography of the site and vicinity, a general site reconnaissance, subsurface exploration, evaluation of the data collected, and preparation of a written report section with supporting graphics.

The scope of work for the Geotechnical Engineering Study included a review of published and unpublished relevant geotechnical documents, a general site reconnaissance, subsurface exploration, laboratory testing of selected samples, an engineering evaluation of the data collected, and preparation of this written report. The analysis and subsequent recommendations were based on information provided by the client and our understanding of the project.

The report and recommendations are intended to comply with the considerations of the California Building Code (CBC), 2013 Edition, and common geologic and geotechnical engineering practices in this area at this time under similar conditions. The tests were performed in general conformance with the standards noted, as modified by common geotechnical practice in this area at this time under similar conditions.

Preliminary geotechnical recommendations for site preparation and grading; foundations; slab-on-grade construction; exterior flatwork; retaining walls; utility trench backfill; site drainage and finish improvements; and observation and testing are presented to guide the development of project plans and specifications. It is our intent that this report be used by the client to form the geotechnical basis of the design of the project as described herein, and in the preparation of plans and specifications.

Analysis of the soils for percolation rates, corrosion potential, mold or other microbial content, asbestos (either in building materials or naturally occurring), radioisotopes, hydrocarbons, or other chemical properties are beyond the scope of this report. This report does not address issues in the domain of contractors such as, but not limited to, site safety, loss of volume due to stripping of the site, shrinkage of soils during compaction, excavatability, shoring, temporary slope angles, and construction means and methods. Ancillary features such as swimming pools, temporary access roads, fences, light poles, and nonstructural fills are not within our scope and are also not addressed.

To verify that pertinent issues have been addressed and to aid in conformance with the intent of this report, it is requested that final grading and foundation plans be submitted to Earth Systems for review.

In the event that there are any changes in the nature, design, or locations of improvements, or if any assumptions used in the preparation of this report prove to be incorrect, the conclusions and recommendations contained herein will not be considered valid unless the changes are reviewed and the conclusions of this report are verified or modified in writing by the geotechnical engineer and engineering geologist. The criteria presented in this report are considered preliminary until such time as they are verified or modified in writing by the geotechnical engineer in the field during construction.

2.0 GEOLOGIC REVIEW

2.1 Regional Geologic Setting

The subject site is located on the northern portion of the San Francisco Peninsula and on the east side of Sign Hill, located west of San Francisco Bay in the Coast Ranges geomorphic province in central California. The northwest-trending mountain ranges are the result of tectonic uplift that has been interpreted to have been occurring since Pliocene-Pleistocene time (beginning approximately 3 to 5 million years before present). The regional basins now occupied by San Pablo and San Francisco Bays, and the Santa Clara Valley, were formed by related tectonic processes during Pleistocene time.

The predominant structural feature in the California Coast Ranges is the San Andreas fault zone, which is the structural boundary between two tectonic plates: the Pacific Plate to the west of the San Andreas fault zone and the North American Plate east of the fault. These two plates are moving past each other at approximately 5.1 cm/year at the mouth of the Gulf of California and 1 to 3 cm/year in the central and northern parts of California (Brown, 1990). The Hayward and Calaveras faults, located on the east side of San Francisco Bay, are interpreted to be part of the San Andreas fault system. The San Andreas fault is located approximately 3 miles west of the site.

For the San Francisco Bay area in general, the oldest rocks east of the San Andreas fault are the Jurassic-Cretaceous Franciscan Complex rocks. The Franciscan Complex is composed of a chaotic assemblage of mainly shale, sandstone, chert, limestone, greenstone, and serpentinite. These rocks are interpreted to represent components of ancient Pacific Ocean crust that have been disrupted and accreted to western California during Cretaceous to early Tertiary time and prior to development of the San Andreas fault system. The Franciscan Complex is overlain by, or in fault contact with, sedimentary rocks of upper Cretaceous age in some terrains. West of the San Andreas fault, the oldest rocks are the predominantly Mesozoic age granitic Salinian Block. Mesozoic and Paleozoic metamorphic rocks are a lesser component of the Salinian Block. On both sides of the San Andreas fault, the oldest rocks are overlain by Tertiary and Quaternary marine and terrestrial sedimentary rocks and local volcanic rocks. All of the above rock units were faulted, folded, and uplifted due to plate motions and activity on the San Andreas, Hayward, Calaveras, and smaller related faults. This deformation began about 30 million years ago but is mainly Pliocene to Pleistocene in age (~5 million to 11,000 years ago). Holocene-age (11,000 years to present-day) plate motion is expressed mainly as creep and seismicity on the various faults of the San Andreas fault system.

The Quaternary sediment around San Francisco Bay were deposited when older rocks in the Santa Cruz Mountains and the Mt. Hamilton-Mt. Diablo Range were exposed to erosion by tectonic uplift.

2.2 Geologic Literature Review

Soil and Geologic Mapping

Two soils are mapped at the subject site by the U.S. Department of Agriculture (USDA, 2016). The northern, tier graded portion of the site is classified as Urban land-Orthents, cut and fill complex. Orthents soil is described as well-drained and forming on slopes from 5 to 75 percent. The complex is described as forming on upland back slopes with an alluvial parent material.

The hillside portion of the lot is described as Candlestick-Kron-Buriburi complex (CKB). CKB complex soils are described as forming on back slopes and mountain flanks with concave downslope shapes. They are described as forming from hard fractured residuum from sandstone. CKB complex is described as well-drained with a saturated hydraulic conductivity of 0.2 to 0.57 inches per hour and is described as very slightly saline (2.0 mmhos/cm). CKB is described as 22% clay, 32% silt, and 46% sand or larger size particles.

Regional and Local Geologic Mapping

Lawson (1914) mapped the geology of the San Mateo quadrangle at a scale of 1:62,500. Lawson's map shows the site to be underlain by Jurassic-age Cahil Sandstone. Nearby radiolarian chert outcrops are present as well as serpentinitized peridotite, gabbro, and pyroxenite. The mapping of Lawson indicates that an unnamed fault (Hillside fault of later mappers) is present approximately 1,500 feet northeast of the site, trending northwesterly. This fault is inferred within areas mapped as Quaternary alluvium. A labeled fault (San Bruno fault) is mapped approximately 3,000 feet southwest of the site, also trending northwesterly. The location of the San Bruno fault is inferred, shown as concealed by alluvium between Colma and South San Francisco and is discontinuous to the northeast and southwest.

Bonilla (1964, 1965, 1971) mapped the geology of the South San Francisco Quadrangle at scales of 1:20,000, 1:20,000, and 1:24,000 respectively.

The bedrock contour map of Bonilla (1964) indicates that the depth to bedrock at the site is between 0 and 50 feet. The bedrock elevation contour labeled as 200 feet passing through the cul-de-sac at the western terminus of Franklin Avenue and the upper reaches of the site are shown to be in bedrock. The sedimentary basin to the northeast of the site, between the site and San Bruno Mountain, is estimated to be 50 to 60 feet thick. The Hillside fault is mapped as concealed by sediments within this basin, approximately 1,500 feet northeast of the site,

trending northwesterly. The San Bruno fault is mapped approximately 1.2 miles southwest of the site, trending northwesterly and concealed by sediments approximately 600 feet thick. The San Andreas fault is mapped approximately 3.1 miles southwest of the site, trending northwesterly.

The geologic map of Bonilla (1965; Figure 3A) indicates that the site is underlain by Quaternary-age slope debris and ravine fill deposits. These deposits are described as *stony silty to sandy clay; locally silty to clayey sand or gravel; yellowish orange to medium gray, unstratified or poorly stratified*. These deposits overlie Jurassic-Cretaceous Franciscan sandstone. Bedding attitudes southwest of the ridge crest are mapped as dipping between 45 and 80 degrees to the southwest. Inferred bedding to the east is shown just above and west of the western terminus of Franklin Avenue. Regionally the strikes and dips of beds imply that a compressional anticlinal fold is present and that this fold may have been flexurally re-folded. Mapping of faults is similar to that of Bonilla (1964). Additionally numerous fractures have been mapped, dominantly to the northeast of the Hillside fault on San Bruno Mountain.

The mapping of Bonilla (1971) is similar to that of previous maps cited above, the scale has been revised to 1:24,000.

Pampeyan and Brabb (1972) mapped the geology of San Mateo County at a scale of 1:62,500. The site is mapped as underlain by slope debris and ravine deposits overlying Franciscan sandstone. The Hillside fault is mapped approximately 1,500 feet northeast of the site, trending northwesterly. The San Bruno fault is mapped approximately 1.2 miles southwest of the site and the San Andreas fault is mapped approximately 3 miles southwest, both trending northwesterly.

Mapping of geotechnical hazards of San Mateo County at a scale of 1:24,000 by Leighton and Associates (1976) indicates that the site is located within Zone 5 (colluvium). The slopes above the site are located within Zone 11 (bedrock). The colluvium is described as having unstable slope conditions which are frequently subject to landslides, particularly with seismic loading, and are subject to downslope creep under the influence of gravity. Bedrock areas are noted to have poor to good slope stability which is structurally governed. The Hillside fault is mapped approximately 1,300 feet northeast of the site, trending northwesterly. The San Bruno fault is mapped as inferred, approximately 1.2 miles southwest of the site, trending northwesterly. The San Andreas fault is mapped approximately 2.8 miles southwest of the site, trending northwesterly.

Bonilla, Jachens, Jayko, Wentworth and McGarr (2000), of the United States Geological Survey published a synthesis of the United States Geological Survey's (USGS Open File Report 97-429, 1997) findings with respect to the San Bruno fault of Lawson (1914) and Bonilla (1964, 65, 71) in the March/April 2000 edition of California Geology (pp. 4-19). The paper, entitled "The Demise of the San Bruno Fault" describes work done by the USGS at the request of Bay Area Rapid Transit. USGS (1997) reviewed geomorphology, digital elevation data, topographic profiles and drainage maps, geologic investigations, subsurface data, and geophysical data (gravity and magnetic data) from the vicinity of the San Bruno fault. The USGS concluded that there was no evidence for the existence of the San Bruno fault as a recognizable geologic structure or as a fault rupture hazard.

Brabb, Graymer, and Jones (1998; Figure 3B) mapped the geology of San Mateo County at a scale of 1:62,500. The site is mapped as underlain by Quaternary (Holocene) colluvium described as *loose to firm, friable, unsorted sand, silt, clay, gravel, rock debris, and organic material in varying proportions*. The Hillside fault is mapped approximately 1,300 feet northeast of the site, trending northwesterly. The San Bruno fault is not included on the map of Brabb, Graymer, and Jones (1998). The San Andreas fault is mapped approximately 2.9 miles southwest of the site, trending northwesterly.

Mapping by Jayko, et al (1999), at a scale of 1:125,000, of damaging landslides in San Mateo County as a result of the 1997-1998 El Nino rainstorms indicates that the site and vicinity were free of damaging landslides.

Faulting

Active faults are defined by the California Geological Survey (CGS) as faults that are well defined and have experienced movement within the last 11,000 years (Hart and Bryant, 2007). The definition of potentially active faults varies, however. A generally accepted definition of a potentially active fault is one that shows evidence of displacement older than 11,000 years and younger than 1,800,000 years (i.e., Pleistocene in age). However, potentially active is no longer used as criteria for zoning by the state. The terms sufficiently active and well-defined are now used by the CGS as criteria for zoning faults under the Alquist-Priolo Act (Hart and Bryant, 2007). Inactive faults are classified as not having been active within the past two million years.

The site is located within the seismically active San Francisco Bay area, and is not within a State Earthquake Fault Zones (CGS, 1982; Figure 4A). The major active faults in the Bay Area are the San Andreas, San Gregorio, Hayward, and Calaveras faults. The San Gregorio, Hayward and Calaveras faults are located, respectively, approximately 8.0 miles west, 15.8 miles east and 24.6 miles east of the site (WGCEP, 2008). The nearest State-zoned fault is the San Andreas fault, approximately mapped 2.9 miles southwest of the site (CGS, 1982). The nearest mapped fault to

the site, irrespective of zoning, is the Hillside fault as shown on Leighton & Associates (1976) and Brabb, Graymer, and Jones (1998) approximately 1,300 feet northeast of the site. No faults are mapped crossing or on trend with the subject site.

Landsliding

The City of South San Francisco General Plan identifies the site as located in the Hillside Zone. The Geologic and Seismic Hazards element describes this area as follows:

The Hillside Zone includes some slopes of over 30 percent. The native soils of this zone are characterized as various sandy and gravelly loams with generally high to very high erosion potential, low strength and stability, and shallow depth. These areas are susceptible to soil creep and small landslides.

Mapping of slope stability under earthquake-induced conditions by Wieczorek et al (1985; Figure 4B) indicates that the site is located within an area of high susceptibility to slope failures in a major earthquake. A major earthquake is defined by Wieczorek et al (1985) as a repeat of the 1906 San Francisco earthquake or an earthquake greater than 8 on the Richter scale.

Liquefaction

The site is not located in an area identified as susceptible to liquefaction by the Wieczorek et al (1985; Figure 4B) or the City of South San Francisco's Geologic and Seismic Safety Element.

Previous Consultants' Reports

Earth Systems reviewed documents (geotechnical and geologic reports and town and county review letters) available from the City of South San Francisco, the City's reviewing firm (Cotton, Shires and Associates) and those provided by the client for the site and surrounding properties. Below is a synthesis of our literature review.

The City of South San Francisco had one report on file for the subject site dated 2000. The file had been moved to another building and the Engineering Department staff did not retrieve the file by the time of preparation of this report. Our visit to the City however revealed that the site is part of the Sterling Terrace No.2 subdivision which was recorded on May 2, 1949.

Michelucci & Associates, Inc. (MAI), 1993a, prepared a response letter to the City of South San Francisco regarding a drainage problem at 52 Franklin Avenue, South San Francisco, California (City Letter dated Feb. 3, 1993). In the response MAI notes that the City indicated that water was flowing from the front of the property over the sidewalk after approximately 10 days of dry weather. The City technician indicated that the source of the flow was about 20 feet from the

back of the sidewalk. MAI visited the site on February 11, 1993, and noted that it had rained over the previous two days prior to their inspection. MAI observed no water flowing on the sidewalk at the time of their visit but did observe that the concrete drainage ditch at the rear of the lot had been recently cleaned out and a significant amount of water was flowing in it. The downhill neighbor indicated that he had not observed water flowing from the ditch to the front of the property and that soil and organic debris had begun to collect in the ditch in the one week since the City had cleaned it out. MAI concluded that the ditch had become blocked, causing water to seep into the adjacent ground and surface near the front of the property.

William Cotton & Associates (WCA, 1993) prepared a Supplemental Geologic and Geotechnical Review for a proposed single family residence at 52 Franklin Avenue (Lot 19) in South San Francisco, CA. WCA reviewed a slide repair plan by R.W. Coyle (1993), MAI (3/9/1993) conference discussion letter, Review of Revised Plans and Calculations (MAI, 6/30/1993) and allowable criteria for gravity wall design letter (MAI 8/24/1993). WCA found that the referenced documents were generally consistent with previous design recommendations of MAI. WCA also notes that they understand that 1) the slump block between the 1955 and 1982 failures will be removed and regraded; 2) a drop inlet and tight line will collect and convey water down to the lower house pad level; and 3) engineered fill will be keyed and benched into bedrock material. WCA recommended the following conditions be attached to issuance of permits at that time. 1) wall design and review by project geotechnical consultant; 2) revised drainage details be submitted; 3) no grading during the winter; 4) disclosure of risk related to debris flows at the site due to the previous damage to and subsequent removal of the previous structure on the site and the potential for the conditions to be replicated; and 5) the geotechnical consultant shall inspect, test, and approve all geotechnical aspects of the project construction.

Globe Soil Engineering (1996) prepared a Soil / Geotechnical Report for the subject site. GSE concluded that from a soil and foundation engineering standpoint the site is suitable for development, provided the recommendations of their report are incorporated into the design of the project. GSE notes that their conclusions and recommendations are in general agreement with MAI (1989 – referenced therein). GSE drilled three borings at the site to depths of 16 to 18 feet below the ground surface and, per their report, a geophysical seismic refraction survey. The site is described as vacant with 20 to 40 percent slopes up from Franklin Avenue. GSE noted evidence of moderate flow across the site and that the site was damaged by slides and erosion in 1982 but was not affected by storms in 1995. GSE's geophysical investigation indicated three layers at the site with velocities of 1) 1,900 ft/s (579 m/s; top soil or fill) with an average thickness of 3 feet, 2) 3,000 ft/s (914 m/s; mixed soil and rock) with an average thickness of 4 feet, and 3) 6,600 ft/s (2,011 m/s; bedrock or hard sediments). Materials encountered in GSE's borings are described as a blanket (3-5' thick) of soft to firm clays and sandy clays with rock fragments over

siltstone and sandstone bedrock. The "soft-hardness" bedrock layers were described as predominantly weathered and fractured greenstone and some sandstone. Groundwater was found in one of the borings (B2) at 16 feet.

Baker – CEG (1998) provided an Engineering Geologic Evaluation Update for the subject site. The letter report was dated August 31, 1998. The site is described as being gently sloping within 70 feet of the street, resulting from past grading. The west side is described as level and the east side is described as having 6 feet of positive elevation change from front to back. The rear portion of the lot (70 to 160 feet from the street) is noted to slope approximately 2:1 horizontal to vertical and downward to the north. Baker indicates that this is the result of a steep cut slope. A concrete-lined drainage ditch is described along the toe of the cut slope for conveying runoff to the east. The cut slope is described as covered by trees and brush. The pad is noted to have little vegetation and the remnants of a previous foundation are present on the site. The natural slope above the site is noted to be covered with annual grasses and weeds. According to Baker CEG, the bench above (and south of) the site was created in 1949 as part of the development of the subdivision. Baker CEG states that much of the downslope edge of this bench (mostly fill) moved downhill during the heavy rains of 1982 and 1955. Surface runoff from above was described as having been formerly collected in an unlined swale at the back edge of the bench (in cut). Vertical scarps left in the bench after the 1955 and 1982 slides are noted to be the source of water flow down to the subject property and a cause of increased erosion along the slope.

Baker CEG (1998) further describes review of the scarps and failures along the bench and up-hill of it while employed by William F Jones Inc in 1982 and 1986. Baker CEG indicates that the natural soil was less than 2 feet in thickness and that the fill along the north side of the bench had been placed directly onto the soil without keying, drainage, or adequate compaction. Baker CEG also reviewed previous reports by MAI (1992) and Globe Soil Engineers (GSE, 1996). Baker CEG made a visual reconnaissance of the site and slope above it and found that conditions in 1998 were similar to those observed in the "mid-1980's" except that some additional erosion had occurred where surface water flows from the graded bench into the 1982 debris flow scar. The slope was noted to be now vegetated where it had been bare 10 to 15 years ago. Baker CEG concludes that the observations in MAI (1992) are generally correct and that the material on the slope above Lot 18 (adjacent to the west) has the potential to mobilize as a debris flow which could flow across the property line and onto the subject site. Measures for mitigation of such an occurrence are suggested.

P. Whitehead and Associates (PWA, 2013), prepared a geotechnical report for the subject site dated November 17, 2013. PWA reviewed soil reports for the area and drilled three test borings at the site. The site is described as pie-slice in shape and extending an average of 150 feet from the property line at Franklin Avenue. During PWA's site reconnaissance the foundation of a pre-

existing residence was observed on the site. The PWA report states that a mud flow occurred on the site in 1982 and that the mud flow displaced the structure from its foundation and partially into Franklin Avenue. The residence was subsequently demolished and removed. The site soils are described as "a relatively thin mantel [sic] of surface clay material underlain be [sic] bedrock". PWA drilled three borings on the site using a minuteman drill rig. The borings are described as "continuously augered". Refusal was encountered in "Weathered Bedrock" at 3 to 5.5 feet below the ground surface. PWA describes the origin of the mud flow as follows "It was evidenced a 3 to 4 feet [sic] scarp and was partly overgrown with brush and grasses." PWA also included rainfall records for San Francisco from 1850 to 1998 to support their assertion of anomalously high rainfall as a triggering mechanism. Rainfall for the 1981-82 season is indicated to be 37.10" and the 1982-83 season is indicated to be 38.17".

Cotton, Shires and Associates, Inc. (CSA, 2015) reviewed architectural plans by Innovative Construction Engineering (2013) and a geotechnical report by P. Whitehead and Associates (2013) for the subject site. CSA previously reviewed an application for the site in 1997 which included a report by another geotechnical consultant dated 1993. CSA indicates that the site was previously developed and that the former residence that had been located on the site was removed after it suffered significant damage from a debris flow in 1982. Based on CSA's review of documents and past consultants reports for the site CSA rejected the proposed development plan until the geologic hazards to the site had been properly addressed and revised design recommendations and plans had been submitted.

Earthquake History

Several strong earthquakes have occurred on the active faults in the San Francisco Bay region within the last 200 years (Figures 5 and 6). Especially notable are the 7.0M 1838 San Francisco earthquake, the 1906 8.3M San Francisco earthquake, the 1926 Monterey Bay 6.1M, the August 6, 1979, 5.8M Coyote Lake earthquake, the April 24, 1984, 6.2M Morgan Hill (Halls Valley) earthquake, and the October 17, 1989, 7.1M (6.9Mw) Loma Prieta earthquake. The Calaveras fault is considered active from San Ramon to Hollister (Hart, 1984), and three earthquakes of Richter magnitude 5.8 and larger have occurred on the Calaveras fault since 1900 (Stover, 1984).

The epicenters of the 1906 San Francisco Earthquake (Mw 7.8), 1984 Morgan Hill (Mw 6.1) and 1989 Loma Prieta (Mw 6.9) earthquakes were, respectively, approximately 9.7 miles northwest, 47.7 miles southeast, and 51.2 miles southeast of the subject site. The 1906 San Francisco earthquake produced ground shaking equivalent to a Modified Mercalli intensity of VII-VIII in the Sign Hill area of South San Francisco (Boatwright and Bundock, 2005); the 1984 Morgan Hill earthquake produced ground shaking equivalent to a Modified Mercalli intensity of IV to V and the 1989 Loma Prieta earthquake produced ground shaking equivalent to a Modified Mercalli intensity of VI-VII in the Sign Hill area (USGS, 2016). Figure 7 is a reproduction of the Modified

Mercalli Intensity Scale (ABAG, 2003). It should be expected that the subject site will be affected by future earthquakes of comparable or greater magnitude than the 1984 Morgan Hill, 1989 Loma Prieta, and 1906 San Francisco earthquakes.

Whereas the U.S. Geological Survey no longer attempts to predict the occurrence and magnitude of future earthquakes, however, for the San Francisco Bay Area the Hayward and Calaveras faults have been identified as "particularly ready" faults with the current likelihood of rupture being larger than the long term probability. The Working Group on California Earthquake Probabilities (UCERF3; 2015) has estimated that there is a 72% probability that one or more major earthquakes (M_W 6.7+) will occur in the Bay Area by the year 2044 (Figure 8). The Hayward fault is considered the most likely fault in the Bay Area (14.3% probability) followed by the Calaveras fault (7.4%) and the San Andreas fault (6.4%) to have a an earthquake of M_W 6.7 or higher by 2044.

2.3 Aerial Photo Interpretations

Earth Systems reviewed aerial photographs taken between 1935 and 2005, and imagery available through Google Earth of the site and vicinity from 1993 to the present, for the presence of terrain features indicative of landslides or active fault zones. The subject site is visible on each of the aerial photographs we reviewed. Lots referred to herein are the Lot numbers assigned to the Sterling Terrace Subdivision, of which the subject site is Lot 19. A listing of aerial photographs we reviewed are included in the references cited section of this report. A map of the Sterling Terrace Subdivision is included as Appendix (D).

For an overview of the site's geologic setting Earth Systems focused on earlier photographs which predate the development of the subdivision (1935 to 1946 photographs). The first instance of development on the subject site is on the 1950 photograph we reviewed. The subject site is located below a steep, north-facing slope which is the southern limb of a northeast trending topographic swale. The swale is relatively narrow but appears to be filled with colluvial deposits comprised of slope wash and debris flows. Resistant bedrock outcrops along the ridgelines appears to strike roughly to the northwest and dip to the northeast. Along the base of the slope, roughly parallel to Hillside Boulevard, a creek is present and has locally steeply incised into the sediments and debris fans at the mouths of the swales originating along the north side of Sign Hill. This creek was in-filled during the development of the valley north of Sign Hill beginning in the 1940s and 50s.

A lineament is seen in stereo aerial photographs as a feature having tonal differences on either side. These differences may be due to changes in soil or rock type, vegetation, groundwater levels, geologic structure, or sedimentary bedding characteristics. Lineaments are sometimes associated with topographic features characteristic of faults, such as linear and shutter ridges, sag ponds, spring zones, and offset drainages. A photolineament is visible approximately 1,500 east of the site in the location of the Hillside fault as mapped by others. No other distinct photolineaments are visible in the photographs we reviewed and no photolineaments or faults were observed to cross the subject site.

The aerial photographs were also examined for geomorphic features characteristic of ancient (dormant) and active landslides. Beginning in the 1935 photograph, the site's future location is located on colluvium at the base of a steep north facing slope. Approximately 10 to 12 small debris slumps, scars, or scarps are visible around the crown of the drainage in which the present day subdivision is located. A few new scarps appear on the 1938 photograph which are not present on the 1935 photograph within the crown area. A residence appears north of the incised drainage at the base of the slope. In the 1946 photograph four large areas, identified by tonal differences, along the north-facing slope above the future subdivision are present. Their shapes and locations are suggestive of possible past debris flow/soil slump activity above the colluvium-filled swale below.

In 1950, the residences which are located around the cul-de-sac terminus of Franklin Avenue have been constructed. The construction of this portion of the subdivision involved cutting into the slopes to create level pads. Much of the material left in place above the cuts was likely colluvium, especially towards the center of the swale above Lots 15 and 16. The cut slope is fresh and bare. The subdivision map for Sterling Terrace has a date of April 1949, suggesting that by the time of the 1950 photograph the cut had been present for approximately 1 year or less. Along the cut in the 1950 photograph, five locations of possible failures or incipient failures are visible. One of these features is located directly above (roughly 55 to 60 feet south of the residence) the subject site along the cut slope. The top of the cut slope is approximately 95 to 100 feet south of the sidewalk. A bench has been constructed above the cut, by cutting and filling, possibly to convey equipment for use during the construction of the subdivision as evidenced by tire or track marks along the bench. Erosion rilling is visible along the fill slope below the bench west of the terminus of Franklin Avenue.

In 1955 a cut slope failure appears to have occurred behind the residence on Lot 14 and a small failure occurred upslope along the Lot 18/19 boundary area below the bench in the approximate location of the incipient feature in the 1950 photo. This failure appears to be the one referred to by Baker CEG in his 1998 letter to CSA. Erosion rilling appears along the cut slope in the 1969 photograph, especially behind Lot 16 near the center of the swale, where surface runoff is

focused by the topography. By 1981 the cut slope has become vegetated with grasses and a few small trees and a patch of bare earth with rilling is visible behind the residences on Lots 22 and 23 along the boundary area.

In the 1982 photograph a fresh scar is visible, originating at the top of the bench above the site and freshly exposed soil is visible approximately halfway down the slope. A debris fan is visible on the site and the residence has been removed. Five additional small scale slump features are visible on the slopes above the bench. A second large failure occurred in 1982 behind the residence on Lot 16. The structure appears to be unaffected by this flow, even though it was a significant failure.

The photographs reviewed from 1983 on are relatively unchanged from 1982 aside from revegetation. The bench/scar above the site becomes obscured by vegetation growth and some soil mounding which seems to be apparent in the 1993 photograph (possibly the slump block referred to by WCA, 1993). An area of moisture concentration is present above the 1982 scarp evidenced by an area of greener vegetation on the satellite imagery we reviewed. The margins of the 1982 failure have been rilled over time as uncontrolled runoff enters the site.

Based on our review of aerial photography, it is our interpretation that the hazard posed by debris flows and/or shallow landsliding at the site is high without significant mitigation. The potential for similar failures above the other residences in the cul-de-sac area is also elevated due to the over-steepening of slopes created by grading.

3.0 FIELD INVESTIGATION AND LABORATORY TESTING

3.1 Site Reconnaissance

An Earth Systems geologist visited the site on April 4, 2016. The site consists of a graded hillside lot. The lot slopes down to the north and east. Previous grading at the site has created a tiered, split-level building pad on the northern portion of the site. Remnant foundation elements are present on the western portion of the lot. The remnant foundations are stepped and climb to the south. The lower, eastern, portion of the front of the lot is approximately 4 to 6 feet lower than the pad grade on the western portion. The soils on the lower portion of the lot are moist and soft. The site slopes steeply up to the south beginning approximately 70 feet south of the sidewalk. At the base of this slope is a linear depression which runs the length of the property from west to east and contained standing water at the time of our visit. This depression is assumed to be the concrete-lined V-ditch as described by others and visible on aerial photographs. The V-ditch is filled with a significant amount of soil. The hill climbs steeply from this point for about 80 feet to a level bench at the top of the lot. The slope and bench area above the lot is heavily overgrown with brush, small trees, and poison oak. At the bench, the ground is level to the east and west of the lot. There are linear mounds of loose soil in line with the

property boundaries that are visible on recent satellite imagery of the site. Within the brush-covered hillside area numerous small scarps (1 foot or less) and erosion rills are present and soil is accumulated on the up-hill side of larger trees. There is what appears to be an active landslide scarp near the southwest site corner where soil is exposed along the uphill side of the bench (the 1982 debris slide scar). The slopes above the bench were generally overgrown with brush, obscuring potential landslide, flow, or creep features.

3.2 Subsurface Exploration

The subsurface exploration for our study consisted of three exploratory borings drilled at the site (B1 through B3) encompassing the level portions of the site on April 26, 2016, using a truck mounted drill rig and manually hand sampling. The exploratory borings were drilled under the direction of an Earth Systems geologist at the approximate locations shown on the Site Plan and Geologic Map (Figure 2). The borings were drilled to depths of between 8.5 and 41.5 feet below the ground surface using a combination of a truck mounted drill rig with 6-inch diameter continuous-flight, solid stem augers and hand auguring. Soils sampled using the truck-mounted system were collected by driving a split-spoon sampler for a distance of 18 inches using a 140-lb drop hammer with a 30-inch free-fall. Samples were obtained from our hand-augured boring by using a 70-lb donut-hammer to advance the sampler. Soils encountered in the borings were categorized and logged in general accordance with the Unified Soil Classification System and rocks were characterized with regard to type, hardness, and degree of weathering. Copies of our boring logs are included in Appendix A. Copies of the Globe Soil Engineering (GSE) boring logs are included in Appendix E.

3.3 Subsurface Profile

The subject site was found to be underlain by recent debris flow deposits, colluvium, and sandstone bedrock. Bedrock was encountered at depths of 11 to 39 feet below the ground surface in Borings B1 and B2, respectively. Bedrock was not encountered in Boring B1, drilled on the slope to a depth of 8.5 feet. The colluvium and debris flow deposits consist of a mixture of medium dense to dense and medium stiff to very stiff clayey sands (SC) and sandy lean clays (CL) which are yellow brown to dark yellow brown in color and are moist. The deposits contain fine angular sandstone fragments and gravel clasts. In Boring B3, a dark olive green clayey sand (SC) was encountered from 17.5 to 39 feet below the ground surface, overlying black sandstone. Artificial fill is present in the area of the former residence, extending to depths of 4 to 6 feet.

Free subsurface water was encountered in our Boring B3 at 39 feet below the ground surface. Very moist soil conditions were encountered in Boring B3 beginning at approximately 30 feet below the ground surface. Groundwater was previously encountered by GSE (1996) at 16 feet below the ground surface, corresponding with the depth to bedrock.

3.4 Laboratory Testing

As the borings were drilled, soil samples were obtained using a tube-lined barrel sampler (ASTM D 3550-01 (2007) with shoe similar to D 2937-04). Standard penetration tests were also performed at selected intervals (ASTM D 1586-11). Selected samples of the soil were tested for moisture and density (ASTM D 2216-10 and D 2937-10) and two samples were tested for shear strength parameters (ASTM D 3080-M-11). Three samples were tested for plasticity index (ASTM D 4318-10). Copies of the laboratory test results are included in Appendix B.

4.0 DATA ANALYSIS

4.1 Subsurface Soil Classification

Based on shear wave velocities obtained at the site by GSE (1996) the site qualifies as site Class B (Rock) as defined by Table 20.3-1 of ASCE 7 (per Section 1613.3.2 of the 2013 California Building Code). Earth Systems used the correlations of PEER (2012) to verify the validity of the velocities presented by GSE (1996) based on our borings at the site. Our calculated shear wave velocities correspond well with those measured by GSE (1996) in their borings at the site to 16 feet below the ground surface (time-average velocity of 1,235m/s per conversions using the PEER procedure). Our time averaged shear wave velocity for the upper 11.9 meters of soil (max soil thickness from Boring B3) was 1,221 m/s.

However, as there will be more than 10 feet of soil between the rock surface and the bottom of the structure the site is not permitted to be classified as Site Class B (ASCE 7, Ch 20.1). Due to this limitation, we have classified the site as **Site Class C**. The range of shear wave velocities for Site Class C is 365-760 m/s. For the purposes of this evaluation Earth Systems has assumed a shear wave velocity of 700 m/s.

4.2 Ground Acceleration

Deterministic Seismic Hazard Evaluation

Estimated peak horizontal ground acceleration is one of the basic parameters used to characterize the ground shaking potential at a given site. Actual ground accelerations at a locality are influenced by topography, geologic structure, condition of subsurface materials, and groundwater level. Table 1 lists the estimated seismic parameters for known active faults in the San Francisco Bay region that could impact the site.

The USGS Working Group on California Earthquake Probabilities (WGCEP) (1995; cited in WGCEP 2008) originally classified seismic sources in California as either Type A, B, or C. The 1997 Uniform Building Code and the 2001 California Building Code adopted these designations and classified faults based on their rate of seismicity and likelihood of generating damaging earthquakes. WCGEP (2008) has adopted the nomenclature and defines Type A sources (eg. San Andreas,

Calaveras, Hayward-Rodgers Creek faults) as faults that have sufficient data on the location, timing, and slip in previous earthquakes that permanent rupture boundaries can be hypothesized. Type B sources (e.g. the faults of the Southeast Extension of the Hayward fault) are defined as faults that have slip-rate estimates but where data on distribution and timing of previous events are inadequate to estimate recurrence intervals. Type C sources (e.g. Foothills fault system, Eastern California Shear Zone) are defined as crustal shear zones where significant strain occurs but where knowledge is insufficient to apportion slip onto specific faults. Type A sources have generally produced the strongest earthquakes, but Type B sources such as the Sargent-Barrocal and Monte Vista-Shannon faults are capable of producing earthquakes of significant magnitude.

The estimated mean peak horizontal ground accelerations presented in Table 1 are based upon the mean, 5% damped, peak ground acceleration derived from five Next Generation Attenuation (NGA) relationships. The NGA relationships used were Campbell & Bozorgnia (2008), Boore & Atkinson (2008), Chiou & Youngs (2008), Abrahamson & Silva (2008), and Idriss (2008). The fault parameters used in our analysis were obtained from the WGCEP Uniform California Earthquake Rupture Forecast (UCERF1; 2002), and UCERF2 (2008) with estimated Type B source recurrence intervals from the California Division of Mines and Geology (CDMG) Open File Report 96-08 (1996). For historically considered faults (no longer considered as independent seismic sources), such as the Sargent-Berrocal fault and Southeast Extension of the Hayward fault, fault parameters were obtained from Cao et al (2003). For our analysis we used a Vs_{30} = 700 m/s, (Site Class C) determined in accordance with Section 1613.3.2 of the 2013 California Building Code.

This method of seismic analysis is a deterministic approach in that the maximum considered earthquake (MCE) along each active fault within the region that may be reasonably expected to generate strong ground shaking at the site is evaluated. Table 1 also lists the distance of the causative faults from the site as derived from the computer program EQFAULT (Blake, 2004), and supplemented by data obtained from published geologic maps, the possible earthquake magnitudes that may be generated by the faults, the recurrence interval for the faults, and the fault type classification of WGCEP UCERF2 (2008).

Based on the data presented in Table 1, below, it appears that the highest peak ground acceleration will result from an earthquake associated with the San Andreas fault zone. The values given are conservative in that it is assumed that the earthquake will occur at the near-point of a fault relative to the site.

TABLE 1
Deterministic Estimates of Peak Ground Acceleration for Significant Known Faults in the Site Region ("Soft Rock" Sites [2])

Fault	Closest Distance (mi/km)	Maximum Magnitude (Mw)[1]	Est. Peak Ground Acceleration (g) Mean[2]	Recurrence Interval[3] (years)	Seismic Source Type[4]
San Andreas	2.8/4.5	8.05	0.499	229	A
San Gregorio	8.0/12.8	7.3	0.271	400	B
Hayward	15.8/25.4	7.33	0.169	155	A
Monte Vista-Shannon	18.2/29.2	6.5	0.089	2410	B
Sargent-Berrocal*	22.5/36.0	6.8	0.094	1200	B*
Calaveras	24.6/39.5	7.0	0.099	54	A

[1] Moment magnitude from WGCEP UCERF2 (2008) or Cao et al (2003)
[2] Ground Accelerations estimated from mean of NGA relationships using Vs30=700m/s (2013 CBC Site Class C Soil)
[3] Recurrence intervals from WGCEP UCERF2 (2008) or CDMG OFR 96-08.
[4] Seismic source type from WGCEP UCERF2 (2008).
*Not included in 2002 CGS Data, (Cao et al, 2003) or 2008 WGCEP data.

Probabilistic Seismic Hazard Evaluation

Probabilistic models by the USGS and California Geological Survey were used to determine peak ground acceleration values for the site. Probabilistic models rely on mathematical formulae in conjunction with a historical earthquake database to determine the probability, P, of an event of magnitude, M, producing an acceleration greater than or equal to a certain value. This is done by selecting a probability of occurrence over a period of time. Typically for sites in the San Francisco Bay area a 10% in 50 year value is used (corresponding to a 475 year return period). The following accelerations were derived using an estimated Vs_{30} = 700 m/s, (Site Class C) determined in accordance with Section 1613.3.2 of the 2013 California Building Code.

The probabilistic evaluation resulted in the following values of Peak Ground Acceleration (PGA).

TABLE 2
Probabilistic Estimates of Ground Acceleration

Source	Return Interval (years)	Probability	Peak Ground Accleration (g)
USGS	475	10% in 50 years	0.518
CGS	475	10% in 50 years	0.539

4.3 Seismic Design Parameters

General

The following seismic design parameters represent the general procedure as outlined in Section 1613 of the California Building Code and in ASCE 7-10. The values determined below are based on the 2009 National Earthquake Hazard Reduction Program (NEHRP) maps and were obtained using the United States Geological Survey's Design Maps Web Application. The site was analyzed using the following co-ordinates: 37.6652°N, 122.4159°W. The resulting seismic design parameters are presented in the table below:

TABLE 3
Summary of Seismic Parameters - CBC 2013

Mapped Short Term Spectral Response Parameter (S_s)	2.030g	
Mapped 1-second Spectral Response Parameter (S_1)	0.957g	
Site Class	C	(>10' soil)
Site Coefficient (F_a)	1.0	$S_s \geq 1.25$
Site Coefficient (F_v)	1.3	$S_1 \geq 0.5$
Site Modified Short Term Response Parameter (S_{Ms})	2.030g	F_aS_s
Site Modified 1-second Response Parameter (S_{M1})	1.244 g	F_vS_1
Design Short Term Response Parameter (S_{Ds})	1.353g	2/3 S_{Ms}
Design 1-second Response Parameter (S_{D1})	0.829g	2/3 S_{M1}
Design PGA	0.547g	Simplified procedure

The site is in a region of generally high seismicity and has the potential to experience strong ground shaking from earthquakes on regional or local causative faults. The sites fall under Seismic Design Category E, based on the mapped values of the 1-second spectral response parameter ($S_1 > 0.75g$) and the site's risk category of III.

4.4 Quantitative Slope Stability Analysis

To evaluate the stability of the slope at the site, Earth Systems analyzed a slope cross section A-A' (see Figure 9). The location of the section is shown on Figure 2.

Computer analyses were performed using Janbu's Simplified Method with the aid of the computer program SLIDE version 6.034 (RocScience, 2016) with circular potential failure surfaces. Natural and cut slopes are considered to be stable if the stability analysis results in a calculated static factor of safety of 1.5 or higher, and a seismic (dynamic) factor of safety of 1.0 or higher. The seismic (dynamic) stability analysis was evaluated using a seismic coefficient of 0.323g. This value is based on the USGS mapped 10% in 50 year ground acceleration of 0.518g determined using a magnitude of 8.05 and distance to the controlling fault (San Andreas) of 4.5 kilometers. If the dynamic factor of safety is less than 1.0, a Newmark displacement analysis is performed to evaluate potential slope deformation and movement.

Earth Systems quantitatively analyzed the stability of the existing slopes using data based on our borings, site observations, and laboratory testing. Earth Systems also used strength data presented in CGS (2002b).

TABLE 4

Map Unit	c (psf)	Φ (deg)	Source
Qhdf	660	11	CGS SHZR 043 (Qls)
Qc	900	40	ESP (this study)
Fs	-	-	Assumed infinite

Section A-A' was analyzed using current site conditions. Groundwater was encountered in our Boring B3 at 39 feet below the ground surface. Globe Soil Engineering (1996) encountered groundwater at 16 feet below the ground surface in their Boring B2. For the purposes of our analysis groundwater was assumed to follow the bedrock surface.

The results of our analyses are presented in Table 4 below. The individual computer printouts are presented in Appendix C.

TABLE 5
Summary of Slope Stability Analyses Factors of Safety

	Static	Dynamic	Figure
A-A'	2.905	1.769	C1, C2

Based on the above results, it appears that the slopes at the site are stable under both static and dynamic (earthquake-induced conditions). Shallow soil slumps are possible at the site and evidence of on-going creep was observed on the hillside. These failure mechanisms may not be accounted for due to the limitations of the modelling software, but are not anticipated to cause significant problems at the site.

4.5 Debris Flow Modeling

The subject site has previously been affected by debris flows in 1955 and 1982. Additionally it is mapped in an area defined as a principal debris flow source area by Ellen et al. (1997; Figure 10) for San Mateo County (USGS Open File 97-745E, Sheet 7 of 11). As such, Earth Systems calculated the potential volumes of material which could affect the site. The topographic base map of Baker (1998) has been substituted onto the development plan provided to us on Figure 11 of this report. Figure 11 shows principal areas of concern for the initiation of debris flows or slope failures on the site.

MAI (1992) calculated that for the subject property, approximately 95 cubic yards of debris from a peninsula of the former bench material above the site could impact the site. MAI also indicated that as much as 440 cubic yards could originate on the slope above the lot.

Using our quantitative slope stability model as described in Section 4.4, Earth Systems added a phreatic surface to simulate a fully saturated condition. The surface is assumed to follow the ground surface to simulate a debris flow where soil and rock are suspended in water. Based on historically observed failures and on-going creep at the site, Earth Systems reduced the strength of the surficial colluvial materials progressively until failure was achieved due to the elevated groundwater conditions. The slope above the site obtained a static factor of safety of 1.0 when the cohesion of the surficial material was reduced to 230 pcf. (Figure C3, Appendix C)

The resulting failure wedge, located between the bench above the site and the level portion of the site has an approximate volume of 250 cubic yards. These estimates are conservative in that they assume the entire soil mass will mobilize as a debris flow. An additional +/- 60 yards of material may be mobilized on the slope above, based on a contour inversion on the topography shown in Baker (1998). Using the USGS Volume model for the Intermountain Western United States (Gartner and others, 2008; Cannon and others, 2010) with a factor of safety of 1.5, Earth Systems calculated a volume of approximately 90 cubic yards of debris could originate on the site slope below the bench. Earth Systems further calculated an estimate of 300 additional cubic yards which could be mobilized from the slopes above the subject site. For our calculations, Earth Systems assumed an hourly rainfall of 12mm (0.5 in/hr), consistent with that observed during the Jan 3 to 5, 1982, storm over a tributary area of 6.5×10^{-4} km^2 and 4.5×10^{-3} km^2.

Based on our analyses and those of MAI (1992) it appears that it can be reasonably expected that up to 500 cubic yards of material would need to be retained or diverted away from the proposed structures.

Portions of retaining/deflection walls subject to impact from debris flows should be designed for minimum impact loads of 125 pcf (Hollingsworth and Kovacs; 1981).

5.0 GEOLOGIC ANALYSIS AND CONCLUSIONS

This Geologic Hazards Evaluation was conducted to determine the geologic conditions at the subject site and to evaluate potential geologic hazards that may impact the proposed residence. Our Geologic Hazards Evaluation focused on addressing potential geologic hazards associated with the site's location near seismically active faults. In general, the potential geologic hazards encountered in the San Francisco Bay Area include landslides, debris flows, and the hazards concomitant with earthquakes. Earthquake-related hazards include ground rupture along the trace of a fault, ground shaking, ridge-top cracking, lateral spreading, lurching, liquefaction, and earthquake-induced landsliding.

The following conclusions are based on the data acquired and analyzed during the course of Earth Systems' Geologic Hazards Evaluation. The local and site geology are shown on Figure 2.

5.1 Primary Seismic Hazards

Ground Rupture

The subject parcel is not within an earthquake fault zone as defined by the current published geologic hazard maps that we reviewed. The nearest fault considered to be active relative to the site is the San Andreas fault, approximately 2.9 miles southwest of the site. In general, ground rupture during earthquakes is most likely to occur along a pre-existing and identifiable fault trace. As such, it is Earth Systems' opinion that the potential for surface fault rupture to affect the proposed new residence at the site is low.

Ridge-top Cracking

The effects of topography on relative ground shaking intensity and resultant ground surface disturbance and structural damage were noted in the Santa Cruz Mountains after the 1906 San Francisco Earthquake (Lawson, 1908) and the 1989 Loma Prieta earthquake (Plafker and Galloway, 1989). Ridge-top cracking during the 1989 Loma Prieta earthquake damaged roadways and structures approximately 10 km from the epicenter in the Summit Road area of the Santa Cruz Mountains. The origin of the cracks is complex, and may have been caused in part by large-scale lateral spreading in the relatively soft Tertiary sedimentary rocks that form the northwest-

trending ridges in the region (Plafker and Galloway, 1989). The topographic effects of ground shaking and high level of ground cracking and structural damage after the Loma Prieta earthquake have been studied at Robinwood Ridge, approximately 7.5 km north-northwest of the epicenter (Hartzell et al., 1994). The study by Hartzell et al. concluded that the apparent amplification of ground shaking is a complex interaction of seismic and topographic conditions that cannot be quantified with existing data. The site is not located on a ridge-top or in similar bedrock materials. It is Earth Systems' opinion that the potential for ridge-top cracking to affect the site is low.

Ground Shaking

The main identified geologic hazard at this site is the potential for strong seismic ground shaking. A moderate to major earthquake on the San Andreas, San Gregorio, Hayward, Calaveras, or other nearby faults could cause severe ground shaking at the site. The foundations for the proposed residence should be designed for seismic shaking, including horizontal and vertical accelerations, as required by the latest edition of the California Building Code. These values should be considered minimum design criteria.

5.2 Secondary Earthquake Effects

Landslides

San Mateo County was not mapped as part of the Seismic Hazards Mapping Act. No State maps exist for seismic hazards in San Mateo. Wieczorek et al (1985) and the City of South San Francisco general plan indicate that the site is located within an area of high susceptibility to earthquake-induced landsliding. Numerous small scale landslides, soil slumps, and debris flows were observed during our review of aerial photographs. No evidence of large-scale landsliding was observed. Our quantitative slope stability modeling indicated that the site slopes are stable under static and dynamic conditions under current hydrologic conditions. Our observations at the site suggest that on-going surficial creep is occurring at the site within the area of the previous slope failures which originated from the bench above the site. This mass may potentially be reactivated under high rainfall conditions where the rate of rainfall exceeds the infiltration rate of the soils and saturated conditions are allowed to persist.

It is our opinion that the hazard posed by landsliding at the subject site is low, however consideration should be given to the installation of subsurface drainage to dissipate excess pore water pressures and to relieve water from the slope as excess pore pressure can act to reduce cohesion and thereby destabilize otherwise stable slopes.

Liquefaction

Liquefaction is generally associated with saturated, well-sorted fine to medium grained sands and is expressed as a sudden loss of cohesion and resultant flow and/or settlement of the material during an earthquake. Lurching and lateral spreading may accompany liquefaction, as was observed in areas underlain by relatively loose, unconsolidated sediments following the 1906 San Francisco earthquake (Lawson, 1908) and the 1989 Loma Prieta earthquake (Plafker and Galloway, 1989). Liquefaction may also occur in fine-grained sediments with low plasticity indices (Bray and Sancio, 2006). The subject site is underlain at shallow depth by Franciscan bedrock which is not susceptible to liquefaction. Furthermore, the site is not within a state or county-defined liquefaction hazard zone. The potential for liquefaction, lurching, and lateral spreading are considered to be low at the subject site.

5.3 Other Geologic Concerns

Debris Flows:

Debris flows are a type of landslide characterized by a rapidly flowing mass of rock fragments, soil, and mud with more than half of the particles being larger than sand size and typically containing cobbles and boulders as well. Debris flows generally are initiated in colluvium filled hollows. These flows result almost invariably from unusually heavy rain, and tend to find their way into drainages and travel for significant distances. For example, a catastrophic rainstorm in the San Francisco Bay area in January 1982 deposited nearly half the normal annual rainfall in 32 hours and triggered more than 18,000 landslides, principally debris flows, and caused 25 fatalities and $66 million in property damage (NOAA, 2005).

The proposed residence is in a location likely to be affected by debris flows. A previous residence constructed on the site was severely damaged by a debris flow in 1982. Numerous debris flows have occurred around the Franklin Avenue terminus area since the construction of the subdivision in 1949.

The potential for debris flows to affect the site is deemed **high** without mitigation for hazardous conditions which exist both on and off the site. A debris wall is recommended for the protection of the proposed structure. Additionally, consideration should be given to the installation of a ring-net type structure (similar to those designed by GeoBrugge) at the top of the on-site slopes to guard against debris failures originating off-site. Mitigation measures should be designed so as to not deflect flows onto neighboring properties.

6.0 SUMMARIZED GEOLOGIC CONCLUSIONS AND RECOMMENDATIONS

The proposed residence on the subject site is considered feasible from a geologic viewpoint provided the mitigation measures as recommended herein and recommendations contained in the Geotechnical Engineering section of this report are implemented in the design and construction.

The property owner should be aware that development in the seismically active Bay Area entails variable risks, which may include potential structural distress to the residence and on-site pavements, plus disruption of local roads and utilities.

The main identified geologic hazards on the parcel are the potentials for

1) Strong seismic shaking due to an earthquake on one or more of the more active faults in the San Francisco Bay Area. A moderate to major earthquake on the San Andreas fault or other nearby faults could cause severe ground shaking at the site.
2) Rainfall-induced debris flows, soil flows, and/or soil slumps originating on the slopes above the proposed residence. The site was previously affected by debris flows in 1955 and 1982. The 1982 debris flow damaged the previous residence on the site which was subsequently removed. Various other locations along the over-steepened cut-slope created during the grading of the subdivision have experienced similar cut slope failures below or originating on the bench above. Failures may occur even during "normal" or average rainfall seasons based on our review of historical aerial photography.

Earth Systems did not observe evidence of active faulting at the site which would affect the proposed residence during our reconnaissance or our subsurface investigations.

It is our opinion that the original grading of the subdivision created unstable, over-steepened cut slopes at the rears of the lots around the terminus of Franklin Avenue. From the initial grading onwards, the cut slope located between the level portions of the lots and the cut/fill bench above has been subject to failures in the forms of debris flows, landsliding, and moderate to severe erosion rilling. The increasing prevalence of vegetation along the slopes appears to have provided some recent stabilization. However, intense rains, especially if combined with seismic shaking could reactivate old features and/or create new failures.

Ideally, both on and off-site remedial measures should be performed, including the repair of the failure and erosion rills at the bench above the site, combined with the installation of a concrete-lined ditch to control surface runoff and prevent uncontrolled runoff along the erodible slopes below. The ditch should discharge to Franklin Avenue.

Retaining walls and/or remedial grading, along with proper drainage should be installed which would buttress existing failures and control subsurface moisture. Retaining walls should be supported by drilled, cast-in-place friction piers which are founded into bedrock. Proper drainage should be installed behind the debris wall to prevent water ponding and seepage into earthen contact planes. Weep holes may also be considered.

A debris wall capable of withstanding impact loads of at least 125 pcf should be installed to protect the proposed residence. The wall should also be high enough to create a catchment of significant size to prevent overflow of possible slope debris onto the building site. Such a mitigation must also prevent flows from being directed onto neighboring properties. If a retention structure is installed, it should be capable of retaining at least 500 cubic yards of material.

The geotechnical engineering conclusions and recommendations presented in Sections 7.0 and 8.0 of this report should be implemented during the design and construction of the proposed residence.

7.0 GEOTECHNICAL ENGINEERING CONCLUSIONS

7.1 Site Suitability

Based on our analysis of the results of the field investigation and laboratory testing program, it is our opinion that the site is geotechnically suitable for the proposed residence, provided the recommendations contained herein are implemented in the design and construction of the project. The primary geotechnical concern at the site is the possibility of a landslide if drainage is not improved. Mud flow potential should also be mitigated as discussed above.

7.2 Soil Expansion Potential

The near-surface soils have a Plasticity Index of 13 to 17 indicating a low to moderate expansion potential. No special mitigation is recommended herein for expansive soil.

7.3 Site Preparation and Grading

It is our understanding that the proposed new residence will be stepped up the hill and a level back yard will be created. Cuts and fills will be required at the site to achieve the desired grades. Retaining walls will be required at the rear section of the structure.

7.4 Foundations

The residence and retaining walls should be supported on a pier and grade beam foundation system that transfers the foundation loads to the underlying bedrock. Pier depths on the order of 11 to 30 feet are anticipated. Recommendations contained herein should be considered preliminary until such time as grading and foundation plans have been reviewed by a geotechnical engineer from Earth Systems.

7.5 Static Settlement

The foundation loads are anticipated to be typical for conventional wood frame buildings. It is anticipated that the foundation elements will bear into the underlying sandstone rock. Static settlements are not anticipated to exceed 3/4 inch with differential settlement of less than ½ inch between adjacent foundation elements.

8.0 SOIL ENGINEERING RECOMMENDATIONS

Site Preparation and Grading

1. No grading work should take place during the rainy season (October to May).

2. The site should be prepared for grading by removing structures scheduled for replacement, existing trees to be removed and their root systems, vegetation, debris, and other potentially deleterious materials from areas to receive improvements. Existing utility lines that will not be serving the proposed residence should be either removed or abandoned. The appropriate method of utility abandonment will depend upon the type and depth of the utility. Recommendations for abandonment can be made as necessary.

3. Surface vegetation and organically contaminated topsoil must be removed from areas to be graded. The depth of surface organic stripping will probably vary and should be determined by the geotechnical engineer during grading operations. Organically contaminated soils may either be stockpiled and later used as topsoil in landscaping areas or removed from the site.

4. The exposed ground in areas to receive fills, pavements, or slab-on-grade should be scarified to a depth of eight inches, moisture conditioned above optimum, and recompacted, as recommended by the geotechnical engineer in the field.

5. Ruts or depressions resulting from the removal of the abandoned utilities, tree root systems, and abandoned and/or buried structures, should be properly cleaned out down to undisturbed soil, the actual depths of removal should be determined in the field by an engineer from Earth Systems. The bottoms of the resulting depressions should be

scarified and cross-scarified at least 8 inches in depth, moisture conditioned and recompacted, as necessary. The depressions should then be backfilled with approved, compacted, moisture conditioned structural fill, as recommended in other sections of this report. Site clearing and backfilling operations should be conducted under the field observation of the geotechnical engineer.

6. Approved fill materials, either native or imported, should be compacted to a minimum 90 percent of maximum density, unless specifically stated otherwise in other paragraphs of this report. Relative compaction criteria will be based on the laboratory test procedure ASTM D1557-12. Fill materials should be placed in thin lifts suitable to achieve the desired compaction. Compacted or recompacted native soil should be placed at a moisture content two percentage points above the optimum value determined from the ASTM test method. Filling operations should be conducted under the field observation of the geotechnical engineer.

7. Fills placed on sloping ground (steeper than 10:1) should be properly keyed at their base and continually benched into stiff undisturbed soil/bedrock as recommended in the field by the geotechnical engineer. The base keys should be at least 10 feet wide, or 1.5 times the width of the compaction equipment, whichever is greater, at locations and depths determined by the geotechnical engineer. As the fills increase in height, they should be continuously keyed into the undisturbed ground to provide a firm bond between the fill material and the undisturbed soil. A subdrain should be placed in the heel of the keyway, if deemed necessary by the geotechnical engineer. Once the keys have been approved by the geotechnical engineer or engineering geologist, backfilling may proceed as described in the preceding paragraphs.

8. Compacted fill slopes should not be steeper than 2:1 in finished slope. Cut slopes in natural soil slopes also should not be steeper than 2:1. Cut slopes should be observed by a qualified Earth Systems representative to evaluate the possible need for stabilizing buttress grading. Fill slopes should be constructed slightly oversize laterally so that they can be trimmed to a clean finished surface at the completion of grading. Constructed slopes should be protected against rain runoff or surplus irrigation water by use of an appropriate drainage control facility. Newly constructed slopes should receive some type of erosion control planting soon after completion of grading.

9. If import soil is required at the site, the soil should meet the following criteria:

    a. Be coarse grained and have a plasticity index of less than 15 and/or an expansion index less than 20;

    b. Be free of organics, debris or other deleterious material;

    c. Have a maximum rock size of 3 inches; and

    d. Contain sufficient clay binder to allow for stable foundation and utility trench excavations.

10. Shallow subsurface conditions not encountered during the exploratory drilling may be exposed during grading that cannot be foreseen at this time. Therefore, it is recommended that site preparation and grading operations be perform under the observation of Earth Systems so that actual conditions can be evaluated in the field as the job progresses. Earth Systems should be notified at least 48 hours prior to commencement of grading operations so that arrangements can be made to provide observation and soil testing services.

Foundations

1. The structures can be supported on a drilled pier and grade beam foundation system with the piers extending a minimum of 10 feet below the grade beam or 5 feet into the underlying bedrock, whichever is deeper. The piers should be a minimum of 16 inches in diameter and designed for an allowable skin friction of 600 psf for supporting vertical dead plus live loads. This value may be increased by one-third to include short term wind and seismic effects. The piers should contain reinforcing steel full depth. A skin friction value of 400 psf should be applied when the piers are in tension.

2. To resist lateral loads, a passive equivalent fluid pressure of 250 pcf applied to the pier beginning 12 inches below finish pad grade may be assumed. Passive resistance may begin at a point on the foundation pier where there is at least 5 feet of horizontal cover to the slope face. This passive design pressure may be increased by one third when including short term forces from wind and seismic forces. The passive resistance may be applied over a one-and-a-half pier diameter tributary area.

3. Piers should be structurally tied to the grade beams. Isolated interior piers are not recommended. The actual design of the piers, their reinforcement, depth, size and spacing will depend upon actual building loads and should be determined by the architect/ engineer responsible for the foundation design. The grade beams should penetrate at least 12 inches into the prepared building pad at the residence.

4. Foundation piers should be drilled under the observation of a representative from Earth Systems who will verify the proper penetration depth into bedrock, and provide additional recommendations if unanticipated conditions are encountered during pier drilling operations.

Retaining Walls

1. Retaining walls that will be constructed as part of the house and exterior retaining walls should be supported by a pier and grade beam foundation system utilizing the foundation recommendations presented in the Foundations section above.

2. Design criteria for retaining walls to laterally retain the on-site soils are presented below:

   A. The lateral "active" earth pressure design value for level backfill against the retaining walls should be 45 pcf (equivalent fluid weight). This value should be increased to 70 pcf for sloping (2H:1V) backfill and 80pcf for 1.5H:1V backfill.

   B. The "at-rest" earth pressure design value for level backfill against the retaining walls should be 65 pcf. This value should be increased to 80 pcf for 2:1 sloping backfill.

   C. If the walls are to be designed for seismic forces, a uniform load of 10H may be assumed with the resultant acting at the midpoint of the wall.

   D. Debris barriers should be designed for a minimum impact load of 125 pcf.

   No surcharge loads are taken into consideration in the above provided equivalent fluid pressures.

3. Surcharge loads applied at the surface on the backfill should be considered to be a uniformly distributed horizontal load. This load would equal to approximately 1/3 and 1/2 of the uniform surcharge load for "active" and "at-rest" conditions, respectively.

4. Retaining walls that are constructed as part of the house or are connected to the house foundation should be designed for at-rest pressures presented in the table below. Walls that are not restrained from rotation may be designed for active pressures.

5. A concrete lined drainage ditch should be constructed at the top of exterior retaining walls to prevent surface irrigation or rain water originating upslope of the walls from flowing over the walls. The drainage ditch should lead to one or both ends of the retaining walls and discharge into an approved collection system.

6. In order to provide proper drainage, an import drain rock blanket should be placed behind the retaining walls. The drain rock blanket should be at least 12 inches wide, and extend along the entire length of the retaining wall. The drain rock blanket should extend from the top of the footing upward to within 2 feet of the top of the wall backfill. The upper 2 feet of backfill over the drainage medium should consist of native soil, compacted to at least 90 of maximum dry density, to reduce the flow of surface drainage into the wall drain system. The drain rock blanket should be separated from the backfill soil using a permeable synthetic fabric conforming to Caltrans Standard Specifications, Section 88-1.02B, Class A. Permeable material should conform to Section 68-2.02F(3), Class 2, of the Caltrans Standard Specifications. Manufactured synthetic drains such as Miradrain or Enkadrain may be used in lieu of drain rock and should be installed in accordance with the recommendations of the manufacturer. A 4-inch diameter, perforated/horizontal pipe should be placed at the bottom of the drain blanket/synthetic drains with perforations down. The pipe should discharge to an approved discharge point beyond and down slope of the wall.

Slabs-on-Grade and Exterior Flatwork

1. Garage slab-on-grade and exterior concrete flatwork should have a minimum thickness of 4 full inches and should be reinforced as directed by the architect/engineer. The flatwork should be cast over a minimum of 4 inches of compacted aggregate base. However, use of a greater thickness of aggregate base would enhance the flatwork performance. The edge of the flatwork should be thickened to penetrate at least 3 inches into the subgrade soil if only 4 inches of non-expansive material is utilized.

2. In areas where moisture transmitted from the subgrade would be undesirable, a vapor retarder should be utilized beneath the floor slab. The vapor retarder should comply with ASTM Standard Specification E 1745-11 and the latest recommendations of ACI Committee 302. The vapor retarder should be installed in accordance with ASTM Standard Practice E 1643-11. Care should be taken to properly lap and seal the vapor retarder, particularly around utilities, and to protect it from damage during construction. A layer of sand above the vapor retarder is optional.

3. If sand, gravel or other permeable material is to be placed over the vapor retarder, the material over the vapor retarder should be only lightly moistened and not saturated prior to casting the slab concrete. Excess water above the vapor retarder would increase the potential for moisture damage to floor coverings and could increase the potential for mold growth or other microbial contamination.

4. Assuming that movement (i.e., ¼-inch or more) of exterior flatwork beyond the structure is acceptable, the flatwork should be designed to be independent of the building foundations. The flatwork should not be doweled to foundations, and a separator should be placed between the two. If differential movement of flatwork is considered undesirable, the flatwork should be designed and constructed in roughly the same manner as the structure slabs, and reinforced footings should be provided around the perimeter of the flatwork.

5. To reduce shrinkage cracks in concrete, the concrete aggregates should be of appropriate size and proportion, the water/cement ratio should be low, the concrete should be properly placed and finished, contraction joints should be installed, and the concrete should be properly cured. This is particularly applicable to slabs that will be cast directly upon a vapor retarder and those that will be protected from transmission of vapor by use of admixtures or surface sealers. Concrete materials, placement and curing specifications should be at the direction of the architect/engineer; ACI 302.1R-04 and ACI 302.2R-04 are suggested as resources for the architect/engineer in preparing such specifications.

Utility Trenches

1. A select, noncorrosive, granular, easily compacted material should be used as bedding and shading immediately around utility pipes. The site soils may be used for trench backfill above the select material. If obtaining compaction is difficult with the site soils, use of a more easily compacted sand may be desirable. The upper foot of backfill should consist of native material to reduce the potential for seepage of water into the backfill.

2. Trench backfill in the upper 8 inches of subgrade beneath pavement areas should be compacted to a minimum of 95 percent of maximum dry density. Trench backfill in other areas should be compacted to a minimum of 90 percent of maximum dry density. Jetting of utility trench backfill should not be allowed.

3. Where utility trenches extend under perimeter foundations, the trenches should be backfilled entirely with native soil compacted to a minimum of 90 percent of maximum dry density. The zone of native soil should extend to a minimum distance of 2 feet on both sides of the foundation. If utility pipes pass through sleeves cast into the perimeter foundations, the annulus between the pipes and sleeves should be completely sealed.

Site Drainage and Finish Improvements

1. The drainage swale at the toe of the slope located at the rear of the proposed residence should always be unobstructed and maintained regularly.

2. Unpaved ground surfaces should be finish graded to direct surface runoff away from site improvements at a minimum 5 percent grade for a minimum distance of 10 feet. If this is not practicable due to the terrain or other site features, swales with improved surfaces should be provided to divert drainage away from improvements. The landscaping should be planned and installed to maintain proper surface drainage conditions.

3. Runoff from driveways, roof gutters, downspouts, planter drains and other improvements should discharge in a non-erosive manner away from foundations, pavements, and other improvements.

4. Stabilization of surface soils, particularly those disturbed during construction, by vegetation or other means during and following construction is essential to protect the site from erosion damage. Care should be taken to establish and maintain vegetation.

5. Bio-retention swales constructed within 10 feet or less from the building foundation should be lined with a 20-mil pond liner.

Geotechnical Observation and Testing

1. It must be recognized that the recommendations contained in this report are based on a limited number of borings and rely on continuity of the subsurface conditions encountered.

2. It is assumed that the geotechnical engineer will be retained to provide consultation during the design phase, to interpret this report during construction, and to provide construction monitoring in the form of testing and observation.

3. Unless otherwise stated, the terms "compacted" and "recompacted" refer to soils placed in level lifts not exceeding 8 inches in loose thickness and compacted to a minimum of 90 percent of maximum dry density. The standard tests used to define maximum dry density and field density should be ASTM D 1557-12 and ASTM D 6938-10, respectively, or other methods acceptable to the geotechnical engineer and jurisdiction.

4. "Moisture conditioning" refers to adjusting the soil moisture to at least optimum moisture prior to application of compactive effort. If the soils are overly moist so that they become unstable, or if the recommended compaction cannot be readily achieved, drying the soil to optimum moisture content or just above may be necessary. Placement of gravel layers or geotextiles may also be necessary to help stabilize unstable soils. The geotechnical engineer should be contacted for recommendations for mitigating unstable soils.

5. At a minimum, the following should be provided by the geotechnical engineer:
   - Review of final grading and foundation plans
   - Professional observation during site preparation, grading, and foundation excavation
   - Oversight of soil special inspection during grading

6. Special inspection of grading should be provided as per Section 1704.7 and Table 1704.7 of the CBC; the soils special inspector should be under the direction of the geotechnical engineer. In our opinion, the following operations should be subject to *continuous* soils special inspection:
   - Scarification and recompaction at bottom of over-excavated surfaces
   - Fill placement and compaction
   - Foundation pier excavations

7. In our opinion, the following operations may be subject to *periodic* geotechnical special inspection; subject to approval by the Building Official:
   - Stripping and clearing of vegetation, roots and deleterious materials
   - Over-excavation to the recommended depth
   - Compaction of driveway subgrade and aggregate base
   - Utility trench backfill compaction
   - Conventional foundation excavations

8. It will be necessary to develop a program of quality control prior to beginning grading. It is the responsibility of the owner, contractor, or project manager to determine any additional inspection items required by the architect/engineer or the governing jurisdiction.

9. A preconstruction conference among a representative of the owner, the geotechnical engineer, soils special inspector, the architect/engineer, and contractors is recommended to discuss planned construction procedures and quality control requirements. Earth Systems should be notified at least 48 hours prior to beginning grading operations.

9.0 CLOSURE

This report is valid for conditions as they exist at this time for the type of project described herein. Our intent was to perform the investigation in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the locality of this project at this time under similar conditions. No representation, warranty, or guarantee is either expressed or implied. This report is intended for the exclusive use by the client as discussed in the Scope of Services section. Application beyond the stated intent is strictly at the user's risk.

If changes with respect to the project type or location become necessary, if items not addressed in this report are incorporated into the plans, or if any of the assumptions stated in this report are not correct, Earth Systems should be notified for modifications to this report. Any items not specifically addressed in this report should comply with the California Building Code and the requirements of the governing jurisdiction. If Earth Systems is not retained to provide construction observation and testing services, it will not be responsible for the interpretation of the information by others or any consequences arising there from.

The preliminary recommendations of this report are based upon the geotechnical conditions encountered during the investigation, and may be augmented by additional requirements of the architect/engineer, or by additional recommendations provided by this firm based on conditions exposed at the time of construction.

This document, the data, conclusions, and recommendations contained herein are the property of Earth Systems. This report should be used in its entirety, with no individual sections reproduced or used out of context. Copies may be made only by Earth Systems, the client, and their authorized agents for use exclusively on the subject project. Any other use is subject to federal copyright laws and the written approval of Earth Systems.

Thank you for this opportunity to have been of service. Please feel free to contact this office at your convenience if you have any questions regarding this report.

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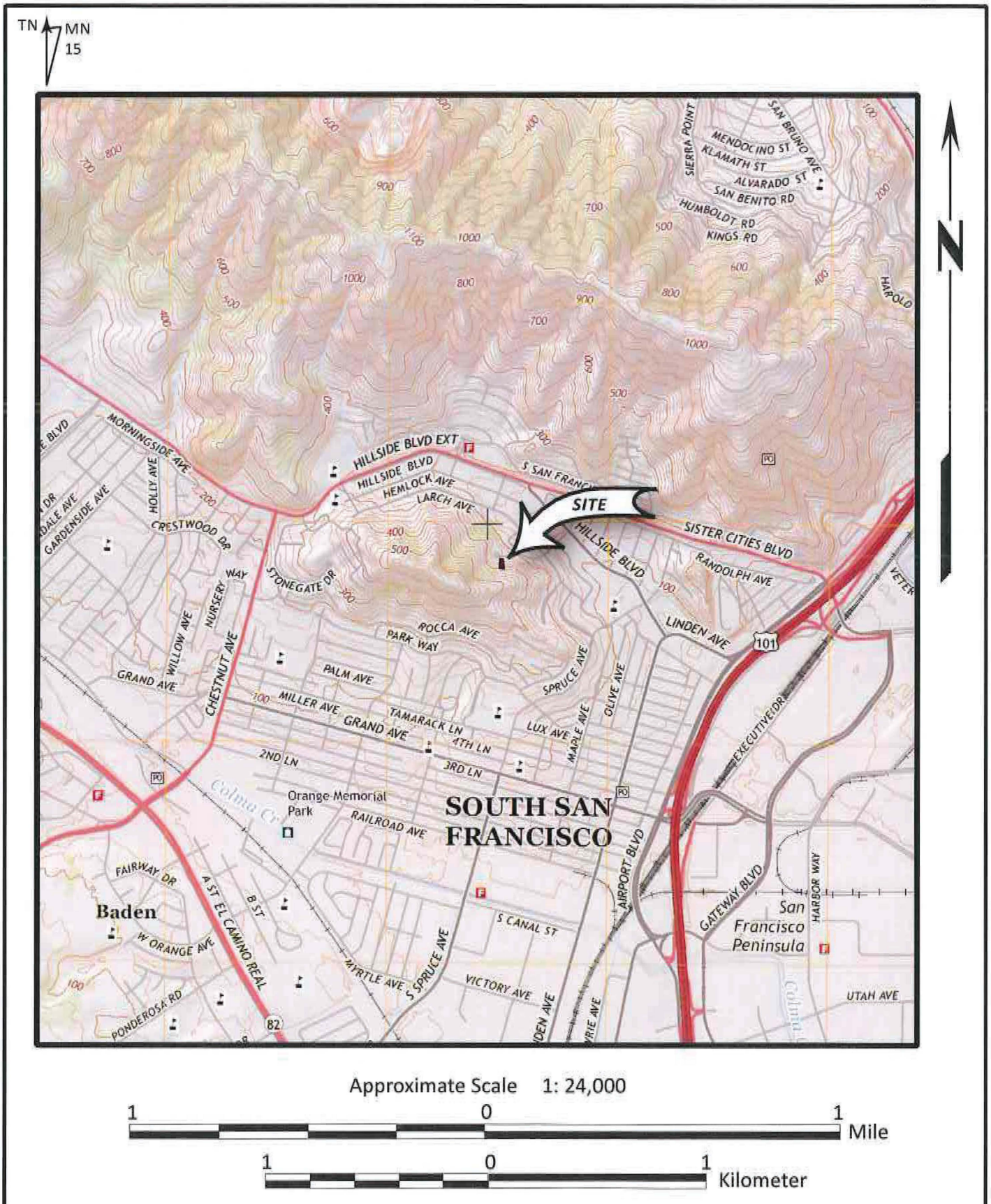
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Aerial Photographs (Stereo Pairs)

Date	Scale	Type	Source	Ref. No.
1935	1:16,500	B&W	Quantum Spatial	AV-248-09-03,-04
3/21/38	1:20,000	B&W	Quantum Spatial	AV-08-03-14
7/29/46	1:23,600	B&W	Quantum Spatial	AV-09-11-4
6/29/50	1:6,000	B&W	Quantum Spatial	AV-35-02-06, -07
5/5/55	1:10,000	B&W	Quantum Spatial	AV-170-07-17, -18
10/30/69	1:12,000	B&W	Quantum Spatial	AV-933-06-15 to -17
10/30/69	1:12,000	B&W	Earth Systems Pacific	AV-933-07-13, -14
6/19/81	1:12,000	B&W	Quantum Spatial	AV-2020-05-15, -16
2/1/82	1:12,000	Infrared	Earth Systems Pacific	AV-2095-01-04, -05
6/6/83	1:12,000	B&W	Quantum Spatial	AV-2265-05-16, -17
5/30/89	1:12,000	B&W	Quantum Spatial	AV-3556-5-18, -19
8/27/93	1:12,000	B&W	Quantum Spatial	AV-4515-6-18
9/7/95	1:12,000	B&W	Quantum Spatial	AV-4916-6-17, -18
10/17/05	1:7,200	B&W	Quantum Spatial	KAV-9200-25-12, -13

FIGURES

Figure 1



Approximate Scale 1: 24,000

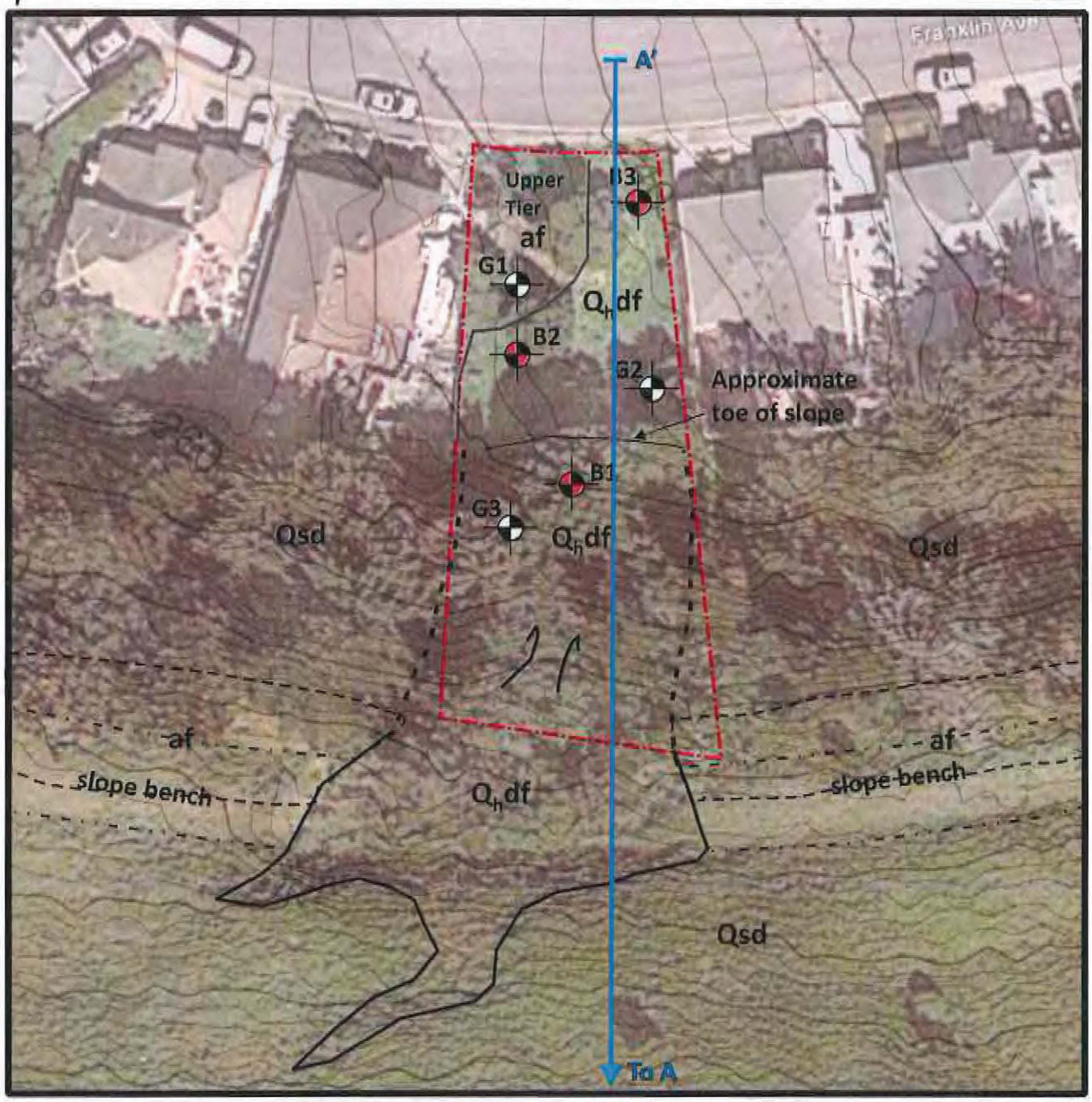
1 0 1 Mile

1 0 1 Kilometer

Base: U.S.G.S. California 7.5-minute series San Francisco South Quadrangle (2015)

Earth Systems Pacific	Proposed Single Family Residence 52 Franklin Avenue South San Francisco, California	**Site Location Map** SH-13000-SA

Figure 2



0 40 80 120

Approximate Scale in Feet

af	artificial fill
$Q_h$df	Holocene debris flow deposits
Qsd	Quaternary slope debris deposits
A — A'	Cross section location
	Site boundary
B3	Approximate boring location (this study)
G3	Approximate boring location (GSE , 1996)

Base: Google Earth (2016); B. Hardin (2016)

Earth Systems Pacific	Proposed Single Family Residence 52 Franklin Avenue South San Francisco, California	**Site Geologic Map** SH-13000-SA

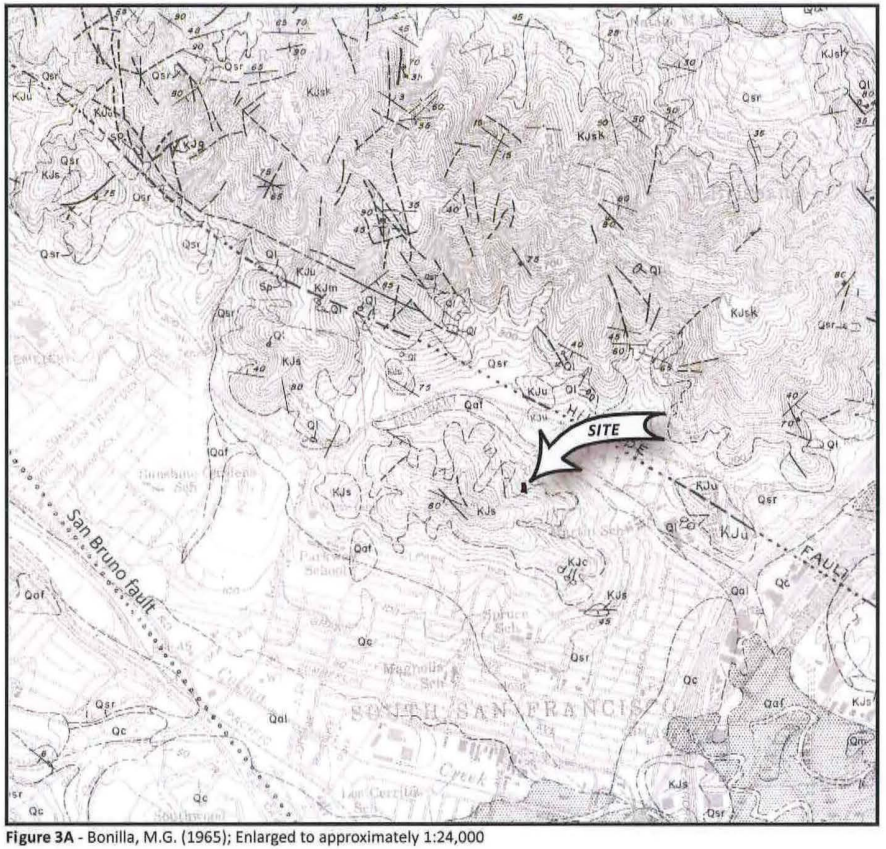


Figure 3A - Bonilla, M.G. (1965); Enlarged to approximately 1:24,000

N

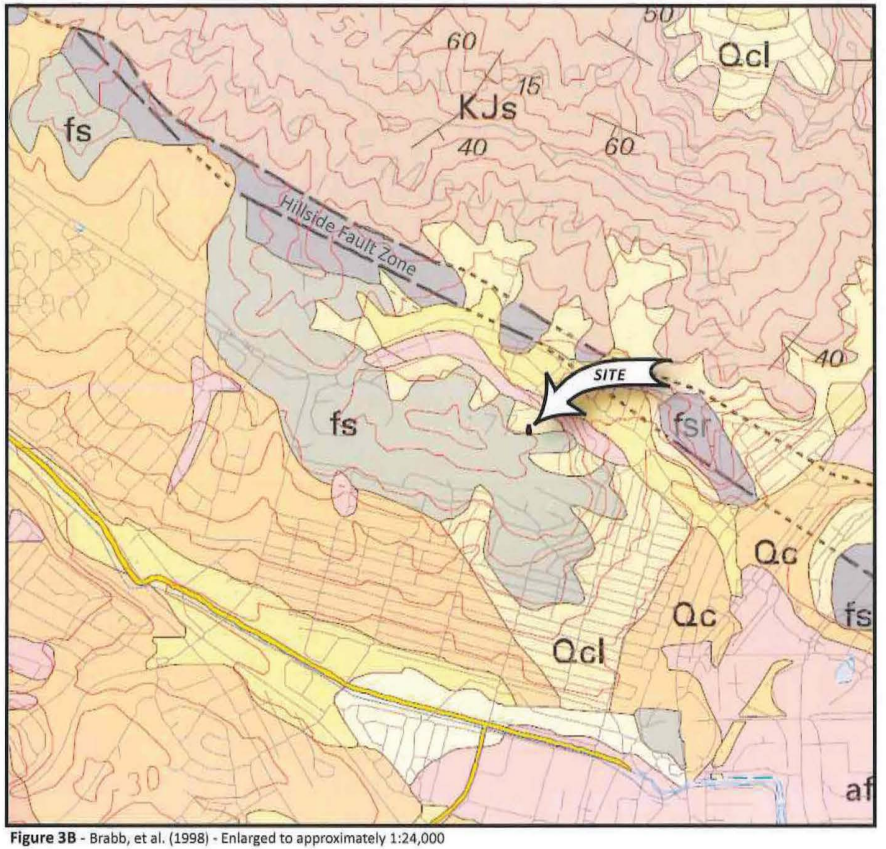


Figure 3B - Brabb, et al. (1998) - Enlarged to approximately 1:24,000

Qaf	Artificial fill
Qal	Alluvium
Qsr	Slope debris and ravine fill
Qc	Colma Formation
KJu	Sheared rocks
KJs	Franciscan Sandstone
KJsk	Francsican Shale
KJc	Franciscan Chert

af	Artificial fill
Qcl	Colluvium (Holocene)
Qc	Colma Formation (Pleistocene)
KJs	Unnamed Sandstone (Jurassic or Cretaceous)
fs	Franciscan Sandstone (Jurassic-Cretaceous)
fsr	Sheared rock/mélange (Jurassic-Cretaceous)

Earth Systems Pacific

Proposed Single Family Residence
52 Franklin Avenue
South San Francisco, California

Regional Geologic Maps

SH-13000-SA

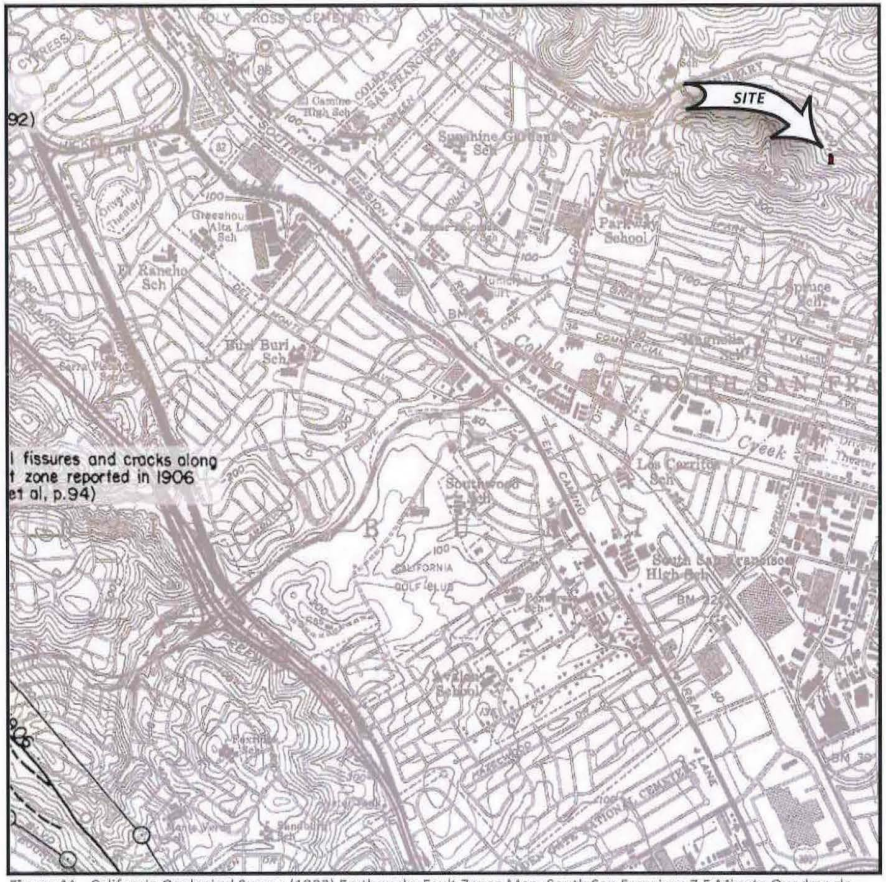


Figure 4A - California Geological Survey (1982) Earthquake Fault Zones Map, South San Francisco 7.5 Minute Quadrangle (approx scale - 1:24,000)

Earthquake Fault Zone

Fault Trace (dashed where approximate, dotted where uncertain)
-1906: Date of historic rupture

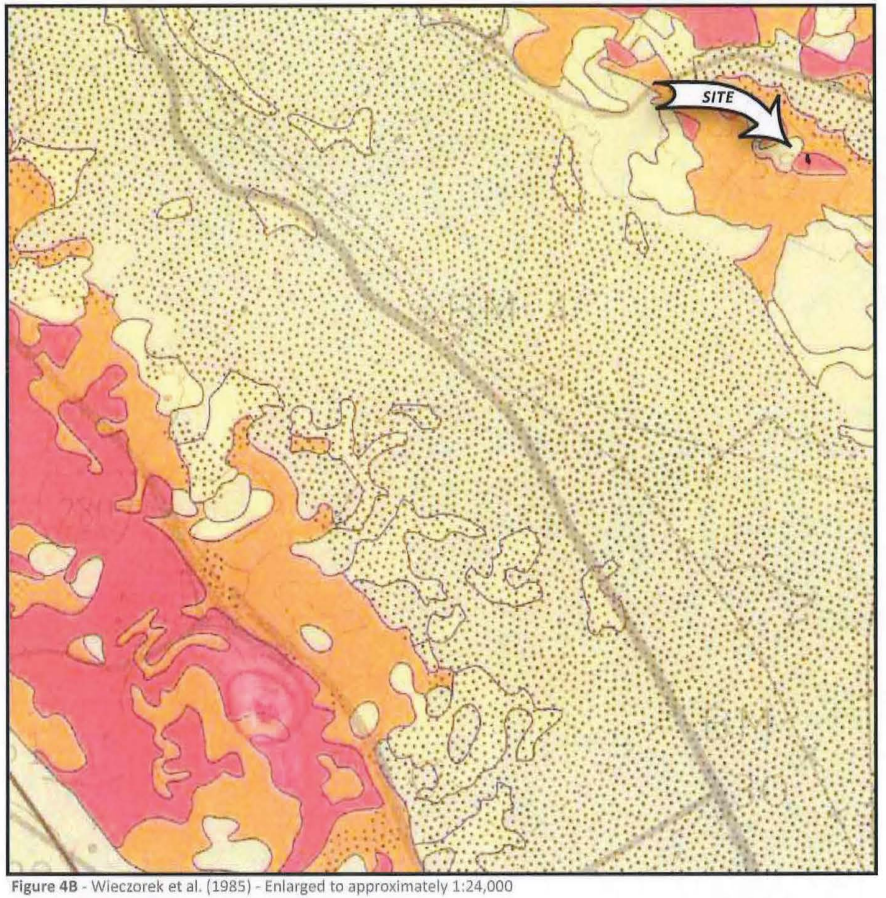


Figure 4B - Wieczorek et al. (1985) - Enlarged to approximately 1:24,000

Earthquake-induced landslide hazard
(susceptibility and percentage of area likely to fail in a major earthquake)

High: Less than or equal to 25%

Moderate: Approximately 15%

Low: Approximately 5%

Very Low: Less than 3%

Liquefaction hazard

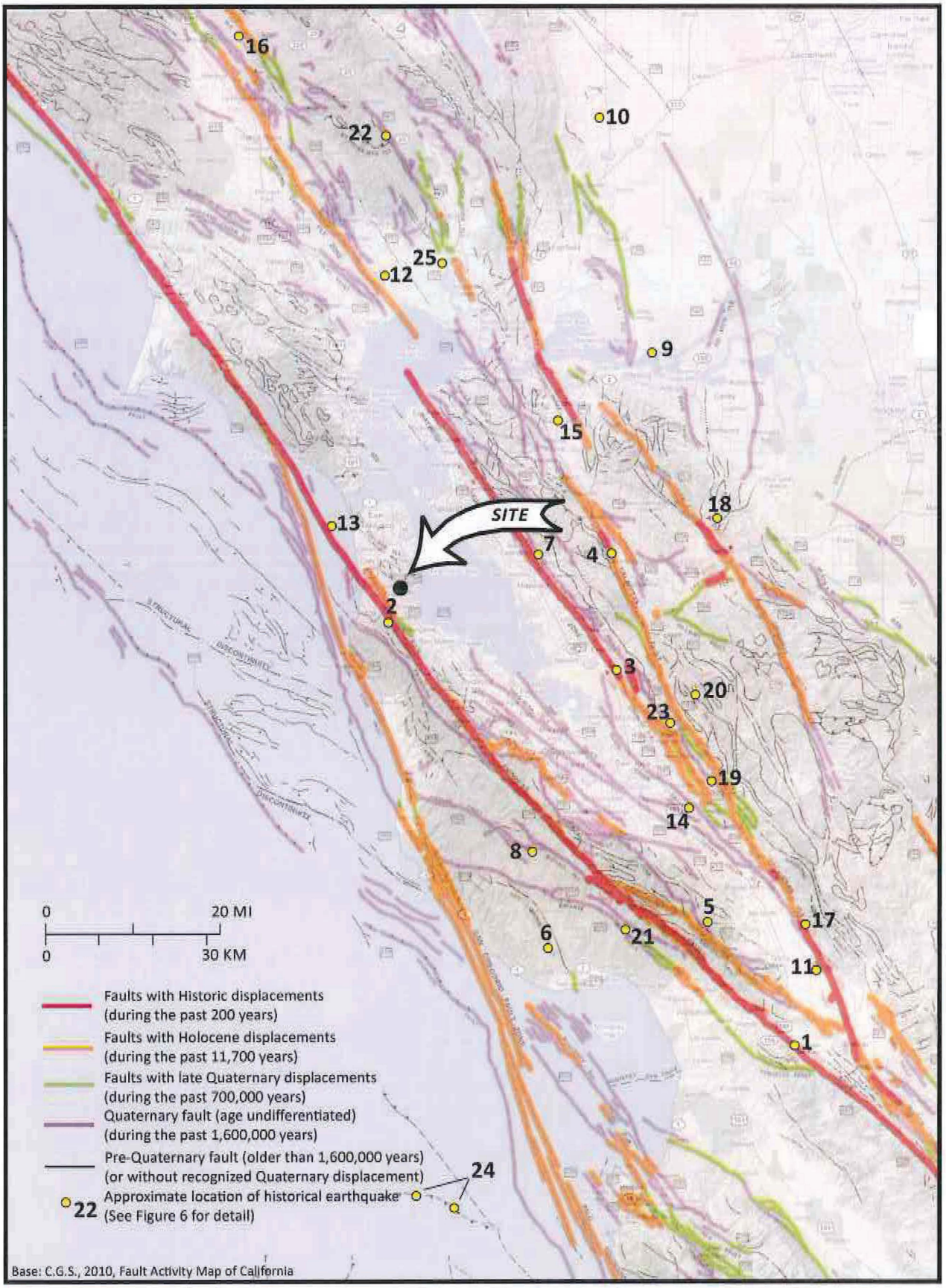
Area of Low, moderate, or high liquefaction susceptibility

Fault Zones

Fault Zone

Earth Systems Pacific	Proposed Single Family Residence 52 Franklin Avenue South San Francisco, California	Seismic and Fault Hazard Maps SH-13000-SA

Figure 5



Earth Systems Pacific	Proposed Single Family Residence 52 Franklin Avenue South San Francisco, California	Regional Faults and Earthquakes SH-13000-SA

Selected San Francisco Bay Area Earthquakes

Location Number (Refer to Figure 5)	Earthquake and Year	Magnitude Reported	Reference
1	Monterey Bay Area, 1836	M 6.8	Toppozada, 1998
2	San Francisco, 1838	M 7.0	Toppozada, 1981
3	Hayward, 1858	M 6.1	Toppozada, 1981
4	Calaveras-Dublin, 1861	M 5.9	Toppozada, 1981
5	Santa Clara Valley, 1864	M 5.9	Toppozada, 1981
6	Santa Cruz, 1865	M 6.3	Toppozada, 1981
7	Hayward, 1868	M 6.8	Toppozada, 1981
8	San Andreas, 1870	M 5.8	Toppozada, 1981
9	Antioch-Collinsville		
	1889	M 6.0	Toppozada, 1981
	1965	M 4.9	Toppozada, 1981
10	Vacaville-Winters, 1892	M 6.4	Toppozada, 1981
11	Calaveras, 1897	M 6.2	Toppozada, 1981
12	Mare Island, 1898	M 6.5	Goter, 1988
13	San Francisco, 1906	M 7.8	U.S. Geological Survey, 2010
14	San Jose, 1911	M 6.5	Toppozada and Parke, 1982
15	Concord, 1955	M 5.4	Tocher, 1959
16	Santa Rosa, 1969	M 5.6	Cloud, 1970
17	Coyote Lake, 1979	M 5.9	Hart, 1988
18	Greenville, 1980	M 5.8	Oppenheimer, 1990
19	Morgan Hill, 1984	M 6.2	Oppenheimer, 1990
20	Mount Lewis, 1986	M 5.7	U.S. Geological Survey, 1989
21	Loma Prieta, 1989	M 7.1	U.S. Geological Survey, 1989
22	Napa, 2000	M 5.2	U.S. Geological Survey, 2000
23	Calaveras Reservoir, 2007	M 5.4	U.S. Geological Survey, 2009
24	Monterey Bay		
	1926	M6.1	NCDEC, 2010
	1926	M6.1	NCDEC, 2010
25	South Napa, 2014	M6.0	U.S. Geological Survey, 2014

NOTE: Modified After Geomatrix, (1992); Update, USGS, 2014

Figure 7

MODIFIED MERCALLI INTENSITY SCALE

MMI Value	Summary Damage Description Used on 1995 Maps	2003 Description of Shaking Severity	Full Description
I			Not felt. Marginal and long period effects of large earthquakes.
II			Felt by persons at rest, on upper floors, or favorably placed.
III			Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.
IV			Hanging objects swing. Vibration like passing of heavy trucks; or sensation of a jolt like a heavy ball striking the walls. Standing motor cars rock. Windows, dishes, doors rattle. Glasses clink. Crockery clashes. In the upper range of IV, wooden walls and frames creak.
V	Pictures Move	Light	Felt outdoors; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Shutters, pictures move. Pendulum clocks stop, start, change rate.
VI	Objects Fall	Moderate	Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knicknacks, books, etc., off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster and Masonry D cracked. Small bells ring (church, school). Trees, bushes shaken (visibly or heard to rustle).
VII	Nonstructural Damage	Strong	Difficult to stand. Noticed by drivers of motor cars. Hanging objects quiver. Furniture broken. Damage to Masonry D, including cracks. Weak chimneys broken off at roof line. Fall of plaster, loose bricks, stones, tiles, cornices (also unbraced parapets and architectural ornaments). Some cracks in Masonry C. Waves on ponds; water turbid with mud. Small slides and caving in along sand or gravel banks. Large bells ring. Concrete irrigation ditches damaged.
VIII	Moderate Damage	Very Strong	Steering of motor cars affected. Damage to Masonry C; partial collapse. Some damage to Masonry B, none to Masonry A. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory stacks, monuments, towers, elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed piling broken off. Branches broken from trees. Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes.
IX	Heavy Damage	Violent	General panic. Masonry D destroyed; Masonry C heavily damaged, sometimes with complete collapse; Masonry B seriously damaged. (General damage to foundations.) Frame structures, if not bolted, shifted off foundations. Frames cracked. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground. In alluvial areas sand and mud ejected, earthquake fountains, sand craters.
X	Extreme Damage	Very Violent	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly.
XI			
XII			Rails bent greatly. Underground pipelines completely out of service.

Masonry A: Good workmanship, mortar, and design; reinforced, especially laterally, and bound together using steel, concrete, etc.; designed to resist lateral forces.

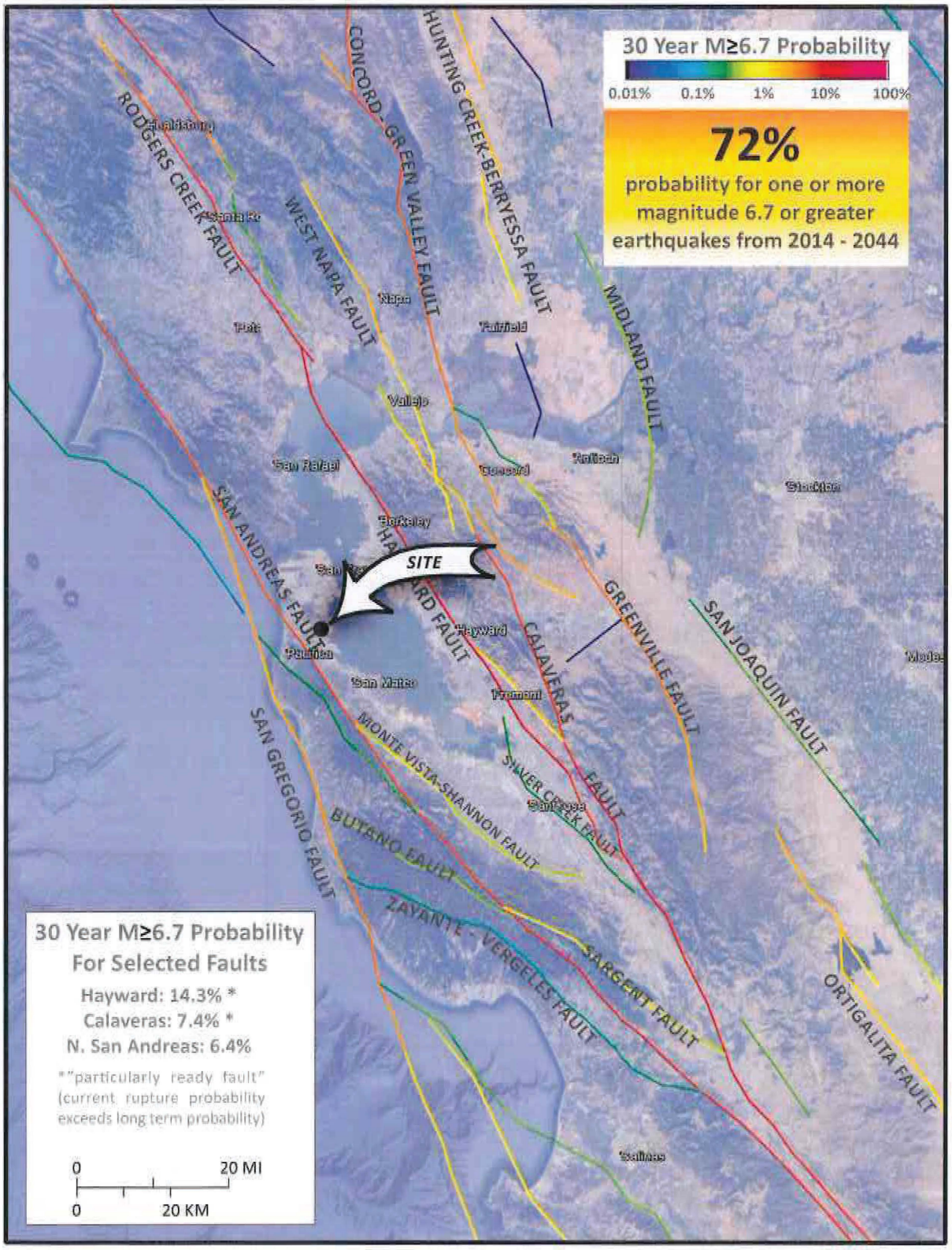
Masonry B: Good workmanship and mortar; reinforced, but not designed to in detail to resist lateral forces.

Masonry C: Ordinary workmanship and mortar; no extreme weaknesses like failing to tie in at corners, but neither reinforced nor designed against horizontal forces.

Masonry D: Weak materials, such as adobe; poor mortar; low standards of workmanship; weak horizontally.

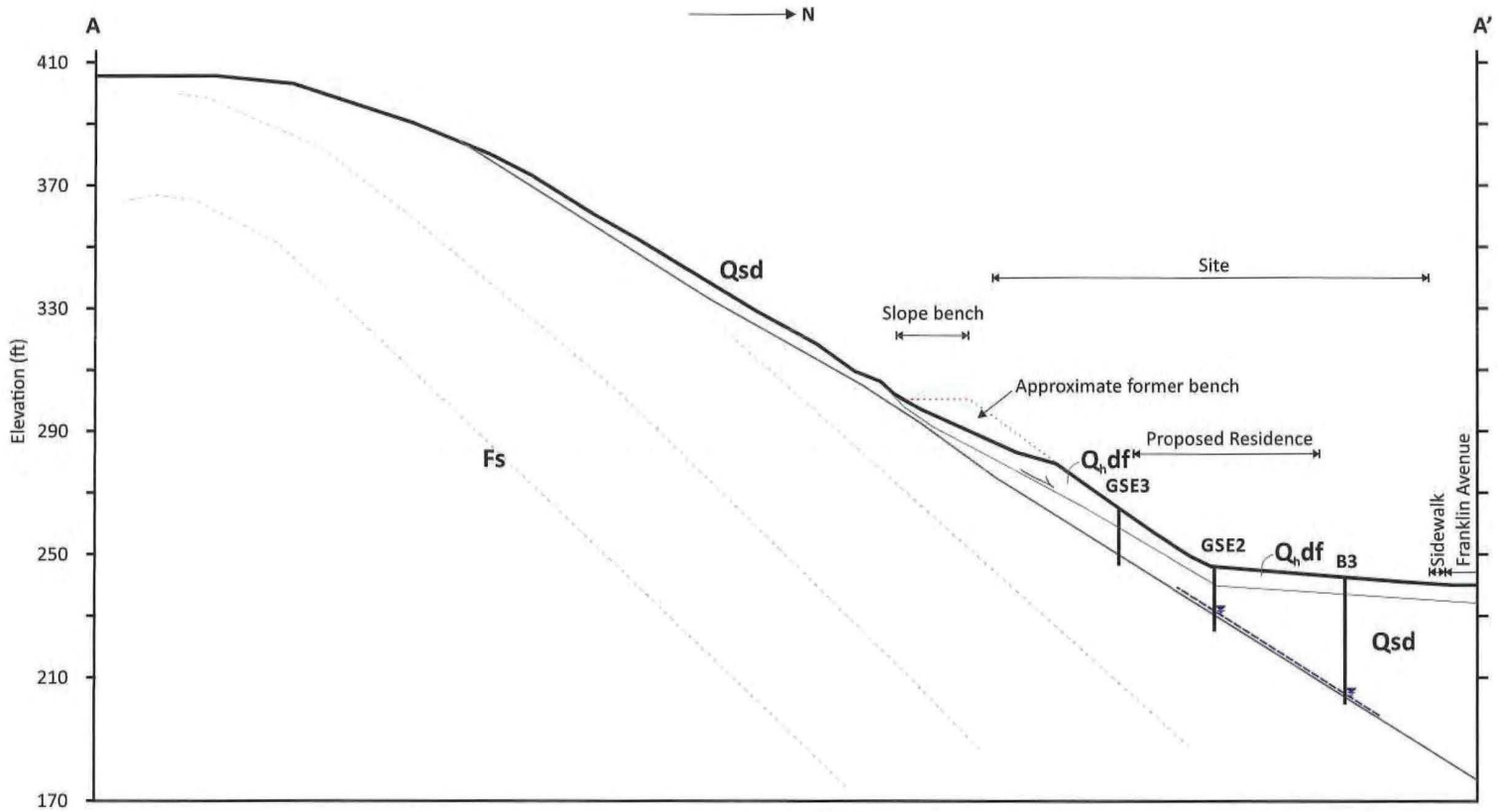
Source: Association of Bay Area Governments (2003)

Figure 8



Base: Working Group on California Earthquake Probabilities (2015)
Uniform California Earthquake Rupture Forecast 3 (UCERF3)
http://www.wgcep.org/UCERF3

Earth Systems Pacific	Proposed Single Family Residence 52 Franklin Avenue South San Francisco, California	Earthquake Probability SH-13000-SA



$Q_h df$	Holocene debris flow deposits		Geologic contact, dashed where approximate, queried where uncertain
Qsd	Quaternary slope debris/colluvium		Groundwater surface
Fs	Franciscan sandstone		Bedding orientation (shown schematically)

40 0 40 80

Approximate Scale in Feet (H=V)

B3 | Boring Location (Earth Systems, this study)

G3 | Boring Location (Globe Soil Engineers, 1996)

Earth Systems Pacific	Proposed Single Family Residence 52 Franklin Avenue South San Francisco, California	Cross Section A-A' SH-13000-SA



Base: Ellen et al. (1997), Enlarged to approximately 1:24,000

1 0 1 Mile

Approximate Scale 1: 24,000

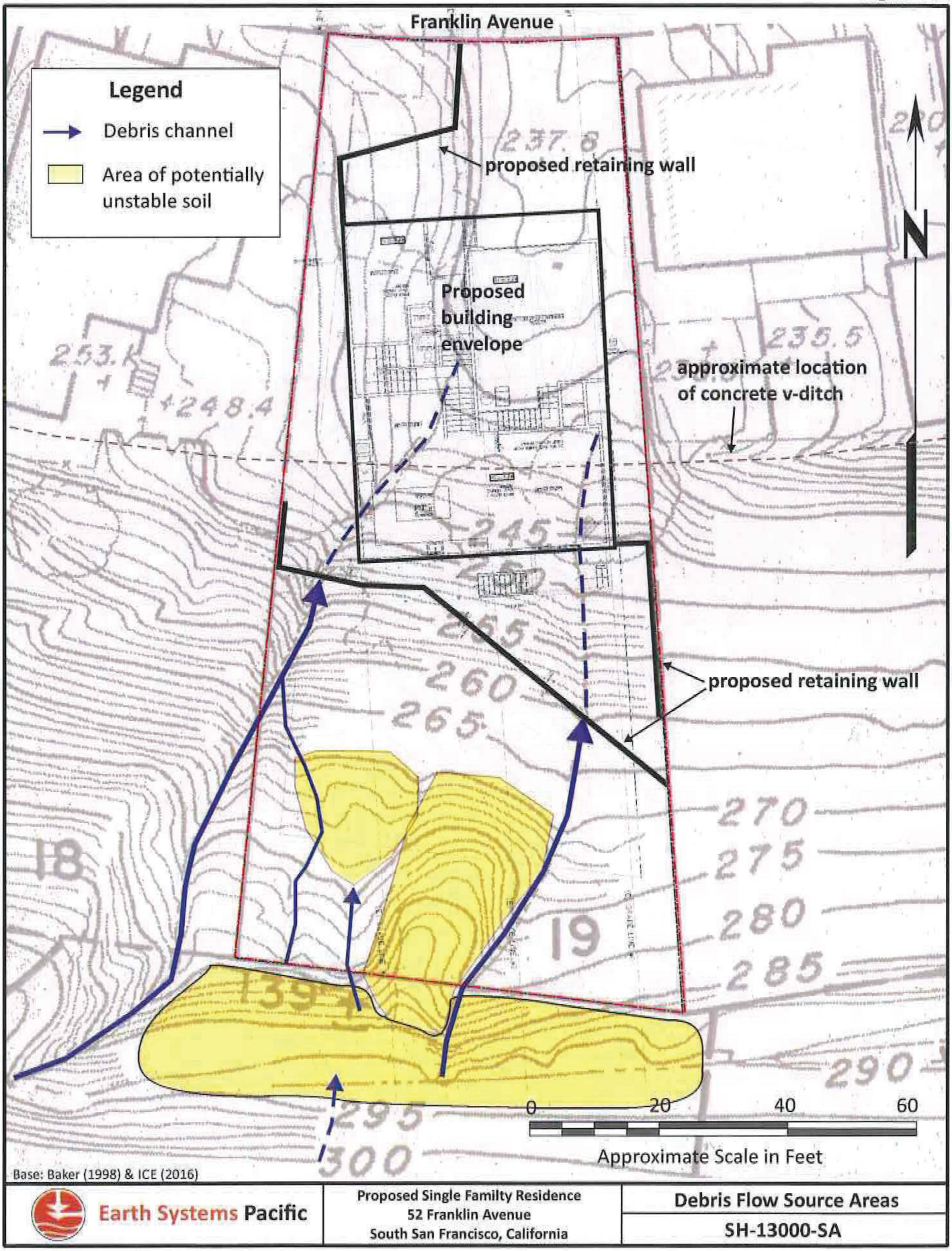
Principal predicted debris-flow source areas

Approximate sources of debris flows triggered during the storm of January 1982

Base: USGS Open File 97-745E, Sheet 7 of 11 (1997)

Earth Systems Pacific	Proposed Single Family Residence 52 Franklin Avenue South San Francisco, California	Principal Debris Flow Source Areas SH-13000-SA

Figure 11



Earth Systems Pacific	Proposed Single Family Residence 52 Franklin Avenue South San Francisco, California	Debris Flow Source Areas SH-13000-SA

APPENDIX A

Boring Logs (3)

Earth Systems Pacific

Boring No. 1
PAGE 1 OF 1

LOGGED BY: DT
DRILL RIG: Hand hammer
AUGER TYPE: Hand Auger

JOB NO.: SH-13000-SA
DATE: 4/26/16

PROPOSED SINGLE FAMILY RESIDENCE
52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO, CALIFORNIA

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN. (70lb hammer)	POCKET PEN (t.s.f)
0	SC		CLAYEY SAND; very dense, yellow brown, moist, fine sand and 1 to 2 mm subangular sandstone fragments [ϕ=30°, c=787psf]	0.0-1.0	1.0	■	109.3	7.9	33 55	
1				1.0-1.5	1.5	■	112.6	10.3	50/4.5	
2			-dark yellow brown						36	
3				1.5-3.0	3.0	●	-	11.2	35 50/5.5	
4			-fine to medium sand, with zones of oxidation						17 28	
5			-very dark yellow brown to gray brown	3.0-4.5	4.5	●	-	10.9	37	
6				4.5-6.0	6.0	●	-	10.9	36 42 44	
7			-1 to 3 mm sandstone fragments	6.0-7.5	7.5	●	-	10.8	6 27 50/6	
8				7.5-8.5	8.5	●	-	10.4	18 56/6	
9			End of boring at 8.5 feet No Groundwater Encountered							
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										

LEGEND: ■ 2.5" Mod Cal Sample ○ Bulk Sample ▭ 2.0" Cal Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 2
PAGE 1 OF 1

LOGGED BY: DT
DRILL RIG: Simco 2400 SK-1
AUGER TYPE: 6" Solid Flight

JOB NO.: SH-13000-SA
DATE: 4/26/16

PROPOSED SINGLE FAMILY RESIDENCE
52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO, CALIFORNIA

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.	POCKET PEN (t.s.f)
0	CL		SANDY lean CLAY; very stiff, brown, moist, with fine to medium grained sand	0.0-5.0	Bag A	○			8	
1			-light brown and light green mottling						11	
2			[LL=28, PI=13]	1.0-2.5	2.5	▬	-	16.5	17	4.0
3	SC		CLAYEY SAND with GRAVEL; medium dense, dark yellow brown, moist, medium to coarse sand and fine subangular gravel						10	
4									17	
5				3.5-5.0	5.0	▬	123.2	11.8	29	
6										
7										
8										
9									10	
10			[LL=25, PI=10]	8.5-10.0	10.0	▬	115.0	13.3	10 19	
11	Bdrx		SANDSTONE; fine grained, very soft, intensely weathered, yellow-brown to dark tan							
12										
13										
14				13.5-14.0	14.0	▬ ●	92.2	6.9	50/2 50/0	
15										
16			-hard							
17										
18				18.0-18.5	18.5	● ○	-	15.2	50/0	
19			End of boring at 18.5 feet (sampler refusal) No Groundwater Encountered							
20										
21										
22										
23										
24										
25										
26										

LEGEND: ▬ 2.5" Mod Cal Sample ○ Bulk Sample ▭ 2.0" Cal Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 3
PAGE 1 OF 2

LOGGED BY: DT
DRILL RIG: Simco 2400 SK-1
AUGER TYPE: 6" Solid Flight

JOB NO.: SH-13000-SA
DATE: 4/26/16

PROPOSED SINGLE FAMILY RESIDENCE
52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO, CALIFORNIA

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.	POCKET PEN (t.s.f)
0	SC		CLAYEY SAND; medium dense, yellow-brown, moist, with fine to medium grained sand and trace fine angular sandstone fragments	0.0-5.0	Bag B	○			8 12	
2			[LL=33, PI=17]	1.0-2.5	2.5	▬	119.2	14.0	20	
4			-dark yellow brown, oxidation zones, mostly fine to medium sand, a little coarse angular sand (sandstone fragments)	3.5-5.0	5.0	▬	117.7	15.3	11 14 30	
9			-light green mottling						10 14	
10				8.5-10.0	10.0	▬	121.7	14.4	26	
14			-brown to light reddish-brown						10 15	
15			[ϕ=40°, c=900psf]	13.5-15.0	15.0	▬	122.4	15.0	27	
16									8 11	
17				15.0-16.5	16.5	●	-	13.8	16	
18	SC		CLAYEY SAND; medium dense, dark olive green, moist, fine to medium sand, with fine angular gravel						6 24	
20			-medium to coarse sand and a few percent fine gravel	18.5-20.0	20.0	●	-	12.5	50/4	
26										

LEGEND: ▬ 2.5" Mod Cal Sample ○ Bulk Sample ▭ 2.0" Cal Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 3
PAGE 2 OF 2

LOGGED BY: DT
DRILL RIG: Simco2400 SK-1
AUGER TYPE: 6" Solid Flight

JOB NO.: SH-13000-SA
DATE: 4/26/16

PROPOSED SINGLE FAMILY RESIDENCE
52 FRANKLIN AVENUE
SOUTH SAN FRANCISCO, CALIFORNIA

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE NUMBER	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.	POCKET PEN (t.s.f)
27	SC		CLAYEY SAND; medium dense, dark olive green, moist, medium to coarse sand, a few percent fine gravel							
28										
29									8	
30			-very moist	28.5-30.0	30.0	●	-	-	10 14	
31										
32										
33										
34										
35										
36										
37										
38										
39										
40	Bdrx		SANDSTONE; soft, modrately weathered, black, bedding approximately 33°						30	
41				40.0-41.5	41.5	●	-	11.2	31 25/2	
42			End of boring at 41.5 feet Groundwater measured at 39 feet during drilling.							
43										
44										
45										
46										
47										
48										
49										
50										
51										
52										
53										

LEGEND: ■ 2.5" Mod Cal Sample ○ Bulk Sample ▭ 2.0" Cal Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

APPENDIX B

Laboratory Test Results

52 Franklin Avenue SH-13000-SA

BULK DENSITY TEST RESULTS

ASTM D 2937-10 (modified for ring liners)

May 16, 2016

BORING NO.	DEPTH feet	MOISTURE CONTENT, %	WET DENSITY, pcf	DRY DENSITY, pcf
B1	0.5 - 1.0	7.9	117.9	109.3
B1	2.5 - 3.0	11.2		
B1	4.0 - 4.5	10.9		
B1	5.5 - 6.0	10.9		
B1	7.0 - 7.5	10.8		
B1	8.0 - 8.5	10.4		
B2	2.0 - 2.5	16.5		
B2	4.5 - 5.0	11.8	137.7	123.2
B2	9.5 - 10.0	13.3	130.4	115.0
B2	13.5 - 14.0	6.9	98.5	92.2
B2	18.0 - 18.5	15.2		
B3	2.0 - 2.5	14.0	135.9	119.2
B3	4.5 - 5.0	15.3	135.7	117.7
B3	9.5 - 10.0	14.4	139.3	121.7
B3	16.0 - 16.5	13.8		
B3	19.5 - 20.0	12.5		
B3	41.0 - 41.5	11.2		

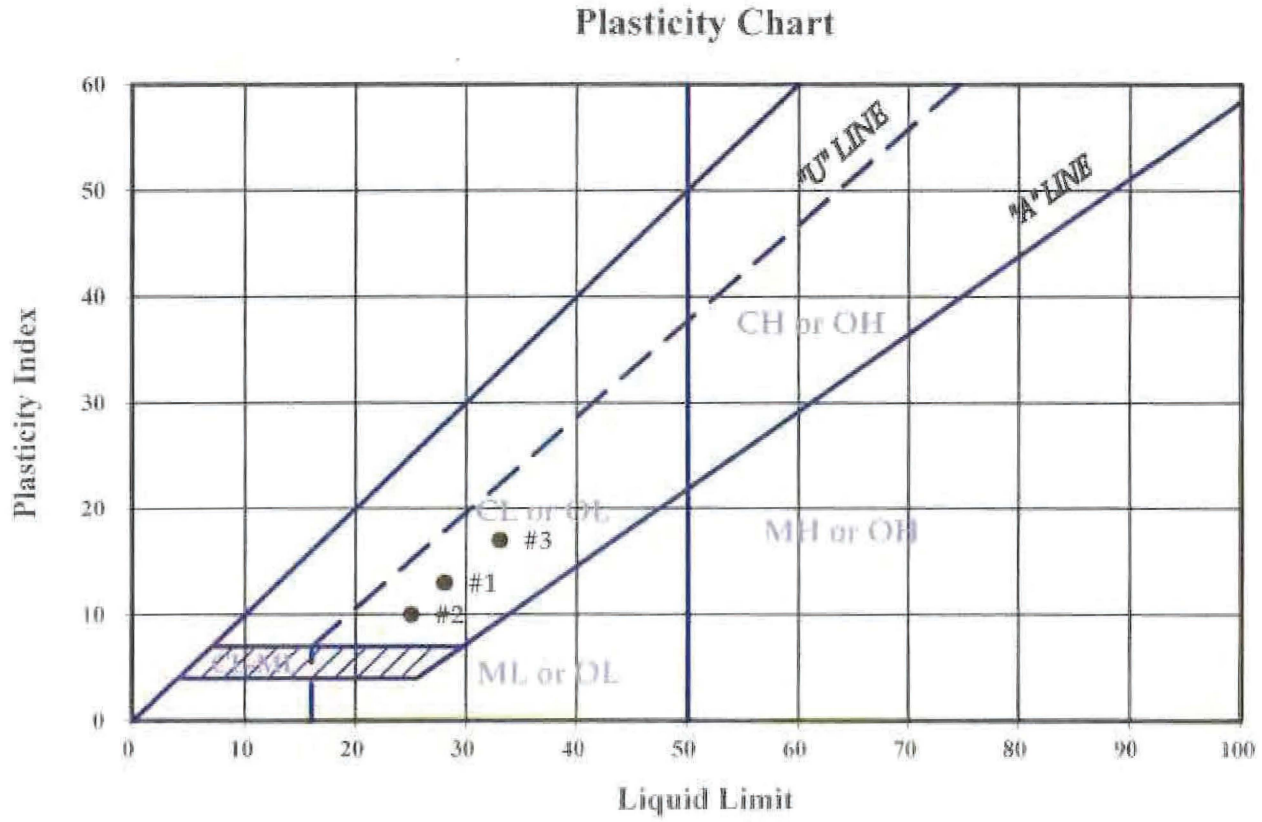
52 Franklin Avenue SH-13000-SA

PLASTICITY INDEX

ASTM D 4318-10

May 16, 2016

Test No.:	1	2	3	4	5
Boring No.:	B2	B2	B3		
Sample Depth:	0.0 - 5.0'	9.5 - 10.0'	0.0 - 5.0'		
Liquid Limit:	28	25	33		
Plastic Limit:	15	15	16		
Plasticity Index:	13	10	17		



52 Franklin Avenue

SH-13000-SA

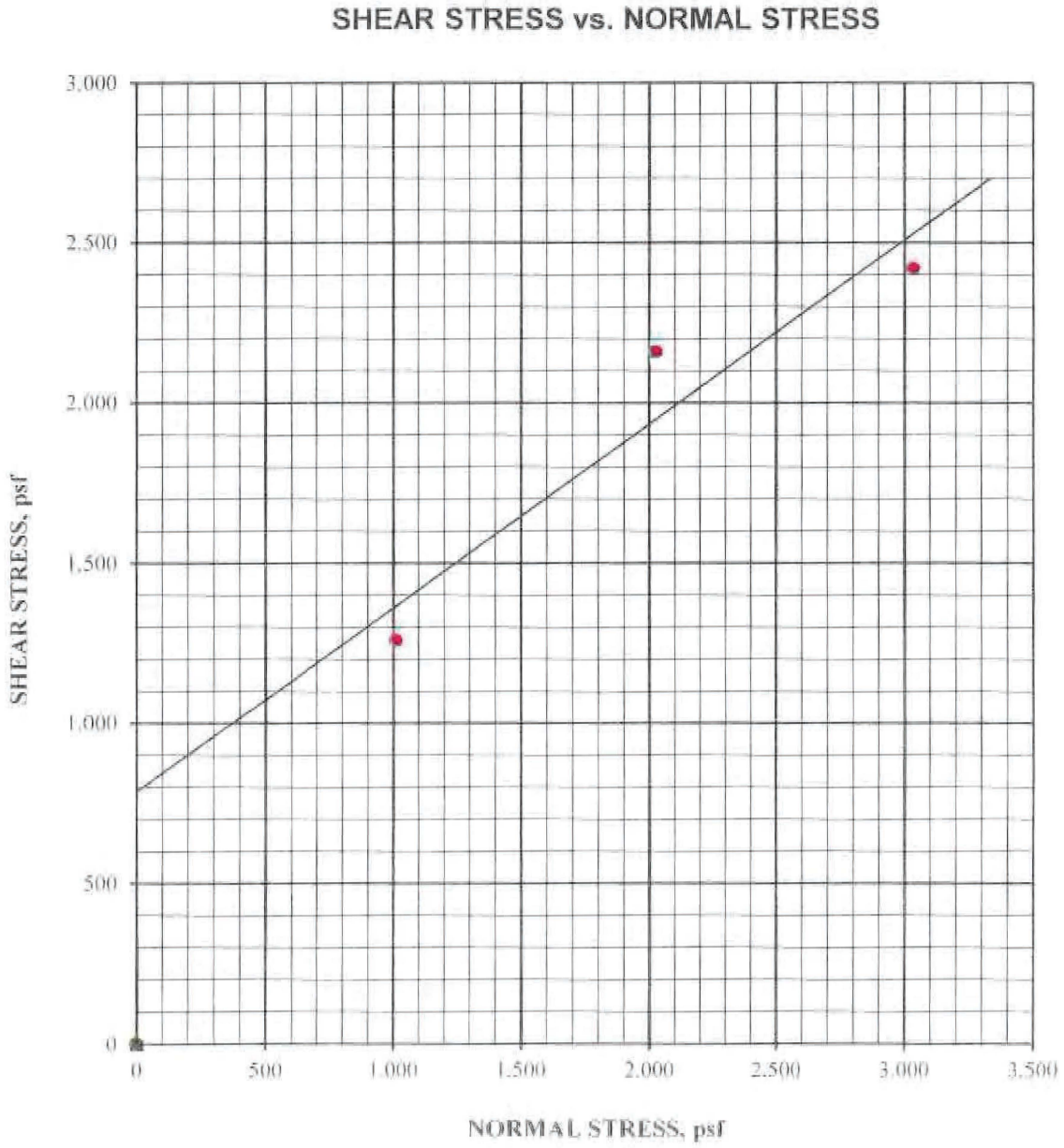
DIRECT SHEAR

ASTM D 3080-11 (modified for consolidated, undrained conditions)

May 16, 2016

Boring #1 @ 1.0 - 1.5'
Yellowish Brown Clayey Sand (SC)
Undisturbed, Saturated

INITIAL DRY DENSITY: 112.6 pcf
INITIAL MOISTURE CONTENT: 10.3 %
PEAK SHEAR ANGLE (Ø): 30°
COHESION (C): 787 psf



DIRECT SHEAR continued

ASTM D 3080-11 (modified for consolidated, undrained conditions)

Boring #1 @ 1.0 - 1.5'

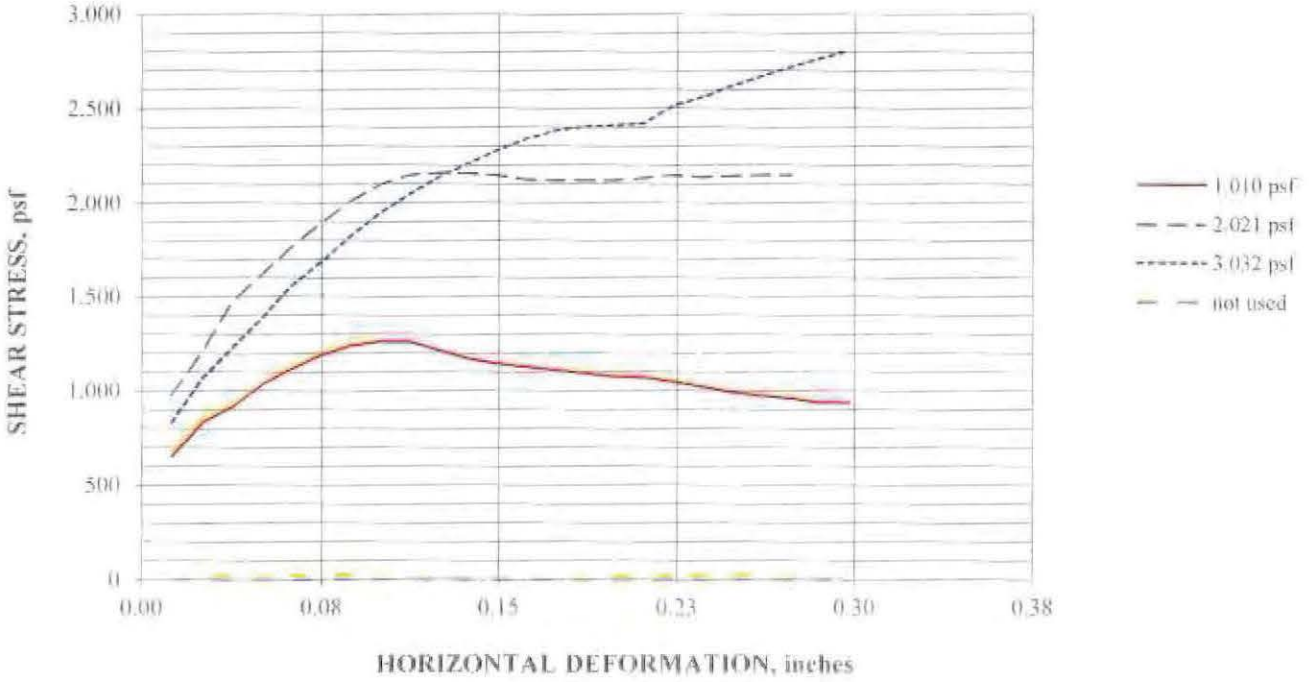
May 16, 2016

Yellowish Brown Clayey Sand (SC)

Undisturbed, Saturated

SPECIFIC GRAVITY: 2.65 (assumed)

SAMPLE NO.:	1	2	3	AVERAGE
INITIAL				
WATER CONTENT, %	10.3	10.3	10.3	10.3
DRY DENSITY, pcf	115.7	111.1	111.0	112.6
SATURATION, %	63.6	55.8	55.8	58.4
VOID RATIO	0.429	0.489	0.489	0.469
DIAMETER, inches	2.370	2.370	2.370	
HEIGHT, inches	1.00	1.00	1.00	
AT TEST				
WATER CONTENT, %	16.1	17.1	16.7	
DRY DENSITY, pcf	116.5	113.1	116.8	
SATURATION, %	100.0	98.5	100.0	
VOID RATIO	0.419	0.462	0.416	
HEIGHT, inches	0.99	0.98	0.95	



52 Franklin Avenue

SH-13000-SA

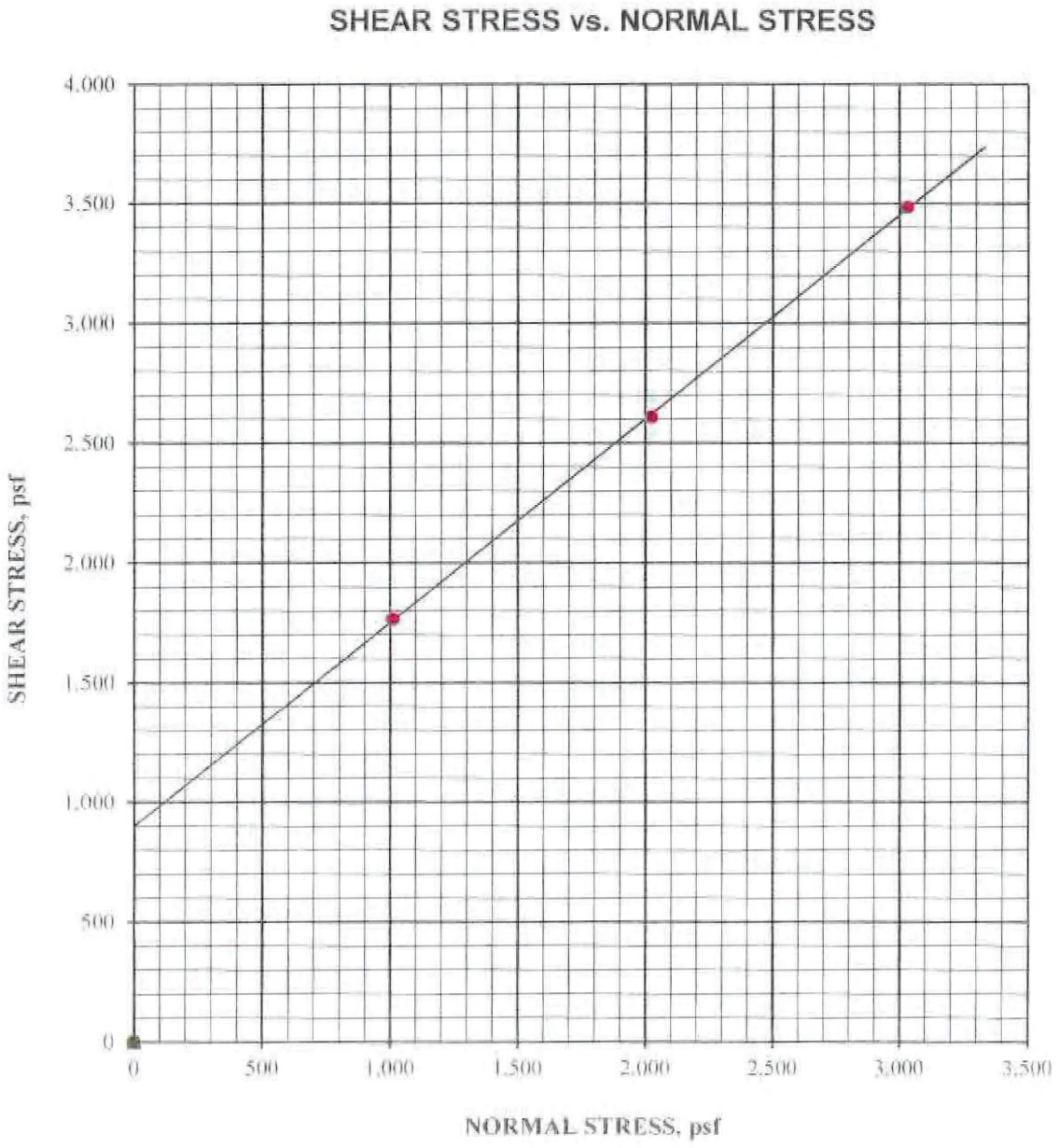
DIRECT SHEAR

ASTM D 3080-11 (modified for consolidated, undrained conditions)

May 16, 2016

Boring #3 @ 14.5 - 15.0'
Dark Yellowish Brown Clayey Sand (SC)
Undisturbed, Saturated

INITIAL DRY DENSITY: 122.4 pcf
INITIAL MOISTURE CONTENT: 15.0 %
PEAK SHEAR ANGLE (Ø): 40°
COHESION (C): 900 psf



DIRECT SHEAR continued

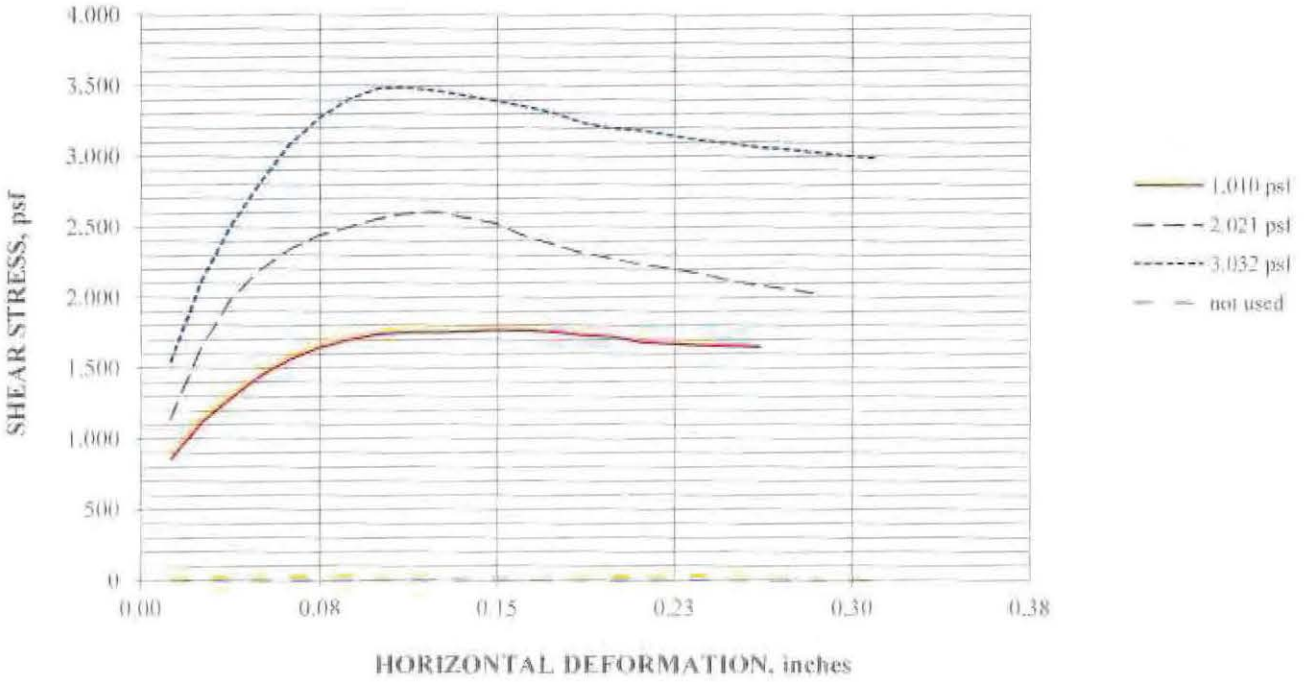
ASTM D 3080-11 (modified for consolidated, undrained conditions)

Boring #3 @ 14.5 - 15.0' May 16, 2016

Dark Yellowish Brown Clayey Sand (SC)

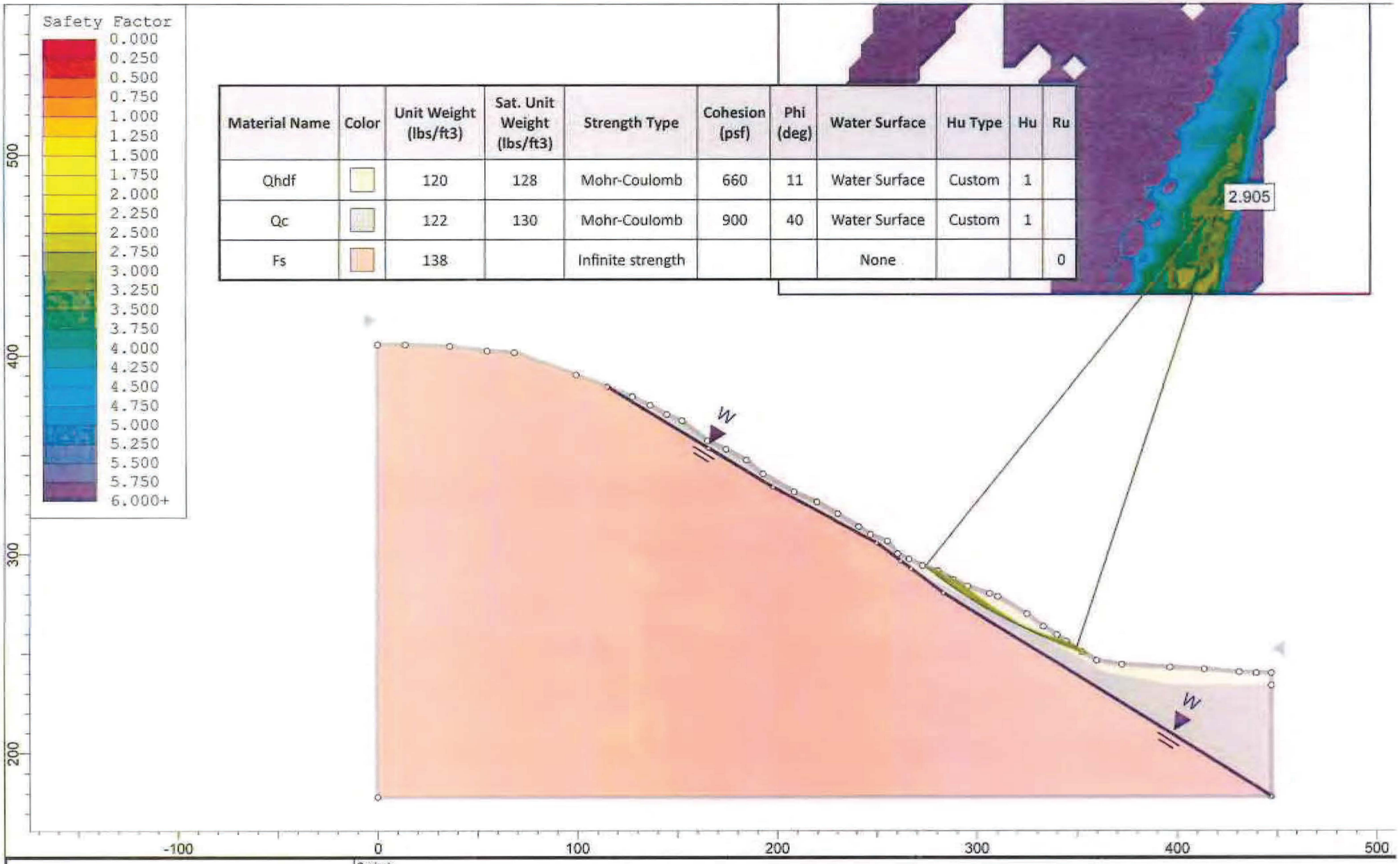
Undisturbed, Saturated SPECIFIC GRAVITY: 2.65 (assumed)

SAMPLE NO.:	1	2	3	AVERAGE
INITIAL				
WATER CONTENT, %	15.0	15.0	15.0	15.0
DRY DENSITY, pcf	121.7	121.6	123.9	122.4
SATURATION, %	110.8	110.5	118.8	113.4
VOID RATIO	0.359	0.360	0.334	0.351
DIAMETER, inches	2.370	2.370	2.370	
HEIGHT, inches	1.00	1.00	1.00	
AT TEST				
WATER CONTENT, %	15.5	15.6	15.4	
DRY DENSITY, pcf	118.7	121.2	123.0	
SATURATION, %	100.0	100.0	100.0	
VOID RATIO	0.393	0.364	0.344	
HEIGHT, inches	1.02	1.00	1.01	



APPENDIX C

Quantitative Slope Stability Plots

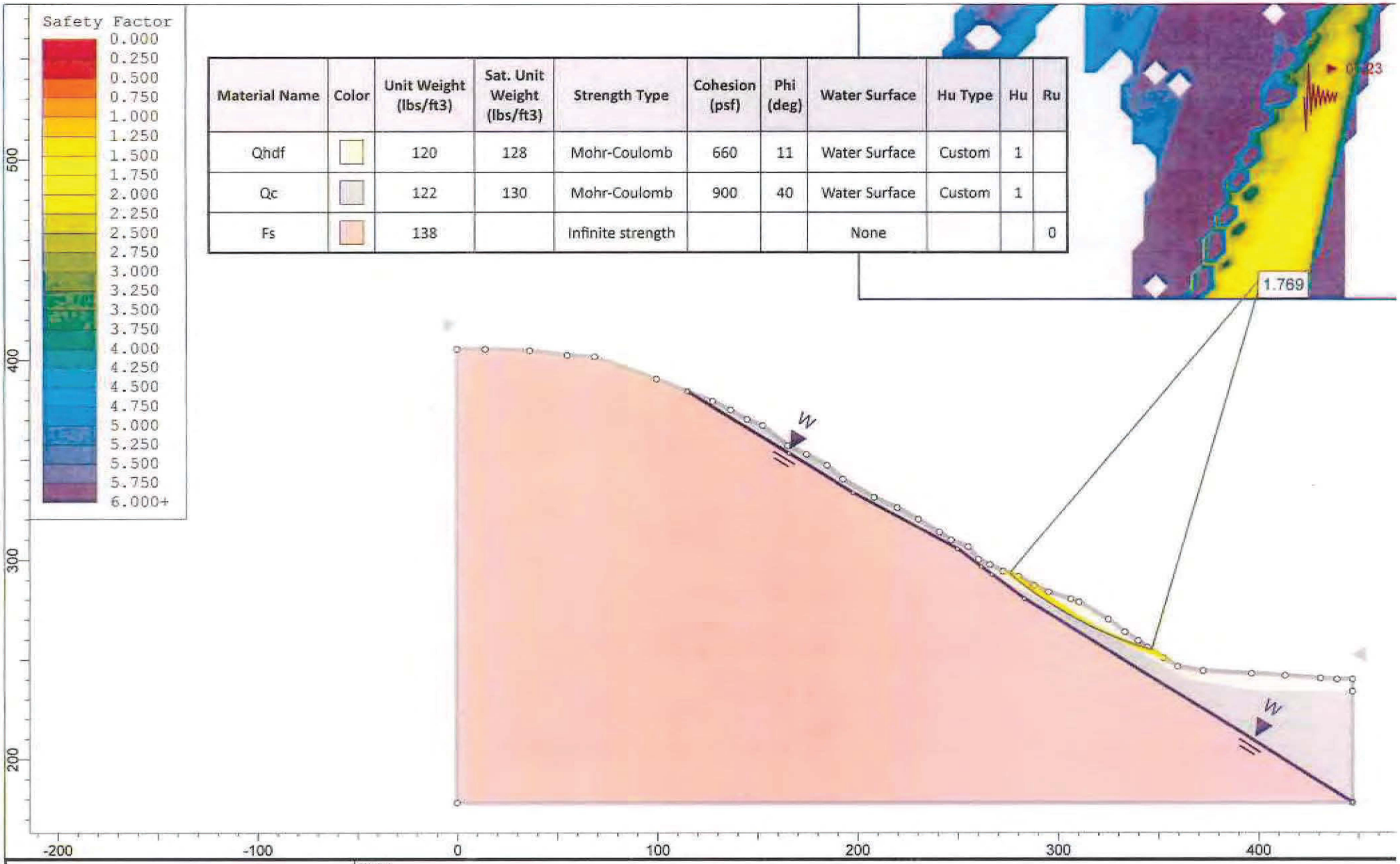


Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Qhdf		120	128	Mohr-Coulomb	660	11	Water Surface	Custom	1	
Qc		122	130	Mohr-Coulomb	900	40	Water Surface	Custom	1	
Fs		138		Infinite strength			None			0

Earth Systems Pacific

SLIDEINTERPRET 6.039

Project	Proposed Single Family Residence - 52 Franklin Avenue		
Analysis Description	A-A'		
Drawn By		Scale 1:800	Company
Date	6/7/2016, 11:15:02 AM		File Name Existing A-A static.slim

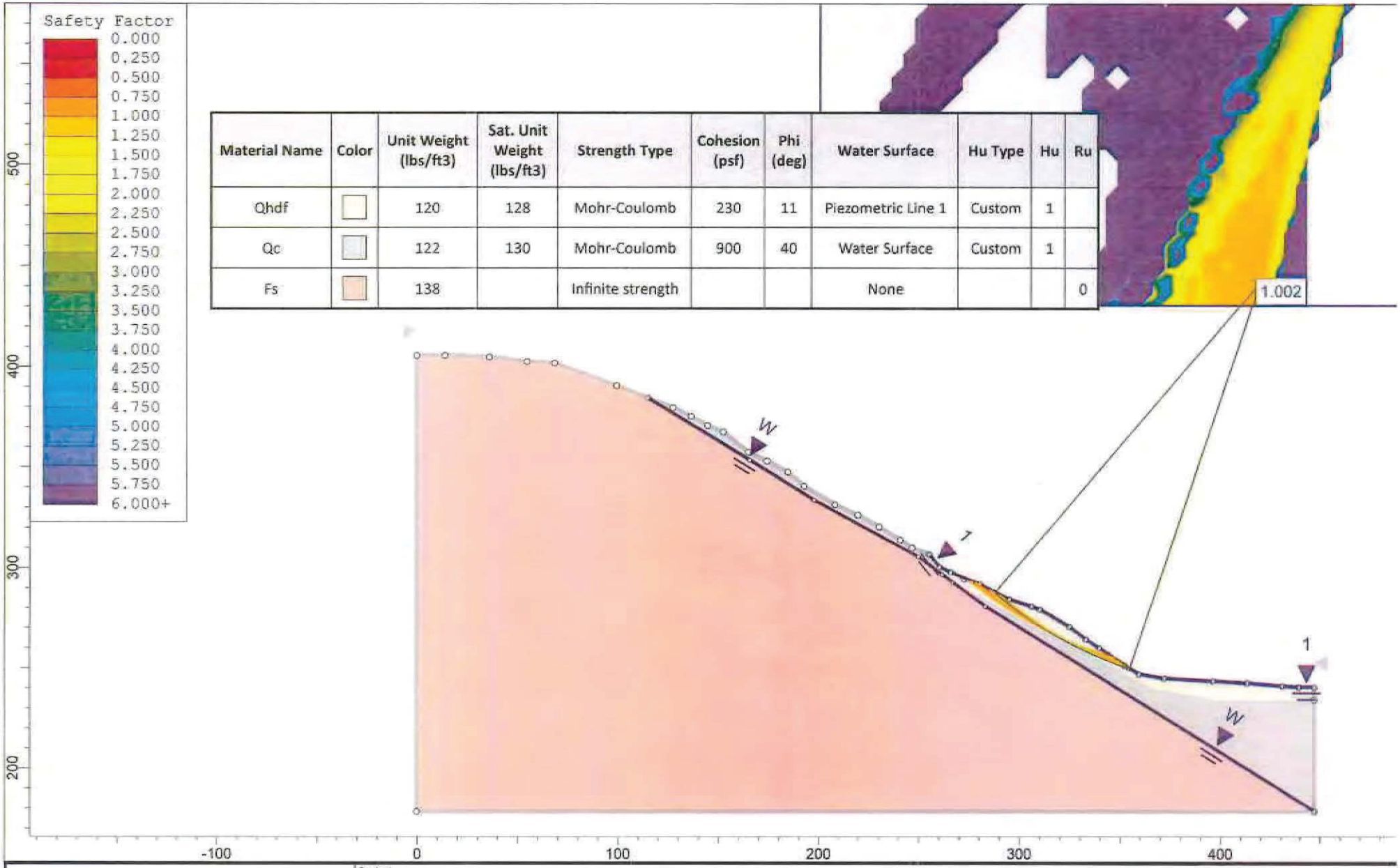


Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Qhdf		120	128	Mohr-Coulomb	660	11	Water Surface	Custom	1	
Qc		122	130	Mohr-Coulomb	900	40	Water Surface	Custom	1	
Fs		138		Infinite strength			None			0

Earth Systems Pacific

Project	Proposed Single Family Residence - 52 Franklin Avenue		
Analysis Description	A-A'		
Drawn By		Scale 1:800	Company
Date	6/7/2016, 11:15:02 AM		File Name Existing A-A dynamic.slim

SLIDEINTERPRET 6.039



Material Name	Color	Unit Weight (lbs/ft3)	Sat. Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type	Hu	Ru
Qhdf		120	128	Mohr-Coulomb	230	11	Piezometric Line 1	Custom	1	
Qc		122	130	Mohr-Coulomb	900	40	Water Surface	Custom	1	
Fs		138		Infinite strength			None			0

Earth Systems Pacific

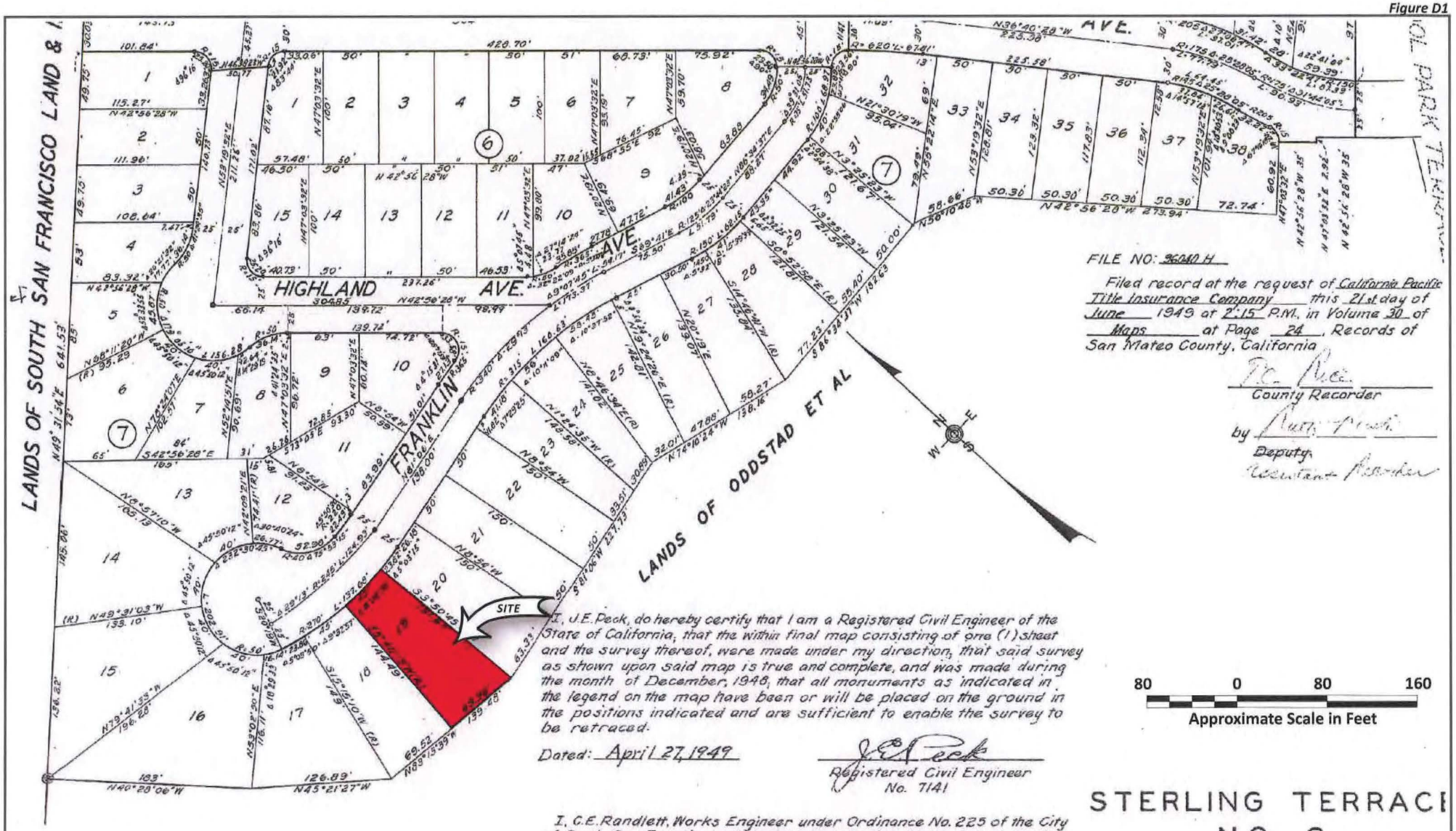
SLIDEINTERPRET 6.039

Project	Proposed Single Family Residence - 52 Franklin Avenue		
Analysis Description	A-A'		
Drawn By		Scale 1:800	Company
Date	6/7/2016, 11:15:02 AM		File Name Fully saturated A-A static.slim

APPENDIX D

Sterling Terrace Subdivision Map (1949)

Figure D1



Earth Systems Pacific	Proposed Single Family Residence 52 Franklin Avenue South San Francisco, California	Sterling Terrace Subdivision Map (1949) SH-13000-SA

APPENDIX E

Globe Soil Engineering Boring Logs (3)

GLOBE SOIL ENGINEERS	PROJECT NO: 960505
	LOCATION: 52 FRANKLIN AVENUE SOUTH SAN FRANCISCO
EXPLORATORY BORING LOG	DATE: 6/14/96
	BORING NO: 1

DRILL RIG: Portable Gas Auger	BORING DIAMETER: 4 Inch	LOGGED BY: WM
DEPTH TO GROUNDWATER: N/A	SURFACE ELEVATION: 250	CHECKED BY: ZN

DESCRIPTION AND CLASSIFICATION				SYMBOL	DEPTH (FEET)	SAMPLE	PENETRATN RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	DRY DENSITY (PCF)	SHEAR STRNGTH (KSF)
DESCRIPTION	COLOR	CONSIST.	SOIL TYPE							
CLAY, sandy with rock fragments and surface roots	Orange brown	Firm	CL				5	10	108	1.8 (UC)
SILT, with rock	light brown	Firm	ML		3		9	12		2.8 (P)
SANDSTONE	Gray brown	hard			6		39	12	118	
SANDSTONE	Gray	hard			12		69	14		
SANDSTONE weathered and. fractured. No caving No water Refusal	Gray	Med-hardness			16					
					20					

BOTTOM OF BORING = 18 FEET

GLOBE SOIL ENGINEERS	PROJECT NO: 960505
	LOCATION: 52 FRANKLIN AVENUE SOUTH SAN FRANCISCO
EXPLORATORY BORING LOG	DATE: 6/14/96
	BORING NO: 2

DRILL RIG: Portable Gas Auger	BORING DIAMETER: 4 Inch	LOGGED BY: WM
DEPTH TO GROUNDWATER: N/A	SURFACE ELEVATION: 250	CHECKED BY: ZN

DESCRIPTION AND CLASSIFICATION				SYMBOL	DEPTH (FEET)	SAMPLE	PENETRATN RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	DRY DENSITY (PCF)	SHEAR STRNGTH (KSF)
DESCRIPTION	COLOR	CONSIST.	SOIL TYPE							
SAND, silty with rock fragments and surface roots	Yellow brown	Soft	SM				4	11	106	2.6 (UC)
SILT, with rock	Light brown	Firm	ML		3		7	10		3.4 (P)
sedimetns decomposed.	Gray brown	Hard			6		40	15	116	
SEDIMENTS weathered	Gray brown	Soft-hardness			12		44	18		
SILTSTONE	Gray brown	Med-hardness			16			(MOISTURE)		
SANDSTONE No caving Refusal	Gray brown	Med-hardness			20		50	22	134	8.6 WET

BOTTOM OF BORING = 19 FEET

GLOBE SOIL ENGINEERS	PROJECT NO: 960505
	LOCATION: 52 FRANKLIN AVENUE SOUTH SAN FRANCISCO
EXPLORATORY BORING LOG	DATE: 6/14/96
	BORING NO: 3

DRILL RIG: Portable Gas Auger	BORING DIAMETER: 4 Inch	LOGGED BY: WM
DEPTH TO GROUNDWATER: N/A	SURFACE ELEVATION: 250	CHECKED BY: ZN

DESCRIPTION AND CLASSIFICATION				SYMBOL	DEPTH (FEET)	SAMPLE	PENETRATN RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	DRY DENSITY (PCF)	SHEAR STRNGTH (KSF)
DESCRIPTION	COLOR	CONSIST.	SOIL TYPE							
CLAY, sandy with rock fragments and surface roots	Yellow brown	Soft	CL				5	14	108	1.9 (UC)
SILT WITH ROCK	Light brown	Firm	ML		3		9	12		2.4 (P)
SEDIMENTARY LAYER decomposed. rhythmically bedded.	Gray brown	Hard	SM		6		36	14	116	
SEDIMENTS	Gray	Soft-hardness			12		39	19		
SANDSTONE No caving Refusal	Gray-brown	Med-hardness			16 20					

BOTTOM OF BORING = 20 FEET

UPDATED GEOLOGIC AND GEOTECHNICAL EVALUATION

Proposed Residence
52 Franklin Avenue
South San Francisco, California

Prepared for:
Mr. Tony Su
August 7, 2008

Michelucci & Associates, Inc.
Geotechnical Consultants

Joseph Michelucci, G.E.
Daniel S. Caldwell, G.E.
Richard Quarry

August 7, 2008
Job No. 06-3601

Mr. Tony Su
636 Alexis Circle
Daly City, CA 94014

Re: Updated Geologic and Geotechnical Evaluation
Proposed Residence
52 Franklin Avenue – South San Francisco, California

Dear Mr. Su:

As authorized, we have completed an additional evaluation at the site of the planned new residence located at 52 Franklin Avenue in South San Francisco, California. This report incorporates information included in previous investigations of the property as well as new subsurface information related to our updated study.

It is our basic conclusion that the project is feasible from a geotechnical viewpoint, provided that the recommendations contained in the accompanying report are incorporated into the final plans and followed during construction. It is important that the final plans include provisions for protecting the new residence from the potentially unstable soil that exists on the slope above the building pad.

We are pleased to have been of service to you on this project, and will be available to review our findings with you and your other consultants at the earliest convenience.

Very truly yours,
MICHELUCCI & ASSOCIATES, INC.

John Petroff
Staff Geologist

David F. Hoexter /cg
David F. Hoexter
Certified Engineering Geologist #1158
(expires 11/30/09)

Joseph Michelucci /cg
Joseph Michelucci
Geotechnical Engineer #593
(expires 3/31/09)

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UPDATED GEOLOGIC AND GEOTECHNICAL ENGINEERING INVESTIGATION

Proposed New Residence
52 Franklin Avenue
South San Francisco, California

INTRODUCTION

This report covers our updated investigation of the soil and bedrock conditions that occur at the site of the planned new residence at 52 Franklin Avenue in South San Francisco, California (Site Vicinity Map, Figure 1, and Regional Geologic Map, Figure 2). An overview of the property, which includes the approximate locations of the test borings performed in conjunction with this study as well as the borings excavated as part of our 1990 study, is shown on the attached Site Plan / Engineering Geologic Map, Figure 3.

The purpose of our study was to evaluate the soil and bedrock conditions that occur at the site, and to provide geotechnical recommendations and design criteria pertaining to building foundations, site grading, retaining walls, drainage, and other items that relate to the site soil and geologic conditions. This report incorporates information previously presented in our September 17, 1990 and July 29, 1992 reports as well as the documentation of discussions with reviewers for the city of South San Francisco that took place at the time of our previous studies. Data obtained from additional site visits and the extension of three additional soil borings are included as part of the current report.

DESCRIPTION OF PROJECT

The site is located on the south side of Franklin Avenue in South San Francisco, California. We understand that future development plans will call for the construction of a new residence, and possible construction of retaining walls to protect the residence from potentially unstable soil that exists on the hillside above the building pad. The extent of planned grading is currently unknown. In general, it will be necessary to stabilize apparent slump debris from the rear of the property, or protect the residence from the debris. It will also be necessary to consider the impact of possible future debris deposition onto the property, which could originate from the neighboring property to the west. Finally, the building pad for the new residence will also need to be cleared of an existing old residence foundation and then be graded flat for the new pad.

The planned development will be impacted by the presence of vegetation, which hosts the endangered Mission Blue Butterfly. This vegetation occurs on the slope above the planned residence at the location of an existing "peninsula / slump block" (see subsequent discussions). We understand that this habitat cannot be disturbed. Therefore, the planned stabilization methods will be limited, most likely to the construction of a retaining wall, or walls, as opposed to an earthwork solution.

SCOPE OF SERVICES

Our study included:

1. Detailed site inspections by our geotechnical personnel, conducted at various times between 1990 and 2008;

2. A review of our files for other projects our firm has completed in the site vicinity;

3. The review of a boundary, utility and topographic survey of the site, prepared by GL&A Civil Engineers, dated March 1990;

4. Discussions during the early 1990's with Mr. Burt Hardin, Senior Engineering Geologist of William Cotton and Associates, and with Mr. Richard Harmon, Senior Engineering Technician of the City of South San Francisco Engineering Department;

5. A review of available published geologic maps and literature;

6. Interpretation of stereo pair aerial photographs taken within airplanes at various times between 1938 and 2005;

7. A meeting at the site with Autumn Meisel, Associate Biologist with TRA Environmental Sciences, who approved the planned drilling locations with regard to the protected butterfly habitat;

8. The excavation of six exploratory test borings; three of the borings were excavated as part of our 1990 study, and three of the borings were excavated as part of the current study;

9. The recovery of samples from the borings, and the performance of a variety of engineering tests upon the various soil layers encountered;

10. The performance of geotechnical engineering analysis utilizing the above items; and,

11. The preparation of this report.

FIELD INVESTIGATION AND LABORATORY TESTS

In order to evaluate the geotechnical engineering characteristics of the soil and bedrock layers which underlie the site, six borings were drilled at the approximate locations indicated on the attached Figure 3. The initial borings were drilled on March 28, 1989, and the three subsequent borings were drilled during June and July 2008, with "Minuteman" power and 3-inch diameter hand augering and sampling equipment. Relatively undisturbed samples were recovered in thin brass tubes from the borings at selected intervals with a free-falling, 140-or 70-pound hammer (with a 30-inch drop) advancing modified California, and in some cases standard penetration, drive samplers 18 inches into the subsurface soil and rock layers. The brass tube encased samples were labeled in the field and carefully sealed to preserve their in-situ moisture content.

As the borings were excavated, logs of the materials encountered were prepared based upon an inspection of the recovered samples and auger cuttings. The final Boring Logs, as presented on the attached Figures 4 through 9, are based upon the field logs with occasional modifications made upon further laboratory examinations of the recovered samples and laboratory test results.

Laboratory tests were performed upon samples that were extruded from the brass tubes. These tests, which are useful in evaluation of the general strength properties of the materials tested, included the determinations of moisture content, dry density and unconfined compressive strength of selected samples. The results of these tests, along with the resistance to penetration of the sampler, are listed opposite the corresponding sample location on the final Boring Logs, Figures 4 through 9.

BACKGROUND

It is our understanding that the subject property was originally developed in approximately 1949 with a one-story, wood framed, single-family residence. Observations of the site and a review of low altitude aerial photographs suggest that a portion, or portions, of the property were affected by one or more debris flow landslides sometime during the 1950's. These flows did not, apparently, result in significant damage to the residence. In January of 1982, a debris flow landslide which originated upslope and to the south of the home (a different location than the initial flow) literally "pushed" the residence off its' foundation. The remaining building structure was subsequently removed. The two properties adjacent to the subject site were also reportedly impacted, although their associated structures were not destroyed.

In 1990, our firm was retained to conduct a geotechnical investigation of the site and provide geotechnical design criteria for construction of a new residence. Our findings were presented in a report entitled "Geotechnical Engineering Investigation, Proposed Development, 52 Franklin Avenue, South San Francisco, California," dated September 17, 1990. The report was prepared for another client and included geotechnical engineering recommendations for the proposed residential development.

In 1992 we prepared a supplemental engineering geologic investigation in response to questions included in a review letter prepared by William Cotton and Associates, dated December 12, 1991. The investigation included field mapping and air photo interpretation, but did not include further subsurface investigation.

Our 1992 report confirmed an area of potential slope instability along the rear of the property and discussed general alternatives, which addressed the rear slope. The investigation concluded that the site was suitable for the construction of a single-family residence and provided recommendations pertaining to improving slope stability and drainage where implemented.

SITE DESCRIPTION

The subject site is located on the south side of Franklin Avenue, approximately 250 feet west of Franklin's intersection with Larch Avenue in South San Francisco, California. The location of the site is shown on the attached Figures 1 and 2. Details of the site, including our engineering geologic observations, are shown on the attached Figure 3.

The property is located on the eastern edge of a broad northeast-trending draw. The proposed residence will be located on a split-level pad, with a gentle drainage gradient towards Franklin Avenue. The site steepens towards the rear (south) of the building pad, sloping upwards at an average inclination on the order of approximately 1-1/2 horizontal to 1 vertical. This slope is the result of a man-made cut, excavated to create room for the building pad and for other residences constructed along Franklin Avenue (as subsequently discussed in this report, the cut does not appear to have been extensive at the location of the subject property's rear slope). The cut surrounds the up-slope, southern and western sides of the residences on the southern side of Franklin Avenue.

A shallow 1- to 2-foot deep drainage swale or ditch is located at the southern end of the relatively level portion of the lot, along the base of the cutslope. The ditch appears to be earth-lined, although concrete may be present below a cover of soil. It appears that this ditch conveys surface water discharge from the slopes above the property, as well as to both the east and west.

A relatively level bench is located above the cut slope, apparently formed by cutting into the slope on the south, and placing a thin wedge of fill on the northern, downslope side. It appears that slope drainage was originally directed from both the east and the west, along the bench, and discharged on the subject property (note the subsequent discussion in the air photo interpretation section of this report). We were not able to field verify this observation, and there are no obvious indications of in- or out-let structures, pipes or drains on the slope. The bench cutslope is nearly vertical. South of and above the bench is a natural slope, which is inclined upward to the south at approximately 2 horizontal to 1 vertical. The bench appears to have been constructed in conjunction with excavation of the cut slope.

GEOLOGIC SETTING

The site is located within the central region of the Coast Ranges Geomorphic Province, which extends from the Oregon border south to the Transverse Ranges. The general topography is characterized by subparallel, northwest trending mountain ranges and intervening valleys. The region has undergone a complex geologic history of sedimentation, volcanic activity, folding, faulting, uplift and erosion.

The site vicinity is primarily underlain by sandstone and shale deposits of the Franciscan Assemblage (Bonilla, 1971). These Cretaceous-age rocks have been uplifted by tectonic forces, and have been partially eroded. The proposed residence is situated on the northern flank of an isolated hill, which is surrounded by a mantle of slope debris and other younger deposits. The regional geology at the site and vicinity is presented on Figure 2.

Bedrock deposits at the site consist primarily of variable fractured and weathered resistant sandstone, with interbedded shale. For the most part, the sandstone is massive where observed in the site vicinity, bedding orientations are variable, and not readily applicable to the site. Deposits of colluvium (slope debris) also occur in the immediate site vicinity. Colluvium commonly consists of an unconsolidated and unsorted mixture of soil and rock fragments derived from the underlying bedrock. It represents an accumulation of soil and rock debris by downslope creep, debris flow and slope wash activity. Colluvium usually thickens in a downslope direction. Man-made fill deposits occur locally. These materials are highly variable in consistency, origin and strength. Bedrock, colluvium and fill are discussed in a subsequent section of this report.

As discussed in our 1990 geotechnical investigation report, there are no indications of active faulting at the site or in the near-vicinity. The nearest active fault in the San Andreas, located approximately three miles to the southwest. Significant ground shaking from earthquakes on the San Andreas or other active faults in the San Francisco Bay Area should be anticipated in the future. This is a hazard shared to some degree by all parts of the Bay Area.

AERIAL PHOTOGRAPHIC INTERPRETATION

Twelve sets of aerial photographic stereo pairs of the site and surrounding area were reviewed at various times for this investigation. The photos reviewed were taken between 1938 and 2005. Six of the photo sets, 1938, 1955, 1958, 1977, 1989 and 2005, were interpreted in detail. The photos are referenced at the conclusion of this report.

The 1938 photos pre-date development of the site and vicinity. It is difficult to precisely locate the site on these relatively small-scale images, which also lack distinctive features (such as trees, roads, structures, etc.) in the immediate site vicinity. However, the site appears to be situated on the margin of a broad colluvial swale sloped down from the crest of "Sign Hill" on the south. There are indications of localized shallow soil slumping and flows, primarily in the center of the drainage. Bedrock outcrops are evident upslope of the site, indicating a relatively thin soil cover directly above the site.

The 1955 photos were taken approximately six years after the original residence was constructed. The Franklin Avenue "circle" has been constructed by excavating into the slope on the south and west and placing fill onto the northern slope. The cutslope south of (above) the subject building site appears relatively fresh (within five or six years old), and there were no slope failures on the subject property. The photos indicate that only minimal soil material was removed from the slope directly adjacent to the subject property, possibly on the order of 1 to 3 feet in thickness. Thus, there was minimum excavation of the slope at this location, as opposed to the more extensive excavation that was completed further west near the apex of the Franklin Avenue "circle".

The 1958 photos show a debris flow scar on the subject property. The scar is indicated on Figure 3 as "older debris flow (1955?)". This flow probably occurred during the unusually heavy storms of December 1955, subsequent to the May 1955 imagery described above. Although there is no debris visible, it is likely that the debris flow was deposited at the base of the slope, behind and/or against the 52 Franklin Avenue residence, and the adjacent eastern residence. The head of the flow is situated on the bench south of the proposed building site, at a similar setting to the subsequent 1982 flow. A well-defined erosion channel, which begins at the bench, flows across the "older slide". This channel appears to provide the only drainage outlet from the entire length of the bench.

Other, smaller failures, and numerous erosion rills, are also visible in the 1958 photos along the length of the cutslope below the bench. Much older slump or debris flow scars are visible along the slope south of the subject site, although none are directly upslope of the site.

The 1977 photos indicate that some additional erosion and shallow slumping had occurred along the cutslope and the bench. There are no indications of fresh, or new failures or slumping above the bench in the intervening period from 1958 to 1977. Although difficult to discern, it appears that discharge from the bench occurs by sheet flow through the older debris flow (1955?) scar.

The 1989 photo pair indicates the presence of additional erosion, slumps and flows on the cutslope west and south of the Franklin Avenue circle. In particular is the 1982 debris flow scar, on the slope at the southwest corner area of the subject property. There does not appear to have been any additional debris flow activity along the slope above the bench within the subject property. The 1982 scar is separated from the older debris floor (1955?) scar by a low ridge of previously existing soil (see Figure 3). The eroded head scarp areas of both the older and more recent debris flows continue across the apex (head) of the "peninsula / slump block," suggesting that it has moved laterally (down slope) a short distance. The 52 Franklin Avenue residence has been removed by the time this photo had been taken. There is a small debris slump/flow scarp on the slope above/south of the adjacent residence to the west (Lot 18). There is also a narrow erosion channel across the bench above the second western adjacent residence (Lot 17?), which discharges to a minor lower bench. This lower bench terminates at the location of the smaller debris slump/flow upslope of the adjacent western residence.

The 2000 and 2005 imagery indicate that the site has experienced little change since 1989.

ENGINEERING GEOLOGIC RECONNAISSANCE

Reconnaissance and engineering geologic mapping were initially conducted on May 12, 1992 by Herminio Delgado, our staff geologist at the time, and David F. Hoexter, Certified Engineering Geologist. Additional mapping was conducted on June 6, 2008 by John Petroff, current staff geologist, and Mr. Hoexter. Our observations are indicated on Figure 3. Although Figure 3 indicates only the immediate vicinity of the property, our reconnaissance included a larger area, particularly upslope and laterally from the site. Figure 1 includes locations of observed rock outcrops and approximate locations of old slump or flow features on the slope in the vicinity of the site. There did not appear to be significant changes based on our current (2008) site observations from those made during our 1990 and 1992 field investigations.

At the time of our reconnaissance, the site was vacant. The building pad and lower slope were covered with a growth of seasonal grasses. The slope above the bench was also covered by grasses and other dense vegetation.

The two debris flow scars previously described were clearly evident in the field, and are shown on Figure 3. Each of the debris flows was irregular in shape, with an average head scarp height of 10 feet and a maximum height of approximately 12 feet. Based on our aerial photographic interpretation, the eastern flow occurred between 1938 and 1958; the western flow is documented to have occurred in 1982. The two flows are separated by a small "peninsula" of soil and highly weathered rock, which appeared to be in-place, but may have slumped a few feet downslope (see air photo interpretation discussion). Indication that this "peninsula / slump block" has moved laterally include a subtle "graben" or depression upslope of our boring B-4 and an oversteepened slope downslope of our boring B-5. These features were not clearly delineated on the 1990 site plan used as a base for our investigation, although we have shown the graben area based on our visual observations. Although a wedge-shaped deposit of artificial fill was clearly visible along the down-slope side of portions of the bench, we did not observe obvious indications of more than one 1 or 2 feet of fill on the subject property. Thus, we have not delineated the fill as a separate unit, and have included the fill with colluvium on our Site Plan / Engineering Geologic Map, Figure 3.

It should be noted that the 1982 debris flow heads on adjacent properties to the south and west of the subject property. Only approximately one-third of the debris flow volume from this event originated on the subject property.

Colluvium was observed where it had not been eroded by debris flows or grading. The colluvium was variably loose to stiff, and consisted of sandy clay and sandy silt, with abundant rock fragments. Underlying the colluvium, we observed stiff to very stiff, weathered residual soil derived from sandstone. This material was encountered in our 1989 Boring 1, which was located within the 1982 debris flow scar.

Weathered sandstone bedrock was observed at several locations within the flow scars, as well as below the scars and on the cut to the east of the property. Sandstone was also observed in the cut above the bench. The sandstone is variable in degree of fracturing and weathering, from closely fractures and highly weathered, to massive and slightly weathered. Particularly on the east side of the property, and further to the east, the sandstone appears to be more highly cemented, and thus more resistant to weathering. The sandstone was generally medium grained and tan in color.

The slope above the bench and subject property is relatively uniform. As shown on Figure 1, we did not observe indications of debris flows directly above the property. Old debris flow/slump scars of relatively limited lateral extent, which based on our interpretation of the air photos, pre-date 1955, were observed at various locations to both the southeast and southwest. Sandstone outcrops were noted in both the bench cut, mid-slope, and near the crest of the ridge, up-slope from the site.

There were no definitive indications of ground water conditions other than isolated pampas grass on the building pad. The occurrence of pampas grass often indicates a high groundwater table or an area of seepage. At this location, however, the pampas grass probably indicates poor drainage, as much of the surface runoff from slope to the south appears to be directed towards the pad. Groundwater was not observed at the time of drilling of our March 1989 and June 2008 exploratory borings, and there were no indications of springs or seeps at the time of our reconnaissance.

SOIL AND BEDROCK CONDITIONS

The soil and bedrock conditions observed in Borings 2 and 3 within the proposed building area consisted generally of a surface soil layer of orange-brown sandy clay with rock fragments. The upper one to two feet of this layer was of moderate density and strength, and has probably been disturbed by the previous development. This layer, which increased in strength with depth, graded into weathered sandstone bedrock.

The materials that compose the slope at the rear of the site consist generally of stiff to very stiff residual soils (weathering products of the underlying sandstone) that grade into dense sandstone bedrock. Boring 1, within the 1982 debris flow, encountered approximately 5-1/2 feet of stiff to very stiff sandy clay with sandstone fragments, which we interpret as highly weathered sandstone/residual soil. This material was underlain by very stiff to hard weathered sandstone. It appears that most of the weak soil deposits that failed in 1982 have been removed. A loose to medium stiff dark brown to black sandy clay with abundant rock fragments colluvial soil mantle exists within the head scarp of the 1982 debris flow. However, some potentially unstable soil deposits are still present on the slope, primarily above the neighboring properties to the east and west.

Borings 4 and 5 were excavated along the crest of the soil peninsula / slump block, which divides the two debris/slope failures (Figure 3). The borings encountered approximately 3-1/2 to 4 feet of medium stiff to stiff fine sandy clayey silt with sandstone fragments. Boring 4 encountered 2 feet of similar residual soil although lighter in color and stronger material. Each boring encountered sandstone bedrock, at depths of 6 feet in Boring 4 and 3-1/2 feet in Boring 5. There were no definitive indications (slickensides, crushed or sheared zones) of the basal peninsula / slump block shear plane. Our interpretation of the likely basal shear plane is shown on the Typical Profile, Figure 10.

Boring 6 was excavated adjacent to the northernmost property line of the subject site and encountered approximately 1 foot of weak artificial fill consisting of brown silty fine sandy clay with concrete and brick fragments. The fill was underlain by colluvium/residual soil consisting of stiff to very stiff yellowish brown fine sandy clay, similar to the near surface soil encountered in Borings 2 and 3.

Sandstone outcroppings were observed within the side- and head-scarp areas of both the pre-1955 and the 1982 flows. Sandstone was also observed on the slope above the site as well as the cutslope immediately above the adjacent property to the east.

Groundwater was not encountered in any of the borings at the time of drilling. However, groundwater levels tend to fluctuate seasonally and could rise in the future. As noted, a significant amount of seepage was affecting the level building pad area in April 1989. The seepage was probably due to a combination of water spilling from the earth-lined drainage channel at the base of the slope, and to recent rainfall. The site was relatively dry in August and September 1990 and June 2008.

A plan of the general site features is included on Figure 3. For a more complete description of the soil layers encountered in the borings, refer to the final Boring Logs included as Figures 4 through 9. A profile of the site is shown on Figure 10.

DISCUSSION

(The following discussion of the Engineering Geologic Evaluation of the property has been formulated in order to respond to the issues raised by William Cotton and Associates, December 12, 1991 letter. For review purposes, the following sections have been formatted to respond to the letter in an orderly fashion. For reference, the aforementioned letter has been appended to the end of this report.)

A. Landslide Map

Two maps noting the presence of the site engineering geologic features were prepared in conjunction with this study. Off-site old slump and flow features as well as observed rock outcroppings are presented on the Site Vicinity and Regional Geologic Maps, Figures 1 and 2, respectively. A Site Plan / Engineering Geologic Map (Figure 3) was prepared for the on-site property features. The map includes approximations for the older (1955?) and the 1982 debris flows and also includes apparent site drainage features.

B. Landslide Debris Volume Calculations

Introduction

Although the precise mechanism for mobilization of the previous debris flows is not known, the probable mechanism involved the channeling of storm surface runoff onto the bench, and discharge of the water onto the head of the debris flow sites. This water would have saturated the soil, causing it to loose strength and flow downslope as a viscous fluid.

Based on our field mapping and air photo interpretation, it appears that past debris flow activity on the site has been limited to the cut slope below and including the bench. Debris flows do not appear to have originated on the natural slope directly above the proposed residence.

Although much of the material that is potentially subject to mobilization has been removed from the slope, debris flows or slumps originating from two locations could still occur. These locations are the small peninsula / slump block of colluvium and weathered, residual rock, located between the two debris flow scars, and the area west of the 1982 flow, downslope of the bench and within the slope cut.

The relatively small volume of material remaining between the two previous flows is not as likely to mobilize as the two previous failures, because it is not likely to receive the large volume of concentrated water flow which contributed to the previous flows. However, this small "peninsula" of material may have slumped several feet sometime following the 1955 debris flow, and thus further movement is possible. If it does mobilize, it is unlikely to present a significant hazard to the proposed structure, due to its relatively small volume. Nevertheless, it may be prudent to mitigate the relatively small hazard represented by this material.

The slope immediately west of the 1982 debris flow is entirely located on neighboring properties. If it becomes saturated in a similar manner to the 1982 on-site failure area, it is likely to fail, also as a debris flow. A small debris slump/flow occurred on the western adjacent Lot 18 in 1982. The material will flow towards the rear of the adjacent Lot 18, but much of the volume may be deflected toward the subject property (Lot 19, 52 Franklin Avenue). At Lot 19, the flow velocity will be reduced; the material will nevertheless represent a hazard to any proposed development.

Debris Volume Calculations

Based on the 1990 topographic survey, and using dimensions of approximately 10 feet wide, 42 feet long, and 6 feet high, we estimate the volume of the peninsula / slump block material to be on the order of 95 cubic yards. We would anticipate complete (100 percent) failure of this material for estimation purposes. Thus, we will recommend that this material be removed or provision be made to protect the future residence (perhaps retaining walls).

It is more difficult to estimate the potential failure volume of the material situated west of the 1982 debris flow scar. Assuming a flow path approximately perpendicular to the slope, most of this material, which is located on the property west of the subject site, would be deposited at the rear of the adjacent, property, Lot 18, to the west. This lot is situated at a higher elevation than the proposed Lot 19 residence, and thus some of this material might flow further downslope onto the subject site. Flow velocity of this material would thus most likely be significantly reduced by the time the material reaches Lot 19. We assume that the dimensions of the potential debris flow would be similar to those of the 1982 flow, particularly because any failure of the slope further to the west would most likely be retained by structures to the west, including those on Lots 18 and 17.

Thus, we estimate the total volume of material to be about 440 cubic yards, based on dimensions of 40 feet wide, 50 feet long, and 6 feet thick. We would conservatively estimate that 50 percent, approximately 220 cubic yards of this material, could potentially impact the subject site. Although this material would be directed against the residence, much of the mass would continue to flow past the structure along the rear (south) side, in the backyard area. Thus, we will recommend that the structure be designed to resist both the force of impact as well as any retained material.

CONCLUSIONS

Based upon our study, it is our opinion that the project can be developed as planned, provided that the recommendations contained within this report are followed. The primary geotechnical considerations will include the peninsula / slump block area and the slope west of the 1982 debris flow scar.

In our opinion, from an engineering viewpoint, by far the best approach to help stabilize the site from future potential instability would involve removal of the peninsula / slump block area exposing strong soil and/or bedrock. If this were done, the potential for the slump block to affect future development would be removed. It is our understanding, however, that environmental concerns may preclude removal of this feature. We understand that sensitive vegetation is growing at this location that may not be allowed to be disturbed. Therefore, consideration will have to be given to constructing some sort of a strong retaining/barricade wall that could retain material from this feature in the future as it attempts to move down slope.

The scar of the1982 debris flow and potential soil from future flows that originate from off-site sources to the west also need to be considered. If there were no property line considerations, regrading operations could mitigate these features, or some sort of a wall complex system could be constructed. Unfortunately, due to the environmental concerns and due to the fact that portions of these features are on adjacent properties, such construction would prove to be impractical unless total cooperation could be gained from the neighbors.

Therefore, in order to mitigate the potential that off-site debris flows could impose upon the new development, we recommend that a retaining wall or walls, possibly in conjunction with a wall to buttress the peninsula / slump block, be constructed. Care however should be taken when the design of such walls are undertaken to ensure that they are constructed such that the walls would not tend to deflect or divert future flows to off-site neighboring properties. Therefore, some sort of a reservoir approach with walls shaped to accept rather than deflect debris should be considered. The civil engineer should evaluate the potential volume of material that could migrate down the slope and design such wall protection systems accordingly.

Finally, due to the fact that some soil could migrate over the future deflection/protection wall systems, we will recommend that the rear wall of the subject residence be designed to act as a retaining wall capable of withstanding future impact and long term soil loading forces.

In the case of the future residence, it will be recommended that the structure be supported upon drilled reinforced concrete piers that extend into the underlying strong soil and/or bedrock.

It is our intent that the recommendations contained in the following section should provide that the new residence will be resistant to any earth movement associated with shallow, fast moving landslides that could occur from upslope properties. Our recommendations are not aimed at preventing such movement but rather minimizing its affect upon future site improvements.

Specific recommendations follow.

RECOMMENDATIONS

The following recommendations are contingent upon our firm being retained to review the development plans and to observe the geotechnical aspects of construction.

A. Seismic Criteria Per 2007 CBC

As of January 1, 2008, the 2007 CBC is being utilized for projects in California. This new code is based upon the 2006 International Building Code.

It is our opinion that the subject site can be classified as Site Class "C" (a very dense soil and soft rock profile) for the purpose of structural engineering calculations as defined in Section 1613 of the 2007 CBC.

In accordance with Section 1613.5.1, mapped spectral response acceleration parameters "S_S" and "S_1" can be determined using the latitude and longitude coordinates of the site (in this case, latitude 37.6651 and longitude -122.4159). An "S_S" of 1.901 and an "S_1" of 0.993 can be used in the design. From Tables 1613.5.3(1) and 1613.5.3(2) of the 2007 CBC, Site Coefficients "Fa" and "Fv" of 1.0 and 1.3, respectively, can be used for an "S_S" value of 1.901, an "S_1" value of 0.993 and a Site Class of "C".

B. Grading

In general, all site flatwork and future slab-on-grade construction should be supported upon a layer of compacted select engineered fill. The engineered fill should be placed upon strong undisturbed soil that occurs below any slide debris, fill, weak naturally occurring soil or foundations associated with previous site improvements. As a minimum, all existing foundations, soil disturbed by the foundation removal, brush, trees, and the roots system should be overexcavated and removed. Level benches should be excavated in any areas that are to receive future slabs-on-grade, garage slabs or other structural features. The overexcavation should remove the weak material as described above and expose strong residual soil or bedrock. At this level, the soil should be scarified, mixed with water or aerated to promote proper compaction, and then compacted to a minimum degree of 90 percent based upon ASTM D 1557. Select nonexpansive fill having of a plasticity index of 8 or less could then be imported to the site, placed in thin lifts, mixed with water or aerated as necessary and compacted to a minimum degree of 95 percent based upon ASTM D 1557.

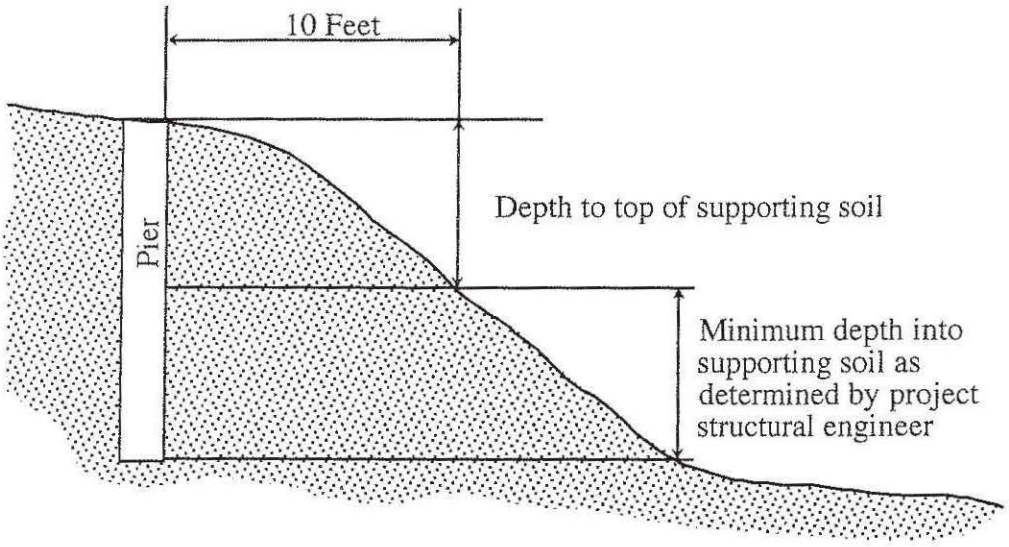
As discussed in the conclusions section of this report, from an engineering viewpoint it is recommended that the peninsula / slump block be removed exposing residual soil and/or bedrock. It is also recommended that any overgrown over-steepened areas also be trimmed back to more stable inclinations. We, however, understand that such recommendations may not be allowed due to the fact that sensitive vegetation is growing in these areas. If such excavations are not allowed, it is recommended that a wall, or a series of retaining walls, be constructed to retain the material from the slump block / peninsula and former 1982 debris flow that could affect the lower property areas. Such a wall system should be designed by a civil or structural engineer. The system should be designed with a configuration that would not deflect debris onto adjacent properties.

C. Foundations

In our opinion, the proposed residence should be constructed upon drilled, cast-in-place, reinforced concrete pier and grade beam foundations.

Drilled piers should be designed on the basis of a skin friction value of 500 psf beginning at the top of supporting material. In this case, the top of supporting material should be assumed to begin at a depth of 4 feet below grade or as defined by the "Rule of Ten" criteria illustrated below, whichever is deeper. The depth may be modified by our representative during construction, especially if very dense bedrock areas are encountered.

DRILLED PIER FOUNDATIONS



Piers depths should be based upon actual design loads. However, as a minimum, the piers should extend 8 feet below the top of supporting material. Therefore, it is anticipated that average pier depths will be on the order of at least 12 feet below existing grade.

Reinforcing for the piers should be determined by the structural engineer based upon anticipated loading.

It is further recommended that the uphill wall of the future residence be designed as a retaining wall capable of holding back at least 4 feet of soil.

D. Retaining Walls

It is recommended that retaining walls be constructed upon the slope in order to mitigate the potential for the former peninsula / slump block and debris flow areas from impacting the site of the future residence. The retaining wall should be deigned in accordance with the equivalent fluid pressures presented below. It is also recommended that the retaining walls have a reservoir free-board height equal to at least 3 feet (or deeper if it is determined by the civil engineer that additional reservoir capacity is required to capture upslope soil). It should be noted that as material accumulates behind the wall, future maintenance will likely be necessary to allow for future reservoir capacity.

Retaining walls should be constructed upon foundations designed in accordance with Section C above. All retaining walls should be designed to resist the active equivalent fluid pressures tabulated below.

WALL BACKSLOPE INCLINATION (H:V)	EQUIVALENT FLUID PRESSURE (pcf)
Level	60
4h: 1v	70
3h: 1v	75
2h: 1v	80

When walls are to be rigidly restrained from rotation, a uniform surcharge pressure of 100 psf should be added to the design values. Interpolation can be used to determine pressures for intermediate inclinations.

Passive resistance can begin at the top of supporting material, as defined above, and can be taken as a value of 350 pcf. This value can be projected over 2 pier diameters.

It is important that adequate subdrainage be constructed behind retaining walls. We have included a Typical Subdrain Detail on Figure 11. In addition, moisture proofing should be provided in areas where moisture migration through retaining walls would be undesirable.

E. Slab-On-Grade Construction

It is anticipated that the only slab-on-grade construction will be for the garage floor. The slabs should be reinforced with steel bars and cast upon engineered fill as described is the grading section. It is recommended that some type of moisture retardant be provided beneath the slabs. We have included a commonly used treatment on the attached Figure 12.

F. Surface Drainage

We recommend that the site be fine-graded to direct water to flow away from the building foundations. As a general requirement, storm water should not be allowed to pond or flow in concentrated streams or channels on the site. Such ponding or flows and the resulting saturation can weaken the soils and perhaps cause some minor site erosion.

It is further recommended that all roof downspouts be led into tightline disposal pipes that deposit water well away from building foundations and into a suitable disposal area.

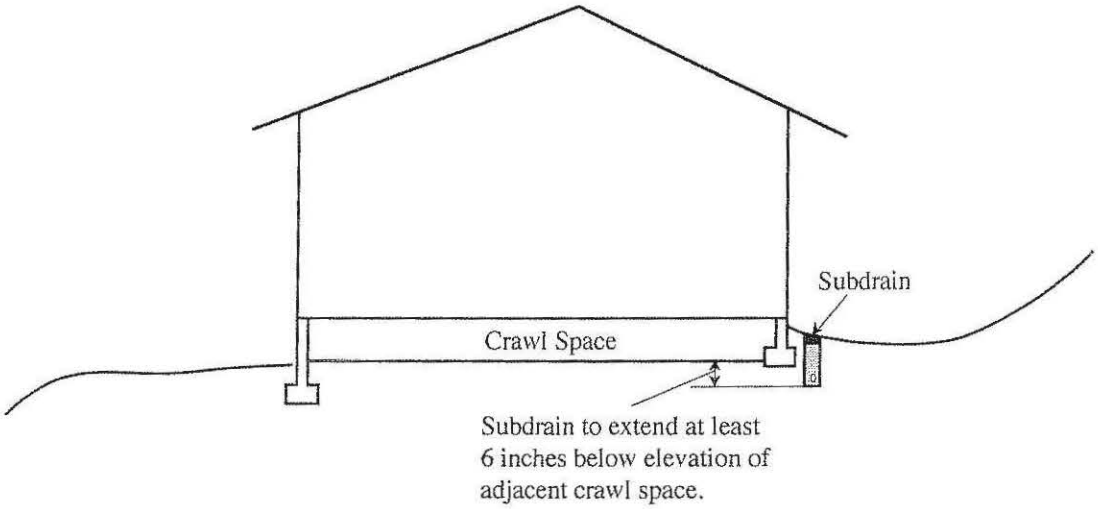
It is important that the civil engineer evaluate the surface drainage on the slope above the building area. In this area, a series of v-ditches and old roadways traverse the site and adjacent properties. It is important that water flow be allowed to proceed as it did prior to any of the former debris flows, and it will be important that the civil engineer evaluate the overall drainage conditions for the hillside.

G. Subdrainage

As noted, subdrainage should be constructed behind retaining walls as illustrated on Figure 11.

In order to mitigate the potential for water to seep into the building "crawl areas", it is also suggested that a foundation drain be constructed along the uphill side of the structures as is illustrated below. If the uphill foundation wall is a retaining wall, the wall subdrain will serve this purpose.

FOUNDATION SUBDRAIN AT UPHILL SIDES OF STRUCTURE



The above subdrain should be constructed in accordance with the specifications for retaining wall subdrainage included on Figure 11. In our opinion, it would also be prudent to construct an "outlet" through the footing or grade beam at a low point within the crawl space. Such an outlet would allow any moisture that entered the subfloor area to be dissipated.

H. Review of Plans and Construction Observations

It is recommended that all of the plans related to our recommendations be submitted to our office for review. The purpose of our review will be to verify that our recommendations are understood and reflected on the plans, and to allow us to provide supplemental recommendations, if necessary.

It is important that we be retained to provide observation and testing services during construction. Our observations and tests will allow us to verify that the materials encountered are consistent with those found during our study, and will allow us to provide supplemental, on-site recommendations, as necessary.

LIMITATIONS

The conclusions and opinions expressed in this report are based upon the exploratory borings that were drilled on the site, spaced as shown on the Site Plan / Engineering Geologic Map, Figure 3. While in our opinion these borings adequately disclose the soil conditions across the site, the possibility exists that abnormalities or changes in the soil conditions, which were not discovered by this investigation, could occur between borings.

This study was not intended to disclose the locations of any existing utilities, septic tanks, leaching fields, hazardous wastes, or other buried structures. The contractor or other people should locate these items, if necessary.

The passage of time may result in significant changes in technology, economic conditions, or site variations that could render this report inaccurate. Accordingly, neither Mr. Tony Sun nor any other party shall rely on the information or conclusions contained in this report after 12 months from its date of issuance without the express written consent of Michelucci & Associates, Inc. Reliance on this report after such period of time shall be at the user's sole risk. Should Michelucci & Associates, Inc. be required to review the report after 12 months from its date of issuance, Michelucci & Associates, Inc. shall be entitled to additional compensation at then-existing rates or such other terms as may be agreed upon between Michelucci & Associates, Inc. and Mr. Tony Su.

This report was prepared to provide engineering opinions and recommendations only. It should not be construed to be any type of guarantee or insurance.

REFERENCES

Air Photos

Pacific Aerial Surveys, Oakland, California, black and white vertical stereo pairs.

PAS-AV-	08-05-15/16	3/31/38	1:23,000
	170-17/18	5/5/55	1:10,000
	279-8-23/24	4/23/58	1:7,200
	1356-6-14/15	6/2/77	1:12,000
	3556-5-18/19	5/30/89	1:12,000
	9010-72-8/9	3/11/05	1:10,000

Reports and Publications

Bonilla, M.G, 1971, "Preliminary Geologic Map of the San Francisco South Quadrangle and Part of the Hunters Point Quadrangle, California", USGS Miscellaneous Field Studies Map MF-311, Scale 1:24,000.

William Cotton and Associates, 1991, "Preliminary Geologic and Geotechnical Review, Murphy New Residence, 52 Franklin Avenue", letter dated December 12, 1991.

GL & A Civil Engineers, 1990, "Boundary, Utility & Topographic Survey of Lot 19, Block 7, Sterling Terrace No 2, South San Francisco, California", March, 1990, Scale 1/8" = 1'-0".

Leighton Associates, 1976, "Geotechnical Hazard Synthesis Map, San Mateo County, California", Planning Department, San Mateo County, California, Scale 1:24,000.

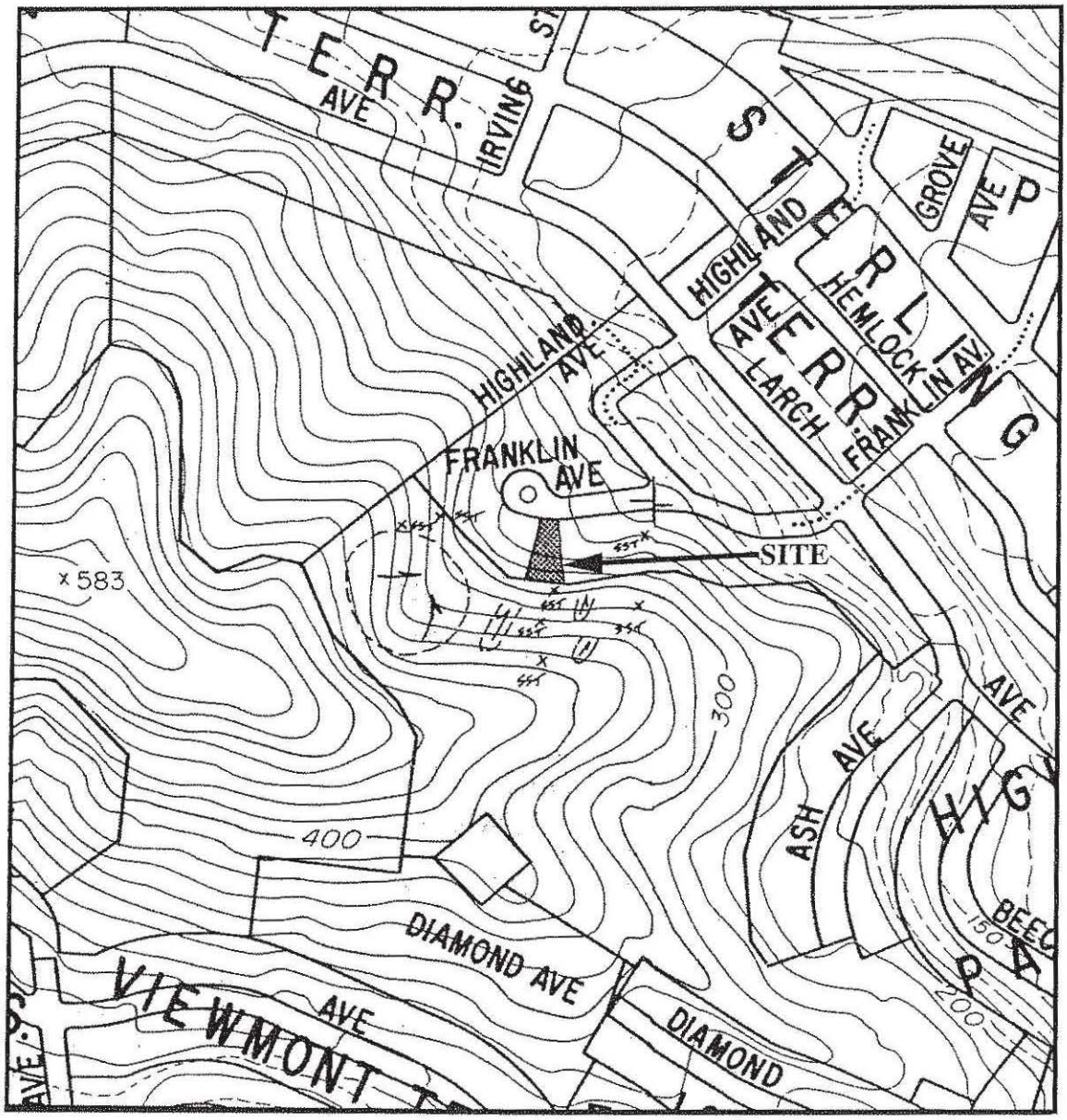
Michelucci & Associates, 1990, "Geotechnical Engineering Investigation, Proposed Development, 52 Franklin Avenue, South San Francisco, California", report dated September 17, 1990.

....., 1992, "Supplemental Engineering Geologic Evaluation, Proposed Residence, 52 Franklin Avenue, South san Francisco, California", report dated July 29, 2002.

SITE VICINITY MAP*

52 Franklin Avenue

South San Francisco, California



EXPLANATION

- x sst — SANDSTONE BEDROCK OUTCROP
- DEBRIS FLOW (APPROXIMATELY LOCATED)
- SITE

0 400' 800'

Scale

*BASE MAP FROM COUNTY OF SAN MATEO CADASTRAL TOPOGRAPHIC SERIES, SHEETS 3C AND 3D, 1973 (BOTH REVISED 1-1-86).

Job No. **06-3601**	Michelucci & Associates, Inc.	Figure **1**

REGIONAL GEOLOGIC MAP*

52 Franklin Avenue
South San Francisco, California



EXPLANATION

Qaf ARTIFICIAL FILL
Qsr SLOPE DEBRIS AND RAVINE FILL
KJc FRANCISCAN FORMATION CHERT
KJs FRANCISCAN FORMATION SANDSTONE AND SHALE

0 2000' 4000'
Scale

*BASE MAP FROM BONILLA, M. G., 1971.

Job No. **06-3601**	Michelucci & Associates, Inc.	Figure **2**

PROJECT 52 FRANKLIN AVENUE, SOUTH SAN FRANCISCO | **BORING NO.** 1

BORING SUPERVISOR L.S. | TYPE OF BORING: Continuous Sample | DATE OF BORING: 3/28/89

HAMMER WEIGHT 140# / 30" Drop

SURFACE ELEVATION

GROUNDWATER DEPTH: 3/28/89 — Dry

DESCRIPTION OF MATERIALS	DEPTH IN FT.	SAMPLE	SAMPLE NUMBER – SAMPLE DIAMETER	DRIVING RESISTANCE BLOWS PER FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSIVE STRENGTH P.S.F.	OTHER TESTS
Stiff to very stiff orange brown very sandy clay with sandstone fragments			1) 2.5"	15	115	15	1750	
			2) 2.5"	35	113	15	3400	
			3) 2"	36	121	12	4600	
	5		4) 2"	49	116	15	5800	
Very stiff to hard orange brown sandy clay to clayey sand - weathered sandstone			5) 1-5/8	52				
Very dense orange brown sandstone			6) 1-5/8	50/5"				
Bottom of boring at 8'	10							
	15							
	20							
	25							
	30							

Job No. 06-3601 | MICHELUCCI & ASSOCIATES | Figure 4

PROJECT 52 FRANKLIN AVENUE, SOUTH SAN FRANCISCO | **BORING NO.** 2

BORING SUPERVISOR L.S. | TYPE OF BORING Minuteman | DATE OF BORING 3/28/89

HAMMER WEIGHT 140# / 30" Drop

SURFACE ELEVATION

GROUNDWATER DEPTH 3/28/89 Dry

DESCRIPTION OF MATERIALS	DEPTH IN FT.	SAMPLE	SAMPLE NUMBER – SAMPLE DIAMETER	DRIVING RESISTANCE BLOWS PER FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSIVE STRENGTH P.S.F.	OTHER TESTS
Stiff to very stiff orange brown sandy clay with sandstone fragments			1) 2"	14				
			2) 2"	27	112	17	5350	
	5		3) 2"	33	116	15	5750	
Very stiff yellow orange brown sandy clay to clayey sand - weathered sandstone	10		4) 2"	39	119	15	5150	
Bottom of boring at 12.5'	15							
	20							
	25							
	30							

Job No. 06-3601 | MICHELUCCI & ASSOCIATES | Figure 5

PROJECT 52 FRANKLIN AVENUE, SOUTH SAN FRANCISCO | **BORING NO.** 3

BORING SUPERVISOR L.S.

TYPE OF BORING: Minuteman

DATE OF BORING: 3/28/89

HAMMER WEIGHT 140# / 30" Drop

SURFACE ELEVATION

GROUNDWATER DEPTH: 3/28/89 — Dry

DESCRIPTION OF MATERIALS	DEPTH IN FT.	SAMPLE	SAMPLE NUMBER – SAMPLE DIAMETER	DRIVING RESISTANCE BLOWS PER FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSIVE STRENGTH P.S.F.	OTHER TESTS
Moist medium stiff to stiff grey brown sandy clay with roots and sandstone fragments			1) 2"	10	107	18	2250	
Very stiff below 2'	5		2) 2"	44	118	15	11500	
Very stiff to hard orange brown sandy clay to clayey sand - weathered sandstone			3) 2"	66	120	12	10700	
Bottom of boring at 6.5'	10							
	15							
	20							
	25							
	30							

Job No. 06-3601 | MICHELUCCI & ASSOCIATES | Figure 6

PROJECT	52 Franklin Avenue, South San Francisco, California	BORING NO. 4
BORING SUPERVISOR	JP	TYPE OF BORING: 3.5" Auger (Minuteman)
HAMMER WEIGHT	140-lb. hammer, 30-inch drop	DATE OF BORING: 6-11-08
SURFACE ELEVATION	---	
GROUNDWATER DEPTH	6-11-08: Dry	

DESCRIPTION OF MATERIALS	DEPTH IN FT.	SAMPLE	SAMPLE NUMBER-SAMPLE DIAMETER	DRIVING RESISTANCE BLOWS PER FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSIVE STRENGTH P.S.F.	OTHER TESTS
Medium stiff, dark olive brown to very dark grayish brown, abundantly fine sandy clayey silt with sandstone fragments and rootlets, dry to slightly damp			1) 2.5"	18	---	--	----	
			2) 2.5"	36	---	--	----	
Stiff, olive brown to light olive brown, abundantly fine sandy clayey silt with weathered sandstone fragments and rootlets, dry	5		3) 2"	43	111	6	----	
(Residual Soil)			4) 2"	101	122	7	3,040	
Very dense, yellowish brown to brownish yellow, deeply weathered silty clayey fine sandstone with strong brown staining, slightly damp			5) spt*	56	---	--	----	
(Weathered Bedrock)	10		6) spt*	50/4"	---	--	----	
-decrease in silt and clay content with depth								
Boring terminated at 9 feet 10 inches								
* spt denotes Standard Penetration Test	15							
	20							
	25							
	30							
	35							

Job No. **06-3601**

Michelucci & Associates, Inc.

Figure 7

PROJECT	52 Franklin Avenue, South San Francisco, California		BORING NO. 5
BORING SUPERVISOR	JP	TYPE OF BORING 3.5" Auger (Minuteman)	DATE OF BORING 6-11-08
HAMMER WEIGHT	140-lb. hammer, 30-inch drop		
SURFACE ELEVATION	---		
GROUNDWATER DEPTH	6-11-08 / Dry		

DESCRIPTION OF MATERIALS	DEPTH IN FT.	SAMPLE	SAMPLE NUMBER-SAMPLE DIAMETER	DRIVING RESISTANCE BLOWS PER FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSIVE STRENGTH P.S.F.	OTHER TESTS
Medium stiff to stiff, dark olive brown to very dark olive brown, abundantly fine sandy clayey silt with sandstone fragments and rootlets, dry to slightly damp			1) 2.5"	41	---	--	----	
			2) 2.5"	51	---	--	----	
Very dense, light olive yellow to yellowish brown, deeply weathered silty clayey fine sandstone, damp to moist	5		3) 2"	64	119	11	11,180	
			4) spt*	46	---	--	----	
(Weathered Bedrock)			5) spt*	73	---	--	----	
Boring terminated at 8 feet 6 inches	10							
* spt denotes Standard Penetration Test	15							
	20							
	25							
	30							
	35							

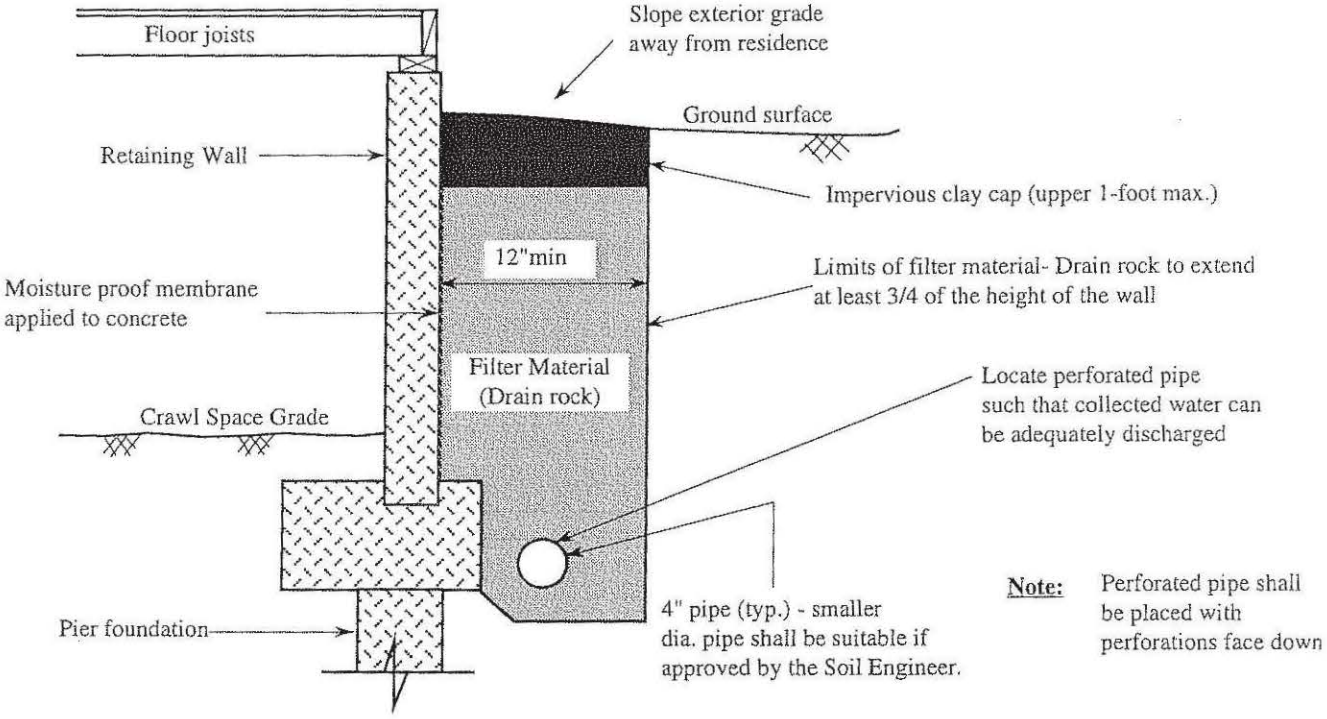
Job No. 06-3601	Michelucci & Associates, Inc.	Figure 8

PROJECT	52 Franklin Avenue, South San Francisco, California	BORING NO. 6
BORING SUPERVISOR	RQ	TYPE OF BORING: Hand Auger
HAMMER WEIGHT	70-lb. hammer, 30-inch drop	DATE OF BORING: 7-24-08
SURFACE ELEVATION	---	
GROUNDWATER DEPTH	7-24-08: Dry	

DESCRIPTION OF MATERIALS	DEPTH IN FT.	SAMPLE	SAMPLE NUMBER-SAMPLE DIAMETER	DRIVING RESISTANCE BLOWS PER FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSIVE STRENGTH P.S.F.	OTHER TESTS
Soft to medium stiff, brown, silty fine sandy clay with concrete fragments and rock fragments, slightly damp **(Fill)**			Sample of auger cuttings taken					
Stiff to very stiff, yellowish brown to brownish yellow, fine sandy clay with sandstone fragments, damp **(Colluvium/Residual Soil)**	5							
Boring terminated at 5 feet 6 inches	10							
	15							
	20							
	25							
	30							
	35							

Job No. **06-3601** **Michelucci & Associates, Inc.** Figure 9

GUIDE SPECIFICATIONS FOR SUBDRAINS BEHIND RETAINING WALLS



TYPICAL SECTION

(Not to Scale)

Subdrain pipe shall be manufactured in accordance with the following requirements:

a. Acrylonitrile-butadiene-styrene (ABS) plastic pipe shall conform to the specifications for ABS plastic pipe given in ASTM Designation D2282 and ASTM Designation D2751. ABS pipe shall have a minimum pipe stiffness of 45 psi at 5% deflection when measured in accordance with ASTM Method D2412.

b. Polyvinyl chloride (PVC) pipe shall conform to AASHTO Designation M278. PVC pipe shall have a minimum pipe stiffness of 50 psi at 5% deflection when measured in accordance with ASTM Method D2412 except that pipe conforming to F758 shall be suitable. Schedule 40 PVC pipe shall be suitable. SDR-35 PVC pipe conforming to ASTM D3034 shall be suitable when the thickness of pipe cover does not exceed 12 feet.

Filter material for use in backfilling trenches around and over subdrain pipes and behind retaining walls shall consist of clean coarse sand and gravel or crushed stone conforming to the following requirements:

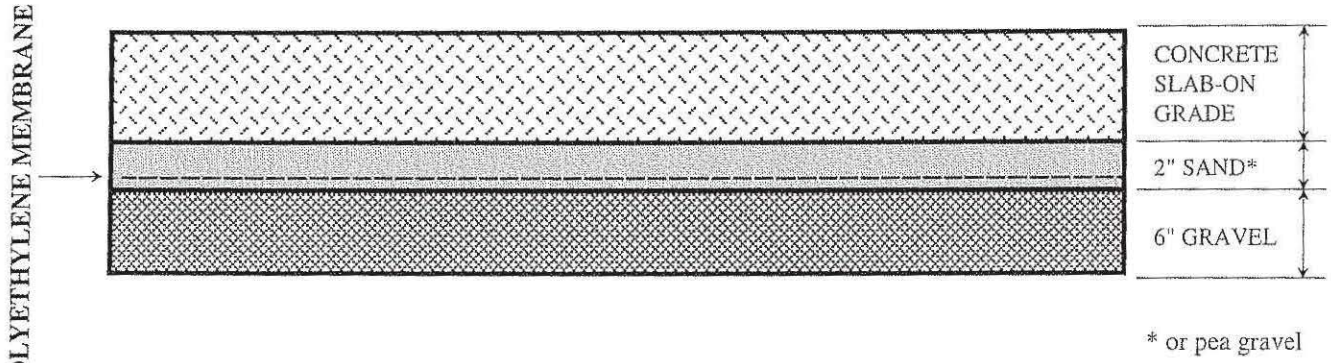
Sieve Size	% Passing Sieve
2"	100
3/4"	70 to 100
3/8"	40 to 100
#4	25 to 50
#8	15 to 45
#30	5 to 25
#50	0 to 20
#200	0 to 3

a. Class 2 " Permeable Material" conforming to the State of California Department of Transportation Standard Specifications, latest edition, Section 68-1.025 shall be suitable.

b. Clean, coarse gravel ("drain rock") shall also be suitable, provided that it is wrapped in an acceptable geotextile ("filter fabric") such as Mirafi 140 N.

MOISTURE RETARDANT BENEATH CONCRETE SLABS

TYPICAL SECTION



* or pea gravel

A. MATERIALS

The mineral aggregate for use under floor slabs shall consist of clean rounded gravel and sand. The aggregate shall be free from clay, organic matter, loam, volcanic tuff, and other deleterious substances.

B. GRADATIONAL REQUIREMENTS

The mineral aggregate shall consist of such sizes that the percentage composition by dry weight as determined by laboratory sieve (U.S. Series) will conform to the following gradation:

	Percentage Passing	
Sieve Size	**Gravel**	**Sand**
1"	**100**	
3/4"	**90-100**	
No. 4	**0-5**	**100**
No. 50		**0-30**

NOTES:

1. The polyethylene membrane should be adequately thick so that it will not be easily damaged during construction. It should be adequately detailed so that there are little or no openings around plumbing at conduit points and near foundations. The membrane should be adequately lapped and sealed at any seams.

2. The sand covering is not a part of the moisture retardant treatment. It is a normally used optional component that gives some protection to the membrane and also aids in curing the concrete. Pea gravel may be used as a substitute for sand.

3. The final moisture retardant detail is to be determined by the project architect.

APPENDIX

William Cotton and Associates

GEOTECHNICAL CONSULTANTS
330 Village Lane
Los Gatos, California 95030
(408) 354-5542

December 12, 1991
F3011

TO: Mr. Ray von Dohren
City Engineer
CITY OF SOUTH SAN FRANCISCO
400 Grand Avenue, P. O. Box 711
South San Francisco, California 94083

SUBJECT: **Preliminary Geologic and Geotechnical Review**
RE: Murphy; New Residence
52 Franklin Avenue

At your request, we have completed a preliminary geologic and geotechnical review of the subject property using:

- Site, Roof and Grading Plan and Grading Cross Section (1 sheet, 8-scale) prepared by Robert W. Croyle, dated August 19, 1991;
- Letter from Robert W. Croyle to Michelucci and Associates, dated September 16, 1991; and
- Geotechnical Engineering Investigation (report) prepared by Michelucci and Associates, dated September 17, 1991.

In addition, we have reviewed pertinent technical documents from our office files and have completed a site inspection.

DISCUSSION

The applicant is proposing to construct a single-family residence in the northern portion of a rectangular lot. It is our understanding that this site was previously occupied by a residence that was removed due to significant structural damage caused by a landslide (i.e., debris flow) in January of 1982. The proposed residence will be located in approximately the same position as the previous residence. Drainage improvements and an engineered "crib wall" are also proposed.

SITE CONDITIONS

Previous grading at the subject property has shaped most of the current site topography. The residential pad and most of the slope to the south appear to have been graded during original construction of the lots along upper Franklin Avenue. The residential pad area has gentle (0.5 to 5 percent inclination) slopes, while the slope south of the pad is steep (15 to 18 percent inclination). A hillside bench with cut slopes of greater than 24 percent inclination and artificial fill slopes greater than 14 percent inclination is located south of the southern property boundary. Natural slopes above the bench are steep (approximately 15 percent inclination).

The bowl shaped area south of the subject property and up to the ridge line, appears to have been formed by landslide processes. Hummocky topography along the hillside slopes indicates that the slopes are undergoing active soil creep. Two active landslides (i.e., debris flows) with head scarps located along the hillside bench, extend into the subject property. Both landslides are characterized by fresh (unweathered) head and lateral margin scarps. Located between the two landslides is a large block of surficial materials (colluvium and artificial fill) that may have partially failed and moved downslope during previous landsliding. In addition to the active landslides above and on the subject property, we observed several other active landslides along the steep slopes behind the residences located on the south and west sides of upper Franklin Avenue.

Drainage at the site is characterized by sheetflow to the north. A shallow earth swale has been constructed along the base of the slope at the south side of the graded pad and appears to extend to the east and west onto adjacent properties. The hillside bench located south of the property, collects sheetflow from the slopes above the properties along the south side of upper Franklin Avenue, and directs runoff to the east. Landsliding has disrupted the flow path and runoff is currently enlarging the southwestern margin of the landslide area creating an erosional gully to the west of, and within the southern portion of the property. Pampas grass, a plant commonly associated with seepage, was observed within the pad area of the lot, and may indicate shallow groundwater conditions.

The subject property is underlain, at depth, by sandstone bedrock materials of the Franciscan Complex. The bedrock is, in turn, overlain by silty sand (soil, colluvium and landslide debris). An active trace of the San Andreas fault is located approximately 3 miles southwest of the property.

CONCLUSIONS AND RECOMMENDED ACTION

The proposed residential development is constrained by active landslide processes, poor drainage conditions, and the site's seismic setting. The applicant's geotechnical consultant has recommended that the slopes be stabilized, or that retaining walls be constructed to protect the residence from future debris flows. The referenced report describes four possible mitigation methods to achieve this goal. The plans indicate that the alternative of constructing a crib wall to "buttress" the slope is the current mitigation method under consideration, however, we have several concerns with the proposed mitigation scheme that should be addressed.

As currently planned, the proposed crib wall would not "buttress" the active landslide. The active landslide is located well upslope from the proposed wall location. If the wall is designed as a diversion or catchment structure, than the indicated 1 foot high freeboard appears inadequate. In addition, the current configuration of the wall appears to divert potential debris to the west, toward an adjacent property. Surface drainage from the hillside bench will not be controlled by the currently proposed "2 foot concrete 'V' ditch" and subdrain. Runoff from the bench currently enters the property well to the north and west of the proposed drainage system. Current runoff along the bench will continue to generate erosional debris and possibly destabilize slopes sufficiently to cause renewed landsliding.

Supplemental evaluations should be completed to fully address the current site conditions and the constraints imposed by the conditions discussed above, and the proposed mitigation plans should be evaluated in detail by the applicant's geotechnical consultant prior to approval of the subject application. Consequently, we recommend the following conditions be satisfactorily completed prior to issuance of grading and building permits:

1. Supplemental Geotechnical Evaluation - The applicant's geotechnical consultant should complete a supplemental geotechnical evaluation of the proposed mitigation plans and address the following items:

   a) Landslide Map - The applicant's geotechnical consultant has recommended that the limits of the debris flow be accurately determined relative to the subject property. The consultant has recommended that a licensed land surveyor be retained to survey the landslide features. Although land surveyors are capable of accurately locating topographic features, they are not trained to recognize or distinguish between various aspects of complicated landslide features. We recommend that the applicant retain the services of a Certified Engineering Geologist (CEG) to accurately map the limits of the active landslides and the current on-site and off-site drainage conditions. In addition, we recommend that the CEG review historical aerial photographs to develop a better understanding of the history of landsliding at the site and along the slopes south of the property.

   b) Landslide Debris Volume Calculations - The applicant's geotechnical consultant has recommended that a "crib wall" be constructed to protect the proposed residence. If an adequate debris or catchment wall is to be constructed to protect the proposed residence, then the volume of potential landslide debris that could impact the residence should be estimated. The consultant should estimate the potential debris flow volumes that could impact the site. All assumptions and supporting data should be provided for review.

   c) Updated Landslide Mitigation Recommendations - The applicant's geotechnical consultants should review the recommendations provided in the referenced report, and all supplemental geologic and geotechnical data. Updated landslide mitigation recommendations should be provided, as necessary, that ensure the long-term stability of the proposed residence. In addition, the consultants should address the potential off-site impacts of the proposed mitigation plan (i.e., diversion of debris to adjacent properties) and provide recommendations to eliminate the potential impacts.

d) Updated Site Drainage Recommendation - The applicant's geotechnical consultant should review the proposed site drainage improvements, and pertinent supplemental data, and provide recommendations for controlling the flow of surface runoff through the property. Off-site and on-site drainage improvements should be evaluated and addressed.

The results of the supplemental geotechnical evaluations should be summarized in a letter/report and submitted to the City Engineer and Geotechnical Consultant for review and approval.

2. Revised Site Development Plans - Revised site development plans reflecting the recommendation of the applicant's geotechnical consultant should be prepared by the project civil engineer. The plans should incorporate recommendations for all grading and drainage improvements and the updated location and configuration of all proposed landslide mitigation measures.

The revised site development plans should be stamped and signed by the project Civil Engineer and submitted to the City Engineer and Geotechnical Consultant for review and approval prior to issuance of grading and building permits.

If you have any questions regarding this review report please contact our office.

Respectfully submitted,

WILLIAM COTTON AND ASSOCIATES, INC.
CITY GEOTECHNICAL CONSULTANT

Burt Hardin
Senior Engineering Geologist

William R. Cotton
Principal Engineering Geologist
CEG 882

WRC:BH:rb

May 29, 2025
E6302A
By Email (Billy.Gross@ssf.net)

Billy Gross, AICP
Principal Planner
CITY OF SOUTH SAN FRANCISCO
315 Maple Avenue
South San Francisco, CA 94080

SUBJECT: **Second Supplemental Geotechnical Peer Review**
RE: New Single Family Residence
52 Franklin Avenue
South San Francisco, California

At your request, we have completed a second supplemental geotechnical peer review of the proposed site development using:

- Innovative Consulting Engineer (ICE), New Construction, 52 Franklin Avenue, South San Francisco, CA, Architectural Plans (A0.0-A6.1), dated March 15, 2025;
- Michelucci & Associates, Inc., Second Review of Plans for Residence letter, dated March 3, 2025;
- Innovative Consulting Engineer (ICE), Structural Plans (S1.0-S3.5), dated February 20, 2025;
- Michelucci & Associates, Inc., Review of Plans for Residence letter, dated January 27, 2025;
- Michelucci & Associates, Inc., Shear and Bending Moment Distributions, Debris Wall Foundation Plans letter, dated September 8, 2023;
- Berns Infrastructure, LLC, Debris Capture Walls, Grading, & Drainage Design plans, 52 Franklin Ave., South San Francisco, CA, dated September 6, 2023;

- Berns Infrastructure, LLC, Debris Capture Walls, Grading, & Drainage Design calculations, 52 Franklin Ave., South San Francisco, CA, dated September 6, 2023;

- Curtis Jensen, Response to Cotton, Shires, (email), with Attachments No. 1 – 7, dated August 9, 2023;

- Michelucci & Associates, Inc., Response to Cotton Shires Peer Review Letter dated August 2, 2023;

- Michelucci & Associates, Inc., Geotechnical Consultation, Mitigation of Debris Flow Potential and Construction of New Residence (letter), prepared by dated July 11, 2023;

In addition, we have completed a recent site visit on May 14, 2025.

DISCUSSION

The applicant proposes to construct a new single-family residence with a garage at the vacant subject property. Access will be provided by a driveway extending from Franklin Avenue. The former residence at this site was removed after it suffered significant damage from a debris flow in 1982.

In our most recent geotechnical peer review letter dated August 23, 2023, we summarized our review of various documents prepared by prepared by Michelucci & Associates, Inc. (MA), including their *Response to Cotton Shires Peer Review Letter*, and supporting emails and attachments, and we concluded that MA had satisfactorily addressed the last of our outstanding comments and concerns. We also confirmed that CSA did not have objections to MA findings, and we recommended that the City of South San Francisco proceed with Geological and Geotechnical permit approval for the project in that August 23, 2023 peer review letter.

Since CSA prepared our August 23, 2023 peer review letter, the Project Civil Engineer, Berns Infrastructure, LLC, submitted the above referenced *Debris Capture Walls, Grading, & Drainage Design* plans and calculations, the Project Structural Engineer, Innovative Consulting Engineer (ICE), submitted structural plans and revised plans, and MA issued two plan review letters for the residence and a letter confirming that the Project Civil Engineer used the recommended shear and moment distributions for design of the Debris Wall Foundations.

The objective of our recent peer and this accompanying letter is to confirm the following:

- The Applicant submitted the necessary plans, reports, and letters, to support the design and construction of the proposed residence and debris capture wall;
- The Geotechnical Consultant reviewed and approved the geotechnically pertinent aspects of the plans and calculations; and
- The site conditions have not changed significantly since our previous site visit in 2023.

CONCLUSIONS AND RECOMMENDED ACTION

Site residential development is constrained by debris flow/landslide hazards, poor existing site drainage, areas of deep landslide/colluvial soil deposits with low bearing capacity and passive resistance, and very strong seismic ground shaking. We understand that the City's NPDES Municipal Regional Storm Water Permit does not allow non-storm water discharge into City streets with municipal storm drain systems. Consequently, the applicant and their consultants have developed design concepts that capture and retain estimated debris flow volume on the subject property.

Based on our review of the provided plans, reports and letters, it appears that the necessary documents to support the design and construction of the proposed residence and debris capture wall have now been submitted to the City. It also appears that the Geotechnical Consultant has reviewed the geotechnical aspects of the plans and calculations, and confirmed that the revised plans *"In our opinion, the February 25, 2025 foundation and retaining wall plans generally comply with the February 27, 2025 letter and July 11, 2023 recommendations."* Based on our recent site visit on May 14, 2025, we confirmed that the site conditions have not changed significantly since our previous site visit in 2023.

We recommend that the City of South San Francisco proceed with Geological and Geotechnical permit approval for the project. On behalf of the City of South San Francisco, CSA has completed a geotechnical and geological peer review of the applicant's Geotechnical Consultants letters, reports, and analyses (and previous reports by other Consultants for this property) through the CEQA process, and we confirm that these documents are ready to be vetted in through the CEQA process.

With the understanding above, we recommend the following condition be attached to the City's Geotechnical permit approval:

1. **Geotechnical Construction Inspections** - The geotechnical consultant should inspect, test (as needed) and approve all geotechnical aspects of the project construction. The inspections should include, but not necessarily be limited to: site preparation and grading, site surface and subsurface drainage improvements, and observations of excavations for foundations prior to placement of steel and concrete. The Geotechnical Consultant should observe site grading operations to ensure appropriate removal of undocumented fill in proposed improvement areas.

   The results of these inspections and the as-built conditions of the project should be described by the geotechnical consultant in a letter and submitted to the City Engineer for review prior to final (as-built) project approval.

LIMITATIONS

This second supplemental geotechnical peer review has been performed to provide technical advice to assist the City's discretionary permit decisions. Our services have been limited to an independent review the referenced geotechnical report to determine the adequacy of the liquefaction hazard evaluation and any associated mitigation measures. Our opinions and conclusions are made in accordance with generally accepted principles and practices of the geotechnical profession. This warranty is in lieu of all other warranties, either expressed or implied.

Respectfully submitted,

COTTON, SHIRES AND ASSOCIATES, INC.

Samuel W. Nolan
Principal Geotechnical Engineer
GE3191

David T. Schrier
Principal Geotechnical Engineer
GE 2334

DTS:SWN

August 23, 2023
E6302A
By Email (aknapp@ix.netcom.com**)**

Ms. Allison Knapp Wollam
Planning and Environmental Consulting Services

SUBJECT: **Supplemental Update Geotechnical Peer Review**
RE: New Single Family Residence
52 Franklin Avenue
South San Francisco, California

At your request, we have completed a supplemental update geotechnical peer review of the proposed site development using:

- Response to Cotton, Shires, (email), prepared by Curtis Jensen, dated August 9, 2023, with Attachments No. 1 – 7);
- Response to Cotton Shires Peer Review Letter, prepared by Michelucci & Associates, Inc., dated August 2, 2023;
- Geotechnical Consultation, Mitigation of Debris Flow Potential and Construction of New Residence (letter), prepared by Michelucci & Associates, Inc., dated July 11, 2023;
- Geotechnical Plan Review-Rear Yard Grading and Drainage Plan (letter), prepared by Earth Systems Pacific, dated October 24, 2017;
- Rear Yard Retaining Walls, Drainage and Grading Plans (C-001 to C-109), prepared by Berns Infrastructure, PLC, dated June 8, 2017;
- Architectural Plans (A0.0-A6.0), prepared by Innovative Consulting Engineer (ICE), undated;
- Proposed Single Family Residence – 52 Franklin Ave (report) prepared by Earth Systems Pacific, dated April 25, 2017;
- Geologic Hazards Evaluation and Geotechnical Engineering Study (report) prepared by Earth Systems Pacific, dated June 17, 2016;

- Geotechnical Report - 52 Franklin Avenue, prepared by P. Whitehead and Associates, dated November 17, 2013; and

- Updated Geologic and Geotechnical Evaluation (report), Proposed Residence, prepared by Michelucci & Associates, Inc., dated August 7, 2008.

In addition, we have reviewed pertinent technical maps from our office files (F3011, F5025), participated in conference calls with the Project Team, discussed the debris flow mitigation concept with the Geotechnical Consultant, and completed a recent site visit on January 25, 2023.

DISCUSSION

The owner proposes to construct a single-family residence with garage at the vacant subject property. Access will be provided by a driveway extending from Franklin Avenue. The former residence at this site was removed after it suffered significant damage from a debris flow in 1982.

In our prior geotechnical peer review letter dated June 24, 2023, we recommended the Geotechnical Consultant should clarify various aspects of their pier design analysis, provide a missing cross section and lateral pile analysis plot, and clarify bedrock depths. At the Geotechnical Consultant's request and to facilitate their responses to our questions, CSA prepared a spread sheet with tabulated questions. We refer to our prior letter for a description of the site conditions.

RESPONSE TO PEER REVIEW COMMENTS

The Geotechnical Consultant prepared their August 2, 2023 Response to Cotton Shires Peer Review Letter, populated CSA's spread sheet tabulated questions regarding input data and design criteria used in their p-y pier analysis, prepared an email clarifying their pier analysis and recent updates, and provided seven attachments. In the following section we have copied our seven requests for clarification followed by the provided the Geotechnical Consultant's responses:

1. **p-y Analysis** – M&A should provide input and output files for our review. M&A should also clarify what parameters (unit weight, γ, friction angle, ϕ, Cohesion, C, and soil moduli, k and/or E) were used to model the underlying bedrock (if different from the soil), and at what depth was the bedrock assumed to begin at. M&A should also show the bedrock contact on the bending moment and shear force plots.

We used the approach described in the Gabr et al., reference (reference No.1 in our report) and the rock compressional velocities measured by JR Associates to develop p-y curves for the rock. JR Associates reported two different types of rock – "highly weathered bedrock" and "weathered bedrock", and we followed this classification system in our estimate of the p-y curves of the two rock types. The Gabr et al., method requires as input the rock Geological Strength Index (GSI) and the rock compressive strength from which the other input factors are computed.

We estimated the GSI of the two rock types from plots in the Marinos et al., paper, reference 6 in the paper. The Gabr et al., method includes a formula for calculating the rock modulus of elasticity using as input the rock compressive strength. As there are no reported measured rock compressive strengths, we first calculated the rock modulus of elasticity from the measured rock compressional velocities and then by trial and error, back computed the rock compressive strengths until the computed moduli of elasticity matched the measured moduli. Lastly, we checked the computed rock p-y values to verify that they were sensibly larger than those used for the soil overlying the "highly weathered bedrock".

The depths to surface of the "highly weathered bedrock" and the "weathered bedrock" were 7 feet and 20 feet, respectively in our model.

M&A also populated our spread sheet tabulated questions, including indicating that the top of highly weathered bedrock was modeled at a depth of 7 feet, and the top of the weathered bedrock was modeled at a depth of 25, groundwater was assumed below the pier tip, a unit weight of 134 pcf was used for both soil and bedrock, phi=30^0 and C=190 psf was used to model the soil, the highly weathered bedrock was modeled using Hoek-Brown criteria (GSI = 35, mi = 19), the slightly weathered bedrock was modeled using Hoek-Brown criteria (GSI=60, mi = 19), a pier diameter of 30 inches, and a pier length of 25 feet.

2. **<u>p-y Analysis Plots</u>** – We note that 5 plots were provided. Figure 5 has been referenced twice in the report text (last paragraph of Page 5). We appear to be missing the Lateral Wall Upper End Bending Moments profile.

   A copy of Figure 7A is attached

3. **Passive Resistance for Lateral and Cross Lot Walls** – M&A should provide recommended passive pressures and beginning depth for passive resistance for the Lateral and Cross Lot Walls.

   Geotechnical engineers commonly provide recommended passive pressures for structural engineers to use in estimating the distribution of soil and/or rock lateral resistance developed against piers subjected to lateral loads and overturning moments. Presumably, in most cases, the structural engineers determine depths to which piers should extend by formulas in Chapter 18 of the Building Code, although how to determine the maximum shear forces and maximum bending moments in the piers is unclear in the Code.

   The p-y analysis is an alternative method for estimating the distribution of soil and/or rock lateral resistance developed against piers subjected to lateral loads and overturning moments. The p-y analysis results in not only the distribution of soil and/or rock lateral resistance developed against piers subjected to lateral loads and overturning moments (similar to passive pressures) but also the maximum shear force and bending moment in the piers.

4. **"Supporting Material" Justification** – Given that the soils overlying the bedrock have been logged as landslide debris, fill, and colluvium, M&A should provide justification to support their assumption that this material is suitable for skin friction and passive resistance, below a depth of 4 feet for the house pier foundation design.

   Our report stated (Page 5), "Drilled piers should be designed on the basis of a skin friction value of 500 psf beginning at the top of supporting material. In this case, the top of supporting material should be assumed to begin at a depth of 4 feet below grade, 1 foot below the top of bedrock, or as defined by the "Rule of Ten" criteria illustrated on the attached Figure 9, whichever is deeper."

   Using the above criteria, landslide debris, fill, and colluvium would not be relied upon for frictional support and frictional support would be within bedrock.

5. **Cross Section A-A** – M&A should provide us with a copy of Cross Section A-A'.

   The missing cross section was provided.

6. **Bedrock Depth** – M&A should clarify anticipated depth to bedrock for the Lateral and Cross Lot Walls. Based on Figure 3, depth to highly

weathered sandstone varies between 3.5 feet and 8 feet. M&A should also clarify if "highly weathered" sandstone is bedrock.

The soil and rock profile for the design of piers supporting the Cross Lot and Lateral Walls is described in Response No. 1 above. We note that if the soil at individual wall pier locations is thinner than the design assumption of 7 feet, the net resistance distribution would be stiffer than the design distributions, and therefore, the design would be conservative at those pier locations. We would consider 'highly weathered" rock to be sandstone.

7. **Boundary Conditions** – Please clarify whether the p-y analysis is for free or fixed head conditions. Based on Figures 4 through 8, the moments at the top of the moment profiles (Fig. 4 and 6), suggest fixed conditions, while the report text states free conditions were assumed. We note that where both free and fixed conditions may be applicable, it is typical to analyze both conditions.

All our p-y analyses are for free head conditions, and the plots of shear force and overturning moments reflect this design basis. The plots do not suggest fixed head conditions. As noted above, our p-y analyses were made for specific wall design impact and static forces and the associated overturning moments. The analyses included these design impact and static forces and the associated overturning moments; they were applied to the tops of the piers as input. The plots show the applied shear forces and overturning moments at the zero depth ordinate.

We note that both the walls and the grade beam connecting the tops of the piers probably will cause a measure of fixity, but we neglected this effect partly because it is conservative, and partly to account for the possibility that the Cross Lot Wall would be located on the slope a short distance above the (level) building area.

CONCLUSIONS AND RECOMMENDED ACTION

Site residential development is constrained by debris flow/landslide hazards, poor existing site drainage, areas of deep landslide/colluvial soil deposits with low bearing capacity and passive resistance, and very strong seismic ground shaking. We understand that the City's NPDES Municipal Regional Storm Water Permit does not allow non-storm water discharge into City streets with municipal storm drain systems. Consequently, the applicant and their Consultants have developed design concepts that capture and retain estimated debris flow volume on the subject property.

We find that the Response to Cotton Shires Peer Review Letter and following email and attachments have satisfactorily addressed the last of our outstanding comments and concerns. We do not have objections to the findings of the Consultants, and we recommend that the City of South San Francisco proceed with Geological and Geotechnical permit approval for the project. On behalf of the City of South San Francisco, CSA has completed a geotechnical and geological peer review of the applicant's Geotechnical Consultants letter reports and analysis (and previous reports by other Consultants for this property) through the CEQA process, and we confirm that these documents are ready to be vetted in through the CEQA process. We also recommend proceeding with preparing the remaining permit required documents. Should the geotechnical or geologic recommendations change, CSA should be given the opportunity to peer review those modifications.

With the understanding above, we recommend the following conditions be attached to the City's Geotechnical permit approval:

1. **Geotechnical Plan Review** - The applicant's geotechnical consultant should review and approve all geotechnical aspects of the building plans (i.e., site preparation and grading, site surface and subsurface drainage improvements and design parameters for foundation, etc.,) to ensure that their recommendations have been properly incorporated.

   The Geotechnical Plan Review should be organized by the Project Geotechnical Consultant as a letter and submitted to the City for review and approval by the appropriate City Staff prior to issuance of building permits.

2. **Geotechnical Construction Inspections -** The geotechnical consultant should inspect, test (as needed) and approve all geotechnical aspects of the project construction. The inspections should include, but not necessarily be limited to: site preparation and grading, site surface and subsurface drainage improvements, and observations of excavations for foundations prior to placement of steel and concrete. The Geotechnical Consultant should observe site grading operations to ensure appropriate removal of undocumented fill in proposed improvement areas.

   The results of these inspections and the as-built conditions of the project should be described by the geotechnical consultant in a

letter and submitted to the City Engineer for review prior to final (as-built) project approval.

LIMITATIONS

This supplemental update geotechnical peer review has been performed to provide technical advice to assist you and your client with the City's discretionary permit decisions. Our services have been limited to an independent review the referenced geotechnical report to determine the adequacy of the liquefaction hazard evaluation and any associated mitigation measures. Our opinions and conclusions are made in accordance with generally accepted principles and practices of the geotechnical profession. This warranty is in lieu of all other warranties, either expressed or implied.

Respectfully submitted,

COTTON, SHIRES AND ASSOCIATES, INC.

Samuel W. Nolan
Principal Geotechnical Engineer
GE3191

David T. Schrier
Principal Geotechnical Engineer
GE 2334

cc: Karen Diaz (karenlisettediaz@gmail.com)

DTS:SWN

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

July 24, 2023
E6302
By Email (aknapp@ix.netcom.com**)**

Ms. Allison Knapp Wollam
Planning and Environmental Consulting Services

SUBJECT: **Updated Geotechnical Peer Review**
RE: New Single Family Residence
52 Franklin Avenue
South San Francisco, California

At your request, we have completed an updated geotechnical peer review of the proposed site development using:

- Geotechnical Consultation, Mitigation of Debris Flow Potential and Construction of New Residence (letter), prepared by Michelucci & Associates, Inc., dated July 11, 2023;
- Geotechnical Plan Review-Rear Yard Grading and Drainage Plan (letter), prepared by Earth Systems Pacific, dated October 24, 2017;
- Rear Yard Retaining Walls, Drainage and Grading Plans (C-001 to C-109), prepared by Berns Infrastructure, PLC, dated June 8, 2017;
- Architectural Plans (A0.0-A6.0), prepared by Innovative Consulting Engineer (ICE), undated;
- Proposed Single Family Residence – 52 Franklin Ave (report) prepared by Earth Systems Pacific, dated April 25, 2017;
- Geologic Hazards Evaluation and Geotechnical Engineering Study (report) prepared by Earth Systems Pacific, dated June 17, 2016;
- Geotechnical Report - 52 Franklin Avenue, prepared by P. Whitehead and Associates, dated November 17, 2013; and
- Updated Geologic and Geotechnical Evaluation (report), Proposed Residence, prepared by Michelucci & Associates, Inc., dated August 7, 2008.

In addition, we have reviewed pertinent technical maps from our office files (F3011, F5025), participated in conference calls with the Project Team, discussed the debris flow mitigation concept with the Geotechnical Consultant, and completed a recent site visit on January 25, 2023.

DISCUSSION

The owner proposes to construct a single-family residence with garage at the vacant subject property. Access will be provided by a driveway extending from Franklin Avenue. The former residence at this site was removed after it suffered significant damage from a debris flow in 1982. In our previous geotechnical peer review (dated June 15, 2017), we noted several deficiencies regarding submitted development plans and recommended that project design be updated. Our comments included, but were not limited to the following:

- The design plan should accommodate the minimum recommended 500 cubic yard volume of debris flow material calculated by Earth Systems Pacific (ESP) that may descend toward the proposed house site.

- The proposed alignment of walls above the residence should be revised so that debris flow material is not diverted into adjacent properties.

- An improved site topographic survey map should be prepared.

- The Project Geotechnical Consultant suggests that the house footprint be moved toward the street to provide space for retention of debris flow material.

We understand that Michelucci & Associates, Inc., is the new project geotechnical engineer. We also understand that Michelucci & Associates, Inc., (M&A) previously investigated the site in 2008 by means of six borings drilled to depths of 5.5 to 12.5 feet below existing ground surface. In the borings, M&A typically encountered 3.5 to 10.0 feet of stiff to very stiff soil overlying sandstone bedrock. The borings on the slope, in the area of the proposed debris walls (B-1, B-4, and B-5) typically encountered 5.5 feet to 6 feet of soil overlying the bedrock.

GEOTECHNICAL EVALUATIONS

The Geotechnical Consultant (M&A) recommends constructing three walls to arrest and contain a future debris flow with up to 500 cubic-yards, including 7- to 12-foot high free-standing (cantilevered) Lateral Walls along the eastern and western property

lines, and a 12-foot high free-standing (cantilevered) Cross Lot Wall along the base of the slope. M&A recommends supporting these walls on 30-inch diameter piers embedded a minimum of 15 feet into the underlying bedrock, and designed to resist an impact force of 8.5 kips per foot over a height of 6.6 feet, and an equivalent fluid pressure of 124 pcf over a height of 7 to 10 feet for the Lateral Walls and 10 feet for the Cross Lot Wall. M&A also recommended that minimum piers lengths should be 25 feet for the Cross Lot Wall and 20 to 25 feet for the Lateral Walls. M&A did not provide recommended passive resistance design criteria for the design of these walls, indicate where the passive resistance should begin, or clarify where the underlying bedrock should assume to begin. M&A completed p-y analysis for the Lateral and Cross Lot Walls, and indicated that underlying soil material was modeled with a friction angle (ϕ) = 30^0 and a cohesion (C) = 190 psf; however, M&A did not clarify at what depth the bedrock was modeled (if at all), or what parameters (ϕ, C) were used to model the bedrock. No soil moduli were provided as is typical for this type of p-y analysis. Typically, we are provided with input and output files of p-y analysis for our peer review.

The Geotechnical Consultant (M&A) also recommends supporting the proposed residence on a drilled pier foundation designed for a skin friction of 500 psf beginning at (" . . *the top of the supporting material*.") a depth of 4 feet below grade, and with a minimum embedment of 8 feet below the top of the bedrock. M&A also recommends that passive resistance for retaining walls in the new residence area (and presumably for the house pier foundations) begin at *" . . the top of the supporting material, as defined above, and be taken as a value of 400 pcf."* Based on the provided borings in the building pad area (B-2, B-3 and B-6), bedrock begins at 9 feet, 5 feet and 5.5 feet below existing grade, respectively.

We also understand that M&A recommends a flexible debris barrier be installed between the southern property line Cross Lot Wall. We assume that M&A is referring to a Geobrugg type debris barrier. M&A also indicated that minimal grading was recommended at the house pad, but that "Slump Block" shown on Figure 2 towards the top of the slope, should be removed/excavated.

The copy of the 2008 M&A report we received did not include a copy of Cross Section A-A'.

CONCLUSIONS AND RECOMMENDED ACTION

Site residential development is constrained by debris flow/landslide hazards, poor existing site drainage, areas of deep landslide/colluvial soil deposits with low bearing capacity and passive resistance, and very strong seismic ground shaking. We understand that the City's NPDES Municipal Regional Storm Water Permit does not allow non-storm water discharge into City streets with municipal storm drain systems. Consequently, the

applicant and their Consultants have developed design concepts that capture and retain estimated debris flow volume on the subject property. As previously indicated, this may require a residence located within the front portion of the lot and a debris collection basin in the middle, relatively gentle portion of the property.

We have no issue with the recommended Lateral Wall and Cross Lot Wall layout, or the recommendation for a Geobrugg type debris barrier.

We do have several questions regarding the p-y analysis, modelling of the underlying clayey soils, and recommendations regarding depth to supporting materials that should be addressed prior to permit submittal to the City.

The new Geotechnical Consultant (M&A) should satisfactorily address the following Items 1 through 5:

1. **p-y Analysis** – M&A should provide input and output files for our review. M&A should also clarify what parameters (unit weight, γ, friction angle, ϕ, Cohesion, C, and soil moduli, k and/or E) were used to model the underlying bedrock (if different from the soil), and at what depth was the bedrock assumed to begin at. M&A should also show the bedrock contact on the bending moment and shear force plots.

2. **p-y Analysis Plots** – We note that 5 plots were provided. Figure 5 has been referenced twice in the report text (last paragraph of Page 5). We appear to be missing the Lateral Wall Upper End Bending Moments profile.

3. **Passive Resistance for Lateral and Cross Lot Walls** – M&A should provide recommended passive pressures and beginning depth for passive resistance for the Lateral and Cross Lot Walls.

4. **"Supporting Material" Justification** – Given that the soils overlying the bedrock have been logged as landslide debris, fill, and colluvium, M&A should provide justification to support their assumption that this material is suitable for skin friction and passive resistance, below a depth of 4 feet for the house pier foundation design.

5. **Cross Section A-A** – M&A should provide us with a copy of Cross Section A-A'.

6. **Bedrock Depth** – M&A should clarify anticipated depth to bedrock for the Lateral and Cross Lot Walls. Based on Figure 3, depth to highly weathered sandstone varies between 3.5 feet and 8 feet. M&A should also clarify if "highly weathered" sandstone is bedrock.

7. **Boundary Conditions** – Please clarify whether the p-y analysis is for free or fixed head conditions. Based on Figures 4 through 8, the moments at the top of the moment profiles (Fig. 4 and 6), suggest fixed conditions, while the report text states free conditions were assumed. We note that where both free and fixed conditions may be applicable, it is typical to analyze both conditions.

LIMITATIONS

This updated geotechnical peer review has been performed to provide technical advice to assist you and your client with the City's discretionary permit decisions. Our services have been limited to an independent review the referenced geotechnical report to determine the adequacy of the liquefaction hazard evaluation and any associated mitigation measures. Our opinions and conclusions are made in accordance with generally accepted principles and practices of the geotechnical profession. This warranty is in lieu of all other warranties, either expressed or implied.

Respectfully submitted,

COTTON, SHIRES AND ASSOCIATES, INC.

Samuel W. Nolan
Principal Geotechnical Engineer
GE3191

David T. Schrier
Principal Geotechnical Engineer
GE 2334

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