



**GEOTECHNICAL INVESTIGATION FOR
PROPOSED NEW RESIDENCE IN LOT-1**

at
1385 Hillside Circle
Burlingame, California

Report Prepared for:

Mr. and Mrs. Chiu

Report Prepared by:

GeoFoundation, Inc.

August 2024



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Mr. and Mrs. Chiu
1385 Hillside Circle
Burlingame, CA 94010

Subject: **Hillside Circle Property
1385 Hillside Circle
Burlingame, California
GEOTECHNICAL INVESTIGATION FOR PROPOSED
NEW RESIDENCE AT LOT-1 (APN: 027-282-060)**

Dear Mr. and Mrs. Chiu:

In accordance with your authorization, we have performed a subsurface investigation into the geotechnical conditions present at the location of the proposed improvements. This report summarizes the conditions we measured and observed, and presents our opinions and recommendations for the design and construction of the proposed new residence at Lot-1.

Site Description

The subject site is a gently to moderately sloping, irregularly-shaped parcel located on the south side of Hillside Circle (at the approximate location shown on Figure 1). For purposes of description in this report, it is assumed that the property faces north. The property is bounded by other developed single-family residential lots to the sides, Easton Drive to the south, and Hillside Circle to the north.

The site is currently occupied by a three-story, wood-framed residence situated near the north side of the lot. There is a detached garage at the northeastern corner of the property. The wooden house floors are supported above crawlspace areas, while the garage has a concrete slab-on-grade floor. A concrete driveway leads from the street to the garage.

The ground surface in the site vicinity has an overall slope down towards the south and east (as shown on Figure 2). At the site, the ground also slopes gently to moderately down towards the south. Surface gradients range from 20:1 to almost 3:1 (horizontal:vertical, H:V). During the original development of the property, it appears that up to 6 feet of cuts were made at the front of the house, in order to create the existing level pad.

The grounds around the residence have been landscaped with front lawn areas, a variety of small to medium-sized bushes and shrubs, and numerous small to large trees. A concrete walkway leads to the front entrance. Concrete and flagstone walkways along the left and right sides of the house lead to the backyard walkways and patio. There is an ADU at the southwestern corner of the property. Up to 6 feet tall retaining walls were constructed at different locations on the property.

Proposed Construction

We understand that the current development for the site proposes the demolition of the existing residence, split of the current lot into three individual lots, and the subsequent construction of three new two-story residences, and associated improvements in the split lots. The new residences are to be of conventional, wood-framed construction. New foundation loads are expected to be typical for this type of structure (i.e. light).

Excavation work at the site is expected to be limited to foundation and potential basement excavations. No significant fill placement is anticipated as part of this work. No pool is planned for the project.

INVESTIGATION

Scope and Purpose

The purpose of our investigation was to determine the nature of the subsurface soil conditions so that we could provide geotechnical recommendations for the construction of the proposed new residences, and associated improvements. In order to achieve this purpose, we have performed the following scope of work:

- 1 - visited the property to observe the geotechnical setting of the area to be developed;
- 2 - reviewed relevant published geological and geotechnical maps;
- 3 - drilled six borings near the location of the proposed improvements;
- 4 - performed laboratory testing on collected soil samples;
- 5 - assessed the collected information and prepared this report.

The findings of these work items are discussed in the following sections of this report.

Geologic Map Review

We reviewed the *Geologic Map of the Montara Mountain and San Mateo 7½' Quadrangles, San Mateo County, California (USGS Map I-2390)*, by Earl H. Pampeyan (1994) and the *State of California Seismic Hazards Zone Map; Montara Mountain Quadrangle (4/4/19)*. The relevant portion of the Pampeyan and state hazard zone maps have been reproduced in Figures 3 and 3a.

The Pampeyan map indicates that the site is located almost at the border of two different geological formations/types and is underlain by either Sheared Rock (map symbol “fsr”) or Older Alluvium (map symbol “Qoa”). Pampeyan describes “fsr” materials as consisting of “Predominantly soft, light to dark gray, sheared shale, siltstone, and graywacke containing various-size tectonic inclusions of Franciscan rock types. Weathers to grayish-yellow clayey and silty sand and in place is eroded to form badlands topography. Area of outcrop may be greater than shown and may include some areas labelled as sandstone (fs). Slopes underlain by sheared rock unit are unstable, especially when wet. Thickness unknown but more than several hundreds of feet. Commonly referred to as melange.”. Pampeyan describes “Qoa” materials as consisting of “Weathered, unconsolidated to moderately consolidated gravel, sand, and clay in various proportions and combinations. Chiefly older alluvial

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fan deposits. Distribution and extent largely inferred from drainage patterns on historic maps, as natural exposures are concealed by urban development. Locally includes younger alluvial and colluvial deposits too small to show at map scale.”.

The Seismic Hazards Zone Map indicates the site is mapped within an area where there has been a historic occurrence of **both** liquefaction and landslide, or where local topographic, local geological, geotechnical, and groundwater conditions would indicate a potential for permanent ground displacement such that mitigation, as defined in Public Resource Code Section 2693(c), would be required.

The active San Andreas Fault is mapped approximately 1.3 miles (2.1 km) southwest of the site.

Subsurface Exploration

On July 18, 2024 we drilled six borings at the site at the locations shown on Figure 4. The borings were drilled using a Mobile B-24 truck-mounted drilling rig and a Minute Man portable drilling rig (as noted on logs) equipped with 4.0 and 3.25 inch diameter helical flight augers, respectively. Logs of the soils encountered during drilling record our observations of the cuttings traveling up the augers and of relatively undisturbed samples collected from the base of the advancing holes. The final boring logs are based upon the field logs with occasional modifications made upon further laboratory examinations of the recovered samples and laboratory test results. The final logs are attached in Appendix A.

The relatively undisturbed samples were obtained by driving a 3.0 inch (outer diameter) Modified California Sampler and a Standard Penetration Sampler (as noted on logs) into the base of the advancing hole by repeated blows from a 140 pound (truck rig) and a 70 pound (portable rig) hammer lifted 30 inches. On the logs, the number of blows required to drive the sampler the final 12 inches of the 18 inch drive, have been recorded as the Blow Counts. These blows have not been adjusted to reflect equivalent blows of any other type of sampler or hammer, or to account for the different hammers and samplers used.

Subsurface Conditions

Boring 1 penetrated 3 feet of very stiff, slightly moist, brown, sandy clay with gravel. Then, light to strong to yellowish brown, medium dense to very dense, slightly moist, silty clayey sand with trace of gravel was encountered down to the terminated boring depth of 29.5 feet. We judged the latter layer to be bedrock.

Boring 2 penetrated 8 feet of stiff, slightly moist, yellowish brown, lean clay with sand and trace of gravel. This was underlain by strong brown, slightly moist, dense to very dense, clayey sand with trace of gravel down to the terminated boring depth of 16.5 feet. We judged the latter layer to be bedrock.

Boring 3 penetrated hard, slightly moist, brown, clay with sand, trace of gravel, and organics down to the terminated boring depth of 2.5 feet, where it encountered refusal. We judged this layer to be bedrock.

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Boring 4 penetrated hard, slightly moist, brown, clay with sand, and trace of gravel down to the terminated boring depth of 7 feet, where it encountered refusal. We judged this layer to be bedrock.

Boring 5 penetrated 5 feet of very dense, slightly moist, brown, lean clayey sand with trace of gravel. This was underlain by dark gray, slightly moist, hard, clay with sand and trace of gravel down to the terminated boring depth of 9 feet, where it encountered refusal. We judged the latter layer to be bedrock.

Boring 6 penetrated hard, slightly moist, brown, clay with sand, trace of gravel, and organics down to the terminated boring depth of 2.5 feet, where it encountered refusal. We judged this layer to be bedrock.

Please refer to Appendix A for a more detailed description of each boring.

No free groundwater was encountered during the drilling of the holes. However, during periods of heavy rain or late in the winter, groundwater seepage may exist at shallower depths, most likely as perched water atop the bedrock.

Laboratory Testing

The relatively undisturbed samples collected during the drilling process were returned to the laboratory for testing of engineering properties. In the lab, selected soil samples were tested for moisture content, density, strength, and plasticity. The results of the laboratory tests are attached to this report in Appendix B.

Plasticity Index (PI) testing performed on the site near surface materials produced PI results of 5, 27, and 22, respectively. These testings indicated that the near surface materials have low to high plasticity and are highly expansive.

Strength testing was conducted on one sample (Sample 1-2 @ 9 feet). Drawing a best-fit-line through the data points showed that this material has high strength parameters. The testing showed that this material has high strength parameters (cohesion = 657 psf, internal friction angle = 42.8 degrees). The other soil layers at the site were judged to also have high strengths based upon their high blow counts as obtained during the sampling process.

CONCLUSIONS AND RECOMMENDATIONS

General

Based upon our investigation, we believe that the proposed improvements can be safely constructed. Geotechnical development of the site is controlled by the presence of high expansion potential of site soils, and gently to moderately sloping, but aided by relatively shallow bedrock.

Expansive soils derive their name from their propensity to change volume in response to changes in moisture content. When they are dry, they shrink; when they become wet, they swell. The pressures these soils can exert as they expand can be sufficiently high to move conventional residential

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foundations. The foundation movement induced by the soil shifting can cause wall coverings to crack, doors and windows to stick, floors to slope, and pools to crack and tilt. Seasonal movements of expansive soils have caused such distress to countless houses and pools in the Bay Area.

To combat seasonal expansive soil movements, it is necessary to utilize a foundation system which derives its support from the deeper, more stable soils. Typically, a drilled, cast-in-place pier foundation system is used to reach the more stable materials. Therefore, we have recommended that such foundation system be utilized at this site for the at-grade foundations of the new residence, while the deeper basement shall have a mat slab foundation.

The recommendations in this report should be incorporated into the design and construction of the proposed new residence, and associated improvements.

Seismicity

The greater San Francisco Bay Area is recognized by Geologists and Seismologists as one of the most active seismic regions in the United States. Several major fault zones pass through the Bay Area in a northwest direction which have produced approximately 12 earthquakes per century strong enough to cause structural damage. The faults causing such earthquakes are part of the San Andreas Fault System, a major rift in the earth's crust that extends for at least 700 miles along western California. The San Andreas Fault System includes the San Andreas, San Gregorio, Hayward, Calaveras Fault Zones, and other faults. In 2014, seismologic and geologic experts convened by the U.S. Geological Survey, California Geological Survey, and the Southern California Earthquake Center concluded that there is a 72 percent probability for at least one "large" earthquake of magnitude 6.7 or greater to occur in the Bay Area before the year 2043. The northern portion of the San Andreas fault is estimated to have a 6 percent probability, while the Hayward and Calaveras faults are estimated to have a 14 and 7 percent probability of producing an earthquake of that magnitude or greater during that time period.

Ground Rupture - The lack of mapped active fault traces through the site, suggests that the potential for primary rupture due to fault offset on the property is low.

Ground Shaking - The subject site is likely to be subject to very strong to violent ground shaking during its life span due to a major earthquake in one of the above-listed fault zones. Current (2022) building code design may be followed by the structural engineer to minimize damages due to seismic shaking, using the following input parameters from ASCE Hazard Tool based upon ASCE 7-16 design parameters:

Site Class – C	$S_{MS} = 2.753$	$S_{M1} = 1.342$	$S_{DS} = 1.835$	$S_{D1} = 0.894$
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Landsliding - - The State *Earthquake Zones of Required Investigation* map indicates that the site is in an area potentially subject to earthquake-induced landslides. The subject site and the surrounding area are gently to moderately sloping. Fortunately, the site is underlain by competent bedrock at relatively shallow depths. Therefore, the hazard due to large-scale deep seismically-induced landsliding is, in our opinion, relatively low for the site. However, as with any slope, minor sloughing

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of the steeper site slopes could occur during earthquake shaking. The proposed improvements should not be affected by any such sloughing, as they will be supported by the stable soils at the site.

Liquefaction - The State of California Seismic Hazards Zones map indicates that the site is in an area potentially subject to liquefaction. Liquefaction most commonly occurs during earthquake shaking in loose fine sands and silty sands associated with a high groundwater table. Groundwater table or loose sandy materials were demonstrated to be absent down to the site bedrock. Therefore, it is also our opinion that liquefaction is unlikely to occur on the subject property.

Ground Subsidence - Ground subsidence may occur when poorly consolidated soils densify as a result of earthquake shaking. Since the proposed building site is underlain at shallow depths by resistant materials, the hazard due to ground subsidence is, in our opinion, considered to be low.

Lateral Spreading - Lateral spreading may occur when a weak layer of material, such as a sensitive or liquefiable soil, loses its shear strength as a result of earthquake shaking. Overlying blocks of competent material may be translated laterally towards a free face. Liquefiable conditions are not present proximate to or at the site, hence, the hazard due to lateral spreading is, in our opinion, considered to be low.

Site Preparation and Grading

All debris resulting from the demolition of existing improvements should be removed from the site and may not be used as fill. Any existing underground utility lines to be abandoned should be removed from within the proposed building envelope and their ends capped outside of the building envelope.

Any vegetation and organically contaminated soils should be cleared from the building area. All holes resulting from removal of tree stumps and roots, or other buried objects, should be overexcavated into firm materials and then backfilled and compacted with native materials.

It would be reasonable to use soils from the basement excavation to raise portions of the site grades to improve drainage of the site.

The placement of fills at the site is expected to include: slab subgrade materials, and finished drainage and landscaping grading. These and all other fills should be placed in conformance with the following guidelines:

Fills may use organic-free soils available at the site or import materials. Import soils should be free of construction debris or other deleterious materials and be non-expansive. *A minimum of 3 days prior to the placement of any fill, our office should be supplied with a 30 pound sample (approximately a full 5 gallon bucket) of any soil or baserock to be used as fill (including native and import materials) for testing and approval.*

All areas to receive fills should be stripped of organics and loose or soft near-surface soils. Fills should be placed on level benches in lifts no greater than 6 inches thick (loose), moisture conditioned to near Optimum Moisture Content (OMC), and be compacted to at least 90 percent of their Maximum

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Dry Density (MDD), as determined by ASTM D-1557. If native expansive soils are used for fill at the site, then the soils should be placed at 3 to 5% over Optimum Moisture Content and be compacted to **between** 85 to 90 percent of their MDD. In pavement (concrete or asphalt) areas to receive vehicular traffic, all baserock materials should be compacted to at least 95 percent of their MDD. Also, the upper 6 inches of soil subgrade beneath any pavements should be compacted to between 90 to 93 percent of its MDD.

Expansive soils may only be used for fill where only vegetation and other movement insensitive improvements are proposed. These materials should not be placed as fill under the house, retaining walls, or patios.

If unretained fills in excess of 3 feet thick are to be placed, our office should be contacted for further recommendations.

Temporary, dry-weather, vertical excavations should remain stable for short periods of time to heights of 5 feet. All excavations should be shored or sloped in accordance with OSHA standards.

Permanent cut and/or fill slopes should be no steeper than 2:1 (H:V). However, even at this gradient, minor sloughing of slopes may still occur in the future. Positive drainage improvements (e.g. drainage swales, catch basins, etc.) should be provided to prevent water from flowing over the tops of cut and/or fill slopes.

Temporary stockpiling of excess soils should be set back a minimum of 25 feet from the crest of slope. The height of soil stockpiles should not exceed 12 feet, unless approved by the soils engineer in writing.

New Foundation for At-Grade Portion of the New Residence

Due to the presence of highly expansive site soils and gentle to moderate slopes, for best performance, the foundations will need to penetrate into the deeper, more stable soils. We recommend a pier and grade beam foundation system be used.

Piers should penetrate a minimum of 12 feet below the lowest adjacent grade, and 8 feet into the bedrock, whichever is deeper. We encountered 3 to 8 feet of clayey/sandy/non-bedrock material during our field exploration. This will likely result in piers with depths ranging from 12 to 20 feet deep.

The piers should have a minimum diameter of 16 inches, and be nominally reinforced with a minimum of four #4 bars vertically. Actual pier depth, diameter, reinforcement, and spacing should be determined by the structural engineer based upon the following design criteria:

A friction value of 600 psf may be assumed to act on that portion of the pier below a depth of 5 feet. Lateral support may be assumed to be developed along the length of the pier below 5 feet, using a passive pressure of 350 pcf Equivalent Fluid Weight (EFW). Passive resistance may be assumed to act over 1.5 projected pier diameters. Above 5 feet, no frictional or lateral support may be assumed. These design values may be increased 1/3 for transient loads (i.e. seismic and wind).

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On the slopes, a lateral creep force of 35 pcf Equivalent Fluid Weight (EFW) should be applied to all piers on any portion of the site where grading operations do not flatten slopes to less than 4:1 (H:V). This creep force should be applied over 3 projected pier diameters from the ground surface to a depth of 10 feet horizontal cover.

Even though piers are designed to derive their vertical resistance through skin friction, the bases of the pier holes should be clean and firm prior to setting steel and pouring concrete. If more than 6 inches of slough exists in the base of the pier holes after drilling, then the slough should be removed. If less than 6 inches of slough exists, the slough may be tamped to a stiff condition. Piers should not remain open for more than a few days prior to casting concrete. In the event of rain, shallow groundwater, or caving conditions it may be necessary to pour piers immediately.

All perimeter piers, and piers under load-bearing walls, should be connected by concrete grade beams. Perimeter grade beams should penetrate a minimum of 6 inches below crawlspace grade (unless a perimeter footing drain is installed to intercept water attempting to enter around the perimeter). Interior grade beams do not need to penetrate below grade. All other isolated floor supports must also be pier supported to resist expansive soil uplift, however, they do not need to be connected by grade beams.

In order to reduce any expansive soil uplift forces on the base of the grade beams, the beams should have either a uniform 4 inch void between their base and the soil, or should be constructed with a knife edge and triangular shaped void in a rectangular trench. The void can be created by the use of prefabricated cardboard void material (e.g. K-void, SureVoid, Carton-void), half a sonotube faced concave down, or other methods devised by the contractor and approved by our offices. *The use of Styrofoam is not acceptable for creating the void.*

The void forms are not required for basement slab where supported by bedrock. Voids are required under the outer 10 feet of the slab where on soil, and less than 5 feet below finish grade.

All improvements connected directly to any pier supported structure, also need to be supported by piers. This includes, but is not limited to: porches, decks, entry stoops and columns, etc. If the designer does not wish to pier support these items, then care must be taken to structurally isolate them (with expansion joints, etc.) from the pier supported structure.

If the above recommendations are followed, total foundation settlements should be less than 1 inch, while differential settlements should be less than ½ inches.

Basement Foundations, Walls, and Floors

Wall Forces – Any basement retaining walls should be designed to resist an active pressure of 45 pcf Equivalent Fluid Weight (EFW), for retained slopes flatter than 4:1 (horizontal:vertical). If it is desired to create steeper retained slopes to reduce the heights of the walls, then the active pressure will need to be increased. An active pressure of 65 pcf EFW should be utilized for retained slopes with an inclination of 2:1 (H:V). Where retained slopes are greater than 4:1, though less than 2:1, the designer should linearly interpolate between 45 and 65 pcf EFW.

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If the walls are considered to be restrained, they should be designed for an additional uniform pressure of $8H$ psf, where H is the height of the wall in feet. We leave it to the design professional's judgment in determining whether a wall is restrained or not. It is our opinion that a supplemental seismic loading for a basement wall is not necessary. However, if desired, the designer may also apply a uniform seismic force of $10H$ psf to the retaining wall in addition to the normal active pressures. The walls should also be designed to resist a point load applied at the midpoint of the wall, equal to $\frac{1}{2}$ of the maximum applied surcharge (if any).

Wall Drainage - The above values have been provided assuming that a back-of-wall drain system will be installed to prevent build-up of hydrostatic pressures. This drainage system may consist of a prefabricated drainage panel (i.e. Miradrain) or a gravel and filter fabric type system. The walls should be waterproofed to prevent the transmission of efflorescence through the walls. The waterproofing should be specified by the designer, though we recommend the use of Bituthene, Miradri, or other similar waterproofing membrane. Either drainage system should be installed with a minimum 3 inch diameter perforated pipe incorporated into the subslab granular section. Ideally the base of the pipe should be placed atop 1 to 2 inches of gravel, with its top even with the elevation of the basement subgrade (i.e. under the gravel). Perforations should be placed face-down (at 5 and 7 o'clock). Preferably, the exterior basement walls should be aligned with the exterior face of the slab to provide a planar surface for waterproofing installation across the cold joint.

If used, the gravel system should consist of a minimum 12 inch wide column of drain rock ($\frac{3}{4}$ inch rock or $\frac{3}{8}$ inch pea gravel) extending the full width of the wall. The rock should continue to within 6 inches of finished grade. Prior to backfilling with the drain rock, a layer of filter fabric (Mirafi 140N or approved equivalent) should be placed against all soil surfaces to separate the rock and soil. The filter fabric should wrap over the top of the gravel and then a 6 inch thick cap of native soils should be placed at the top of the drain. If concrete flatwork is to directly overlay the back-of-wall drain, then the drain rock should continue to the base of the concrete. Additionally, where the drain will be located within crawlspace area, the gravel should continue to the crawlspace ground surface without the soil cap.

If prefabricated drainage panels are used, these panels should dead-end into the subslab gravel for collection under the slab. The tops of the panels should be sealed and secured in accordance with the manufacturer's specifications. The base of the drainage panels should extend down below the top of the filter fabric-wrapped drain rock.

Floor - The basement floor/foundation may consist of a mat slab designed for a modulus of subgrade reaction of 15 pci in the center, which can be increased to 30 pci along the sides of the basement (extending 20% of the basement width/length from the edge to the interior), and 60 pci at the corners (again 20 percent of the width/length extending off the building corners towards the sides and interior). These design values may be increased $\frac{1}{3}$ for transient loads (i.e. seismic and wind).

The entire slab should be underlain by at least 4 inches of clean, crushed drain rock. The drain rock should be covered by a moisture barrier which conforms to ASTM E1745-97 (e.g. Stego Wrap or an approved equivalent). The moisture barrier should wrap up the edges of the mat slab to be overlapped by the basement wall waterproofing. Perforated collector pipes should be embedded within the drain

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rock around the perimeter of the slab and at 20 foot spacing (one-way) under the slab to carry any water which gathers within the drain rock to the back-of-wall drain discharge location. The need for any sand over the top of the vapor barrier should be determined by the slab designer or architect.

Window Well and Access Well Drainage – Any window well and access well drainage should be tight lined to the same sump pump used for under-slab and wall drainage. This sump should be located in an area with easy access, and may discharge into the storm drain system. There should be a minimum 4 inch lip between the wells and the floor slabs. A high water alarm should be provided in the sump. Consideration should be given to a backup generator. No roof drain lines should discharge into any window well or stairwell/depressed patio.

Retaining Walls

New site retaining walls must not be structurally connected to the house or other structures. New site walls which are located on, or within 10 feet of the crest of, slopes steeper than 5:1 (H:V); and, walls for which expansive soil movements are undesirable, should utilize a pier and grade beam foundation system. Alternatively, L-shaped or deepened spread footing may be used if the ground surface below the wall is flatter than 5:1 (for at least 10 feet of the crest). If spread footings are utilized, then some expansive soil movements of the walls may occur. Therefore, in order to reduce the detrimental effect of such movements on site walls, we recommend the use of a “flexible” wall system (e.g. Keystone, Allan Block, wood lagging, etc.), or the liberal use of vertical construction joints.

Wall Forces - Any unrestrained retaining walls required for the proposed construction should be designed to resist an active pressure of 45 pcf Equivalent Fluid Weight (EFW) in supporting soils with retained slopes less than 4:1 (H:V). An active pressure of 65 pcf EFW should be utilized for retained slopes with an inclination of 2:1 (H:V). Where retained slopes are greater than 4:1, though less than 2:1, the designer should linearly interpolate between 45 and 65 pcf EFW.

Where a retaining wall is located within a horizontal distance less than twice the height of the lower retaining wall, the lower retaining wall will need to be designed for an additional surcharge pressure from the upper wall(s). Once the geometry of such walls has been determined, please provide our office with a cross-section so that we can determine the required surcharge.

Any restrained retaining walls required should be designed for the aforementioned active pressures with an additional uniform pressure of $8H$ psf, where H is the height of the wall in feet. We leave it to the design professional's judgment in determining whether a wall is restrained or not. An additional uniform force of $10H$ psf may be applied to account for seismic forces on the wall with more than 6 feet tall, although it is our opinion that such forces need not be applied to site walls. All retaining walls should also be designed to resist a point load applied at the midpoint of the wall, equal to $\frac{1}{2}$ the maximum applied surcharge.

Drilled Piers - Any wall which is located on, or within 10 feet of the crest of, slopes steeper than 5:1 (H:V) should utilize a drilled pier foundation system. Additionally, any site walls for which expansive soil shifting is unacceptable should use drilled piers. We note that pier-supported walls may not rely upon a toe footing to resist overturning forces. All vertical and lateral forces should be resisted by

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piers. This may require the use of a staggered, double row of piers, depending upon the wall height and any surcharges.

The piers should have a minimum diameter of 16 inches and be nominally reinforced with a minimum of four #4 bars vertically. Piers should be spaced no closer than 3 diameters, center to center. In order to maximize the soil arching behind the piers, it is prudent to limit the maximum net (clearance) pier spacing to 5 feet. Actual pier depth, diameter, reinforcement, and spacing should be determined by the structural engineer.

A friction value of 600 psf may be assumed to act on that portion of the pier below a depth of 5 feet. Lateral support may be assumed to be developed along the length of the pier once there is a minimum 10 feet of horizontal cover between the face of the pier and the face of slope. At that depth, a passive pressure of 350 pcf Equivalent Fluid Weight (EFW) may be used for design. Passive resistance may be assumed to act over 1.5 projected pier diameters. Above 5 feet, no frictional or lateral support may be assumed. These design values may be increased 1/3 for transient loads (i.e. seismic and wind).

On the slopes, a lateral creep force of 35 pcf Equivalent Fluid Weight (EFW) should be applied to all piers on any portion of the site where grading operations do not flatten slopes to less than 4:1 (H:V). This creep force should be applied over 3 projected pier diameters from the ground surface to a depth of 10 feet horizontal cover.

If drilled piers are utilized beneath a concrete or block wall, they will need to be connected by a concrete grade beam. No grade beam is required for a wood lagging wall.

L-shaped or Deepened Spread Footings – If used, the footings must be embedded so that there is a minimum of 10 feet of horizontal cover between the face of the footings and any adjacent, parallel slope steeper than 5:1. The Footings should be designed using an allowable bearing pressure of 2500 psf, at a minimum depth of 36 inches below adjacent grade, and on competent materials as approved by our office in the field. Deepening of the footing may be required to reach competent soil. Lateral pressures may be resisted by a passive pressure of 350 pcf EFW assumed to be acting against the face of the footings (or shear keys, if required). Passive resistance may start at a depth of 2.5 feet below exterior grade. However, for passive resistance to start, the footing must be embedded so that there is a minimum of 10 feet of horizontal cover between the face of the footing and any adjacent, parallel slope. Alternatively, lateral pressures may be resisted by friction between the base of the footings and the ground surface. A friction coefficient of 0.35 may be assumed. Frictional and passive resistance may not be used in combination. The above values may be increased 1/3 for transient loads.

Wall Drainage - The above values have been provided assuming that back-of-wall drains will be installed to prevent build-up of hydrostatic pressures behind all walls. This drainage system may consist of a prefabricated drainage panel (i.e. Miradrain) or a gravel and filter fabric type system. We also recommend that any interior retaining walls, or walls through which efflorescence transmission would be undesirable, should be waterproofed.

The waterproofing should be specified by the designer, though we suggest the use of Bituthene, Miradri, or other similar waterproofing membrane. Surface drainage above the wall should preclude

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overtopping of the wall, and should also preclude ponding on the ground surface above the wall. *Additionally, the ground surface above all walls should form a drainage swale to carry water to the sides of the wall and/or to area drain locations.*

The back-of-wall drain systems should be installed with a minimum 3-inch diameter perforated pipe placed a minimum of 4 inches below the top of the footing (preferably at the base of the footing heel). The pipe should not be placed on top of the heel of the wall footing unless seepage through the base of the wall is acceptable. Perforations should be placed face-down (at 5 and 7 o'clock). The perforated pipe should connect to a solid discharge line, which discharges away from the new structures. This solid line should not connect to surface water drain lines (i.e. downspout and area drain lines). If water transmission through the base of a wall is not a concern, then weep holes may be used in place of the pipe.

If used, the gravel system should consist of a minimum 12 inch wide column of drain rock ($\frac{3}{8}$ to $\frac{3}{4}$ inch clean, crushed rock) extending the full width of the wall. The rock should continue to within 12 inches of finish grade. Prior to backfilling with the drain rock, a layer of filter fabric (Mirafi 140N or approved equivalent) should be placed against all soil surfaces to separate the rock and soil. The filter fabric should wrap over the top of the gravel and then a 12 inch thick cap of native soils should be placed at the top of the drain. If concrete flatwork is to directly overlay the back-of-wall drain, or if the drain is located in a crawlspace area, then the soil cap should be eliminated.

If prefabricated drainage panels are used (not acceptable for use with segmental block walls), a packet of filter fabric-wrapped drain rock should be placed around the perforated collector pipe at the base of the panel. The tops of the panels should be sealed and secured in accordance with the manufacturer's recommendations. The base of the drainage panels should extend down below the top of the filter fabric-wrapped drain rock. We note that Caltrans Class II permeable rock may be utilized in lieu of clean drain rock and filter fabric. The Class II permeable rock needs to be compacted into place, and needs to be certified by the quarry or rockery that it meets the Caltrans Class II permeable rock specifications.

Slabs-on-Grade

The house floors should not consist of concrete slabs-on-grade (although the basement floor may consist of a mat slab – see above). This is due to the expansive nature of the site soils which would cause deformations in a conventional slab-on-grade. However, the driveway, any sidewalks or patios, and garage floor may consist of conventional concrete slabs-on-grade, though it should be expected that some seasonal/post-construction shifting of such slabs will occur. We have provided guidelines to help reduce post-construction movements, however, it is nearly impossible to economically eliminate all shifting.

To help reduce cracking, we recommend slabs be a minimum of 5 inches thick and be nominally reinforced with #4 bars at 18 inches on center, each way. Slabs which are thinner or more lightly reinforced may experience undesirable cosmetic cracking. However, actual reinforcement and thickness should be determined by the structural engineer based upon anticipated usage and loading.

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In large non-interior slabs (e.g. patios, garage, etc.), score joints should be placed at a maximum of 10 feet on center. In sidewalks, score joints should be placed at a maximum of 5 feet on center. All slabs should be separated from adjacent improvements (e.g. footings, porches, columns, etc.) with expansion joints. Interior floor slabs will experience shrinkage cracking. These cosmetic cracks may be sealed with epoxy or other measures specified by the architect.

It would be prudent (though not required) to underlay all slabs with at least 30 inches of non-expansive materials. This will help to reduce future expansive soil movements of the slabs. Slabs which are not underlain by this non-expansive material may undergo excessive seasonal shifting.

All interior slabs (including garage slab) should be underlain by a minimum of 4 inches of clean $\frac{3}{4}$ inch crushed drain rock. The drain rock should be covered by a vapor barrier which conforms to ASTM E1745-97 (e.g. Stego Wrap or an approved equivalent). The architect or structural engineer should determine if sand is required over the vapor barrier.

Slabs which will be subject to light vehicular loads and through which moisture transmission is not a concern (e.g. driveway) should be underlain by at least 8 inches of compacted baserock, in lieu of any sand and gravel. The 6 inches of granular subgrade may be included as part of the 30 inches of non-expansive materials. Exterior landscaping flatwork (e.g. patios and sidewalks) may be placed directly on proof-rolled soil subgrade materials (e.g. no granular subgrade), however, they will be potentially subject to greater amounts of shifting and moisture transmission.

The garage slabs may be allowed to “float” independently from the perimeter grade beams if some post-construction differential movement is acceptable. If so, the slab should be separated from the grade beam with an expansion joint completely around the perimeter and at any interior isolated columns. Ideally, the grade beam at the front of the garage should continue to final floor elevation, with the slab inside the grade beam. This will help to assure that the garage doors always shut upon the grade beam, which should experience little or no movement (while the slab has the potential for greater movements).

As stated previously, in pavement (concrete or asphalt) areas to receive vehicular traffic, all baserock materials should be compacted to at least 95 percent of their MDD. Also, the upper 6 inches of native soil subgrade beneath any pavements should be compacted to between 90 to 93 percent of its MDD.

To reduce post-construction expansive soil movements (i.e. heave) of any slabs, care should be taken to keep the subgrade moist for an extended period of time prior to pouring the slabs. Shrinkage cracks should not be allowed to develop in the soil beneath any proposed slabs.

Drainage

Surface Drainage - Adjacent to any buildings, the ground surface should slope at least 5 percent away from the foundations within 5 feet of the perimeter. Impervious surfaces should have a minimum gradient of 2 percent away from the foundation. Surface water should be directed away from all buildings into drainage swales, or into a surface drainage system (i.e. catch basins and a solid drain line). “Trapped” planting areas should not be created next to any buildings without providing means for drainage (i.e. area drains).

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All roof eaves should be lined with gutters. The downspouts may be connected to solid drain lines, or may discharge onto paved surfaces which drain away from the structure. The downspouts may be connected to the same drain line as any catch basins, but must not connect to any perforated pipe drainage system. If splash blocks are preferred, then a perimeter footing drain system **is strongly encouraged** to be installed.

Footing Drain - Due to the potential for changes to surface drainage provisions, it would be wise (though not required unless splash blocks are used) to install a perimeter footing drain to intercept water attempting to enter the crawlspace, or under the floor slab. If a footing drain is not installed, some infiltration of moisture into the crawlspace may occur. Such penetration should not be detrimental to the performance of the structure, but can possibly cause humidity and mildew problems within the house, or seepage up through the slab floors. Where the basement wall is at the perimeter of the house, it will serve as a perimeter footing drain system.

The footing drain system, if installed, should consist of a 12 inch wide gravel-filled trench, *dug at least 12 inches below the elevation of the adjacent crawlspace or slab subgrade*. The trench should be lined with a layer of filter fabric (Mirafi 140N or equivalent) to prevent migration of silts and clays into the gravel, but still permit the flow of water. Then 1 to 2 inches of drain rock (clean crushed rock or pea gravel) should be placed in the base of the lined trench. Next a perforated pipe (minimum 3 inch diameter) should be placed on top of the thin rock layer. The perforations in the pipe should be face down. The trench should then be backfilled with more rock to within 6 inches of finished grade. The filter fabric should be wrapped over the top of the rock. Above the filter fabric 6 inches of native soils should be used to cap the drain. If concrete slabs are to directly overlay the drain, then the gravel should continue to the base of the slab, without the 6 inch soil cap. This drain should not be connected to any surface drainage system and basement light well drains.

Drainage Discharge - The surface drain lines should discharge at least 15 feet away from the house, preferably at the street. The discharge location(s) may need to be protected by energy dissipaters to reduce the potential for erosion. Care should be taken not to direct concentrated flows of water towards neighboring properties. This may require the use of multiple discharge points.

The footing drain (if installed) should discharge independently from the surface drainage system. A sump pump may be required for the footing drain discharge system. The surface and subsurface drain systems should not be connected to one another. The under-slab drainage system must discharge independently of any other drainage system, and must outlet at a location where any backup of a surface drainage system cannot backflow into the perforated portions of the subslab system.

Drainage Materials - Drain lines should consist of hard-walled pipes (e.g. SDR 35 or Schedule 40 PVC). In areas where vehicle loading is not a possibility, SDR 38 or HDPE pipes may be used. Corrugated, flexible pipes may not be used in any drain system installed at the property.

Surface drain lines (e.g. downspouts, area drains, etc.) should be laid with a minimum 2 percent gradient (¼ inch of fall per foot of pipe). Any subsurface drain systems (e.g. footing drains) should be laid with a minimum 1 percent gradient (1/8 inch of fall per foot of pipe).

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Utility Lines

Unless they pass through the perimeter footing drain system, all utility trenches should be backfilled with compacted native clay-rich materials within 5 feet of any buildings. This will help to prevent migration of surface water into trenches and then underneath the structures' perimeter. The rest of the trenches may be compacted with other native soils or clean imported fill. Only mechanical means of compaction of trench backfill will be allowed. Jetting of sands is not acceptable. Trench backfill should be compacted to at least 90 percent of its MDD. However, under pavements, concrete flatwork, and footings the upper 12 inches of trench backfill must be compacted to at least 95 percent of its MDD.

Pavement

The new driveway may consist of concrete, interlocking pavers, or asphaltic concrete over Caltrans Class II aggregate base (baserock). The asphalt should have a minimum thickness of 2½ inches. The baserock should have a minimum thickness of 8 inches, though 12 inches is preferable due to the expansive nature of the near-surface site soils. All of the baserock should attain a minimum compaction of 95 percent of its MDD. The upper 6 inches of the soil subgrade and any fill below this layer should attain between 90 to 93 percent relative compaction.

Plan Review and Construction Observations

The use of the recommendations contained within this report is contingent upon our being contracted to review the plans, and to observe geotechnically relevant aspects of the construction. We should be provided with a full set of plans to review at the same time the plans are submitted to the building/planning department for review. A minimum of one working week should be provided for review of the plans.

At a minimum, our observations should include: compaction testing of fills and subgrades; footing and basement excavation; pier drilling; forming of the grade beams voids; slab and driveway subgrade preparation; installation of any drainage system (e.g. behind the basement wall, behind the retaining wall, under-slab, footing and surface), and final grading. A minimum of 48 hours notice should be provided for all construction observations.

LIMITATIONS

This report has been prepared for the exclusive use of the addressee, and their architects and engineers for aiding in the design and construction of the proposed development. It is the addressee's responsibility to provide this report to the appropriate design professionals, building officials, and contractors to ensure correct implementation of the recommendations. The opinions, comments and conclusions presented in this report were based upon information derived from our field investigation and laboratory testing. Conditions between or beyond our borings may vary from those encountered. Such variations may result in changes to our recommendations and possibly variations in project costs.

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Should any additional information become available, or should there be changes in the proposed scope of work as outlined above, then we should be supplied with that information so as to make any necessary changes to our opinions and recommendations. Such changes may require additional investigation or analyses, and hence additional costs may be incurred. Our work has been conducted in general conformance with the standard of care in the field of geotechnical engineering currently in practice in the San Francisco Bay Area for projects of this nature and magnitude. We make no other warranty either expressed or implied. By utilizing the design recommendations within this report, the addressee acknowledges and accepts the risks and limitations of development at the site, as outlined within the report.

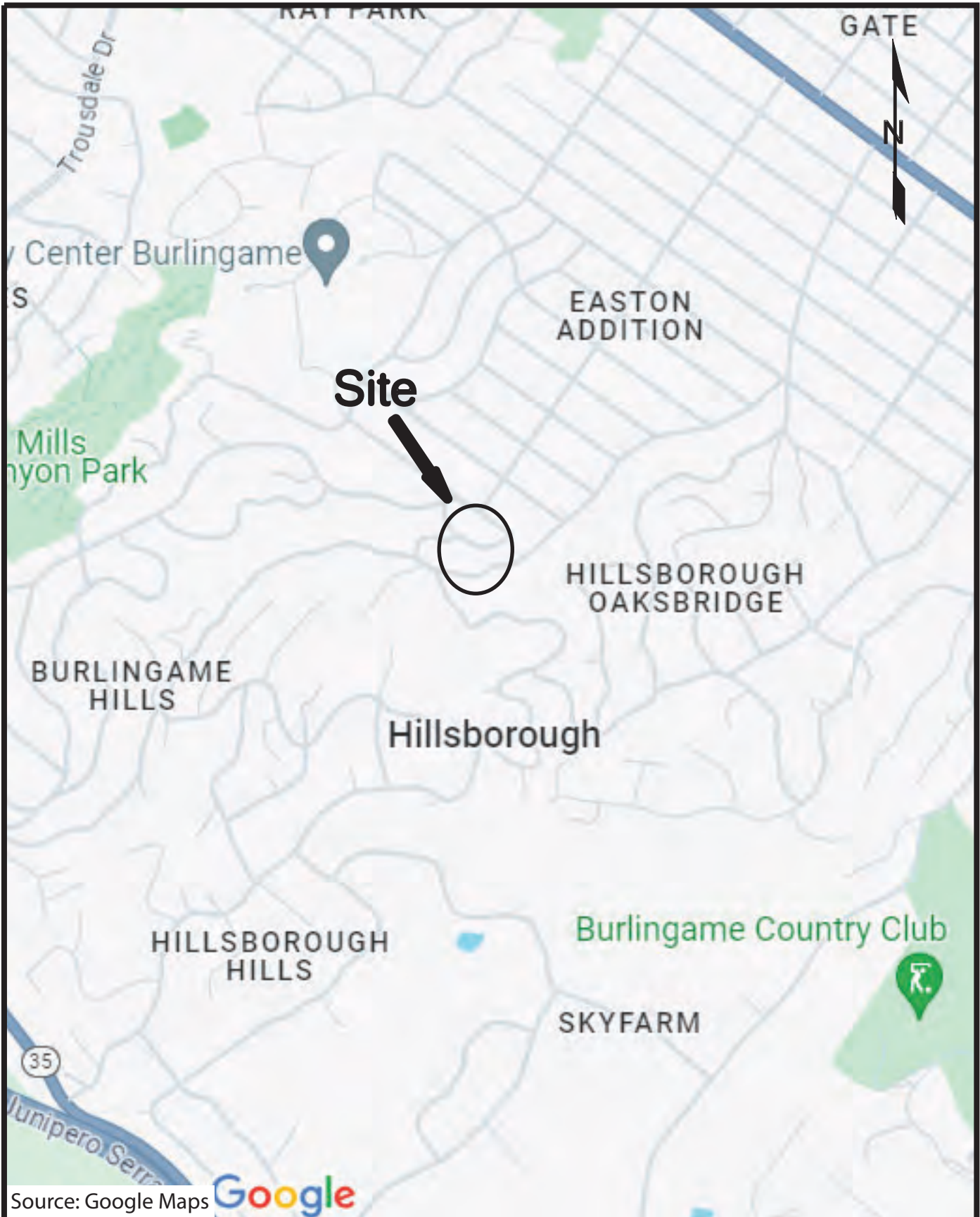
Respectfully Submitted;
GeoFoundation, Inc.

K. Younesi

Kourosh Younesi
Principal Engineer, PE 88582



cc: 1 electronic copy to client email Address



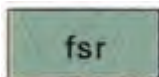
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Tel: (408) 710-6701

Figure 1 - Site Location



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Figure 2 - Vicinity Topography



fsr Sheared rock

fsr: Predominantly soft, light to dark gray, sheared shale, siltstone, and graywacke containing various-size tectonic inclusions of Franciscan rock types. Weathers to grayish-yellow clayey and silty sand and in place is eroded to form badlands topography. Area of outcrop may be greater than shown and may include some areas labelled as sandstone (fs). Slopes underlain by sheared rock unit are unstable, especially when wet. Thickness unknown but more than several hundreds of feet. Commonly referred to as melange.



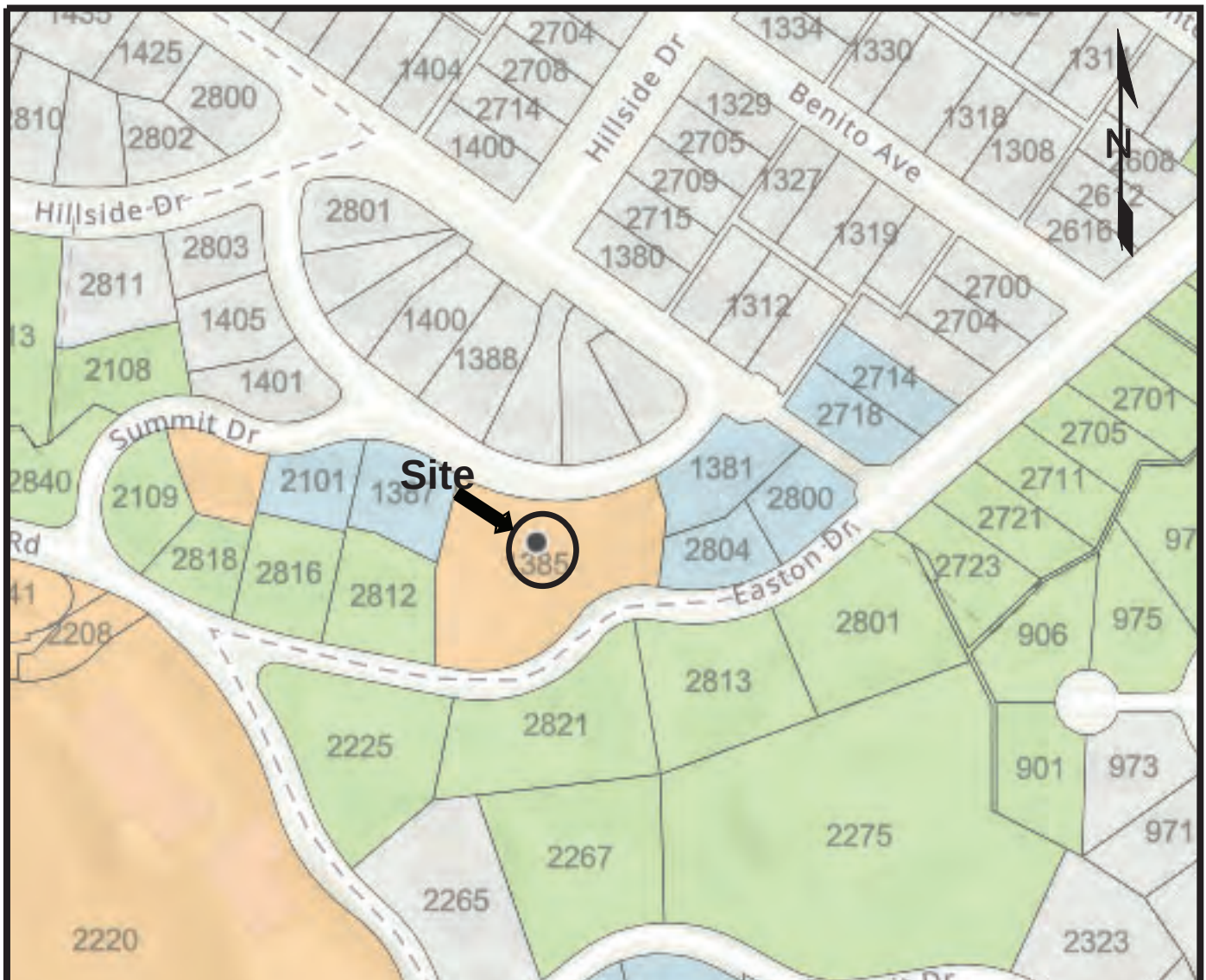
Qoa Older Alluvium (Pleistocene)

Qoa: Weathered, unconsolidated to moderately consolidated gravel, sand, and clay in various proportions and combinations. Chiefly older alluvial fan deposits. Distribution and extent largely inferred from drainage patterns on historic maps, as natural exposures are concealed by urban development. Locally includes younger alluvial and colluvial deposits too small to show at map scale.

Source: Pampeyan, E.H., 1994 Geologic map of the Montara Mountain and San Mateo 7.5' quadrangles, San Mateo County, California (Map I-2390)

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Figure 3 - Geologic Map



MAP EXPLANATION

Zones of Required Investigation:



Liquefaction

Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.



Earthquake-Induced Landslides

Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

NOTE:

Seismic Hazard Zones identified on this map may include developed land where delineated hazards have already been mitigated to city or county standards. Check with your local building/planning department for information regarding the location of such mitigated areas.

**State of California Seismic Hazard Zones; Montara Mountain Quadrangle Official Map;
Released: April 4, 2019**

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Figure 3a - Seismic Hazards Map



 - Boring Locations

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Figure 4 - Site Plan with
Approximate Boring Location

APPENDIX A

Boring Logs

LOG OF BORING

DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)	
				Sandy CLAY with gravel; brown; slightly moist ; very stiff (CL)			
5	1-1		25	Silty clayey SAND with trace of gravel; light to strong to yellowish brown; slightly moist; medium dense to very dense; (SC/SM); (bedrock)	98.5	15.7	
10	1-2		68				
15	1-3		40				7.9
20	1-3		50				8.5
25	1-3		63				12.6
30	1-3		68			8.0	
				Bottom of Boring @ 29.5 feet No Ground Water Was Encountered			
Logged by: KY Job No: 24042 Drilled on 7/18/24					Mod. Cal Sampler SPT Sampler		
GEOFOUNDATION Inc. 486 Chelsea Xing, San Jose, Ca 95138 Tel: (408) 710 - 6701					Figure A1 - Log of B-1		

LOG OF BORING

DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)
5	2-1		16	Lean CLAY with sand and trace of gravel; dark yellowish brown; slightly moist; stiff (CL); (harder after 5 feet)	110.3	16.9
10	2-2		>50	Clay SAND with trace of gravel; strong brown ; slightly moist; dense to very dense; (SC); (bedrock)		
15	2-3		45			11.0
20				Bottom of Boring @ 16.5 feet No Ground Water Was Encountered		
25						
30						

Logged by: KY
 Job No: 24042
 Drilled on 7/18/24

Mobile B-24 Drilling Rig
 140 Pound Hammer

Mod. Cal
 Sampler
 SPT
 Sampler

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Figure A2 - Log of B-2

LOG OF BORING						
DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)
	3-1		50/6"	CLAY with sand, trace of gravel and organics; brown; slightly moist; hard; (CL) (bedrock)		5.0
	3-2		50/6"			
5				Bottom of Boring @ 2.5 feet Drilling Refusal @ 2 feet No Ground Water Was Encountered		
10						
15						
20						
25						
30						

Logged by: KY
 Job No: 24042
 Drilled on 7/18/24

Minute Man
 70 Pound Hammer

Mod. Cal
 Sampler
 SPT
 Sampler

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Figure A3 - Log of B-3

LOG OF BORING						
DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)
5	4-1		51	CLAY with sand and trace of gravel; brown; slightly moist; hard (CL) (bedrock)		14.3
	4-2		67			
10				Bottom of Boring @ 7.0 feet Drilling Refusal @ 5.5 feet No Ground Water Was Encountered		
15						
20						
25						
30						

Logged by: KY
 Job No: 24042
 Drilled on 7/18/24

Minute Man Drilling Rig
 70 Pound Hammer

Mod. Cal
 Sampler
 SPT
 Sampler

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Figure A4 - Log of B-4

LOG OF BORING

DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)
5	5-1		75	Lean clayey SAND with trace of gravel; brown ; slightly moist; very dense (SC)	114.7	15.4
10	5-2		>50	CLAY with sand and trace of gravel; dark gray; slightly moist; hard (CL) (bedrock)		9.8
15				Bottom of Boring @ 9.0 feet Drilling Refusal @ 8.0 feet No Ground Water Was Encountered		
20						
25						
30						
Logged by: KY Job No: 24042 Drilled on 7/18/24					Mod. Cal Sampler SPT Sampler	
GEOFOUNDATION Inc. 486 Chelsea Xing, San Jose, Ca 95138 Tel: (408) 710 - 6701					Figure A5 - Log of B-5	

LOG OF BORING

DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)
5			50/6" 50/6"	CLAY with sand, trace of gravel and organics; brown; slightly moist; hard; (CL) (bedrock)		
10				Bottom of Boring @ 2.5 feet Drilling Refusal @ 2 feet No Ground Water Was Encountered		
15						
20						
25						
30						
Logged by: KY Job No: 24042 Drilled on 7/18/24				Minute Man 70 Pound Hammer	Mod. Cal Sampler SPT Sampler	

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Figure A6 - Log of B-6

APPENDIX B

Laboratory Test Results



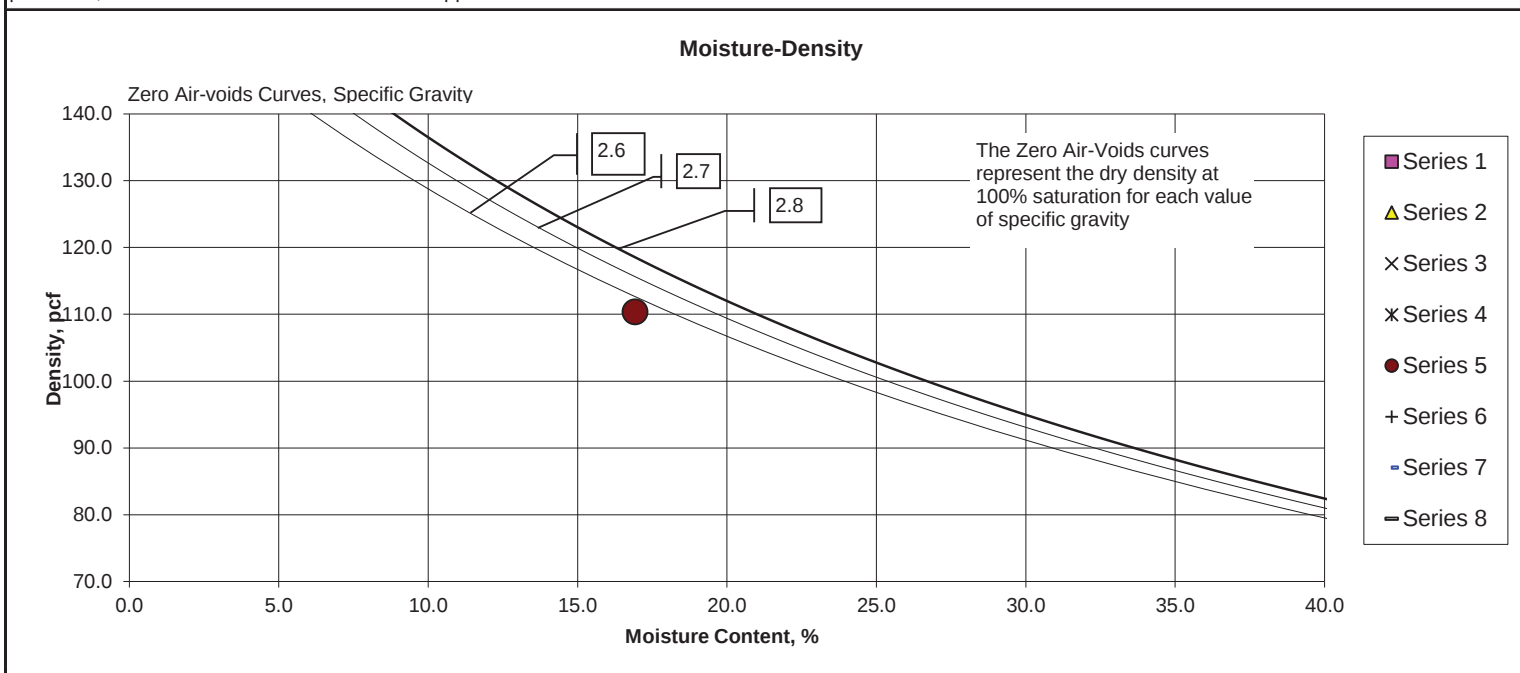
Moisture-Density-Porosity Report

Cooper Testing Labs, Inc. (ASTM D7263b)

CTL Job No: 1157-223a Project No. 24042 By: RU
Client: GeoFoundation Inc. Date: 07/22/24
Project Name: Hillside Cir Residences Remarks: 3-1 @ 2' - sample disturbed; m/c only.

Boring:	1-3	1-4	1-5	1-6	2-2	2-3	3-1	4-2
Sample:								
Depth, ft:								6.5
Visual Description:	Light Brown Clayey SAND	Strong Brown Cayey SAND	Strong Brown Clayey SAND	Strong Brown Clayey SAND	Strong Brown Clayey SAND	Strong Brown Clayey SAND	Brown CLAY w/ Sand & organics	Brown CLAY w/ Sand
Actual G_s								
Assumed G_s					2.70			
Moisture, %	7.9	8.5	12.6	8.0	16.9	11.0	5.0	14.3
Wet Unit wt, pcf					129.0			
Dry Unit wt, pcf					110.3			
Dry Bulk Dens.pb, (g/cc)					1.77			
Saturation, %					86.6			
Total Porosity, %					34.5			
Volumetric Water Cont., θ_w , %					29.9			
Volumetric Air Cont., θ_a , %					4.6			
Void Ratio					0.53			
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (G_s) was used then the saturation, porosities, and void ratio should be considered approximate.





Moisture-Density-Porosity Report

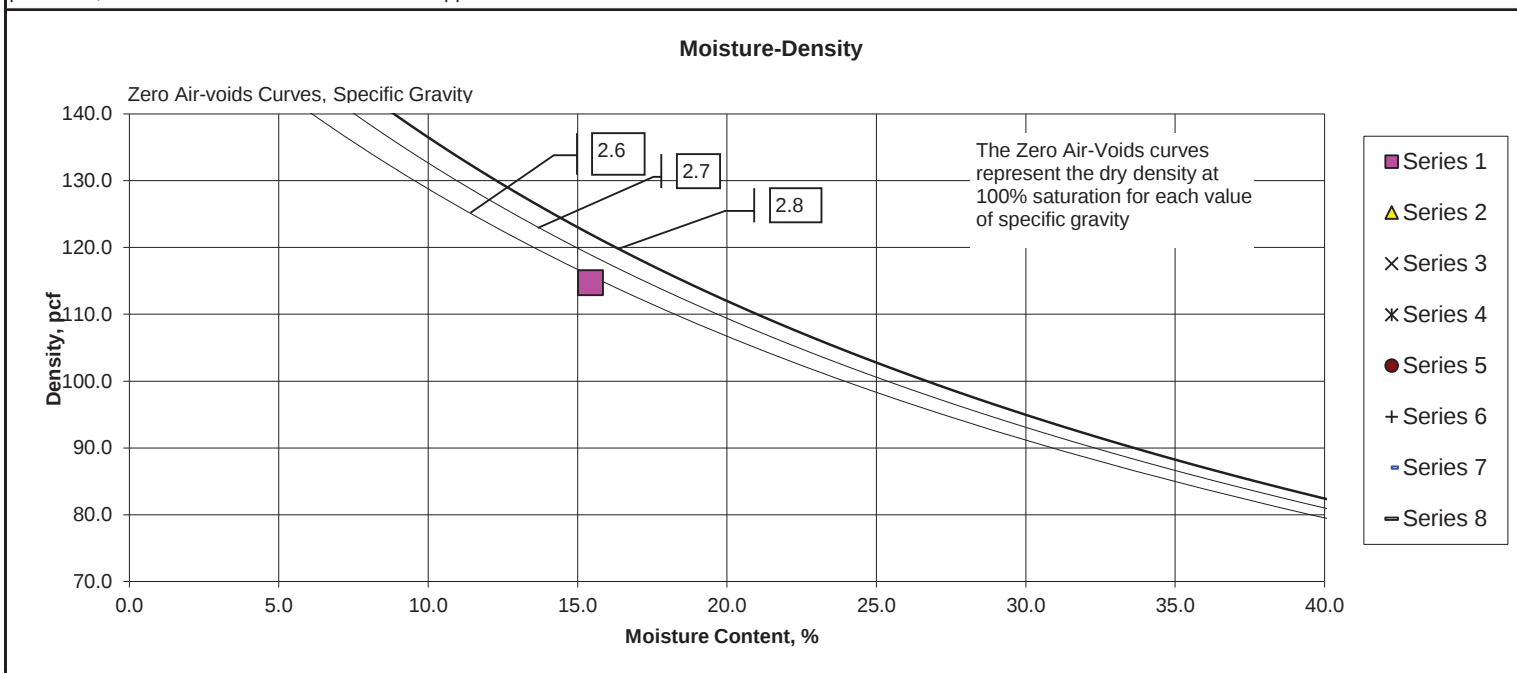
Cooper Testing Labs, Inc. (ASTM D7263b)

CTL Job No: 1157-223b
Client: GeoFoundation Inc.
Project Name: Hillside Cir Residences

Project No. 24042
Date: 07/22/24
By: RU
Remarks:

Boring:	5-1	5-2						
Sample:								
Depth, ft:	4	9						
Visual Description:	Brown Lean Clayey SAND	Dark Gray CLAY w/ Sand						
Actual G_s								
Assumed G_s	2.70							
Moisture, %	15.4	9.8						
Wet Unit wt, pcf	132.4							
Dry Unit wt, pcf	114.7							
Dry Bulk Dens.pb, (g/cc)	1.84							
Saturation, %	88.8							
Total Porosity, %	31.9							
Volumetric Water Cont., θ_w , %	28.4							
Volumetric Air Cont., θ_a , %	3.6							
Void Ratio	0.47							
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (G_s) was used then the saturation, porosities, and void ratio should be considered approximate.



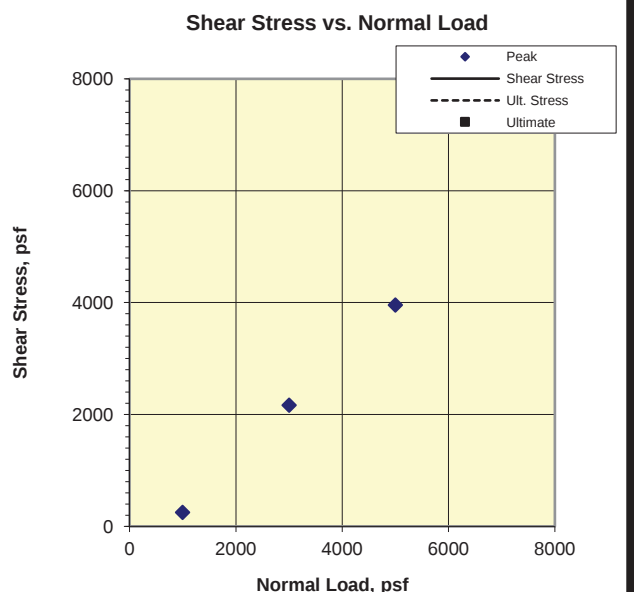
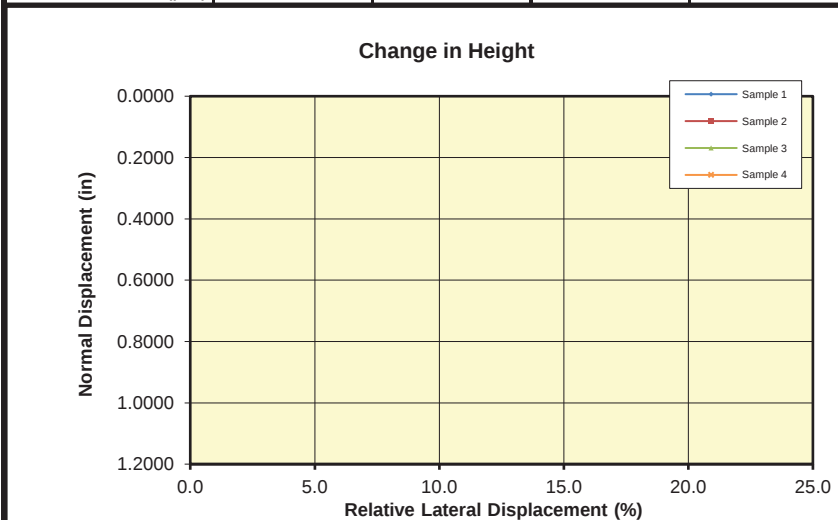
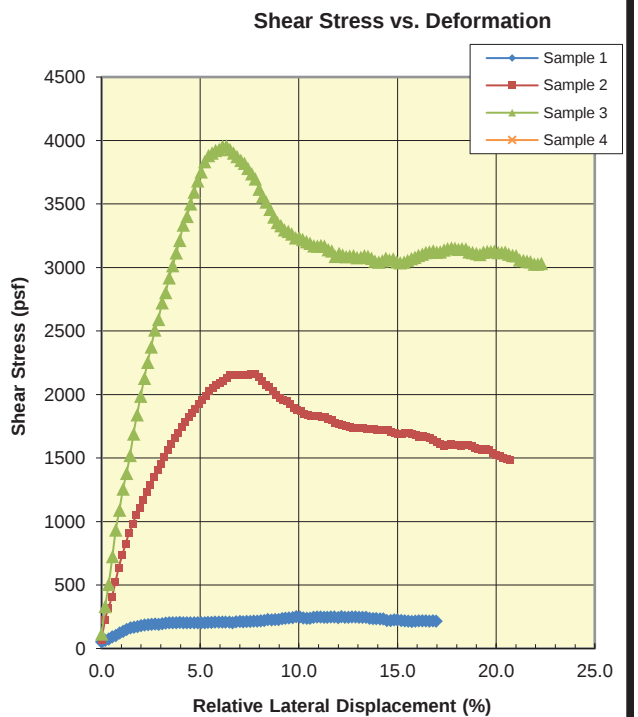


Consolidated Undrained Direct Shear (ASTM D3080M)

CTL Job #: 1157-223 Project #: 24042 By: MD
Client: GeoFoundation, Inc. Date: 7/23/2024 Checked: PJ
Project Name: Hillside Cir Residences Remolding Info:

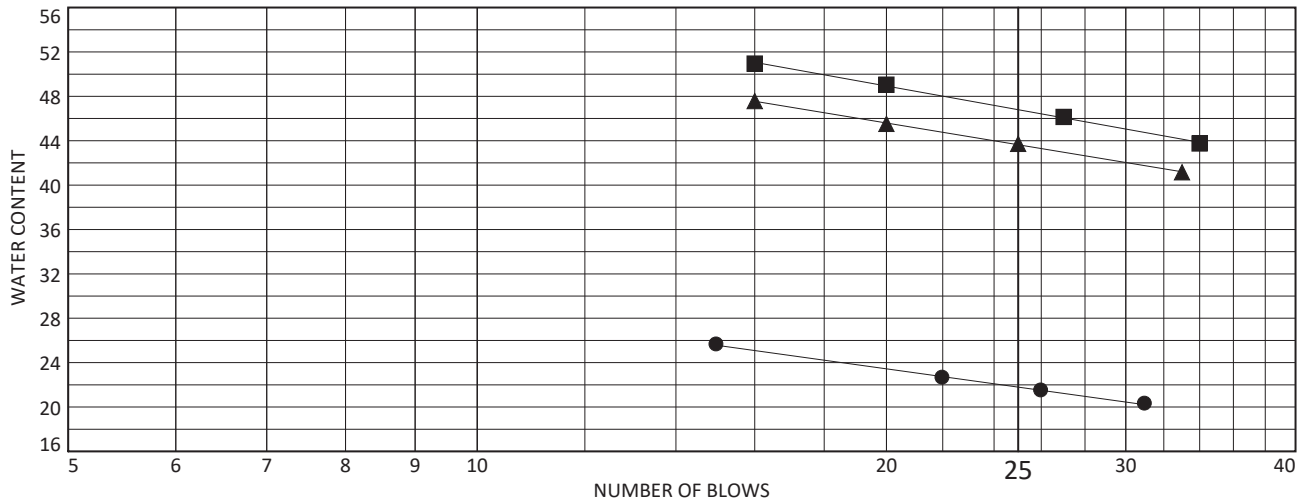
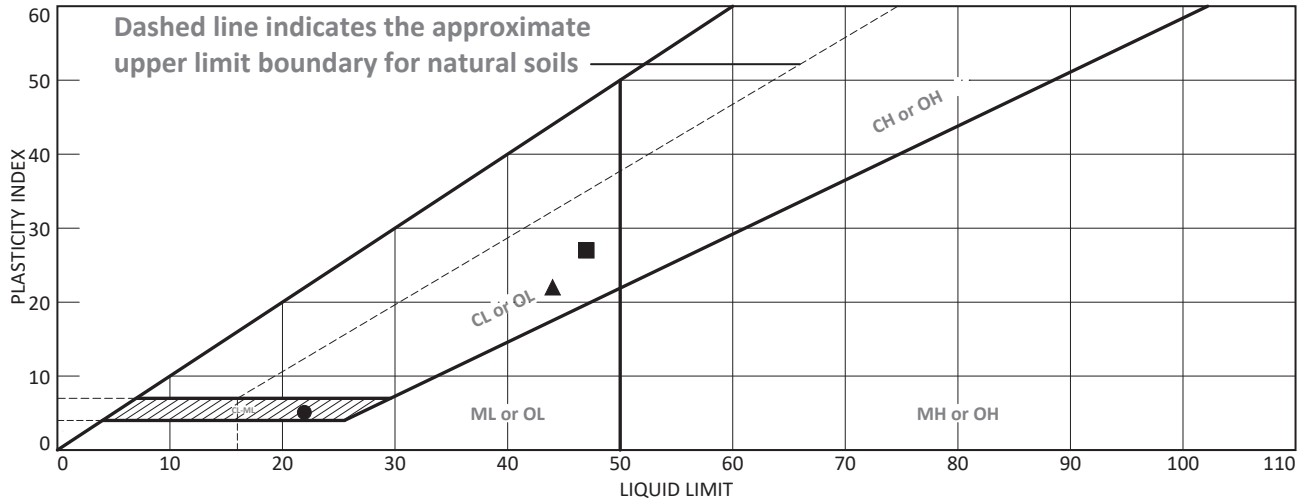
Specimen Data				
	1	2	3	4
Boring:	1-2	1-2	1-2	
Sample:				
Depth (ft):	9	9	9	
Visual Description:	Yellowish Brown Silty SAND	Yellowish Brown Silty SAND	Yellowish Brown Silty SAND	
Normal Load (psf)	1000	3000	5000	
Dry Mass of Specimen (g)	118.0	119.0	121.4	
Initial Height (in)	1.00	1.00	1.00	
Initial Diameter (in)	2.42	2.42	2.42	
Initial Void Ratio	0.724	0.711	0.676	
Initial Moisture (%)	15.4	15.7	16.5	
Initial Wet Density (pcf)	112.8	114.0	117.2	
Initial Dry Density (pcf)	97.7	98.5	100.6	
Initial Saturation (%)	57.5	59.7	66.0	
ΔHeight Consol (in)	0.0199	0.0335	0.0375	
At Test Void Ratio	0.690	0.653	0.613	
At Test Moisture (%)	20.5	19.9	19.7	
At Test Wet Density (pcf)	120.1	122.2	125.1	
At Test Dry Density (pcf)	99.7	101.9	104.5	
At Test Saturation (%)	80.0	82.1	86.7	
Strain Rate (%/min)	1.1	1.1	1.1	
Strengths Picked at	Peak	Peak	Peak	
Shear Stress (psf)	250	2164	3957	
ΔHeight (in) at Peak				
Ultimate Stress (psf)				

Phi (deg)	42.8	Ult. Phi (deg)	
Cohesion (psf)	657	Ult. Cohesion (psf)	



Remarks: *DS-CU* A fully undrained condition may not be attained in this test. ΔH is not measured during undrained direct shear tests.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Yellowish Brown Silty Clayey SAND	22	17	5			
■	Dark Yellowish Brown Lean CLAY w/ Sand	47	20	27			
▲	Brown Lean Clayey SAND	44	22	22			

Project No. 1157-223 Client: GeoFoundation Inc.

Project: Hillside Cir Residences - 24042

● Source of Sample: 1-1 Depth: 4'

■ Source of Sample: 2-1 Depth: 4'

▲ Source of Sample: 5-1 Depth: 4'

Remarks:

COOPER TESTING LABORATORY

Figure



**GEOTECHNICAL INVESTIGATION FOR
PROPOSED NEW RESIDENCE IN LOT-2**

at
1385 Hillside Circle
Burlingame, California

Report Prepared for:

Mr. and Mrs. Chiu

Report Prepared by:

GeoFoundation, Inc.

August 2024



File: 24042
August 6, 2024

Mr. and Mrs. Chiu
1385 Hillside Circle
Burlingame, CA 94010

Subject: **Hillside Circle Property
1385 Hillside Circle
Burlingame, California
GEOTECHNICAL INVESTIGATION FOR PROPOSED
NEW RESIDENCE AT LOT-2 (APN: 027-282-050)**

Dear Mr. and Mrs. Chiu:

In accordance with your authorization, we have performed a subsurface investigation into the geotechnical conditions present at the location of the proposed improvements. This report summarizes the conditions we measured and observed, and presents our opinions and recommendations for the design and construction of the proposed new residence at Lot-2.

Site Description

The subject site is a gently to moderately sloping, irregularly-shaped parcel located on the south side of Hillside Circle (at the approximate location shown on Figure 1). For purposes of description in this report, it is assumed that the property faces north. The property is bounded by other developed single-family residential lots to the sides, Easton Drive to the south, and Hillside Circle to the north.

The site is currently occupied by a three-story, wood-framed residence situated near the north side of the lot. There is a detached garage at the northeastern corner of the property. The wooden house floors are supported above crawlspace areas, while the garage has a concrete slab-on-grade floor. A concrete driveway leads from the street to the garage.

The ground surface in the site vicinity has an overall slope down towards the south and east (as shown on Figure 2). At the site, the ground also slopes gently to moderately down towards the south. Surface gradients range from 20:1 to almost 3:1 (horizontal:vertical, H:V). During the original development of the property, it appears that up to 6 feet of cuts were made at the front of the house, in order to create the existing level pad.

The grounds around the residence have been landscaped with front lawn areas, a variety of small to medium-sized bushes and shrubs, and numerous small to large trees. A concrete walkway leads to the front entrance. Concrete and flagstone walkways along the left and right sides of the house lead to the backyard walkways and patio. There is an ADU at the southwestern corner of the property. Up to 6 feet tall retaining walls were constructed at different locations on the property.

Proposed Construction

We understand that the current development for the site proposes the demolition of the existing residence, split of the current lot into three lots, and the subsequent construction of three new two-story residences, and associated improvements in the split lots. The new residences are to be of conventional, wood-framed construction. New foundation loads are expected to be typical for this type of structure (i.e. light).

Excavation work at the site is expected to be limited to foundation and potential basement excavations. No significant fill placement is anticipated as part of this work. No pool is planned for the project.

INVESTIGATION

Scope and Purpose

The purpose of our investigation was to determine the nature of the subsurface soil conditions so that we could provide geotechnical recommendations for the construction of the proposed new residences, and associated improvements. In order to achieve this purpose, we have performed the following scope of work:

- 1 - visited the property to observe the geotechnical setting of the area to be developed;
- 2 - reviewed relevant published geological and geotechnical maps;
- 3 - drilled six borings near the location of the proposed improvements;
- 4 - performed laboratory testing on collected soil samples;
- 5 - assessed the collected information and prepared this report.

The findings of these work items are discussed in the following sections of this report.

Geologic Map Review

We reviewed the *Geologic Map of the Montara Mountain and San Mateo 7½' Quadrangles, San Mateo County, California (USGS Map I-2390)*, by Earl H. Pampeyan (1994) and the *State of California Seismic Hazards Zone Map; Montara Mountain Quadrangle (4/4/19)*. The relevant portion of the Pampeyan and state hazard zone maps have been reproduced in Figures 3 and 3a.

The Pampeyan map indicates that the site is located almost at the border of two different geological formations/types and is underlain by either Sheared Rock (map symbol “fsr”) or Older Alluvium (map symbol “Qoa”). Pampeyan describes “fsr” materials as consisting of “Predominantly soft, light to dark gray, sheared shale, siltstone, and graywacke containing various-size tectonic inclusions of Franciscan rock types. Weathers to grayish-yellow clayey and silty sand and in place is eroded to form badlands topography. Area of outcrop may be greater than shown and may include some areas labelled as sandstone (fs). Slopes underlain by sheared rock unit are unstable, especially when wet. Thickness unknown but more than several hundreds of feet. Commonly referred to as melange.”. Pampeyan describes “Qoa” materials as consisting of “Weathered, unconsolidated to moderately consolidated gravel, sand, and clay in various proportions and combinations. Chiefly older alluvial

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fan deposits. Distribution and extent largely inferred from drainage patterns on historic maps, as natural exposures are concealed by urban development. Locally includes younger alluvial and colluvial deposits too small to show at map scale.”.

The Seismic Hazards Zone Map indicates the site is mapped within an area where there has been a historic occurrence of **both** liquefaction and landslide, or where local topographic, local geological, geotechnical, and groundwater conditions would indicate a potential for permanent ground displacement such that mitigation, as defined in Public Resource Code Section 2693(c), would be required.

The active San Andreas Fault is mapped approximately 1.3 miles (2.1 km) southwest of the site.

Subsurface Exploration

On July 18, 2024 we drilled six borings at the site at the locations shown on Figure 4. The borings were drilled using a Mobile B-24 truck-mounted drilling rig and a Minute Man portable drilling rig (as noted on logs) equipped with 4.0 and 3.25 inch diameter helical flight augers, respectively. Logs of the soils encountered during drilling record our observations of the cuttings traveling up the augers and of relatively undisturbed samples collected from the base of the advancing holes. The final boring logs are based upon the field logs with occasional modifications made upon further laboratory examinations of the recovered samples and laboratory test results. The final logs are attached in Appendix A.

The relatively undisturbed samples were obtained by driving a 3.0 inch (outer diameter) Modified California Sampler and a Standard Penetration Sampler (as noted on logs) into the base of the advancing hole by repeated blows from a 140 pound (truck rig) and a 70 pound (portable rig) hammer lifted 30 inches. On the logs, the number of blows required to drive the sampler the final 12 inches of the 18 inch drive, have been recorded as the Blow Counts. These blows have not been adjusted to reflect equivalent blows of any other type of sampler or hammer, or to account for the different hammers and samplers used.

Subsurface Conditions

Boring 1 penetrated 3 feet of very stiff, slightly moist, brown, sandy clay with gravel. Then, light to strong to yellowish brown, medium dense to very dense, slightly moist, silty clayey sand with trace of gravel was encountered down to the terminated boring depth of 29.5 feet. We judged the latter layer to be bedrock.

Boring 2 penetrated 8 feet of stiff, slightly moist, yellowish brown, lean clay with sand and trace of gravel. This was underlain by strong brown, slightly moist, dense to very dense, clayey sand with trace of gravel down to the terminated boring depth of 16.5 feet. We judged the latter layer to be bedrock.

Boring 3 penetrated hard, slightly moist, brown, clay with sand, trace of gravel, and organics down to the terminated boring depth of 2.5 feet, where it encountered refusal. We judged this layer to be bedrock.

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Boring 4 penetrated hard, slightly moist, brown, clay with sand, and trace of gravel down to the terminated boring depth of 7 feet, where it encountered refusal. We judged this layer to be bedrock.

Boring 5 penetrated 5 feet of very dense, slightly moist, brown, lean clayey sand with trace of gravel. This was underlain by dark gray, slightly moist, hard, clay with sand and trace of gravel down to the terminated boring depth of 9 feet, where it encountered refusal. We judged the latter layer to be bedrock.

Boring 6 penetrated hard, slightly moist, brown, clay with sand, trace of gravel, and organics down to the terminated boring depth of 2.5 feet, where it encountered refusal. We judged this layer to be bedrock.

Please refer to Appendix A for a more detailed description of each boring.

No free groundwater was encountered during the drilling of the holes. However, during periods of heavy rain or late in the winter, groundwater seepage may exist at shallower depths, most likely as perched water atop the bedrock.

Laboratory Testing

The relatively undisturbed samples collected during the drilling process were returned to the laboratory for testing of engineering properties. In the lab, selected soil samples were tested for moisture content, density, strength, and plasticity. The results of the laboratory tests are attached to this report in Appendix B.

Plasticity Index (PI) testing performed on the site near surface materials produced PI results of 5, 27, and 22, respectively. These testings indicated that the near surface materials have low to high plasticity and are highly expansive.

Strength testing was conducted on one sample (Sample 1-2 @ 9 feet). Drawing a best-fit-line through the data points showed that this material has high strength parameters. The testing showed that this material has high strength parameters (cohesion = 657 psf, internal friction angle = 42.8 degrees). The other soil layers at the site were judged to also have high strengths based upon their high blow counts as obtained during the sampling process.

CONCLUSIONS AND RECOMMENDATIONS

General

Based upon our investigation, we believe that the proposed improvements can be safely constructed. Geotechnical development of the site is controlled by the presence of high expansion potential of site soils, and gently to moderately sloping, but aided by relatively shallow bedrock.

Expansive soils derive their name from their propensity to change volume in response to changes in moisture content. When they are dry, they shrink; when they become wet, they swell. The pressures these soils can exert as they expand can be sufficiently high to move conventional residential

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foundations. The foundation movement induced by the soil shifting can cause wall coverings to crack, doors and windows to stick, floors to slope, and pools to crack and tilt. Seasonal movements of expansive soils have caused such distress to countless houses and pools in the Bay Area.

To combat seasonal expansive soil movements, it is necessary to utilize a foundation system which derives its support from the deeper, more stable soils. Typically, a drilled, cast-in-place pier foundation system is used to reach the more stable materials. Therefore, we have recommended that such foundation system be utilized at this site for the at-grade foundations of the new residence, while the deeper basement shall have a mat slab foundation.

The recommendations in this report should be incorporated into the design and construction of the proposed new residence, and associated improvements.

Seismicity

The greater San Francisco Bay Area is recognized by Geologists and Seismologists as one of the most active seismic regions in the United States. Several major fault zones pass through the Bay Area in a northwest direction which have produced approximately 12 earthquakes per century strong enough to cause structural damage. The faults causing such earthquakes are part of the San Andreas Fault System, a major rift in the earth's crust that extends for at least 700 miles along western California. The San Andreas Fault System includes the San Andreas, San Gregorio, Hayward, Calaveras Fault Zones, and other faults. In 2014, seismologic and geologic experts convened by the U.S. Geological Survey, California Geological Survey, and the Southern California Earthquake Center concluded that there is a 72 percent probability for at least one "large" earthquake of magnitude 6.7 or greater to occur in the Bay Area before the year 2043. The northern portion of the San Andreas fault is estimated to have a 6 percent probability, while the Hayward and Calaveras faults are estimated to have a 14 and 7 percent probability of producing an earthquake of that magnitude or greater during that time period.

Ground Rupture - The lack of mapped active fault traces through the site, suggests that the potential for primary rupture due to fault offset on the property is low.

Ground Shaking - The subject site is likely to be subject to very strong to violent ground shaking during its life span due to a major earthquake in one of the above-listed fault zones. Current (2022) building code design may be followed by the structural engineer to minimize damages due to seismic shaking, using the following input parameters from ASCE Hazard Tool based upon ASCE 7-16 design parameters:

Site Class – C	$S_{MS} = 2.753$	$S_{M1} = 1.342$	$S_{DS} = 1.835$	$S_{D1} = 0.894$
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Landsliding - - The State *Earthquake Zones of Required Investigation* map indicates that the site is in an area potentially subject to earthquake-induced landslides. The subject site and the surrounding area are gently to moderately sloping. Fortunately, the site is underlain by competent bedrock at relatively shallow depths. Therefore, the hazard due to large-scale deep seismically-induced landsliding is, in our opinion, relatively low for the site. However, as with any slope, minor sloughing

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of the steeper site slopes could occur during earthquake shaking. The proposed improvements should not be affected by any such sloughing, as they will be supported by the stable soils at the site.

Liquefaction - The State of California Seismic Hazards Zones map indicates that the site is in an area potentially subject to liquefaction. Liquefaction most commonly occurs during earthquake shaking in loose fine sands and silty sands associated with a high groundwater table. Groundwater table or loose sandy materials were demonstrated to be absent down to the site bedrock. Therefore, it is also our opinion that liquefaction is unlikely to occur on the subject property.

Ground Subsidence - Ground subsidence may occur when poorly consolidated soils densify as a result of earthquake shaking. Since the proposed building site is underlain at shallow depths by resistant materials, the hazard due to ground subsidence is, in our opinion, considered to be low.

Lateral Spreading - Lateral spreading may occur when a weak layer of material, such as a sensitive or liquefiable soil, loses its shear strength as a result of earthquake shaking. Overlying blocks of competent material may be translated laterally towards a free face. Liquefiable conditions are not present proximate to or at the site, hence, the hazard due to lateral spreading is, in our opinion, considered to be low.

Site Preparation and Grading

All debris resulting from the demolition of existing improvements should be removed from the site and may not be used as fill. Any existing underground utility lines to be abandoned should be removed from within the proposed building envelope and their ends capped outside of the building envelope.

Any vegetation and organically contaminated soils should be cleared from the building area. All holes resulting from removal of tree stumps and roots, or other buried objects, should be overexcavated into firm materials and then backfilled and compacted with native materials.

It would be reasonable to use soils from the basement excavation to raise portions of the site grades to improve drainage of the site.

The placement of fills at the site is expected to include: slab subgrade materials, and finished drainage and landscaping grading. These and all other fills should be placed in conformance with the following guidelines:

Fills may use organic-free soils available at the site or import materials. Import soils should be free of construction debris or other deleterious materials and be non-expansive. *A minimum of 3 days prior to the placement of any fill, our office should be supplied with a 30 pound sample (approximately a full 5 gallon bucket) of any soil or baserock to be used as fill (including native and import materials) for testing and approval.*

All areas to receive fills should be stripped of organics and loose or soft near-surface soils. Fills should be placed on level benches in lifts no greater than 6 inches thick (loose), moisture conditioned to near Optimum Moisture Content (OMC), and be compacted to at least 90 percent of their Maximum

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Dry Density (MDD), as determined by ASTM D-1557. If native expansive soils are used for fill at the site, then the soils should be placed at 3 to 5% over Optimum Moisture Content and be compacted to **between** 85 to 90 percent of their MDD. In pavement (concrete or asphalt) areas to receive vehicular traffic, all baserock materials should be compacted to at least 95 percent of their MDD. Also, the upper 6 inches of soil subgrade beneath any pavements should be compacted to between 90 to 93 percent of its MDD.

Expansive soils may only be used for fill where only vegetation and other movement insensitive improvements are proposed. These materials should not be placed as fill under the house, retaining walls, or patios.

If unretained fills in excess of 3 feet thick are to be placed, our office should be contacted for further recommendations.

Temporary, dry-weather, vertical excavations should remain stable for short periods of time to heights of 5 feet. All excavations should be shored or sloped in accordance with OSHA standards.

Permanent cut and/or fill slopes should be no steeper than 2:1 (H:V). However, even at this gradient, minor sloughing of slopes may still occur in the future. Positive drainage improvements (e.g. drainage swales, catch basins, etc.) should be provided to prevent water from flowing over the tops of cut and/or fill slopes.

Temporary stockpiling of excess soils should be set back a minimum of 25 feet from the crest of slope. The height of soil stockpiles should not exceed 12 feet, unless approved by the soils engineer in writing.

New Foundation for At-Grade Portion of the New Residence

Due to the presence of highly expansive site soils and gentle to moderate slopes, for best performance, the foundations will need to penetrate into the deeper, more stable soils. We recommend a pier and grade beam foundation system be used.

Piers should penetrate a minimum of 12 feet below the lowest adjacent grade, and 8 feet into the bedrock, whichever is deeper. We encountered 3 to 8 feet of clayey/sandy/non-bedrock material during our field exploration. This will likely result in piers with depths ranging from 12 to 20 feet deep.

The piers should have a minimum diameter of 16 inches, and be nominally reinforced with a minimum of four #4 bars vertically. Actual pier depth, diameter, reinforcement, and spacing should be determined by the structural engineer based upon the following design criteria:

A friction value of 600 psf may be assumed to act on that portion of the pier below a depth of 5 feet. Lateral support may be assumed to be developed along the length of the pier below 5 feet, using a passive pressure of 350 pcf Equivalent Fluid Weight (EFW). Passive resistance may be assumed to act over 1.5 projected pier diameters. Above 5 feet, no frictional or lateral support may be assumed. These design values may be increased 1/3 for transient loads (i.e. seismic and wind).

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On the slopes, a lateral creep force of 35 pcf Equivalent Fluid Weight (EFW) should be applied to all piers on any portion of the site where grading operations do not flatten slopes to less than 4:1 (H:V). This creep force should be applied over 3 projected pier diameters from the ground surface to a depth of 10 feet horizontal cover.

Even though piers are designed to derive their vertical resistance through skin friction, the bases of the pier holes should be clean and firm prior to setting steel and pouring concrete. If more than 6 inches of slough exists in the base of the pier holes after drilling, then the slough should be removed. If less than 6 inches of slough exists, the slough may be tamped to a stiff condition. Piers should not remain open for more than a few days prior to casting concrete. In the event of rain, shallow groundwater, or caving conditions it may be necessary to pour piers immediately.

All perimeter piers, and piers under load-bearing walls, should be connected by concrete grade beams. Perimeter grade beams should penetrate a minimum of 6 inches below crawlspace grade (unless a perimeter footing drain is installed to intercept water attempting to enter around the perimeter). Interior grade beams do not need to penetrate below grade. All other isolated floor supports must also be pier supported to resist expansive soil uplift, however, they do not need to be connected by grade beams.

In order to reduce any expansive soil uplift forces on the base of the grade beams, the beams should have either a uniform 4 inch void between their base and the soil, or should be constructed with a knife edge and triangular shaped void in a rectangular trench. The void can be created by the use of prefabricated cardboard void material (e.g. K-void, SureVoid, Carton-void), half a sonotube faced concave down, or other methods devised by the contractor and approved by our offices. *The use of Styrofoam is not acceptable for creating the void.*

The void forms are not required for basement slab where supported by bedrock. Voids are required under the outer 10 feet of the slab where on soil, and less than 5 feet below finish grade.

All improvements connected directly to any pier supported structure, also need to be supported by piers. This includes, but is not limited to: porches, decks, entry stoops and columns, etc. If the designer does not wish to pier support these items, then care must be taken to structurally isolate them (with expansion joints, etc.) from the pier supported structure.

If the above recommendations are followed, total foundation settlements should be less than 1 inch, while differential settlements should be less than ½ inches.

Basement Foundations, Walls, and Floors

Wall Forces – Any basement retaining walls should be designed to resist an active pressure of 45 pcf Equivalent Fluid Weight (EFW), for retained slopes flatter than 4:1 (horizontal:vertical). If it is desired to create steeper retained slopes to reduce the heights of the walls, then the active pressure will need to be increased. An active pressure of 65 pcf EFW should be utilized for retained slopes with an inclination of 2:1 (H:V). Where retained slopes are greater than 4:1, though less than 2:1, the designer should linearly interpolate between 45 and 65 pcf EFW.

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If the walls are considered to be restrained, they should be designed for an additional uniform pressure of $8H$ psf, where H is the height of the wall in feet. We leave it to the design professional's judgment in determining whether a wall is restrained or not. It is our opinion that a supplemental seismic loading for a basement wall is not necessary. However, if desired, the designer may also apply a uniform seismic force of $10H$ psf to the retaining wall in addition to the normal active pressures. The walls should also be designed to resist a point load applied at the midpoint of the wall, equal to $\frac{1}{2}$ of the maximum applied surcharge (if any).

Wall Drainage - The above values have been provided assuming that a back-of-wall drain system will be installed to prevent build-up of hydrostatic pressures. This drainage system may consist of a prefabricated drainage panel (i.e. Miradrain) or a gravel and filter fabric type system. The walls should be waterproofed to prevent the transmission of efflorescence through the walls. The waterproofing should be specified by the designer, though we recommend the use of Bituthene, Miradri, or other similar waterproofing membrane. Either drainage system should be installed with a minimum 3 inch diameter perforated pipe incorporated into the subslab granular section. Ideally the base of the pipe should be placed atop 1 to 2 inches of gravel, with its top even with the elevation of the basement subgrade (i.e. under the gravel). Perforations should be placed face-down (at 5 and 7 o'clock). Preferably, the exterior basement walls should be aligned with the exterior face of the slab to provide a planar surface for waterproofing installation across the cold joint.

If used, the gravel system should consist of a minimum 12 inch wide column of drain rock ($\frac{3}{4}$ inch rock or $\frac{3}{8}$ inch pea gravel) extending the full width of the wall. The rock should continue to within 6 inches of finished grade. Prior to backfilling with the drain rock, a layer of filter fabric (Mirafi 140N or approved equivalent) should be placed against all soil surfaces to separate the rock and soil. The filter fabric should wrap over the top of the gravel and then a 6 inch thick cap of native soils should be placed at the top of the drain. If concrete flatwork is to directly overlay the back-of-wall drain, then the drain rock should continue to the base of the concrete. Additionally, where the drain will be located within crawlspace area, the gravel should continue to the crawlspace ground surface without the soil cap.

If prefabricated drainage panels are used, these panels should dead-end into the subslab gravel for collection under the slab. The tops of the panels should be sealed and secured in accordance with the manufacturer's specifications. The base of the drainage panels should extend down below the top of the filter fabric-wrapped drain rock.

Floor - The basement floor/foundation may consist of a mat slab designed for a modulus of subgrade reaction of 15 pci in the center, which can be increased to 30 pci along the sides of the basement (extending 20% of the basement width/length from the edge to the interior), and 60 pci at the corners (again 20 percent of the width/length extending off the building corners towards the sides and interior). These design values may be increased $\frac{1}{3}$ for transient loads (i.e. seismic and wind).

The entire slab should be underlain by at least 4 inches of clean, crushed drain rock. The drain rock should be covered by a moisture barrier which conforms to ASTM E1745-97 (e.g. Stego Wrap or an approved equivalent). The moisture barrier should wrap up the edges of the mat slab to be overlapped by the basement wall waterproofing. Perforated collector pipes should be embedded within the drain

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rock around the perimeter of the slab and at 20 foot spacing (one-way) under the slab to carry any water which gathers within the drain rock to the back-of-wall drain discharge location. The need for any sand over the top of the vapor barrier should be determined by the slab designer or architect.

Window Well and Access Well Drainage – Any window well and access well drainage should be tight lined to the same sump pump used for under-slab and wall drainage. This sump should be located in an area with easy access, and may discharge into the storm drain system. There should be a minimum 4 inch lip between the wells and the floor slabs. A high water alarm should be provided in the sump. Consideration should be given to a backup generator. No roof drain lines should discharge into any window well or stairwell/depressed patio.

Retaining Walls

New site retaining walls must not be structurally connected to the house or other structures. New site walls which are located on, or within 10 feet of the crest of, slopes steeper than 5:1 (H:V); and, walls for which expansive soil movements are undesirable, should utilize a pier and grade beam foundation system. Alternatively, L-shaped or deepened spread footing may be used if the ground surface below the wall is flatter than 5:1 (for at least 10 feet of the crest). If spread footings are utilized, then some expansive soil movements of the walls may occur. Therefore, in order to reduce the detrimental effect of such movements on site walls, we recommend the use of a “flexible” wall system (e.g. Keystone, Allan Block, wood lagging, etc.), or the liberal use of vertical construction joints.

Wall Forces - Any unrestrained retaining walls required for the proposed construction should be designed to resist an active pressure of 45 pcf Equivalent Fluid Weight (EFW) in supporting soils with retained slopes less than 4:1 (H:V). An active pressure of 65 pcf EFW should be utilized for retained slopes with an inclination of 2:1 (H:V). Where retained slopes are greater than 4:1, though less than 2:1, the designer should linearly interpolate between 45 and 65 pcf EFW.

Where a retaining wall is located within a horizontal distance less than twice the height of the lower retaining wall, the lower retaining wall will need to be designed for an additional surcharge pressure from the upper wall(s). Once the geometry of such walls has been determined, please provide our office with a cross-section so that we can determine the required surcharge.

Any restrained retaining walls required should be designed for the aforementioned active pressures with an additional uniform pressure of $8H$ psf, where H is the height of the wall in feet. We leave it to the design professional's judgment in determining whether a wall is restrained or not. An additional uniform force of $10H$ psf may be applied to account for seismic forces on the wall with more than 6 feet tall, although it is our opinion that such forces need not be applied to site walls. All retaining walls should also be designed to resist a point load applied at the midpoint of the wall, equal to $\frac{1}{2}$ the maximum applied surcharge.

Drilled Piers - Any wall which is located on, or within 10 feet of the crest of, slopes steeper than 5:1 (H:V) should utilize a drilled pier foundation system. Additionally, any site walls for which expansive soil shifting is unacceptable should use drilled piers. We note that pier-supported walls may not rely upon a toe footing to resist overturning forces. All vertical and lateral forces should be resisted by

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piers. This may require the use of a staggered, double row of piers, depending upon the wall height and any surcharges.

The piers should have a minimum diameter of 16 inches and be nominally reinforced with a minimum of four #4 bars vertically. Piers should be spaced no closer than 3 diameters, center to center. In order to maximize the soil arching behind the piers, it is prudent to limit the maximum net (clearance) pier spacing to 5 feet. Actual pier depth, diameter, reinforcement, and spacing should be determined by the structural engineer.

A friction value of 600 psf may be assumed to act on that portion of the pier below a depth of 5 feet. Lateral support may be assumed to be developed along the length of the pier once there is a minimum 10 feet of horizontal cover between the face of the pier and the face of slope. At that depth, a passive pressure of 350 pcf Equivalent Fluid Weight (EFW) may be used for design. Passive resistance may be assumed to act over 1.5 projected pier diameters. Above 5 feet, no frictional or lateral support may be assumed. These design values may be increased 1/3 for transient loads (i.e. seismic and wind).

On the slopes, a lateral creep force of 35 pcf Equivalent Fluid Weight (EFW) should be applied to all piers on any portion of the site where grading operations do not flatten slopes to less than 4:1 (H:V). This creep force should be applied over 3 projected pier diameters from the ground surface to a depth of 10 feet horizontal cover.

If drilled piers are utilized beneath a concrete or block wall, they will need to be connected by a concrete grade beam. No grade beam is required for a wood lagging wall.

L-shaped or Deepened Spread Footings – If used, the footings must be embedded so that there is a minimum of 10 feet of horizontal cover between the face of the footings and any adjacent, parallel slope steeper than 5:1. The Footings should be designed using an allowable bearing pressure of 2500 psf, at a minimum depth of 36 inches below adjacent grade, and on competent materials as approved by our office in the field. Deepening of the footing may be required to reach competent soil. Lateral pressures may be resisted by a passive pressure of 350 pcf EFW assumed to be acting against the face of the footings (or shear keys, if required). Passive resistance may start at a depth of 2.5 feet below exterior grade. However, for passive resistance to start, the footing must be embedded so that there is a minimum of 10 feet of horizontal cover between the face of the footing and any adjacent, parallel slope. Alternatively, lateral pressures may be resisted by friction between the base of the footings and the ground surface. A friction coefficient of 0.35 may be assumed. Frictional and passive resistance may not be used in combination. The above values may be increased 1/3 for transient loads.

Wall Drainage - The above values have been provided assuming that back-of-wall drains will be installed to prevent build-up of hydrostatic pressures behind all walls. This drainage system may consist of a prefabricated drainage panel (i.e. Miradrain) or a gravel and filter fabric type system. We also recommend that any interior retaining walls, or walls through which efflorescence transmission would be undesirable, should be waterproofed.

The waterproofing should be specified by the designer, though we suggest the use of Bituthene, Miradri, or other similar waterproofing membrane. Surface drainage above the wall should preclude

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overtopping of the wall, and should also preclude ponding on the ground surface above the wall. *Additionally, the ground surface above all walls should form a drainage swale to carry water to the sides of the wall and/or to area drain locations.*

The back-of-wall drain systems should be installed with a minimum 3-inch diameter perforated pipe placed a minimum of 4 inches below the top of the footing (preferably at the base of the footing heel). The pipe should not be placed on top of the heel of the wall footing unless seepage through the base of the wall is acceptable. Perforations should be placed face-down (at 5 and 7 o'clock). The perforated pipe should connect to a solid discharge line, which discharges away from the new structures. This solid line should not connect to surface water drain lines (i.e. downspout and area drain lines). If water transmission through the base of a wall is not a concern, then weep holes may be used in place of the pipe.

If used, the gravel system should consist of a minimum 12 inch wide column of drain rock ($\frac{3}{8}$ to $\frac{3}{4}$ inch clean, crushed rock) extending the full width of the wall. The rock should continue to within 12 inches of finish grade. Prior to backfilling with the drain rock, a layer of filter fabric (Mirafi 140N or approved equivalent) should be placed against all soil surfaces to separate the rock and soil. The filter fabric should wrap over the top of the gravel and then a 12 inch thick cap of native soils should be placed at the top of the drain. If concrete flatwork is to directly overlay the back-of-wall drain, or if the drain is located in a crawlspace area, then the soil cap should be eliminated.

If prefabricated drainage panels are used (not acceptable for use with segmental block walls), a packet of filter fabric-wrapped drain rock should be placed around the perforated collector pipe at the base of the panel. The tops of the panels should be sealed and secured in accordance with the manufacturer's recommendations. The base of the drainage panels should extend down below the top of the filter fabric-wrapped drain rock. We note that Caltrans Class II permeable rock may be utilized in lieu of clean drain rock and filter fabric. The Class II permeable rock needs to be compacted into place, and needs to be certified by the quarry or rockery that it meets the Caltrans Class II permeable rock specifications.

Slabs-on-Grade

The house floors should not consist of concrete slabs-on-grade (although the basement floor may consist of a mat slab – see above). This is due to the expansive nature of the site soils which would cause deformations in a conventional slab-on-grade. However, the driveway, any sidewalks or patios, and garage floor may consist of conventional concrete slabs-on-grade, though it should be expected that some seasonal/post-construction shifting of such slabs will occur. We have provided guidelines to help reduce post-construction movements, however, it is nearly impossible to economically eliminate all shifting.

To help reduce cracking, we recommend slabs be a minimum of 5 inches thick and be nominally reinforced with #4 bars at 18 inches on center, each way. Slabs which are thinner or more lightly reinforced may experience undesirable cosmetic cracking. However, actual reinforcement and thickness should be determined by the structural engineer based upon anticipated usage and loading.

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In large non-interior slabs (e.g. patios, garage, etc.), score joints should be placed at a maximum of 10 feet on center. In sidewalks, score joints should be placed at a maximum of 5 feet on center. All slabs should be separated from adjacent improvements (e.g. footings, porches, columns, etc.) with expansion joints. Interior floor slabs will experience shrinkage cracking. These cosmetic cracks may be sealed with epoxy or other measures specified by the architect.

It would be prudent (though not required) to underlay all slabs with at least 30 inches of non-expansive materials. This will help to reduce future expansive soil movements of the slabs. Slabs which are not underlain by this non-expansive material may undergo excessive seasonal shifting.

All interior slabs (including garage slab) should be underlain by a minimum of 4 inches of clean $\frac{3}{4}$ inch crushed drain rock. The drain rock should be covered by a vapor barrier which conforms to ASTM E1745-97 (e.g. Stego Wrap or an approved equivalent). The architect or structural engineer should determine if sand is required over the vapor barrier.

Slabs which will be subject to light vehicular loads and through which moisture transmission is not a concern (e.g. driveway) should be underlain by at least 8 inches of compacted baserock, in lieu of any sand and gravel. The 6 inches of granular subgrade may be included as part of the 30 inches of non-expansive materials. Exterior landscaping flatwork (e.g. patios and sidewalks) may be placed directly on proof-rolled soil subgrade materials (e.g. no granular subgrade), however, they will be potentially subject to greater amounts of shifting and moisture transmission.

The garage slabs may be allowed to “float” independently from the perimeter grade beams if some post-construction differential movement is acceptable. If so, the slab should be separated from the grade beam with an expansion joint completely around the perimeter and at any interior isolated columns. Ideally, the grade beam at the front of the garage should continue to final floor elevation, with the slab inside the grade beam. This will help to assure that the garage doors always shut upon the grade beam, which should experience little or no movement (while the slab has the potential for greater movements).

As stated previously, in pavement (concrete or asphalt) areas to receive vehicular traffic, all baserock materials should be compacted to at least 95 percent of their MDD. Also, the upper 6 inches of native soil subgrade beneath any pavements should be compacted to between 90 to 93 percent of its MDD.

To reduce post-construction expansive soil movements (i.e. heave) of any slabs, care should be taken to keep the subgrade moist for an extended period of time prior to pouring the slabs. Shrinkage cracks should not be allowed to develop in the soil beneath any proposed slabs.

Drainage

Surface Drainage - Adjacent to any buildings, the ground surface should slope at least 5 percent away from the foundations within 5 feet of the perimeter. Impervious surfaces should have a minimum gradient of 2 percent away from the foundation. Surface water should be directed away from all buildings into drainage swales, or into a surface drainage system (i.e. catch basins and a solid drain line). “Trapped” planting areas should not be created next to any buildings without providing means for drainage (i.e. area drains).

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All roof eaves should be lined with gutters. The downspouts may be connected to solid drain lines, or may discharge onto paved surfaces which drain away from the structure. The downspouts may be connected to the same drain line as any catch basins, but must not connect to any perforated pipe drainage system. If splash blocks are preferred, then a perimeter footing drain system **is strongly encouraged** to be installed.

Footing Drain - Due to the potential for changes to surface drainage provisions, it would be wise (though not required unless splash blocks are used) to install a perimeter footing drain to intercept water attempting to enter the crawlspace, or under the floor slab. If a footing drain is not installed, some infiltration of moisture into the crawlspace may occur. Such penetration should not be detrimental to the performance of the structure, but can possibly cause humidity and mildew problems within the house, or seepage up through the slab floors. Where the basement wall is at the perimeter of the house, it will serve as a perimeter footing drain system.

The footing drain system, if installed, should consist of a 12 inch wide gravel-filled trench, *dug at least 12 inches below the elevation of the adjacent crawlspace or slab subgrade*. The trench should be lined with a layer of filter fabric (Mirafi 140N or equivalent) to prevent migration of silts and clays into the gravel, but still permit the flow of water. Then 1 to 2 inches of drain rock (clean crushed rock or pea gravel) should be placed in the base of the lined trench. Next a perforated pipe (minimum 3 inch diameter) should be placed on top of the thin rock layer. The perforations in the pipe should be face down. The trench should then be backfilled with more rock to within 6 inches of finished grade. The filter fabric should be wrapped over the top of the rock. Above the filter fabric 6 inches of native soils should be used to cap the drain. If concrete slabs are to directly overlay the drain, then the gravel should continue to the base of the slab, without the 6 inch soil cap. This drain should not be connected to any surface drainage system and basement light well drains.

Drainage Discharge - The surface drain lines should discharge at least 15 feet away from the house, preferably at the street. The discharge location(s) may need to be protected by energy dissipaters to reduce the potential for erosion. Care should be taken not to direct concentrated flows of water towards neighboring properties. This may require the use of multiple discharge points.

The footing drain (if installed) should discharge independently from the surface drainage system. A sump pump may be required for the footing drain discharge system. The surface and subsurface drain systems should not be connected to one another. The under-slab drainage system must discharge independently of any other drainage system, and must outlet at a location where any backup of a surface drainage system cannot backflow into the perforated portions of the subslab system.

Drainage Materials - Drain lines should consist of hard-walled pipes (e.g. SDR 35 or Schedule 40 PVC). In areas where vehicle loading is not a possibility, SDR 38 or HDPE pipes may be used. Corrugated, flexible pipes may not be used in any drain system installed at the property.

Surface drain lines (e.g. downspouts, area drains, etc.) should be laid with a minimum 2 percent gradient (¼ inch of fall per foot of pipe). Any subsurface drain systems (e.g. footing drains) should be laid with a minimum 1 percent gradient (1/8 inch of fall per foot of pipe).

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Utility Lines

Unless they pass through the perimeter footing drain system, all utility trenches should be backfilled with compacted native clay-rich materials within 5 feet of any buildings. This will help to prevent migration of surface water into trenches and then underneath the structures' perimeter. The rest of the trenches may be compacted with other native soils or clean imported fill. Only mechanical means of compaction of trench backfill will be allowed. Jetting of sands is not acceptable. Trench backfill should be compacted to at least 90 percent of its MDD. However, under pavements, concrete flatwork, and footings the upper 12 inches of trench backfill must be compacted to at least 95 percent of its MDD.

Pavement

The new driveway may consist of concrete, interlocking pavers, or asphaltic concrete over Caltrans Class II aggregate base (baserock). The asphalt should have a minimum thickness of 2½ inches. The baserock should have a minimum thickness of 8 inches, though 12 inches is preferable due to the expansive nature of the near-surface site soils. All of the baserock should attain a minimum compaction of 95 percent of its MDD. The upper 6 inches of the soil subgrade and any fill below this layer should attain between 90 to 93 percent relative compaction.

Plan Review and Construction Observations

The use of the recommendations contained within this report is contingent upon our being contracted to review the plans, and to observe geotechnically relevant aspects of the construction. We should be provided with a full set of plans to review at the same time the plans are submitted to the building/planning department for review. A minimum of one working week should be provided for review of the plans.

At a minimum, our observations should include: compaction testing of fills and subgrades; footing and basement excavation; pier drilling; forming of the grade beams voids; slab and driveway subgrade preparation; installation of any drainage system (e.g. behind the basement wall, behind the retaining wall, under-slab, footing and surface), and final grading. A minimum of 48 hours notice should be provided for all construction observations.

LIMITATIONS

This report has been prepared for the exclusive use of the addressee, and their architects and engineers for aiding in the design and construction of the proposed development. It is the addressee's responsibility to provide this report to the appropriate design professionals, building officials, and contractors to ensure correct implementation of the recommendations. The opinions, comments and conclusions presented in this report were based upon information derived from our field investigation and laboratory testing. Conditions between or beyond our borings may vary from those encountered. Such variations may result in changes to our recommendations and possibly variations in project costs.

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Should any additional information become available, or should there be changes in the proposed scope of work as outlined above, then we should be supplied with that information so as to make any necessary changes to our opinions and recommendations. Such changes may require additional investigation or analyses, and hence additional costs may be incurred. Our work has been conducted in general conformance with the standard of care in the field of geotechnical engineering currently in practice in the San Francisco Bay Area for projects of this nature and magnitude. We make no other warranty either expressed or implied. By utilizing the design recommendations within this report, the addressee acknowledges and accepts the risks and limitations of development at the site, as outlined within the report.

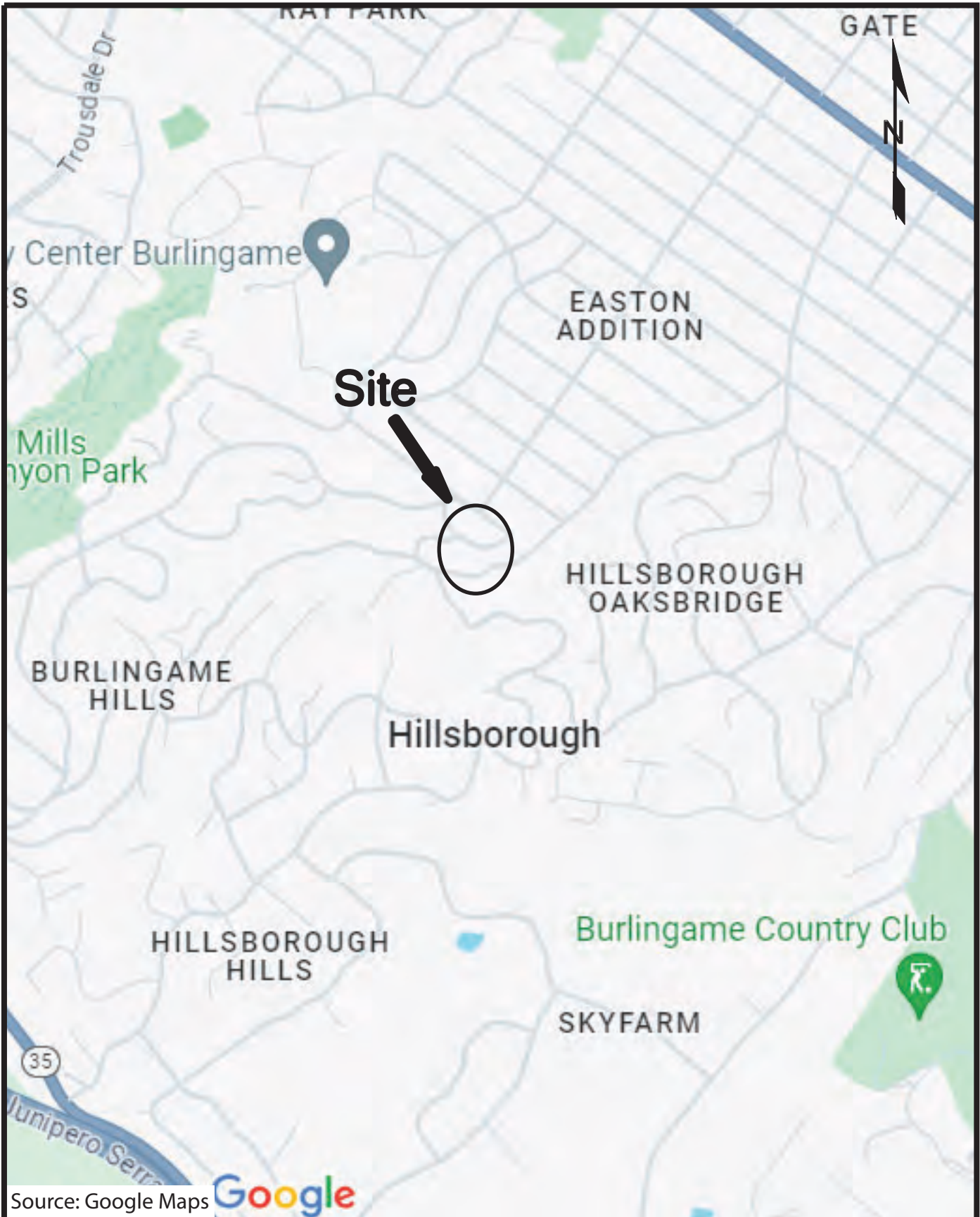
Respectfully Submitted;
GeoFoundation, Inc.

K. Younesi

Kourosh Younesi
Principal Engineer, PE 88582



cc: 1 electronic copy to client email Address



Source: Google Maps



GEOFOUNDATION Inc.

486 Chelsea Xing, San Jose, CA 95138

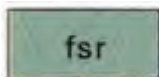
Tel: (408) 710-6701

Figure 1 - Site Location



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Figure 2 - Vicinity Topography



fsr Sheared rock

fsr: Predominantly soft, light to dark gray, sheared shale, siltstone, and graywacke containing various-size tectonic inclusions of Franciscan rock types. Weathers to grayish-yellow clayey and silty sand and in place is eroded to form badlands topography. Area of outcrop may be greater than shown and may include some areas labelled as sandstone (fs). Slopes underlain by sheared rock unit are unstable, especially when wet. Thickness unknown but more than several hundreds of feet. Commonly referred to as melange.



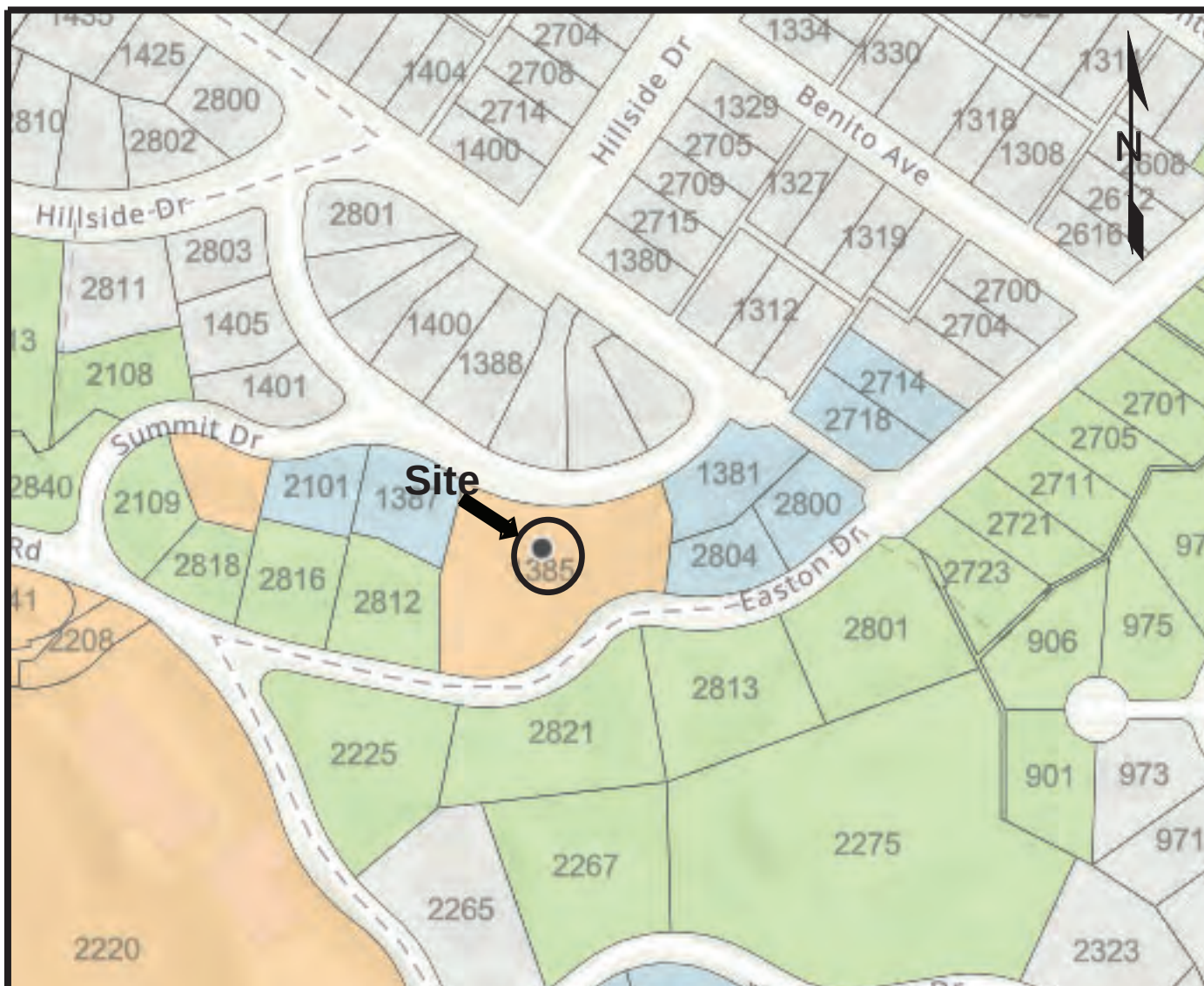
Qoa Older Alluvium (Pleistocene)

Qoa: Weathered, unconsolidated to moderately consolidated gravel, sand, and clay in various proportions and combinations. Chiefly older alluvial fan deposits. Distribution and extent largely inferred from drainage patterns on historic maps, as natural exposures are concealed by urban development. Locally includes younger alluvial and colluvial deposits too small to show at map scale.

Source: Pampeyan, E.H., 1994 Geologic map of the Montara Mountain and San Mateo 7.5' quadrangles, San Mateo County, California (Map I-2390)

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Figure 3 - Geologic Map



MAP EXPLANATION

Zones of Required Investigation:

- Liquefaction**
 Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.
- Earthquake-Induced Landslides**
 Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

NOTE: Seismic Hazard Zones identified on this map may include developed land where delineated hazards have already been mitigated to city or county standards. Check with your local building/planning department for information regarding the location of such mitigated areas.

**State of California Seismic Hazard Zones; Montara Mountain Quadrangle Official Map;
Released: April 4, 2019**

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Figure 3a - Seismic Hazards Map



 - Boring Locations

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Figure 4 - Site Plan with
Approximate Boring Location

APPENDIX A

Boring Logs

LOG OF BORING

DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)
				Sandy CLAY with gravel; brown; slightly moist ; very stiff (CL)		
5	1-1		25			
10	1-2		68		98.5	15.7
15	1-3		40	Silty clayey SAND with trace of gravel; light to strong to yellowish brown; slightly moist; medium dense to very dense; (SC/SM); (bedrock)		7.9
20	1-3		50			8.5
25	1-3		63			12.6
30	1-3		68			8.0
				Bottom of Boring @ 29.5 feet No Ground Water Was Encountered		
Logged by: KY Job No: 24042 Drilled on 7/18/24					Mod. Cal Sampler SPT Sampler	
GEOFOUNDATION Inc. 486 Chelsea Xing, San Jose, Ca 95138 Tel: (408) 710 - 6701					Figure A1 - Log of B-1	

LOG OF BORING

DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)
5	2-1		16	Lean CLAY with sand and trace of gravel; dark yellowish brown; slightly moist; stiff (CL); (harder after 5 feet)	110.3	16.9
10	2-2		>50	Clay SAND with trace of gravel; strong brown ; slightly moist; dense to very dense; (SC); (bedrock)		
15	2-3		45			11.0
20				Bottom of Boring @ 16.5 feet No Ground Water Was Encountered		
25						
30						

Logged by: KY
Job No: 24042
Drilled on 7/18/24

Mobile B-24 Drilling Rig
140 Pound Hammer

Mod. Cal
Sampler
SPT
Sampler

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Figure A2 - Log of B-2

LOG OF BORING						
DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)
	3-1		50/6"	CLAY with sand, trace of gravel and organics; brown; slightly moist; hard; (CL) (bedrock)		5.0
	3-2		50/6"			
5				Bottom of Boring @ 2.5 feet Drilling Refusal @ 2 feet No Ground Water Was Encountered		
10						
15						
20						
25						
30						

Logged by: KY
 Job No: 24042
 Drilled on 7/18/24

Minute Man
 70 Pound Hammer

Mod. Cal
 Sampler
 SPT
 Sampler

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Figure A3 - Log of B-3

LOG OF BORING						
DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)
5	4-1		51	CLAY with sand and trace of gravel; brown; slightly moist; hard (CL) (bedrock)		14.3
	4-2		67			
10				Bottom of Boring @ 7.0 feet Drilling Refusal @ 5.5 feet No Ground Water Was Encountered		
15						
20						
25						
30						

Logged by: KY
 Job No: 24042
 Drilled on 7/18/24

Minute Man Drilling Rig
 70 Pound Hammer

Mod. Cal
 Sampler
 SPT
 Sampler

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Figure A4 - Log of B-4

LOG OF BORING

DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)
5	5-1		75	Lean clayey SAND with trace of gravel; brown ; slightly moist; very dense (SC)	114.7	15.4
10	5-2		>50	CLAY with sand and trace of gravel; dark gray; slightly moist; hard (CL) (bedrock)		9.8
15				Bottom of Boring @ 9.0 feet Drilling Refusal @ 8.0 feet No Ground Water Was Encountered		
20						
25						
30						
Logged by: KY Job No: 24042 Drilled on 7/18/24					Mod. Cal Sampler SPT Sampler	
GEOFOUNDATION Inc. 486 Chelsea Xing, San Jose, Ca 95138 Tel: (408) 710 - 6701					Figure A5 - Log of B-5	

LOG OF BORING

DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)
			50/6"	CLAY with sand, trace of gravel and organics; brown; slightly moist; hard; (CL)		
			50/6"	(bedrock)		
5						
10						
15						
20						
25						
30						
Logged by: KY Job No: 24042 Drilled on 7/18/24				Minute Man 70 Pound Hammer		Mod. Cal Sampler SPT Sampler

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Figure A6 - Log of B-6

APPENDIX B

Laboratory Test Results



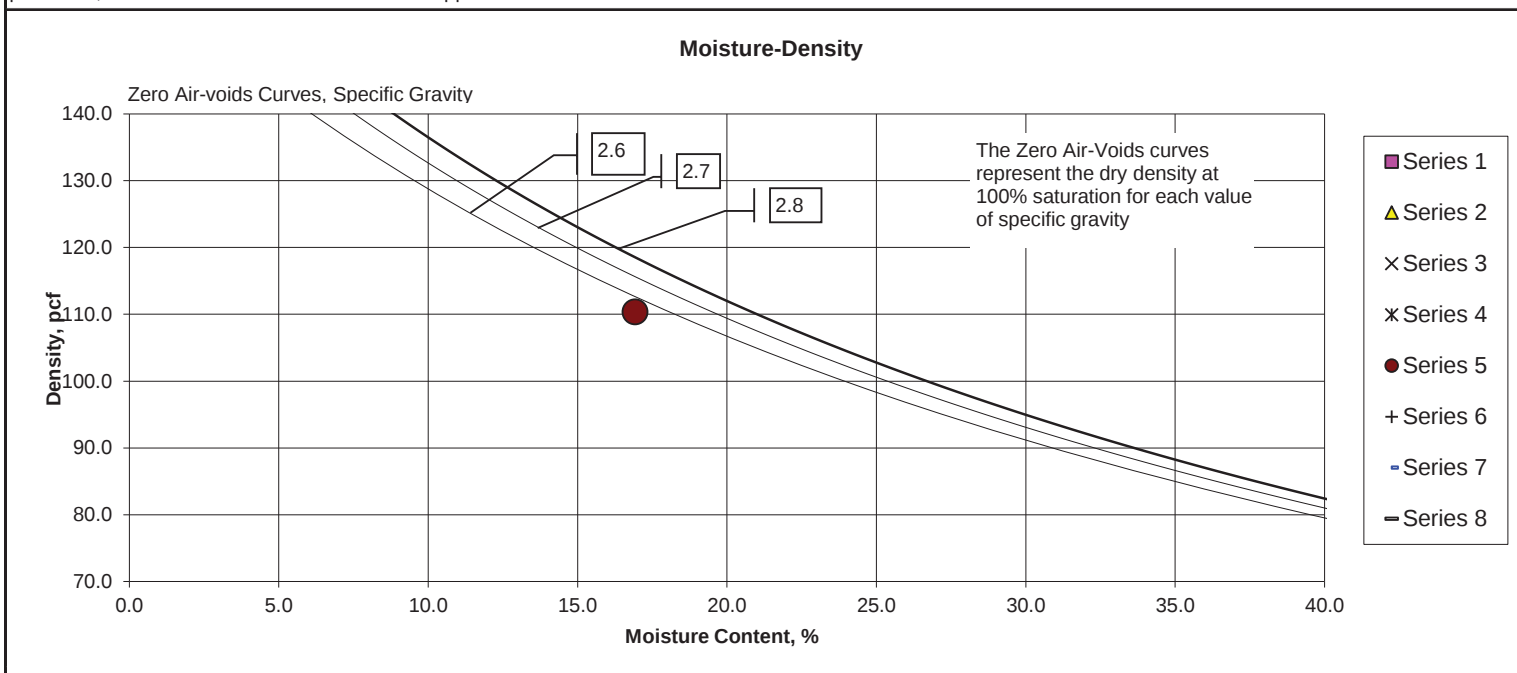
Moisture-Density-Porosity Report

Cooper Testing Labs, Inc. (ASTM D7263b)

CTL Job No: <u>1157-223a</u>	Project No. <u>24042</u>	By: <u>RU</u>
Client: <u>GeoFoundation Inc.</u>	Date: <u>07/22/24</u>	
Project Name: <u>Hillside Cir Residences</u>	Remarks: <u>3-1 @ 2' - sample disturbed; m/c only.</u>	

Boring:	1-3	1-4	1-5	1-6	2-2	2-3	3-1	4-2
Sample:								
Depth, ft:								6.5
Visual Description:	Light Brown Clayey SAND	Strong Brown Cayey SAND	Strong Brown Clayey SAND	Strong Brown Clayey SAND	Strong Brown Clayey SAND	Strong Brown Clayey SAND	Brown CLAY w/ Sand & organics	Brown CLAY w/ Sand
Actual G_s								
Assumed G_s					2.70			
Moisture, %	7.9	8.5	12.6	8.0	16.9	11.0	5.0	14.3
Wet Unit wt, pcf					129.0			
Dry Unit wt, pcf					110.3			
Dry Bulk Dens.pb, (g/cc)					1.77			
Saturation, %					86.6			
Total Porosity, %					34.5			
Volumetric Water Cont., θ_w , %					29.9			
Volumetric Air Cont., θ_a , %					4.6			
Void Ratio					0.53			
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (G_s) was used then the saturation, porosities, and void ratio should be considered approximate.





Moisture-Density-Porosity Report

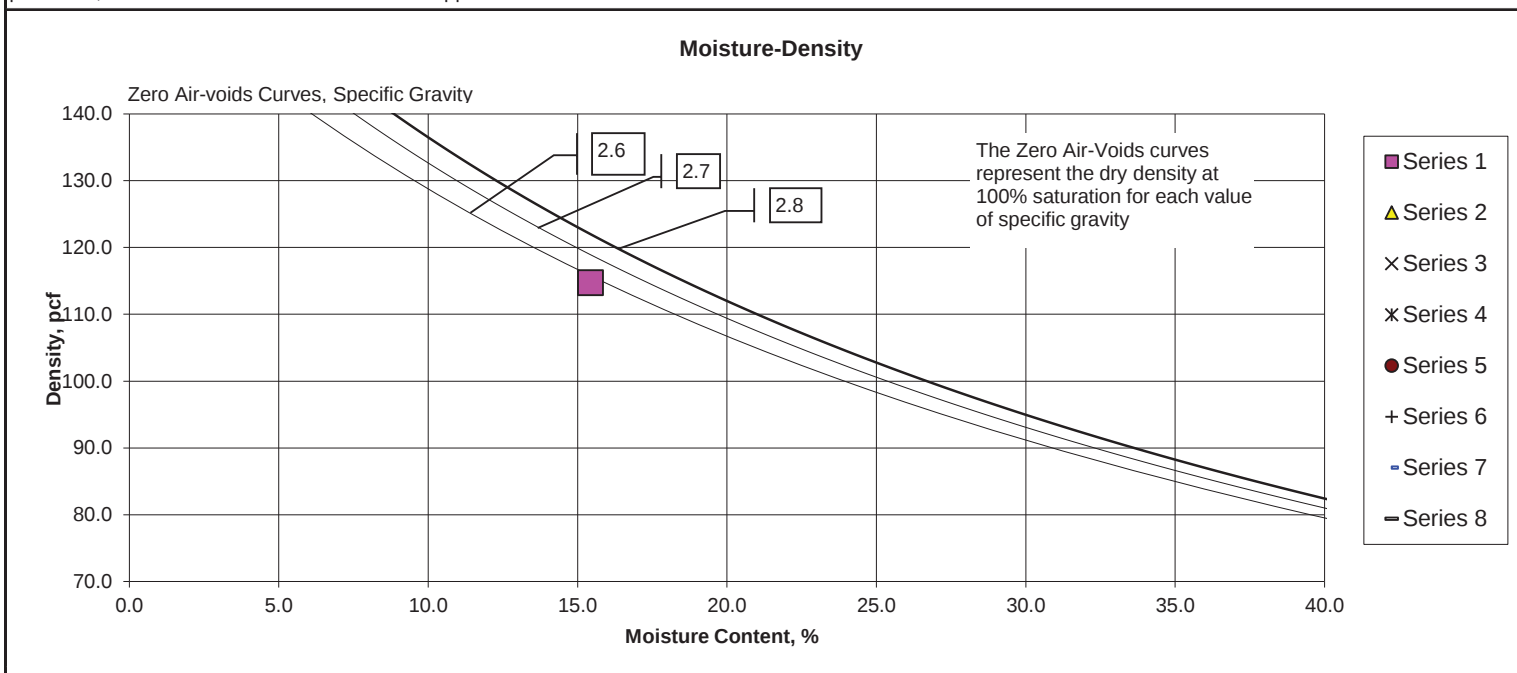
Cooper Testing Labs, Inc. (ASTM D7263b)

CTL Job No: 1157-223b
Client: GeoFoundation Inc.
Project Name: Hillside Cir Residences

Project No. 24042
Date: 07/22/24
By: RU
Remarks:

Boring:	5-1	5-2						
Sample:								
Depth, ft:	4	9						
Visual Description:	Brown Lean Clayey SAND	Dark Gray CLAY w/ Sand						
Actual G_s								
Assumed G_s	2.70							
Moisture, %	15.4	9.8						
Wet Unit wt, pcf	132.4							
Dry Unit wt, pcf	114.7							
Dry Bulk Dens.pb, (g/cc)	1.84							
Saturation, %	88.8							
Total Porosity, %	31.9							
Volumetric Water Cont., θ_w , %	28.4							
Volumetric Air Cont., θ_a , %	3.6							
Void Ratio	0.47							
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (G_s) was used then the saturation, porosities, and void ratio should be considered approximate.



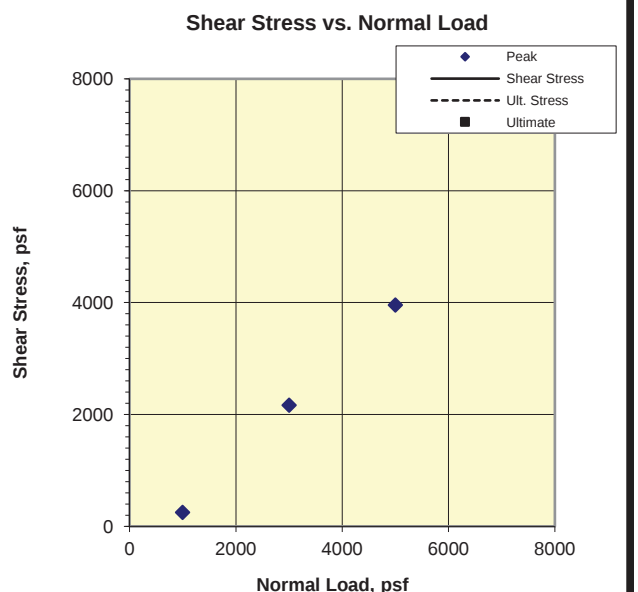
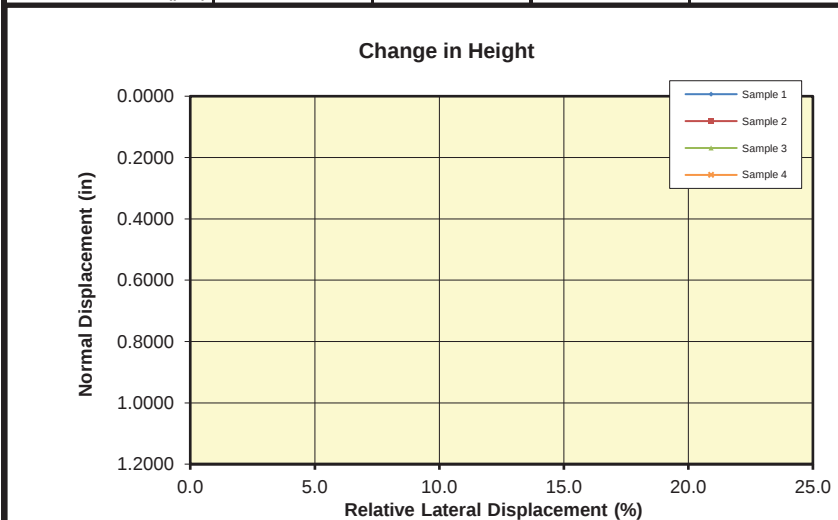
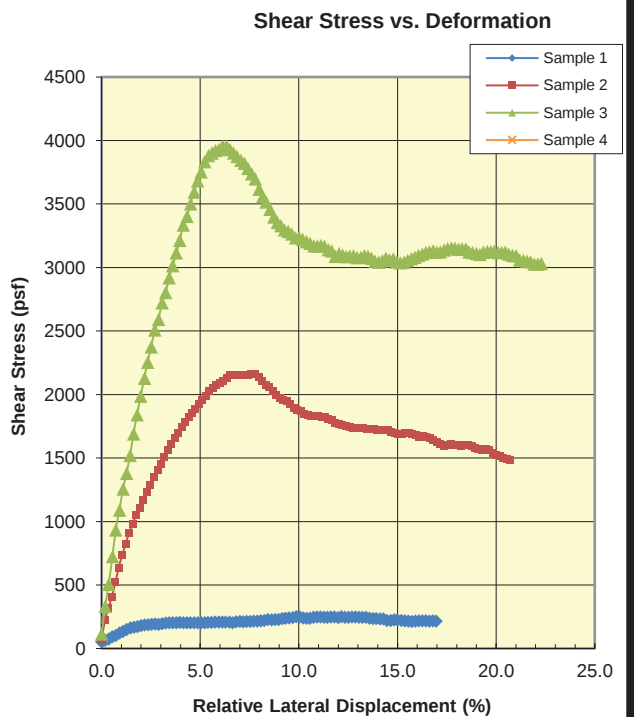


Consolidated Undrained Direct Shear (ASTM D3080M)

CTL Job #: 1157-223 Project #: 24042 By: MD
Client: GeoFoundation, Inc. Date: 7/23/2024 Checked: PJ
Project Name: Hillside Cir Residences Remolding Info:

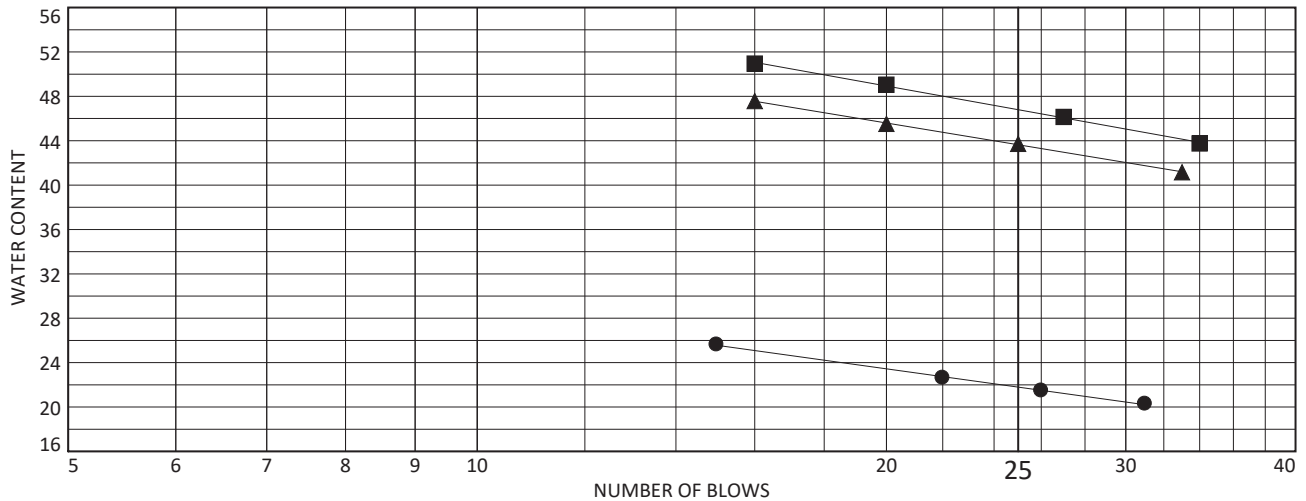
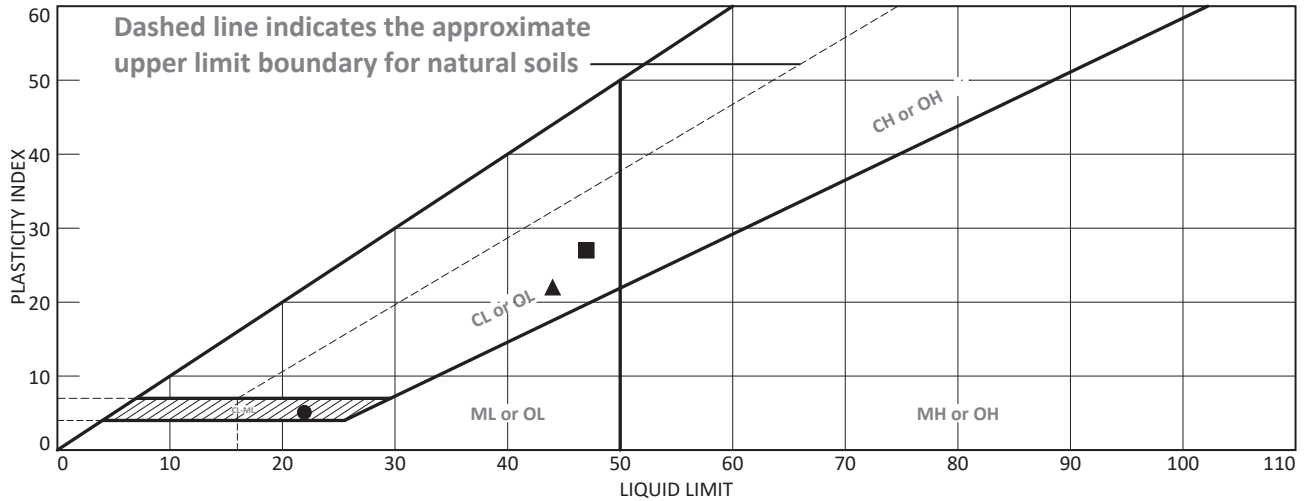
Specimen Data				
	1	2	3	4
Boring:	1-2	1-2	1-2	
Sample:				
Depth (ft):	9	9	9	
Visual Description:	Yellowish Brown Silty SAND	Yellowish Brown Silty SAND	Yellowish Brown Silty SAND	
Normal Load (psf)	1000	3000	5000	
Dry Mass of Specimen (g)	118.0	119.0	121.4	
Initial Height (in)	1.00	1.00	1.00	
Initial Diameter (in)	2.42	2.42	2.42	
Initial Void Ratio	0.724	0.711	0.676	
Initial Moisture (%)	15.4	15.7	16.5	
Initial Wet Density (pcf)	112.8	114.0	117.2	
Initial Dry Density (pcf)	97.7	98.5	100.6	
Initial Saturation (%)	57.5	59.7	66.0	
ΔHeight Consol (in)	0.0199	0.0335	0.0375	
At Test Void Ratio	0.690	0.653	0.613	
At Test Moisture (%)	20.5	19.9	19.7	
At Test Wet Density (pcf)	120.1	122.2	125.1	
At Test Dry Density (pcf)	99.7	101.9	104.5	
At Test Saturation (%)	80.0	82.1	86.7	
Strain Rate (%/min)	1.1	1.1	1.1	
Strengths Picked at	Peak	Peak	Peak	
Shear Stress (psf)	250	2164	3957	
ΔHeight (in) at Peak				
Ultimate Stress (psf)				

Phi (deg)	42.8	Ult. Phi (deg)	
Cohesion (psf)	657	Ult. Cohesion (psf)	



Remarks: *DS-CU* A fully undrained condition may not be attained in this test. ΔH is not measured during undrained direct shear tests.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Yellowish Brown Silty Clayey SAND	22	17	5			
■	Dark Yellowish Brown Lean CLAY w/ Sand	47	20	27			
▲	Brown Lean Clayey SAND	44	22	22			

Project No. 1157-223 Client: GeoFoundation Inc.

Project: Hillside Cir Residences - 24042

● Source of Sample: 1-1 Depth: 4'

■ Source of Sample: 2-1 Depth: 4'

▲ Source of Sample: 5-1 Depth: 4'

Remarks:

COOPER TESTING LABORATORY

Figure



**GEOTECHNICAL INVESTIGATION FOR
PROPOSED NEW RESIDENCE IN LOT-3**

at
1385 Hillside Circle
Burlingame, California

Report Prepared for:

Mr. and Mrs. Chiu

Report Prepared by:

GeoFoundation, Inc.

August 2024



File: 24042
August 6, 2024

Mr. and Mrs. Chiu
1385 Hillside Circle
Burlingame, CA 94010

Subject: **Hillside Circle Property
1385 Hillside Circle
Burlingame, California
GEOTECHNICAL INVESTIGATION FOR PROPOSED
NEW RESIDENCE AT LOT-3 (APN: 027-282-040)**

Dear Mr. and Mrs. Chiu:

In accordance with your authorization, we have performed a subsurface investigation into the geotechnical conditions present at the location of the proposed improvements. This report summarizes the conditions we measured and observed, and presents our opinions and recommendations for the design and construction of the proposed new residence at Lot-3.

Site Description

The subject site is a gently to moderately sloping, irregularly-shaped parcel located on the south side of Hillside Circle (at the approximate location shown on Figure 1). For purposes of description in this report, it is assumed that the property faces north. The property is bounded by other developed single-family residential lots to the sides, Easton Drive to the south, and Hillside Circle to the north.

The site is currently occupied by a three-story, wood-framed residence situated near the north side of the lot. There is a detached garage at the northeastern corner of the property. The wooden house floors are supported above crawlspace areas, while the garage has a concrete slab-on-grade floor. A concrete driveway leads from the street to the garage.

The ground surface in the site vicinity has an overall slope down towards the south and east (as shown on Figure 2). At the site, the ground also slopes gently to moderately down towards the south. Surface gradients range from 20:1 to almost 3:1 (horizontal:vertical, H:V). During the original development of the property, it appears that up to 6 feet of cuts were made at the front of the house, in order to create the existing level pad.

The grounds around the residence have been landscaped with front lawn areas, a variety of small to medium-sized bushes and shrubs, and numerous small to large trees. A concrete walkway leads to the front entrance. Concrete and flagstone walkways along the left and right sides of the house lead to the backyard walkways and patio. There is an ADU at the southwestern corner of the property. Up to 6 feet tall retaining walls were constructed at different locations on the property.

Proposed Construction

We understand that the current development for the site proposes the demolition of the existing residence, split of the current lot into three lots, and the subsequent construction of three new two-story residences, and associated improvements in the split lots. The new residences are to be of conventional, wood-framed construction. New foundation loads are expected to be typical for this type of structure (i.e. light).

Excavation work at the site is expected to be limited to foundation and potential basement excavations. No significant fill placement is anticipated as part of this work. No pool is planned for the project.

INVESTIGATION

Scope and Purpose

The purpose of our investigation was to determine the nature of the subsurface soil conditions so that we could provide geotechnical recommendations for the construction of the proposed new residences, and associated improvements. In order to achieve this purpose, we have performed the following scope of work:

- 1 - visited the property to observe the geotechnical setting of the area to be developed;
- 2 - reviewed relevant published geological and geotechnical maps;
- 3 - drilled six borings near the location of the proposed improvements;
- 4 - performed laboratory testing on collected soil samples;
- 5 - assessed the collected information and prepared this report.

The findings of these work items are discussed in the following sections of this report.

Geologic Map Review

We reviewed the *Geologic Map of the Montara Mountain and San Mateo 7½' Quadrangles, San Mateo County, California (USGS Map I-2390)*, by Earl H. Pampeyan (1994) and the *State of California Seismic Hazards Zone Map; Montara Mountain Quadrangle (4/4/19)*. The relevant portion of the Pampeyan and state hazard zone maps have been reproduced in Figures 3 and 3a.

The Pampeyan map indicates that the site is located almost at the border of two different geological formations/types and is underlain by either Sheared Rock (map symbol “fsr”) or Older Alluvium (map symbol “Qoa”). Pampeyan describes “fsr” materials as consisting of “Predominantly soft, light to dark gray, sheared shale, siltstone, and graywacke containing various-size tectonic inclusions of Franciscan rock types. Weathers to grayish-yellow clayey and silty sand and in place is eroded to form badlands topography. Area of outcrop may be greater than shown and may include some areas labelled as sandstone (fs). Slopes underlain by sheared rock unit are unstable, especially when wet. Thickness unknown but more than several hundreds of feet. Commonly referred to as melange.”. Pampeyan describes “Qoa” materials as consisting of “Weathered, unconsolidated to moderately consolidated gravel, sand, and clay in various proportions and combinations. Chiefly older alluvial

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fan deposits. Distribution and extent largely inferred from drainage patterns on historic maps, as natural exposures are concealed by urban development. Locally includes younger alluvial and colluvial deposits too small to show at map scale.”.

The Seismic Hazards Zone Map indicates the site is mapped within an area where there has been a historic occurrence of **both** liquefaction and landslide, or where local topographic, local geological, geotechnical, and groundwater conditions would indicate a potential for permanent ground displacement such that mitigation, as defined in Public Resource Code Section 2693(c), would be required.

The active San Andreas Fault is mapped approximately 1.3 miles (2.1 km) southwest of the site.

Subsurface Exploration

On July 18, 2024 we drilled six borings at the site at the locations shown on Figure 4. The borings were drilled using a Mobile B-24 truck-mounted drilling rig and a Minute Man portable drilling rig (as noted on logs) equipped with 4.0 and 3.25 inch diameter helical flight augers, respectively. Logs of the soils encountered during drilling record our observations of the cuttings traveling up the augers and of relatively undisturbed samples collected from the base of the advancing holes. The final boring logs are based upon the field logs with occasional modifications made upon further laboratory examinations of the recovered samples and laboratory test results. The final logs are attached in Appendix A.

The relatively undisturbed samples were obtained by driving a 3.0 inch (outer diameter) Modified California Sampler and a Standard Penetration Sampler (as noted on logs) into the base of the advancing hole by repeated blows from a 140 pound (truck rig) and a 70 pound (portable rig) hammer lifted 30 inches. On the logs, the number of blows required to drive the sampler the final 12 inches of the 18 inch drive, have been recorded as the Blow Counts. These blows have not been adjusted to reflect equivalent blows of any other type of sampler or hammer, or to account for the different hammers and samplers used.

Subsurface Conditions

Boring 1 penetrated 3 feet of very stiff, slightly moist, brown, sandy clay with gravel. Then, light to strong to yellowish brown, medium dense to very dense, slightly moist, silty clayey sand with trace of gravel was encountered down to the terminated boring depth of 29.5 feet. We judged the latter layer to be bedrock.

Boring 2 penetrated 8 feet of stiff, slightly moist, yellowish brown, lean clay with sand and trace of gravel. This was underlain by strong brown, slightly moist, dense to very dense, clayey sand with trace of gravel down to the terminated boring depth of 16.5 feet. We judged the latter layer to be bedrock.

Boring 3 penetrated hard, slightly moist, brown, clay with sand, trace of gravel, and organics down to the terminated boring depth of 2.5 feet, where it encountered refusal. We judged this layer to be bedrock.

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Boring 4 penetrated hard, slightly moist, brown, clay with sand, and trace of gravel down to the terminated boring depth of 7 feet, where it encountered refusal. We judged this layer to be bedrock.

Boring 5 penetrated 5 feet of very dense, slightly moist, brown, lean clayey sand with trace of gravel. This was underlain by dark gray, slightly moist, hard, clay with sand and trace of gravel down to the terminated boring depth of 9 feet, where it encountered refusal. We judged the latter layer to be bedrock.

Boring 6 penetrated hard, slightly moist, brown, clay with sand, trace of gravel, and organics down to the terminated boring depth of 2.5 feet, where it encountered refusal. We judged this layer to be bedrock.

Please refer to Appendix A for a more detailed description of each boring.

No free groundwater was encountered during the drilling of the holes. However, during periods of heavy rain or late in the winter, groundwater seepage may exist at shallower depths, most likely as perched water atop the bedrock.

Laboratory Testing

The relatively undisturbed samples collected during the drilling process were returned to the laboratory for testing of engineering properties. In the lab, selected soil samples were tested for moisture content, density, strength, and plasticity. The results of the laboratory tests are attached to this report in Appendix B.

Plasticity Index (PI) testing performed on the site near surface materials produced PI results of 5, 27, and 22, respectively. These testings indicated that the near surface materials have low to high plasticity and are highly expansive.

Strength testing was conducted on one sample (Sample 1-2 @ 9 feet). Drawing a best-fit-line through the data points showed that this material has high strength parameters. The testing showed that this material has high strength parameters (cohesion = 657 psf, internal friction angle = 42.8 degrees). The other soil layers at the site were judged to also have high strengths based upon their high blow counts as obtained during the sampling process.

CONCLUSIONS AND RECOMMENDATIONS

General

Based upon our investigation, we believe that the proposed improvements can be safely constructed. Geotechnical development of the site is controlled by the presence of high expansion potential of site soils, and gently to moderately sloping, but aided by relatively shallow bedrock.

Expansive soils derive their name from their propensity to change volume in response to changes in moisture content. When they are dry, they shrink; when they become wet, they swell. The pressures these soils can exert as they expand can be sufficiently high to move conventional residential

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foundations. The foundation movement induced by the soil shifting can cause wall coverings to crack, doors and windows to stick, floors to slope, and pools to crack and tilt. Seasonal movements of expansive soils have caused such distress to countless houses and pools in the Bay Area.

To combat seasonal expansive soil movements, it is necessary to utilize a foundation system which derives its support from the deeper, more stable soils. Typically, a drilled, cast-in-place pier foundation system is used to reach the more stable materials. Therefore, we have recommended that such foundation system be utilized at this site for the at-grade foundations of the new residence, while the deeper basement shall have a mat slab foundation.

The recommendations in this report should be incorporated into the design and construction of the proposed new residence, and associated improvements.

Seismicity

The greater San Francisco Bay Area is recognized by Geologists and Seismologists as one of the most active seismic regions in the United States. Several major fault zones pass through the Bay Area in a northwest direction which have produced approximately 12 earthquakes per century strong enough to cause structural damage. The faults causing such earthquakes are part of the San Andreas Fault System, a major rift in the earth's crust that extends for at least 700 miles along western California. The San Andreas Fault System includes the San Andreas, San Gregorio, Hayward, Calaveras Fault Zones, and other faults. In 2014, seismologic and geologic experts convened by the U.S. Geological Survey, California Geological Survey, and the Southern California Earthquake Center concluded that there is a 72 percent probability for at least one "large" earthquake of magnitude 6.7 or greater to occur in the Bay Area before the year 2043. The northern portion of the San Andreas fault is estimated to have a 6 percent probability, while the Hayward and Calaveras faults are estimated to have a 14 and 7 percent probability of producing an earthquake of that magnitude or greater during that time period.

Ground Rupture - The lack of mapped active fault traces through the site, suggests that the potential for primary rupture due to fault offset on the property is low.

Ground Shaking - The subject site is likely to be subject to very strong to violent ground shaking during its life span due to a major earthquake in one of the above-listed fault zones. Current (2022) building code design may be followed by the structural engineer to minimize damages due to seismic shaking, using the following input parameters from ASCE Hazard Tool based upon ASCE 7-16 design parameters:

Site Class – C	$S_{MS} = 2.753$	$S_{M1} = 1.342$	$S_{DS} = 1.835$	$S_{D1} = 0.894$
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Landsliding - - The State *Earthquake Zones of Required Investigation* map indicates that the site is in an area potentially subject to earthquake-induced landslides. The subject site and the surrounding area are gently to moderately sloping. Fortunately, the site is underlain by competent bedrock at relatively shallow depths. Therefore, the hazard due to large-scale deep seismically-induced landsliding is, in our opinion, relatively low for the site. However, as with any slope, minor sloughing

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of the steeper site slopes could occur during earthquake shaking. The proposed improvements should not be affected by any such sloughing, as they will be supported by the stable soils at the site.

Liquefaction - The State of California Seismic Hazards Zones map indicates that the site is in an area potentially subject to liquefaction. Liquefaction most commonly occurs during earthquake shaking in loose fine sands and silty sands associated with a high groundwater table. Groundwater table or loose sandy materials were demonstrated to be absent down to the site bedrock. Therefore, it is also our opinion that liquefaction is unlikely to occur on the subject property.

Ground Subsidence - Ground subsidence may occur when poorly consolidated soils densify as a result of earthquake shaking. Since the proposed building site is underlain at shallow depths by resistant materials, the hazard due to ground subsidence is, in our opinion, considered to be low.

Lateral Spreading - Lateral spreading may occur when a weak layer of material, such as a sensitive or liquefiable soil, loses its shear strength as a result of earthquake shaking. Overlying blocks of competent material may be translated laterally towards a free face. Liquefiable conditions are not present proximate to or at the site, hence, the hazard due to lateral spreading is, in our opinion, considered to be low.

Site Preparation and Grading

All debris resulting from the demolition of existing improvements should be removed from the site and may not be used as fill. Any existing underground utility lines to be abandoned should be removed from within the proposed building envelope and their ends capped outside of the building envelope.

Any vegetation and organically contaminated soils should be cleared from the building area. All holes resulting from removal of tree stumps and roots, or other buried objects, should be overexcavated into firm materials and then backfilled and compacted with native materials.

It would be reasonable to use soils from the basement excavation to raise portions of the site grades to improve drainage of the site.

The placement of fills at the site is expected to include: slab subgrade materials, and finished drainage and landscaping grading. These and all other fills should be placed in conformance with the following guidelines:

Fills may use organic-free soils available at the site or import materials. Import soils should be free of construction debris or other deleterious materials and be non-expansive. *A minimum of 3 days prior to the placement of any fill, our office should be supplied with a 30 pound sample (approximately a full 5 gallon bucket) of any soil or baserock to be used as fill (including native and import materials) for testing and approval.*

All areas to receive fills should be stripped of organics and loose or soft near-surface soils. Fills should be placed on level benches in lifts no greater than 6 inches thick (loose), moisture conditioned to near Optimum Moisture Content (OMC), and be compacted to at least 90 percent of their Maximum

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Dry Density (MDD), as determined by ASTM D-1557. If native expansive soils are used for fill at the site, then the soils should be placed at 3 to 5% over Optimum Moisture Content and be compacted to **between** 85 to 90 percent of their MDD. In pavement (concrete or asphalt) areas to receive vehicular traffic, all baserock materials should be compacted to at least 95 percent of their MDD. Also, the upper 6 inches of soil subgrade beneath any pavements should be compacted to between 90 to 93 percent of its MDD.

Expansive soils may only be used for fill where only vegetation and other movement insensitive improvements are proposed. These materials should not be placed as fill under the house, retaining walls, or patios.

If unretained fills in excess of 3 feet thick are to be placed, our office should be contacted for further recommendations.

Temporary, dry-weather, vertical excavations should remain stable for short periods of time to heights of 5 feet. All excavations should be shored or sloped in accordance with OSHA standards.

Permanent cut and/or fill slopes should be no steeper than 2:1 (H:V). However, even at this gradient, minor sloughing of slopes may still occur in the future. Positive drainage improvements (e.g. drainage swales, catch basins, etc.) should be provided to prevent water from flowing over the tops of cut and/or fill slopes.

Temporary stockpiling of excess soils should be set back a minimum of 25 feet from the crest of slope. The height of soil stockpiles should not exceed 12 feet, unless approved by the soils engineer in writing.

New Foundation for At-Grade Portion of the New Residence

Due to the presence of highly expansive site soils and gentle to moderate slopes, for best performance, the foundations will need to penetrate into the deeper, more stable soils. We recommend a pier and grade beam foundation system be used.

Piers should penetrate a minimum of 12 feet below the lowest adjacent grade, and 8 feet into the bedrock, whichever is deeper. We encountered 3 to 8 feet of clayey/sandy/non-bedrock material during our field exploration. This will likely result in piers with depths ranging from 12 to 20 feet deep.

The piers should have a minimum diameter of 16 inches, and be nominally reinforced with a minimum of four #4 bars vertically. Actual pier depth, diameter, reinforcement, and spacing should be determined by the structural engineer based upon the following design criteria:

A friction value of 600 psf may be assumed to act on that portion of the pier below a depth of 5 feet. Lateral support may be assumed to be developed along the length of the pier below 5 feet, using a passive pressure of 350 pcf Equivalent Fluid Weight (EFW). Passive resistance may be assumed to act over 1.5 projected pier diameters. Above 5 feet, no frictional or lateral support may be assumed. These design values may be increased 1/3 for transient loads (i.e. seismic and wind).

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On the slopes, a lateral creep force of 35 pcf Equivalent Fluid Weight (EFW) should be applied to all piers on any portion of the site where grading operations do not flatten slopes to less than 4:1 (H:V). This creep force should be applied over 3 projected pier diameters from the ground surface to a depth of 10 feet horizontal cover.

Even though piers are designed to derive their vertical resistance through skin friction, the bases of the pier holes should be clean and firm prior to setting steel and pouring concrete. If more than 6 inches of slough exists in the base of the pier holes after drilling, then the slough should be removed. If less than 6 inches of slough exists, the slough may be tamped to a stiff condition. Piers should not remain open for more than a few days prior to casting concrete. In the event of rain, shallow groundwater, or caving conditions it may be necessary to pour piers immediately.

All perimeter piers, and piers under load-bearing walls, should be connected by concrete grade beams. Perimeter grade beams should penetrate a minimum of 6 inches below crawlspace grade (unless a perimeter footing drain is installed to intercept water attempting to enter around the perimeter). Interior grade beams do not need to penetrate below grade. All other isolated floor supports must also be pier supported to resist expansive soil uplift, however, they do not need to be connected by grade beams.

In order to reduce any expansive soil uplift forces on the base of the grade beams, the beams should have either a uniform 4 inch void between their base and the soil, or should be constructed with a knife edge and triangular shaped void in a rectangular trench. The void can be created by the use of prefabricated cardboard void material (e.g. K-void, SureVoid, Carton-void), half a sonotube faced concave down, or other methods devised by the contractor and approved by our offices. *The use of Styrofoam is not acceptable for creating the void.*

The void forms are not required for basement slab where supported by bedrock. Voids are required under the outer 10 feet of the slab where on soil, and less than 5 feet below finish grade.

All improvements connected directly to any pier supported structure, also need to be supported by piers. This includes, but is not limited to: porches, decks, entry stoops and columns, etc. If the designer does not wish to pier support these items, then care must be taken to structurally isolate them (with expansion joints, etc.) from the pier supported structure.

If the above recommendations are followed, total foundation settlements should be less than 1 inch, while differential settlements should be less than ½ inches.

Basement Foundations, Walls, and Floors

Wall Forces – Any basement retaining walls should be designed to resist an active pressure of 45 pcf Equivalent Fluid Weight (EFW), for retained slopes flatter than 4:1 (horizontal:vertical). If it is desired to create steeper retained slopes to reduce the heights of the walls, then the active pressure will need to be increased. An active pressure of 65 pcf EFW should be utilized for retained slopes with an inclination of 2:1 (H:V). Where retained slopes are greater than 4:1, though less than 2:1, the designer should linearly interpolate between 45 and 65 pcf EFW.

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If the walls are considered to be restrained, they should be designed for an additional uniform pressure of $8H$ psf, where H is the height of the wall in feet. We leave it to the design professional's judgment in determining whether a wall is restrained or not. It is our opinion that a supplemental seismic loading for a basement wall is not necessary. However, if desired, the designer may also apply a uniform seismic force of $10H$ psf to the retaining wall in addition to the normal active pressures. The walls should also be designed to resist a point load applied at the midpoint of the wall, equal to $\frac{1}{2}$ of the maximum applied surcharge (if any).

Wall Drainage - The above values have been provided assuming that a back-of-wall drain system will be installed to prevent build-up of hydrostatic pressures. This drainage system may consist of a prefabricated drainage panel (i.e. Miradrain) or a gravel and filter fabric type system. The walls should be waterproofed to prevent the transmission of efflorescence through the walls. The waterproofing should be specified by the designer, though we recommend the use of Bituthene, Miradri, or other similar waterproofing membrane. Either drainage system should be installed with a minimum 3 inch diameter perforated pipe incorporated into the subslab granular section. Ideally the base of the pipe should be placed atop 1 to 2 inches of gravel, with its top even with the elevation of the basement subgrade (i.e. under the gravel). Perforations should be placed face-down (at 5 and 7 o'clock). Preferably, the exterior basement walls should be aligned with the exterior face of the slab to provide a planar surface for waterproofing installation across the cold joint.

If used, the gravel system should consist of a minimum 12 inch wide column of drain rock ($\frac{3}{4}$ inch rock or $\frac{3}{8}$ inch pea gravel) extending the full width of the wall. The rock should continue to within 6 inches of finished grade. Prior to backfilling with the drain rock, a layer of filter fabric (Mirafi 140N or approved equivalent) should be placed against all soil surfaces to separate the rock and soil. The filter fabric should wrap over the top of the gravel and then a 6 inch thick cap of native soils should be placed at the top of the drain. If concrete flatwork is to directly overlay the back-of-wall drain, then the drain rock should continue to the base of the concrete. Additionally, where the drain will be located within crawlspace area, the gravel should continue to the crawlspace ground surface without the soil cap.

If prefabricated drainage panels are used, these panels should dead-end into the subslab gravel for collection under the slab. The tops of the panels should be sealed and secured in accordance with the manufacturer's specifications. The base of the drainage panels should extend down below the top of the filter fabric-wrapped drain rock.

Floor - The basement floor/foundation may consist of a mat slab designed for a modulus of subgrade reaction of 15 pci in the center, which can be increased to 30 pci along the sides of the basement (extending 20% of the basement width/length from the edge to the interior), and 60 pci at the corners (again 20 percent of the width/length extending off the building corners towards the sides and interior). These design values may be increased $\frac{1}{3}$ for transient loads (i.e. seismic and wind).

The entire slab should be underlain by at least 4 inches of clean, crushed drain rock. The drain rock should be covered by a moisture barrier which conforms to ASTM E1745-97 (e.g. Stego Wrap or an approved equivalent). The moisture barrier should wrap up the edges of the mat slab to be overlapped by the basement wall waterproofing. Perforated collector pipes should be embedded within the drain

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rock around the perimeter of the slab and at 20 foot spacing (one-way) under the slab to carry any water which gathers within the drain rock to the back-of-wall drain discharge location. The need for any sand over the top of the vapor barrier should be determined by the slab designer or architect.

Window Well and Access Well Drainage – Any window well and access well drainage should be tight lined to the same sump pump used for under-slab and wall drainage. This sump should be located in an area with easy access, and may discharge into the storm drain system. There should be a minimum 4 inch lip between the wells and the floor slabs. A high water alarm should be provided in the sump. Consideration should be given to a backup generator. No roof drain lines should discharge into any window well or stairwell/depressed patio.

Retaining Walls

New site retaining walls must not be structurally connected to the house or other structures. New site walls which are located on, or within 10 feet of the crest of, slopes steeper than 5:1 (H:V); and, walls for which expansive soil movements are undesirable, should utilize a pier and grade beam foundation system. Alternatively, L-shaped or deepened spread footing may be used if the ground surface below the wall is flatter than 5:1 (for at least 10 feet of the crest). If spread footings are utilized, then some expansive soil movements of the walls may occur. Therefore, in order to reduce the detrimental effect of such movements on site walls, we recommend the use of a “flexible” wall system (e.g. Keystone, Allan Block, wood lagging, etc.), or the liberal use of vertical construction joints.

Wall Forces - Any unrestrained retaining walls required for the proposed construction should be designed to resist an active pressure of 45 pcf Equivalent Fluid Weight (EFW) in supporting soils with retained slopes less than 4:1 (H:V). An active pressure of 65 pcf EFW should be utilized for retained slopes with an inclination of 2:1 (H:V). Where retained slopes are greater than 4:1, though less than 2:1, the designer should linearly interpolate between 45 and 65 pcf EFW.

Where a retaining wall is located within a horizontal distance less than twice the height of the lower retaining wall, the lower retaining wall will need to be designed for an additional surcharge pressure from the upper wall(s). Once the geometry of such walls has been determined, please provide our office with a cross-section so that we can determine the required surcharge.

Any restrained retaining walls required should be designed for the aforementioned active pressures with an additional uniform pressure of $8H$ psf, where H is the height of the wall in feet. We leave it to the design professional's judgment in determining whether a wall is restrained or not. An additional uniform force of $10H$ psf may be applied to account for seismic forces on the wall with more than 6 feet tall, although it is our opinion that such forces need not be applied to site walls. All retaining walls should also be designed to resist a point load applied at the midpoint of the wall, equal to $\frac{1}{2}$ the maximum applied surcharge.

Drilled Piers - Any wall which is located on, or within 10 feet of the crest of, slopes steeper than 5:1 (H:V) should utilize a drilled pier foundation system. Additionally, any site walls for which expansive soil shifting is unacceptable should use drilled piers. We note that pier-supported walls may not rely upon a toe footing to resist overturning forces. All vertical and lateral forces should be resisted by

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piers. This may require the use of a staggered, double row of piers, depending upon the wall height and any surcharges.

The piers should have a minimum diameter of 16 inches and be nominally reinforced with a minimum of four #4 bars vertically. Piers should be spaced no closer than 3 diameters, center to center. In order to maximize the soil arching behind the piers, it is prudent to limit the maximum net (clearance) pier spacing to 5 feet. Actual pier depth, diameter, reinforcement, and spacing should be determined by the structural engineer.

A friction value of 600 psf may be assumed to act on that portion of the pier below a depth of 5 feet. Lateral support may be assumed to be developed along the length of the pier once there is a minimum 10 feet of horizontal cover between the face of the pier and the face of slope. At that depth, a passive pressure of 350 pcf Equivalent Fluid Weight (EFW) may be used for design. Passive resistance may be assumed to act over 1.5 projected pier diameters. Above 5 feet, no frictional or lateral support may be assumed. These design values may be increased 1/3 for transient loads (i.e. seismic and wind).

On the slopes, a lateral creep force of 35 pcf Equivalent Fluid Weight (EFW) should be applied to all piers on any portion of the site where grading operations do not flatten slopes to less than 4:1 (H:V). This creep force should be applied over 3 projected pier diameters from the ground surface to a depth of 10 feet horizontal cover.

If drilled piers are utilized beneath a concrete or block wall, they will need to be connected by a concrete grade beam. No grade beam is required for a wood lagging wall.

L-shaped or Deepened Spread Footings – If used, the footings must be embedded so that there is a minimum of 10 feet of horizontal cover between the face of the footings and any adjacent, parallel slope steeper than 5:1. The Footings should be designed using an allowable bearing pressure of 2500 psf, at a minimum depth of 36 inches below adjacent grade, and on competent materials as approved by our office in the field. Deepening of the footing may be required to reach competent soil. Lateral pressures may be resisted by a passive pressure of 350 pcf EFW assumed to be acting against the face of the footings (or shear keys, if required). Passive resistance may start at a depth of 2.5 feet below exterior grade. However, for passive resistance to start, the footing must be embedded so that there is a minimum of 10 feet of horizontal cover between the face of the footing and any adjacent, parallel slope. Alternatively, lateral pressures may be resisted by friction between the base of the footings and the ground surface. A friction coefficient of 0.35 may be assumed. Frictional and passive resistance may not be used in combination. The above values may be increased 1/3 for transient loads.

Wall Drainage - The above values have been provided assuming that back-of-wall drains will be installed to prevent build-up of hydrostatic pressures behind all walls. This drainage system may consist of a prefabricated drainage panel (i.e. Miradrain) or a gravel and filter fabric type system. We also recommend that any interior retaining walls, or walls through which efflorescence transmission would be undesirable, should be waterproofed.

The waterproofing should be specified by the designer, though we suggest the use of Bituthene, Miradri, or other similar waterproofing membrane. Surface drainage above the wall should preclude

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overtopping of the wall, and should also preclude ponding on the ground surface above the wall. *Additionally, the ground surface above all walls should form a drainage swale to carry water to the sides of the wall and/or to area drain locations.*

The back-of-wall drain systems should be installed with a minimum 3-inch diameter perforated pipe placed a minimum of 4 inches below the top of the footing (preferably at the base of the footing heel). The pipe should not be placed on top of the heel of the wall footing unless seepage through the base of the wall is acceptable. Perforations should be placed face-down (at 5 and 7 o'clock). The perforated pipe should connect to a solid discharge line, which discharges away from the new structures. This solid line should not connect to surface water drain lines (i.e. downspout and area drain lines). If water transmission through the base of a wall is not a concern, then weep holes may be used in place of the pipe.

If used, the gravel system should consist of a minimum 12 inch wide column of drain rock ($\frac{3}{8}$ to $\frac{3}{4}$ inch clean, crushed rock) extending the full width of the wall. The rock should continue to within 12 inches of finish grade. Prior to backfilling with the drain rock, a layer of filter fabric (Mirafi 140N or approved equivalent) should be placed against all soil surfaces to separate the rock and soil. The filter fabric should wrap over the top of the gravel and then a 12 inch thick cap of native soils should be placed at the top of the drain. If concrete flatwork is to directly overlay the back-of-wall drain, or if the drain is located in a crawlspace area, then the soil cap should be eliminated.

If prefabricated drainage panels are used (not acceptable for use with segmental block walls), a packet of filter fabric-wrapped drain rock should be placed around the perforated collector pipe at the base of the panel. The tops of the panels should be sealed and secured in accordance with the manufacturer's recommendations. The base of the drainage panels should extend down below the top of the filter fabric-wrapped drain rock. We note that Caltrans Class II permeable rock may be utilized in lieu of clean drain rock and filter fabric. The Class II permeable rock needs to be compacted into place, and needs to be certified by the quarry or rockery that it meets the Caltrans Class II permeable rock specifications.

Slabs-on-Grade

The house floors should not consist of concrete slabs-on-grade (although the basement floor may consist of a mat slab – see above). This is due to the expansive nature of the site soils which would cause deformations in a conventional slab-on-grade. However, the driveway, any sidewalks or patios, and garage floor may consist of conventional concrete slabs-on-grade, though it should be expected that some seasonal/post-construction shifting of such slabs will occur. We have provided guidelines to help reduce post-construction movements, however, it is nearly impossible to economically eliminate all shifting.

To help reduce cracking, we recommend slabs be a minimum of 5 inches thick and be nominally reinforced with #4 bars at 18 inches on center, each way. Slabs which are thinner or more lightly reinforced may experience undesirable cosmetic cracking. However, actual reinforcement and thickness should be determined by the structural engineer based upon anticipated usage and loading.

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In large non-interior slabs (e.g. patios, garage, etc.), score joints should be placed at a maximum of 10 feet on center. In sidewalks, score joints should be placed at a maximum of 5 feet on center. All slabs should be separated from adjacent improvements (e.g. footings, porches, columns, etc.) with expansion joints. Interior floor slabs will experience shrinkage cracking. These cosmetic cracks may be sealed with epoxy or other measures specified by the architect.

It would be prudent (though not required) to underlay all slabs with at least 30 inches of non-expansive materials. This will help to reduce future expansive soil movements of the slabs. Slabs which are not underlain by this non-expansive material may undergo excessive seasonal shifting.

All interior slabs (including garage slab) should be underlain by a minimum of 4 inches of clean $\frac{3}{4}$ inch crushed drain rock. The drain rock should be covered by a vapor barrier which conforms to ASTM E1745-97 (e.g. Stego Wrap or an approved equivalent). The architect or structural engineer should determine if sand is required over the vapor barrier.

Slabs which will be subject to light vehicular loads and through which moisture transmission is not a concern (e.g. driveway) should be underlain by at least 8 inches of compacted baserock, in lieu of any sand and gravel. The 6 inches of granular subgrade may be included as part of the 30 inches of non-expansive materials. Exterior landscaping flatwork (e.g. patios and sidewalks) may be placed directly on proof-rolled soil subgrade materials (e.g. no granular subgrade), however, they will be potentially subject to greater amounts of shifting and moisture transmission.

The garage slabs may be allowed to “float” independently from the perimeter grade beams if some post-construction differential movement is acceptable. If so, the slab should be separated from the grade beam with an expansion joint completely around the perimeter and at any interior isolated columns. Ideally, the grade beam at the front of the garage should continue to final floor elevation, with the slab inside the grade beam. This will help to assure that the garage doors always shut upon the grade beam, which should experience little or no movement (while the slab has the potential for greater movements).

As stated previously, in pavement (concrete or asphalt) areas to receive vehicular traffic, all baserock materials should be compacted to at least 95 percent of their MDD. Also, the upper 6 inches of native soil subgrade beneath any pavements should be compacted to between 90 to 93 percent of its MDD.

To reduce post-construction expansive soil movements (i.e. heave) of any slabs, care should be taken to keep the subgrade moist for an extended period of time prior to pouring the slabs. Shrinkage cracks should not be allowed to develop in the soil beneath any proposed slabs.

Drainage

Surface Drainage - Adjacent to any buildings, the ground surface should slope at least 5 percent away from the foundations within 5 feet of the perimeter. Impervious surfaces should have a minimum gradient of 2 percent away from the foundation. Surface water should be directed away from all buildings into drainage swales, or into a surface drainage system (i.e. catch basins and a solid drain line). “Trapped” planting areas should not be created next to any buildings without providing means for drainage (i.e. area drains).

File: 24042
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All roof eaves should be lined with gutters. The downspouts may be connected to solid drain lines, or may discharge onto paved surfaces which drain away from the structure. The downspouts may be connected to the same drain line as any catch basins, but must not connect to any perforated pipe drainage system. If splash blocks are preferred, then a perimeter footing drain system **is strongly encouraged** to be installed.

Footing Drain - Due to the potential for changes to surface drainage provisions, it would be wise (though not required unless splash blocks are used) to install a perimeter footing drain to intercept water attempting to enter the crawlspace, or under the floor slab. If a footing drain is not installed, some infiltration of moisture into the crawlspace may occur. Such penetration should not be detrimental to the performance of the structure, but can possibly cause humidity and mildew problems within the house, or seepage up through the slab floors. Where the basement wall is at the perimeter of the house, it will serve as a perimeter footing drain system.

The footing drain system, if installed, should consist of a 12 inch wide gravel-filled trench, *dug at least 12 inches below the elevation of the adjacent crawlspace or slab subgrade*. The trench should be lined with a layer of filter fabric (Mirafi 140N or equivalent) to prevent migration of silts and clays into the gravel, but still permit the flow of water. Then 1 to 2 inches of drain rock (clean crushed rock or pea gravel) should be placed in the base of the lined trench. Next a perforated pipe (minimum 3 inch diameter) should be placed on top of the thin rock layer. The perforations in the pipe should be face down. The trench should then be backfilled with more rock to within 6 inches of finished grade. The filter fabric should be wrapped over the top of the rock. Above the filter fabric 6 inches of native soils should be used to cap the drain. If concrete slabs are to directly overlay the drain, then the gravel should continue to the base of the slab, without the 6 inch soil cap. This drain should not be connected to any surface drainage system and basement light well drains.

Drainage Discharge - The surface drain lines should discharge at least 15 feet away from the house, preferably at the street. The discharge location(s) may need to be protected by energy dissipaters to reduce the potential for erosion. Care should be taken not to direct concentrated flows of water towards neighboring properties. This may require the use of multiple discharge points.

The footing drain (if installed) should discharge independently from the surface drainage system. A sump pump may be required for the footing drain discharge system. The surface and subsurface drain systems should not be connected to one another. The under-slab drainage system must discharge independently of any other drainage system, and must outlet at a location where any backup of a surface drainage system cannot backflow into the perforated portions of the subslab system.

Drainage Materials - Drain lines should consist of hard-walled pipes (e.g. SDR 35 or Schedule 40 PVC). In areas where vehicle loading is not a possibility, SDR 38 or HDPE pipes may be used. Corrugated, flexible pipes may not be used in any drain system installed at the property.

Surface drain lines (e.g. downspouts, area drains, etc.) should be laid with a minimum 2 percent gradient (¼ inch of fall per foot of pipe). Any subsurface drain systems (e.g. footing drains) should be laid with a minimum 1 percent gradient (1/8 inch of fall per foot of pipe).

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Utility Lines

Unless they pass through the perimeter footing drain system, all utility trenches should be backfilled with compacted native clay-rich materials within 5 feet of any buildings. This will help to prevent migration of surface water into trenches and then underneath the structures' perimeter. The rest of the trenches may be compacted with other native soils or clean imported fill. Only mechanical means of compaction of trench backfill will be allowed. Jetting of sands is not acceptable. Trench backfill should be compacted to at least 90 percent of its MDD. However, under pavements, concrete flatwork, and footings the upper 12 inches of trench backfill must be compacted to at least 95 percent of its MDD.

Pavement

The new driveway may consist of concrete, interlocking pavers, or asphaltic concrete over Caltrans Class II aggregate base (baserock). The asphalt should have a minimum thickness of 2½ inches. The baserock should have a minimum thickness of 8 inches, though 12 inches is preferable due to the expansive nature of the near-surface site soils. All of the baserock should attain a minimum compaction of 95 percent of its MDD. The upper 6 inches of the soil subgrade and any fill below this layer should attain between 90 to 93 percent relative compaction.

Plan Review and Construction Observations

The use of the recommendations contained within this report is contingent upon our being contracted to review the plans, and to observe geotechnically relevant aspects of the construction. We should be provided with a full set of plans to review at the same time the plans are submitted to the building/planning department for review. A minimum of one working week should be provided for review of the plans.

At a minimum, our observations should include: compaction testing of fills and subgrades; footing and basement excavation; pier drilling; forming of the grade beams voids; slab and driveway subgrade preparation; installation of any drainage system (e.g. behind the basement wall, behind the retaining wall, under-slab, footing and surface), and final grading. A minimum of 48 hours notice should be provided for all construction observations.

LIMITATIONS

This report has been prepared for the exclusive use of the addressee, and their architects and engineers for aiding in the design and construction of the proposed development. It is the addressee's responsibility to provide this report to the appropriate design professionals, building officials, and contractors to ensure correct implementation of the recommendations. The opinions, comments and conclusions presented in this report were based upon information derived from our field investigation and laboratory testing. Conditions between or beyond our borings may vary from those encountered. Such variations may result in changes to our recommendations and possibly variations in project costs.

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Should any additional information become available, or should there be changes in the proposed scope of work as outlined above, then we should be supplied with that information so as to make any necessary changes to our opinions and recommendations. Such changes may require additional investigation or analyses, and hence additional costs may be incurred. Our work has been conducted in general conformance with the standard of care in the field of geotechnical engineering currently in practice in the San Francisco Bay Area for projects of this nature and magnitude. We make no other warranty either expressed or implied. By utilizing the design recommendations within this report, the addressee acknowledges and accepts the risks and limitations of development at the site, as outlined within the report.

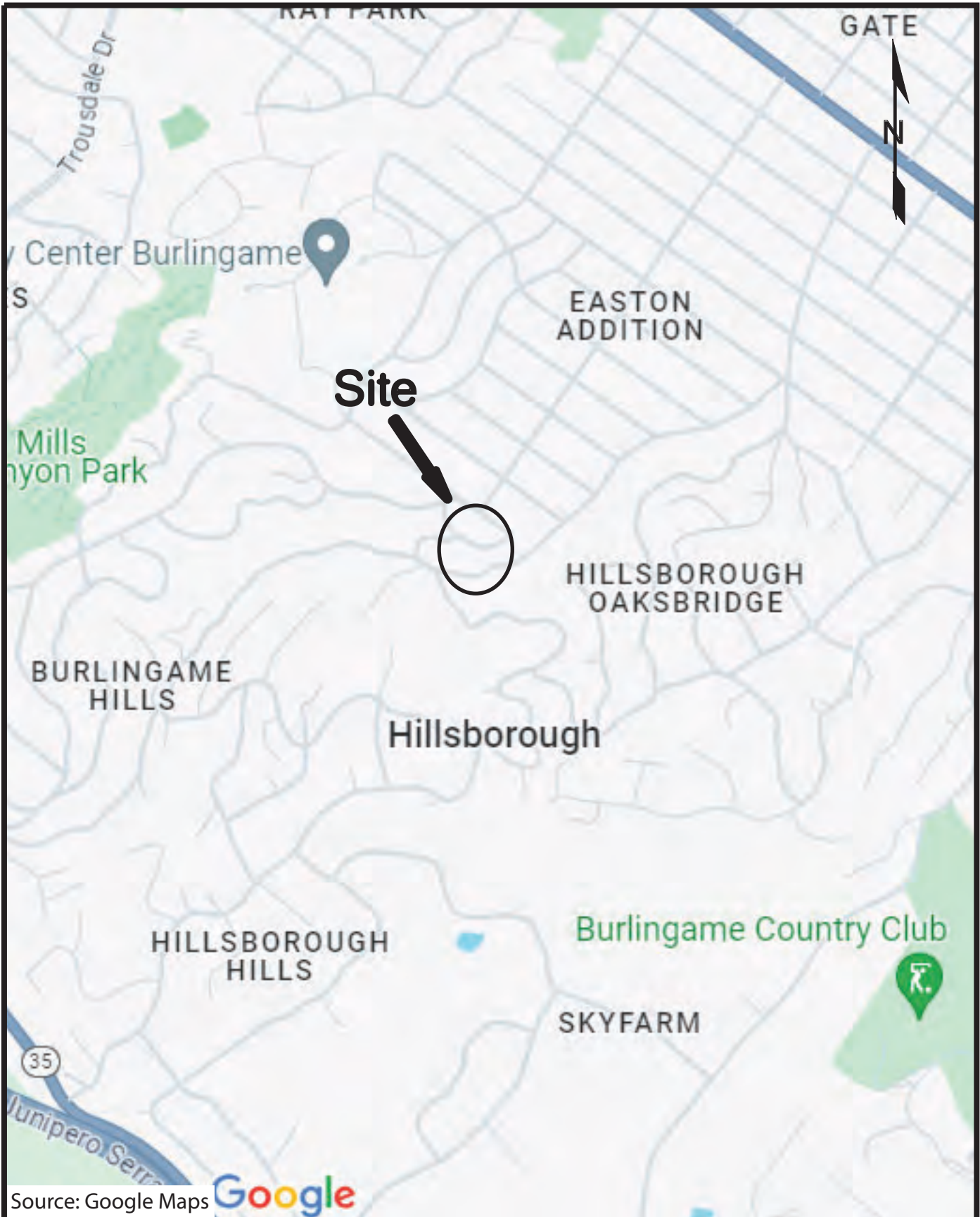
Respectfully Submitted;
GeoFoundation, Inc.

K. Younesi

Kourosh Younesi
Principal Engineer, PE 88582



cc: 1 electronic copy to client email Address



Source: Google Maps



GEOFOUNDATION Inc.

486 Chelsea Xing, San Jose, CA 95138

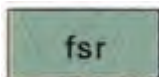
Tel: (408) 710-6701

Figure 1 - Site Location



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Figure 2 - Vicinity Topography



fsr Sheared rock

fsr: Predominantly soft, light to dark gray, sheared shale, siltstone, and graywacke containing various-size tectonic inclusions of Franciscan rock types. Weathers to grayish-yellow clayey and silty sand and in place is eroded to form badlands topography. Area of outcrop may be greater than shown and may include some areas labelled as sandstone (fs). Slopes underlain by sheared rock unit are unstable, especially when wet. Thickness unknown but more than several hundreds of feet. Commonly referred to as melange.



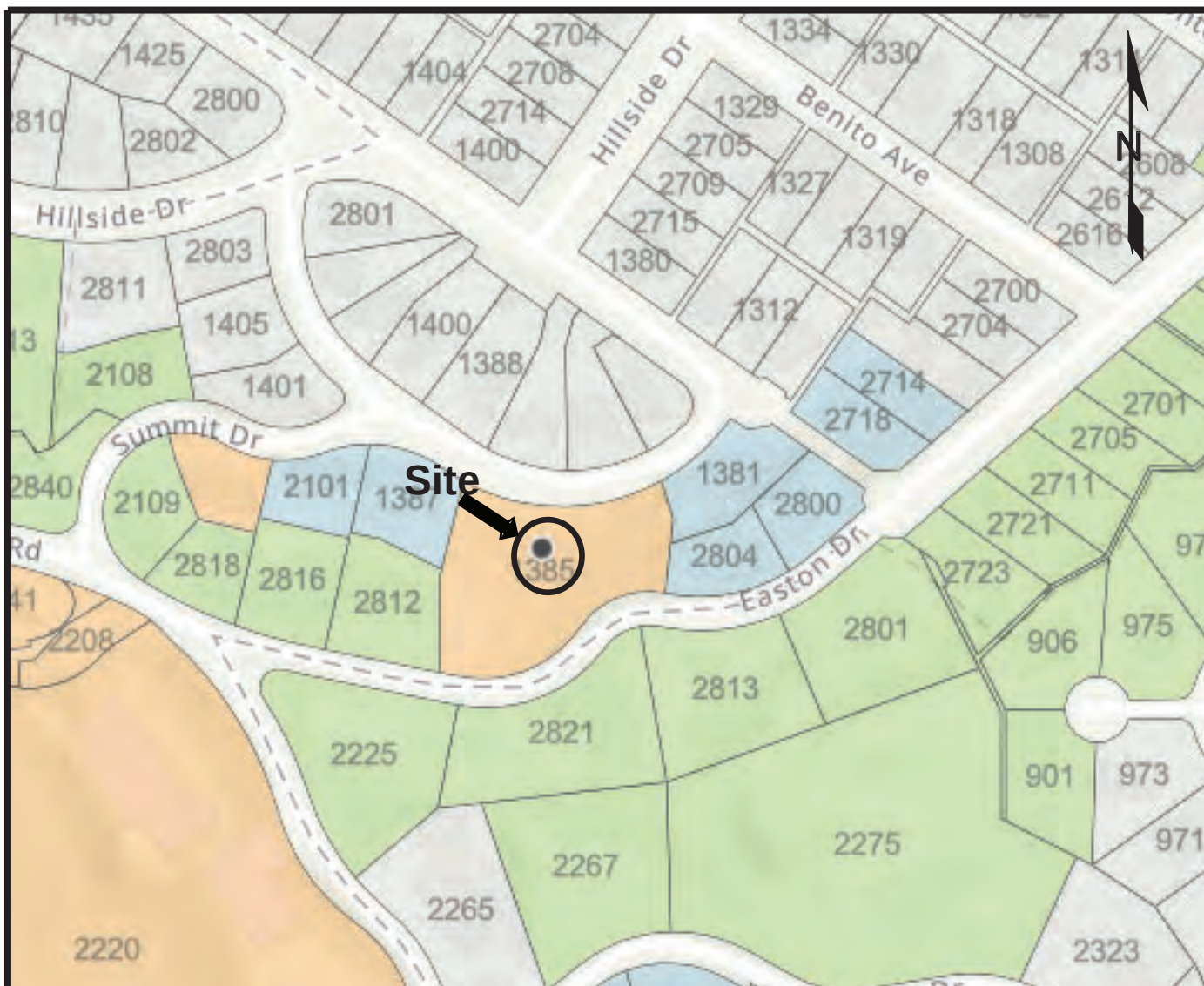
Qoa Older Alluvium (Pleistocene)

Qoa: Weathered, unconsolidated to moderately consolidated gravel, sand, and clay in various proportions and combinations. Chiefly older alluvial fan deposits. Distribution and extent largely inferred from drainage patterns on historic maps, as natural exposures are concealed by urban development. Locally includes younger alluvial and colluvial deposits too small to show at map scale.

Source: Pampeyan, E.H., 1994 Geologic map of the Montara Mountain and San Mateo 7.5' quadrangles, San Mateo County, California (Map I-2390)

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Figure 3 - Geologic Map



MAP EXPLANATION

Zones of Required Investigation:

- Liquefaction**
 Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.
- Earthquake-Induced Landslides**
 Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

NOTE: Seismic Hazard Zones identified on this map may include developed land where delineated hazards have already been mitigated to city or county standards. Check with your local building/planning department for information regarding the location of such mitigated areas.

**State of California Seismic Hazard Zones; Montara Mountain Quadrangle Official Map;
Released: April 4, 2019**

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Figure 3a - Seismic Hazards Map



 - Boring Locations

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Figure 4 - Site Plan with
Approximate Boring Location

APPENDIX A

Boring Logs

LOG OF BORING

DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)
				Sandy CLAY with gravel; brown; slightly moist ; very stiff (CL)		
5	1-1		25			
10	1-2		68		98.5	15.7
15	1-3		40	Silty clayey SAND with trace of gravel; light to strong to yellowish brown; slightly moist; medium dense to very dense; (SC/SM); (bedrock)		7.9
20	1-3		50			8.5
25	1-3		63			12.6
30	1-3		68			8.0
				Bottom of Boring @ 29.5 feet No Ground Water Was Encountered		

Logged by: KY
Job No: 24042
Drilled on 7/18/24

Mobile B-24 Drilling Rig
140 Pound Hammer

Mod. Cal
Sampler
SPT
Sampler

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Figure A1 - Log of B-1

LOG OF BORING

DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)
5	2-1		16	Lean CLAY with sand and trace of gravel; dark yellowish brown; slightly moist; stiff (CL); (harder after 5 feet)	110.3	16.9
10	2-2		>50	Clay SAND with trace of gravel; strong brown ; slightly moist; dense to very dense; (SC); (bedrock)		
15	2-3		45			11.0
20				Bottom of Boring @ 16.5 feet No Ground Water Was Encountered		
25						
30						

Logged by: KY
 Job No: 24042
 Drilled on 7/18/24

Mobile B-24 Drilling Rig
 140 Pound Hammer

Mod. Cal
 Sampler
 SPT
 Sampler

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Figure A2 - Log of B-2

LOG OF BORING						
DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)
	3-1		50/6"	CLAY with sand, trace of gravel and organics; brown; slightly moist; hard; (CL) (bedrock)		5.0
	3-2		50/6"			
5				Bottom of Boring @ 2.5 feet Drilling Refusal @ 2 feet No Ground Water Was Encountered		
10						
15						
20						
25						
30						

Logged by: KY
 Job No: 24042
 Drilled on 7/18/24

Minute Man
 70 Pound Hammer

Mod. Cal
 Sampler
 SPT
 Sampler

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Figure A3 - Log of B-3

LOG OF BORING						
DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)
5	4-1		51	CLAY with sand and trace of gravel; brown; slightly moist; hard (CL) (bedrock)		14.3
	4-2		67			
10				Bottom of Boring @ 7.0 feet Drilling Refusal @ 5.5 feet No Ground Water Was Encountered		
15						
20						
25						
30						

Logged by: KY
 Job No: 24042
 Drilled on 7/18/24

Minute Man Drilling Rig
 70 Pound Hammer

Mod. Cal
 Sampler
 SPT
 Sampler

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Figure A4 - Log of B-4

LOG OF BORING

DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)
5	5-1		75	Lean clayey SAND with trace of gravel; brown ; slightly moist; very dense (SC)	114.7	15.4
10	5-2		>50	CLAY with sand and trace of gravel; dark gray; slightly moist; hard (CL) (bedrock)		9.8
15				Bottom of Boring @ 9.0 feet Drilling Refusal @ 8.0 feet No Ground Water Was Encountered		
20						
25						
30						
Logged by: KY Job No: 24042 Drilled on 7/18/24					Mod. Cal Sampler SPT Sampler	
GEOFOUNDATION Inc. 486 Chelsea Xing, San Jose, Ca 95138 Tel: (408) 710 - 6701					Figure A5 - Log of B-5	

LOG OF BORING

DEPTH (ft)	SAMPLE NUMBER	SAMPLE LOC.	BLOW COUNTS (12 inches)	MATERIAL DESCRIPTION	DRY DENSITY (pcf)	MOISTURE CONTENT (%)
			50/6"	CLAY with sand, trace of gravel and organics; brown; slightly moist; hard; (CL)		
			50/6"	(bedrock)		
5						
10						
15						
20						
25						
30						
Logged by: KY Job No: 24042 Drilled on 7/18/24				Minute Man 70 Pound Hammer		Mod. Cal Sampler SPT Sampler

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Figure A6 - Log of B-6

APPENDIX B

Laboratory Test Results



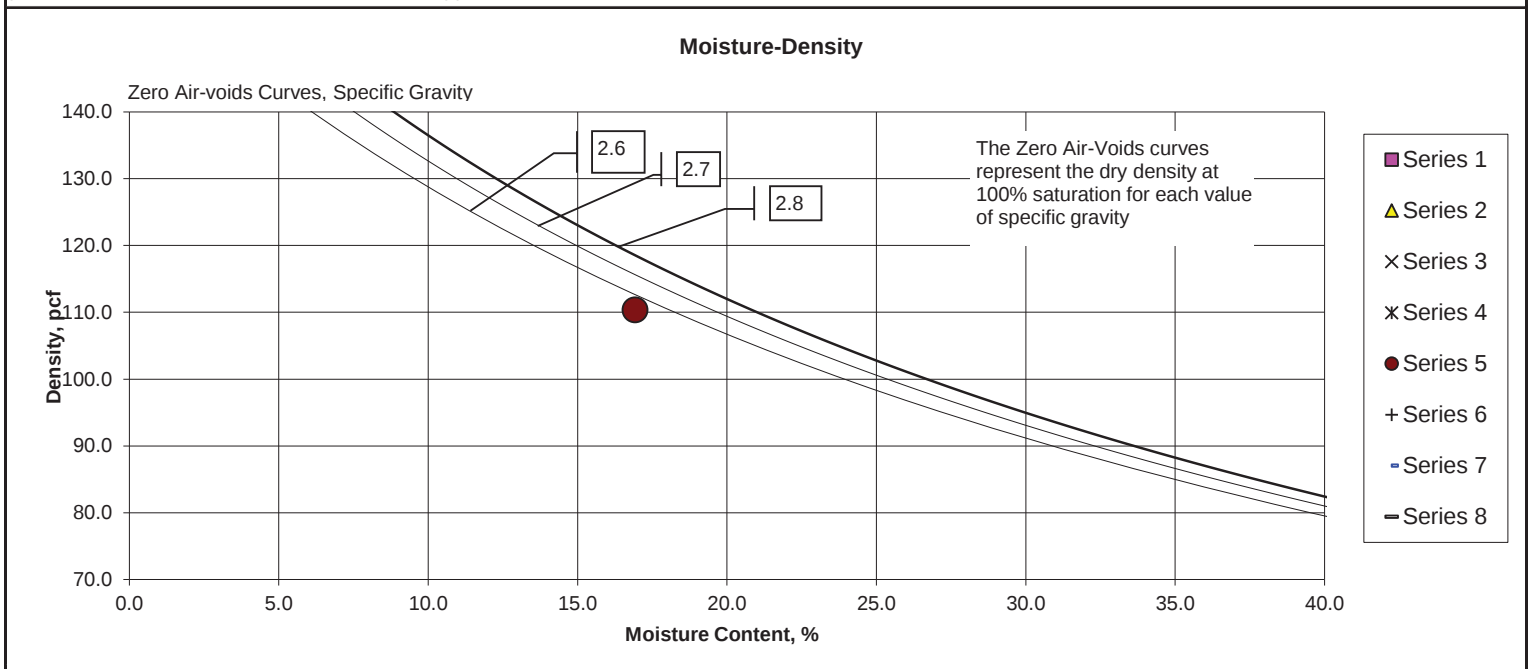
Moisture-Density-Porosity Report

Cooper Testing Labs, Inc. (ASTM D7263b)

CTL Job No: 1157-223a Project No. 24042 By: RU
Client: GeoFoundation Inc. Date: 07/22/24
Project Name: Hillside Cir Residences Remarks: 3-1 @ 2' - sample disturbed; m/c only.

Boring:	1-3	1-4	1-5	1-6	2-2	2-3	3-1	4-2
Sample:								
Depth, ft:								6.5
Visual Description:	Light Brown Clayey SAND	Strong Brown Cayey SAND	Strong Brown Clayey SAND	Strong Brown Clayey SAND	Strong Brown Clayey SAND	Strong Brown Clayey SAND	Brown CLAY w/ Sand & organics	Brown CLAY w/ Sand
Actual G_s								
Assumed G_s					2.70			
Moisture, %	7.9	8.5	12.6	8.0	16.9	11.0	5.0	14.3
Wet Unit wt, pcf					129.0			
Dry Unit wt, pcf					110.3			
Dry Bulk Dens.pb, (g/cc)					1.77			
Saturation, %					86.6			
Total Porosity, %					34.5			
Volumetric Water Cont., θ_w , %					29.9			
Volumetric Air Cont., θ_a , %					4.6			
Void Ratio					0.53			
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (G_s) was used then the saturation, porosities, and void ratio should be considered approximate.





Moisture-Density-Porosity Report

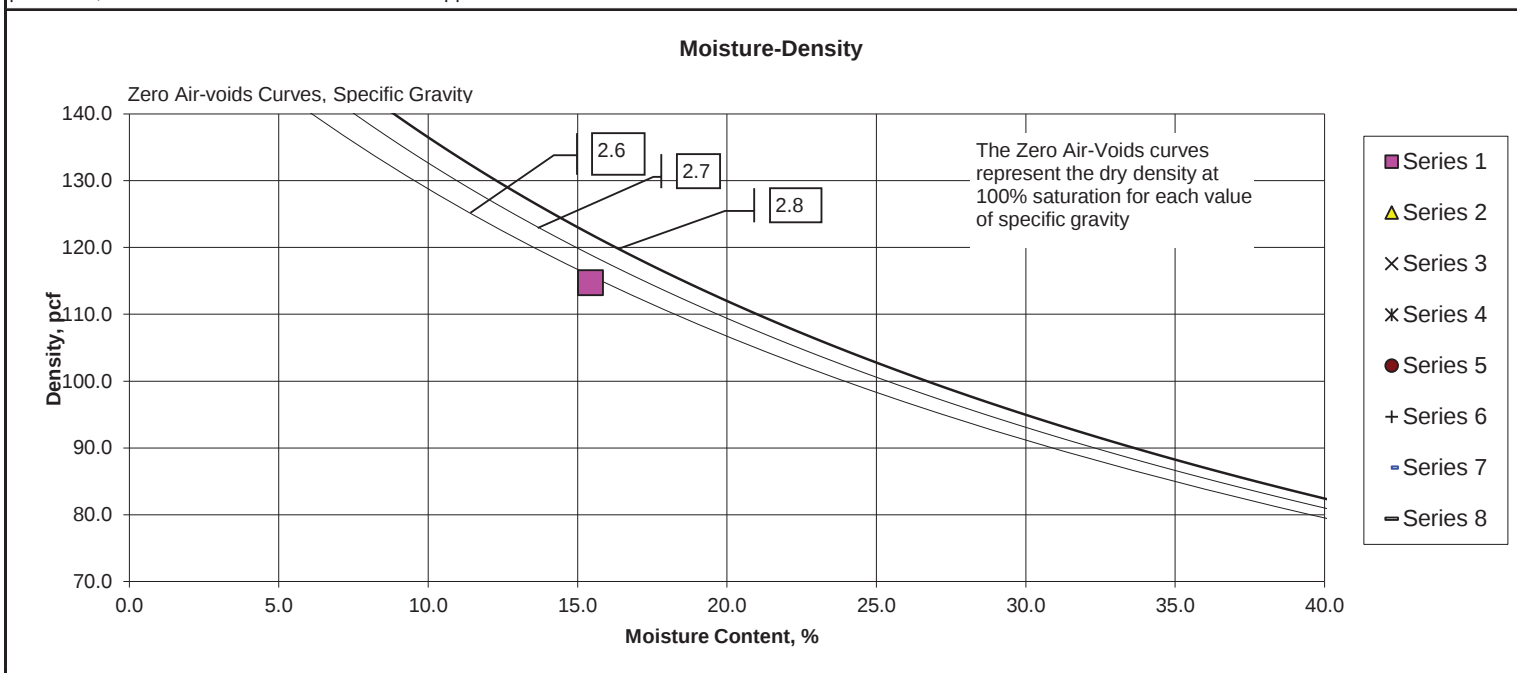
Cooper Testing Labs, Inc. (ASTM D7263b)

CTL Job No: 1157-223b
Client: GeoFoundation Inc.
Project Name: Hillside Cir Residences

Project No. 24042
Date: 07/22/24
By: RU
Remarks:

Boring:	5-1	5-2						
Sample:								
Depth, ft:	4	9						
Visual Description:	Brown Lean Clayey SAND	Dark Gray CLAY w/ Sand						
Actual G_s								
Assumed G_s	2.70							
Moisture, %	15.4	9.8						
Wet Unit wt, pcf	132.4							
Dry Unit wt, pcf	114.7							
Dry Bulk Dens.pb, (g/cc)	1.84							
Saturation, %	88.8							
Total Porosity, %	31.9							
Volumetric Water Cont., θ_w , %	28.4							
Volumetric Air Cont., θ_a , %	3.6							
Void Ratio	0.47							
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (G_s) was used then the saturation, porosities, and void ratio should be considered approximate.



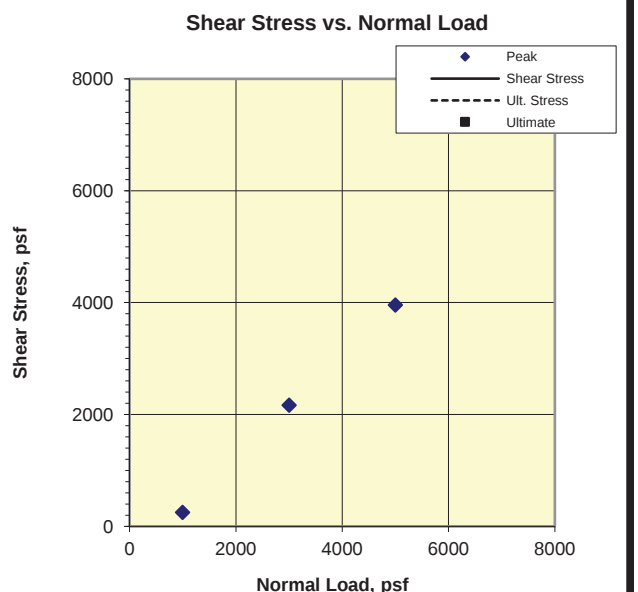
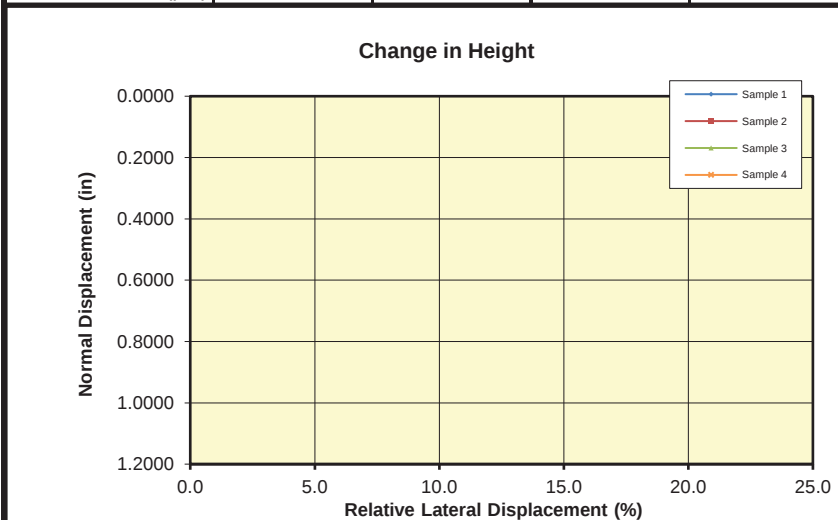
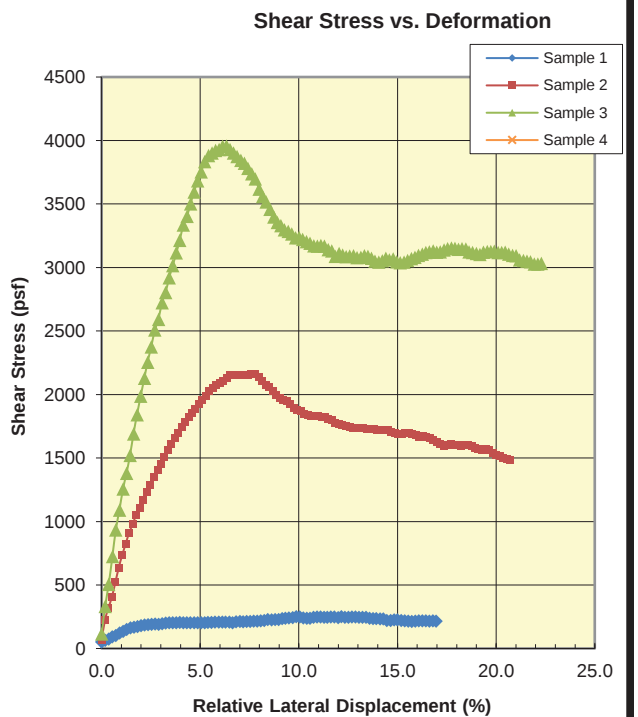


Consolidated Undrained Direct Shear (ASTM D3080M)

CTL Job #: 1157-223 Project #: 24042 By: MD
Client: GeoFoundation, Inc. Date: 7/23/2024 Checked: PJ
Project Name: Hillside Cir Residences Remolding Info:

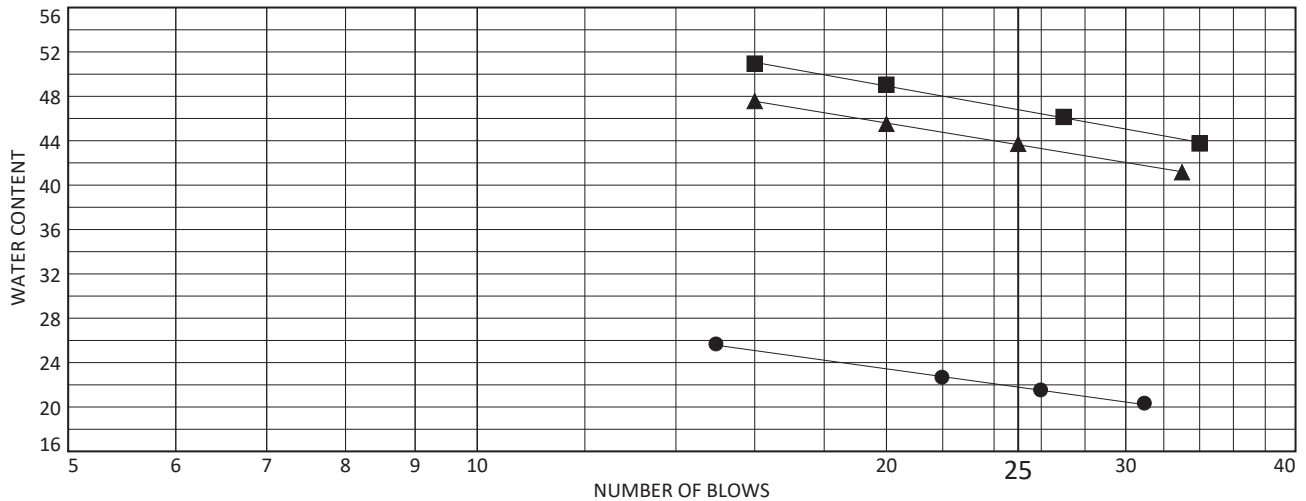
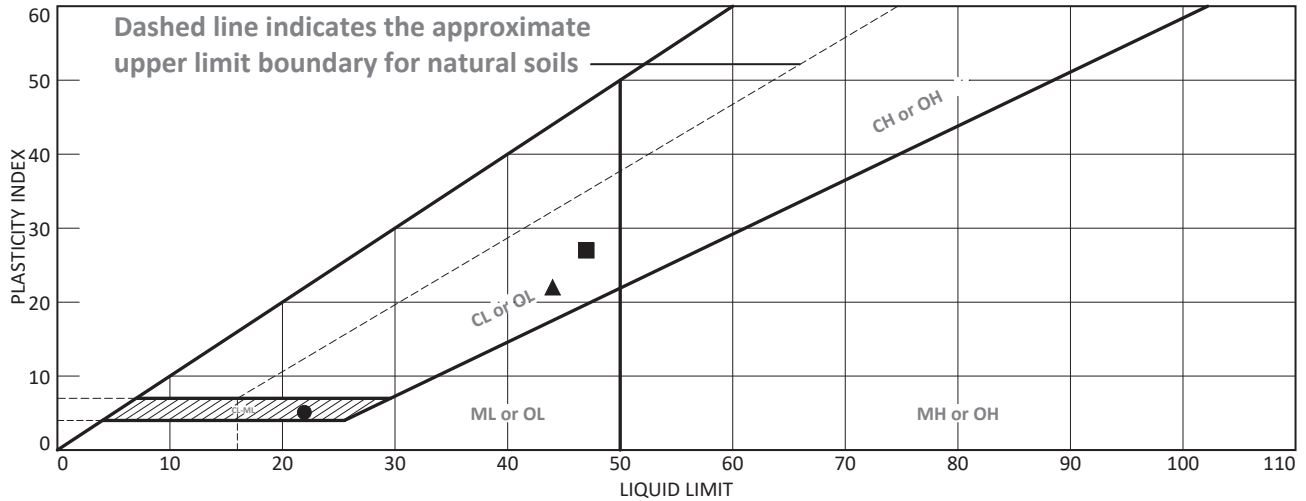
Specimen Data				
	1	2	3	4
Boring:	1-2	1-2	1-2	
Sample:				
Depth (ft):	9	9	9	
Visual Description:	Yellowish Brown Silty SAND	Yellowish Brown Silty SAND	Yellowish Brown Silty SAND	
Normal Load (psf)	1000	3000	5000	
Dry Mass of Specimen (g)	118.0	119.0	121.4	
Initial Height (in)	1.00	1.00	1.00	
Initial Diameter (in)	2.42	2.42	2.42	
Initial Void Ratio	0.724	0.711	0.676	
Initial Moisture (%)	15.4	15.7	16.5	
Initial Wet Density (pcf)	112.8	114.0	117.2	
Initial Dry Density (pcf)	97.7	98.5	100.6	
Initial Saturation (%)	57.5	59.7	66.0	
ΔHeight Consol (in)	0.0199	0.0335	0.0375	
At Test Void Ratio	0.690	0.653	0.613	
At Test Moisture (%)	20.5	19.9	19.7	
At Test Wet Density (pcf)	120.1	122.2	125.1	
At Test Dry Density (pcf)	99.7	101.9	104.5	
At Test Saturation (%)	80.0	82.1	86.7	
Strain Rate (%/min)	1.1	1.1	1.1	
Strengths Picked at	Peak	Peak	Peak	
Shear Stress (psf)	250	2164	3957	
ΔHeight (in) at Peak				
Ultimate Stress (psf)				

Phi (deg)	42.8	Ult. Phi (deg)	
Cohesion (psf)	657	Ult. Cohesion (psf)	



Remarks: *DS-CU* A fully undrained condition may not be attained in this test. ΔH is not measured during undrained direct shear tests.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Yellowish Brown Silty Clayey SAND	22	17	5			
■	Dark Yellowish Brown Lean CLAY w/ Sand	47	20	27			
▲	Brown Lean Clayey SAND	44	22	22			

Project No. 1157-223 Client: GeoFoundation Inc.

Project: Hillside Cir Residences - 24042

● Source of Sample: 1-1 Depth: 4'

■ Source of Sample: 2-1 Depth: 4'

▲ Source of Sample: 5-1 Depth: 4'

Remarks:

COOPER TESTING LABORATORY

Figure

1385 HILLSIDE CIRCLE CONSTRUCTION EMISSIONS & HEALTH RISK ASSESSMENT

Burlingame, California

April 11, 2025

Prepared for:

**Maria Kisyova, AICP
Project Manager
David J. Powers & Associates, Inc.
1736 Franklin, Suite 400
Oakland, CA 94612**

Prepared by:

**Casey Divine
Jordyn Bauer**

ILLINGWORTH & RODKIN, INC.
/// Acoustics • Air Quality ///
**429 East Cotati Avenue
Cotati, CA 94931
(707) 794-0400**

I&R Project#: 25-018

Introduction

The purpose of this report is to address the potential construction air quality and health risk impacts associated with the proposed residential development located at 1385 Hillside Circle in Burlingame, California. Air quality impacts from this project would be associated with the demolition of the existing uses and construction of the new homes. Air pollutant emissions associated with construction of the project were estimated using appropriate computer models. In addition, the potential project health risks and the impact of existing toxic air contaminant (TAC) sources affecting the nearby sensitive receptors were evaluated. The analysis was conducted following guidance provided by the Bay Area Air District (Air District).¹

Project Description

The approximately 0.86-acre project site is currently occupied by an existing single-family home, a secondary residence, and a detached garage. The project proposes to demolish the existing land uses and subdivide the lot into three individual parcels to construct three single-family homes. Construction is proposed from May 2026 through December 2027.

Setting

The project is located in San Mateo County, which is in the San Francisco Bay Area Air Basin. Ambient air quality standards have been established at both the State and federal level. The Bay Area meets all ambient air quality standards with the exception of ground-level ozone, respirable particulate matter (PM₁₀), and fine particulate matter (PM_{2.5}).

Air Pollutants of Concern

High ozone concentrations in the air basin are caused by the cumulative emissions of reactive organic gases (ROG) and nitrogen oxides (NO_x). These precursor pollutants react under certain meteorological conditions to form ozone concentrations. Controlling the emissions of these precursor pollutants is the focus of the Bay Area's attempts to reduce ambient ozone concentrations. The highest ozone concentrations in the Bay Area occur in the eastern and southern inland valleys that are downwind of air pollutant sources. High ozone concentrations aggravate respiratory and cardiovascular diseases, reduced lung function, and increase coughing and chest discomfort.

Particulate matter is another problematic air pollutant in the air basin. Particulate matter is assessed and measured in terms of respirable particulate matter or particles that have a diameter of 10 micrometers or less (PM₁₀) and fine particulate matter where particles have a diameter of 2.5 micrometers or less (PM_{2.5}). Elevated concentrations of PM₁₀ and PM_{2.5} are the result of both region-wide (or cumulative) emissions and localized emissions. High particulate matter concentrations aggravate respiratory and cardiovascular diseases, reduce lung function, increase mortality (e.g., lung cancer), and result in reduced lung function growth in children.

¹ Formerly known as the Bay Area Air Quality Management District (BAAQMD), 2022 CEQA Air Quality Guidelines, April 2023.

Toxic Air Contaminants

TACs are a broad class of compounds known to cause morbidity or mortality, often because they cause cancer. TACs are found in ambient air, especially in urban areas, and are caused by industry, agriculture, fuel combustion, and commercial operations (e.g., dry cleaners). TACs are typically found in low concentrations, even near their source (e.g., diesel particulate matter [DPM] near a freeway). Because chronic exposure of TACs can result in adverse health effects, they are regulated at the regional, State, and federal level.

Diesel exhaust is the predominant TAC in urban air and is estimated to represent about three-quarters of the cancer risk from TACs (based on the Bay Area average). According to the California Air Resources Board (CARB), diesel exhaust is a complex mixture of gases, vapors, and fine particles. This complexity makes the evaluation of health effects from diesel exhaust exposure a complex scientific issue. Some of the chemicals in diesel exhaust, such as benzene and formaldehyde, have been previously identified as TACs by the CARB, and are listed as carcinogens either under the State's Proposition 65 or under the Federal Hazardous Air Pollutants programs. Health risks from TACs are estimated using the Office of Environmental Health Hazard Assessment (OEHHA) risk assessment guidelines, which were published in February of 2015 and incorporated in the Air District's current California Environmental Quality Act (CEQA) guidance.²

PM_{2.5} emissions can include TACs. Due to the adverse health effects caused by PM_{2.5} exposure even at low concentrations, the Air District developed assessing methods and health risk thresholds to address exposure to increased concentrations caused by project PM_{2.5} emissions.³

Sensitive Receptors

There are groups of people more affected by air pollution than others. CARB has identified the following persons who are most likely to be affected by air pollution: children under 16, the elderly over 65, athletes, and people with cardiovascular and chronic respiratory diseases. These groups are classified as sensitive receptors. Locations that may contain a high concentration of these sensitive population groups include residential areas, hospitals, daycare facilities, elder care facilities, and elementary schools. For cancer risk assessments, infants and small children are the most sensitive receptors, since they are more susceptible to cancer causing TACs. Residential locations are assumed to include infants and small children. The closest sensitive receptors would be located in the adjacent single-family residences surrounding the project site. There are also children located at the Hoover Elementary School located to the southwest of the site. There are additional single-family residences surrounding the site at further distances. This project would introduce new sensitive receptors (i.e., residents) to the area.

² OEHHA, 2015. *Air Toxics Hot Spots Program Risk Assessment Guidelines, The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*. Office of Environmental Health Hazard Assessment. February.

³ Bay Area Air District, 2022 *CEQA Air Quality Guidelines*, Appendix A, p40.

Bay Area Air District

The Bay Area Air District has jurisdiction over an approximately 5,600-square mile area, commonly referred to as the San Francisco Bay Area (Bay Area). The District's boundary encompasses the nine San Francisco Bay Area counties, including Alameda County, Contra Costa County, Marin County, San Francisco County, San Mateo County, Santa Clara County, Napa County, southwestern Solano County, and southern Sonoma County.

The Air District is the lead agency in developing plans to address attainment and maintenance of the National Ambient Air Quality Standards and California Ambient Air Quality Standards. The District also has permit authority over most types of stationary equipment utilized for the proposed project. The Air District is responsible for permitting and inspection of stationary sources; enforcement of regulations, including setting fees, levying fines, and enforcement actions; and ensuring that public nuisances are minimized.

The Air District's Community Air Risk Evaluation (CARE) program was initiated in 2004 to evaluate and reduce health risks associated with exposures to outdoor TACs in the Bay Area.⁴ The program examines TAC emissions from point sources, area sources, and on-road and off-road mobile sources with an emphasis on diesel exhaust, which is a major contributor to airborne health risk in California. The CARE program is an on-going program that encourages community involvement and input. The technical analysis portion of the CARE program has been implemented in three phases that includes an assessment of the sources of TAC emissions, modeling and measurement programs to estimate concentrations of TAC, and an assessment of exposures and health risks. Throughout the program, information derived from the technical analyses has been used to develop emission reduction activities in areas with high TAC exposures and high density of sensitive populations. Risk reduction activities associated with the CARE program are focused on the most at-risk communities in the Bay Area. Seven areas have been identified by the Air District as impacted communities. They include Eastern San Francisco, Richmond/San Pablo, Western Alameda, San José, Vallejo, Concord, and Pittsburgh/Antioch. The project site is not located within any of the Air District CARE areas.

Overburdened communities are areas located (i) within a census tract identified by the California Communities Environmental Health Screening Tool (CalEnviroScreen), Version 4.0 implemented by OEHHA, as having an overall score at or above the 70th percentile, or (ii) within 1,000 feet of any such census tract.⁵ The Air District has identified several overburdened areas within its boundaries. However, the project site is not within an overburdened area as the Project site is scored at the 16th percentile on CalEnviroScreen.⁶

⁴ See Bay Area Air District: <https://www.baaqmd.gov/community-health/community-health-protection-program/community-air-risk-evaluation-care-program>.

⁵ See Bay Area Air District: https://www.baaqmd.gov/~media/dotgov/files/rules/reg-2-permits/2021-amendments/documents/20210722_01_appendixd_mapsofverburdenedcommunities-pdf.pdf?la=en.

⁶ OEHA, CalEnviroScreen 4.0 Maps <https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40>

Bay Area Air District CEQA Air Quality Guidelines

In June 2010, the Air District adopted thresholds of significance to assist in the review of projects under CEQA. In 2023, the Bay Area Air District revised the *CEQA Air Quality Guidelines* that include significance thresholds to assist in the evaluation of air quality impacts of projects and plans proposed within the Bay Area. The current Air District guidelines provide recommended procedures for evaluating potential air impacts during the environmental review process consistent with CEQA requirements including thresholds of significance, mitigation measures, and background air quality information. They include assessment methodologies for criteria air pollutants, air toxics, odors, and GHG emissions as shown in Table 1.⁷ Air quality impacts and health risks are considered potentially significant if they exceed these thresholds.

The Air District recommends all projects include a “basic” set of best management practices (BMPs) to manage fugitive dust and consider impacts from dust (i.e., fugitive PM₁₀ and PM_{2.5}) to be less than significant if BMPs are implemented (listed below). The Air District strongly encourages enhanced BMPs for construction sites near schools, residential areas, other sensitive land uses, or if air quality impacts were found to be significant.

Table 1. Bay Area Air District CEQA Significance Thresholds

Criteria Air Pollutant	Construction Thresholds			
	Average Daily Emissions (lbs./day)			
ROG	54			
NO _x	54			
PM ₁₀	82 (Exhaust)			
PM _{2.5}	54 (Exhaust)			
CO	Not Applicable			
Fugitive Dust (PM ₁₀ /PM _{2.5})	Best Management Practices (BMPs)*			
Health Risks and Hazards	Single Sources / Individual Projects		Combined Sources (Cumulative from all sources within 1000-foot zone of influence)	
Excess Cancer Risk	>10 in a million	OR Compliance with Qualified Community Risk Reduction Plan	>100 in a million	OR Compliance with Qualified Community Risk Reduction Plan
Hazard Index	>1.0		>10.0	
Incremental annual PM _{2.5}	>0.3 µg/m ³		>0.8 µg/m ³	
Note: ROG = reactive organic gases, NO _x = nitrogen oxides, PM ₁₀ = course particulate matter or particulates with an aerodynamic diameter of 10 micrometers (µm) or less, PM _{2.5} = fine particulate matter or particulates with an aerodynamic diameter of 2.5µm or less.				
* The Bay Area Air District strongly recommends implementing all feasible fugitive dust management practices especially when construction projects are located near sensitive communities, including schools, residential areas, or other sensitive land uses.				

Source: Bay Area Air District, 2022 CEQA Air Quality Guidelines

⁷ Bay Area Air District, 2022 CEQA Air Quality Guidelines, April 2023.

Envision Burlingame 2040 General Plan

In January 2019, the City of Burlingame adopted their Envision Burlingame Updated Draft 2040 General Plan,⁸ which includes goals to reduce exposure of the City's sensitive population to exposure of air pollution and toxic air contaminants. The following goals are applicable to the proposed project:

Goal HP-3: Minimize exposure of residents and employees of local business to harmful air pollutants.

- HP-3.1 Regional Air Quality Standards.* Support regional policies and efforts to improve air quality and participate in regional planning efforts with the Bay Area Air Quality Management District to meet or exceed air quality standards.
- HP-3.2 Local Air Quality Standards.* Work with local business, industries, and developers to reduce the impact of stationary and mobile sources of pollution. Ensure that new development does not create cumulative net increases in air pollution and require Transportation Demand Management (TDM) techniques when air quality impacts are unavoidable.
- HP-3.3 Indoor Air Quality Standards.* Require that developers mitigate impacts on indoor air quality for new residential and commercial developments, particularly along higher-density corridors, near industrial uses, and along the freeway and rail line, such as in North Burlingame, along Rollins Road, and in Downtown. Potential mitigation strategies include installing air filters (MERV 13 or higher), building sound walls, and planting vegetation and trees as pollution buffers.
- HP-3.4 Air Pollution Reduction.* Support regional efforts to improve air quality, reduce auto use, expand infrastructure for alternative transportation, and reduce traffic congestion. Focus efforts to reduce truck idling to two minutes or fewer in industrial and warehouse districts along Rollins Road and the Inner Bayshore.
- HP-3.5 Woodstove and Fireplace Replacement.* Encourage residents to replace wood-burning fireplaces and stoves with cleaner electric heat pumps, natural gas, or propane stoves. Educate the public about financial assistance options through the BAAQMD's fireplace and wood stove replacement incentive program.
- HP-3.6 Caltrain Electrification.* Encourage the electrification of Caltrain to eliminate emissions from the rail line.
- HP-3.7 Proximity to Sensitive Locations.* Avoid locating stationary and mobile sources of air pollution near sensitive uses such as residences, schools, childcare facilities,

⁸ City of Burlingame, 2019. "Chapter 9 Healthy People and Healthy Places", *Envision Burlingame General Plan*. January. Web: <https://www.burlingame.org/DocumentCenter/View/657/Chapter-9---Healthy-People-and-Healthy-Places-PDF>

healthcare facilities, and senior living facilities. Where adjacent exist, include site planning and building features that minimize potential conflicts and impacts.

HP-3.8 Proximity to Emissions Sources. Avoid locating residential developments and other sensitive uses near significant pollution sources such as freeways and large stationary source emitters. Require BAAQMD recommended procedures for air modeling and health risk assessment for new sensitive land uses located near sources of toxic air contaminants.

HP-3.9 Building Site Design and Operations. Place sensitive uses within development projects (e.g., residences, daycares, medical clinics) as far away from emissions sources (including loading docks, busy roads, stationary sources) as possible. Design open space, commercial buildings, or parking garages between sensitive land use and air pollution sources as a buffer. Locate operable windows, balconies, and building air intakes far away from emissions sources.

HP-3.11 Dust Abatement. Require dust abatement actions for all new construction and redevelopment projects.

HP-3.12 Construction Best Practices. Require construction projects to implement the Bay Area Air Quality Management District's Best Practices for Construction to reduce pollution from dust and exhaust as feasible.

Construction Period Emissions

The California Emissions Estimator Model (CalEEMod) Version 2022 was used to estimate emissions from on-site construction activity, construction vehicle trips, and evaporative emissions. The project land use types and size were input to CalEEMod. The CalEEMod model output along with construction inputs are included in *Attachment 1*.

CalEEMod Inputs

Land Uses

The proposed project land uses were entered into CalEEMod as described in Table 2.

Table 2. Summary of Project Land Use Inputs

Project Land Uses	Size	Units	Square Feet (sf)	Acreage
Single Family Housing	3	Dwelling Unit	15,126	0.86

Construction Inputs

CalEEMod computes annual emissions for construction that are based on the project type, size, and acreage. The model provides emission estimates for both on-site and off-site construction activities. On-site activities are primarily made up of construction equipment emissions, while off-site activity includes worker, hauling, and vendor traffic. The construction build-out scenario,

including equipment quantities, average hours per day, total number of workdays, and schedule, were based on CalEEMod default information for a project of this type and size that were adjusted to meet the applicant provided total schedule length (included in *Attachment 1*). The construction schedule assumed that the earliest start date would be May 2026. Based on CalEEMod defaults and the provided construction schedule length, the Project would be built out over a period of approximately 20 months, or 426 construction workdays.

Construction Traffic Emissions

Construction would produce traffic in the form of worker trips and truck traffic. The traffic-related emissions are based on worker and vendor trip estimates produced by CalEEMod and haul trips that were computed based on provided demolition material to be exported, estimated soil imported and/or exported to the site, and the estimated amount of concrete truck trips to and from the site. CalEEMod provides daily estimates of worker and vendor trips for each applicable phase. Daily haul trips for demolition and grading were developed by CalEEMod using the provided demolition and estimated soil volumes. The number of total concrete round haul trips was estimated for the project and converted to daily one-way trips, assuming two trips per delivery. These values are shown in the project construction worksheet included in *Attachment 1*.

Summary of Computed Construction Period Emissions

Average daily emissions were annualized for each year of construction by dividing the annual construction emissions by the number of active workdays during that year. Table 3 shows the unmitigated annualized average daily construction emissions of ROG, NO_x, PM₁₀ exhaust, and PM_{2.5} exhaust during construction of the project. As indicated in Table 3, predicted unmitigated average project construction emissions would not exceed the BAAQMD significance thresholds.

Table 3. Construction Period Emissions - Unmitigated

Year	ROG	NO _x	PM ₁₀ Exhaust	PM _{2.5} Exhaust
<i>Construction Emissions Total (Tons)</i>				
2026	0.04	0.43	0.02	0.01
2027	0.16	0.55	0.02	0.02
<i>Average Daily Construction Emissions (pounds/day)</i>				
2026 (175 construction workdays)	0.50	4.96	0.18	0.17
2027 (251 construction workdays)	1.30	4.35	0.16	0.14
Air District Thresholds (<i>pounds per day</i>)	54 lbs./day	54 lbs./day	82 lbs./day	54 lbs./day
Exceed Threshold?	No	No	No	No

Construction activities, particularly during site preparation and grading, would temporarily generate fugitive dust in the form of PM₁₀ and PM_{2.5}. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of soils. Unless properly controlled, vehicles leaving the site would deposit mud on local streets, which could be an additional source of airborne dust after it dries. The Air District recommends all projects include a “basic” set of BMPs to manage fugitive dust and considers impacts from dust (i.e., fugitive PM₁₀ and PM_{2.5}) to be less-than-significant if BMPs are implemented to reduce these emissions. The project would have to implement Burlingame General Policy HP-3.12, which requires construction

projects to implement the Air District's Best Practices for Construction to reduce pollution from dust and exhaust as feasible.

Burlingame General Plan Policy HP-3.12: Include measures to control dust and exhaust during construction.

During any construction period ground disturbance, the applicant shall ensure that the project contractor implement measures to control dust and exhaust. Implementation of the measures listed below would reduce the air quality impacts associated with grading and new construction to a less-than-significant level. The contractor shall implement the following BMPs that are required of all projects under General Plan Policy HP-3.12:

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
3. 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.
4. All vehicle speeds on unpaved roads shall be limited to 15 miles per hour (mph).
5. 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.
6. All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph.
7. All trucks and equipment, including their tires, shall be washed off prior to leaving the site.
8. 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.
9. 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 Air District's General Air Pollution Complaints number shall also be visible to ensure compliance with applicable regulations.

Effectiveness of General Plan Policy HP-3.12

The General Plan Policy HP-3.12 measures above are consistent with the Air District-recommended basic BMPs for reducing fugitive dust contained in the Air District CEQA Air Quality Guidelines. For this analysis, only the basic set of BMPs are required as the Project

emissions and PM_{2.5} impacts were below the Air District thresholds. Enhanced BMPs would be required as mitigation if air quality impacts were found to be significant.

Construction Health Risk Impacts

Health risk impacts were addressed by predicting increased lifetime cancer risk, the increase in annual PM_{2.5} concentrations, and computing the Hazard Index (HI) for non-cancer health risks. Construction activity is the only source of TAC emissions from the Project that would have health risk impacts. Construction equipment and associated heavy-duty truck traffic generates diesel exhaust, which is a known TAC. These exhaust emissions pose health risks for sensitive receptors such as surrounding residents. The primary health risk impact issues associated with construction emissions are cancer risk and exposure to PM_{2.5}. A health risk assessment of the project construction activities was conducted that evaluated potential health effects to nearby sensitive receptors from construction emissions of DPM and PM_{2.5}.⁹ This assessment included dispersion modeling to predict the off-site concentrations resulting from project construction, so that lifetime cancer risks and non-cancer health effects could be evaluated. The project maximally exposed individual (MEI) is identified as the sensitive receptor(s) that is most impacted by the project's health risk impacts from construction activities.

Modeled Sensitive Receptors

Receptors for this assessment included locations where sensitive populations would be present for extended periods of time (i.e., chronic exposures). This includes the existing residences surrounding the site and the elementary school as shown in Figure 1. Residential receptors are assumed to include all receptor groups (i.e., third trimester, infants, children, and adults) with almost continuous exposure to project emissions. Health risks were also computed for child receptors at the nearby school. While there are additional receptors within 1,000 feet of the project site, the receptors chosen are adequate to identify maximum impacts from the project.

Construction Emissions

The CalEEMod model provided total uncontrolled annual PM₁₀ exhaust emissions (assumed to be DPM) for the off-road construction equipment and for exhaust emissions from on-road vehicles. Total DPM emissions were estimated to be 0.04 tons (71 pounds). Fugitive dust emissions (PM_{2.5}), which reflect the application of BMPs, were estimated to be less than 0.01 tons (10 pounds) from all construction stages. The on-road emissions are a result of haul truck travel during grading activities, worker travel, and vendor deliveries during construction. A trip length of half-a-mile was used to represent vehicle travel while at or near the construction site. It was assumed that the emissions from on-road vehicles traveling at or near the site would occur at the construction site.

Dispersion Modeling

The U.S. EPA AERMOD dispersion model was used to predict DPM and PM_{2.5} concentrations at sensitive receptors (i.e., residences, elementary school) in the vicinity of the project construction area. The AERMOD dispersion model is an Air District-recommended model for use in modeling

⁹ DPM is identified by California as a toxic air contaminant due to the potential to cause cancer.

analysis of these types of emission activities for CEQA projects.¹⁰ Emission sources for the construction site were grouped into two categories: exhaust emissions of DPM and fugitive PM_{2.5} dust emissions.

Construction Sources

To represent the construction equipment exhaust emissions, an area source was used with an emission release height of 20 feet (6 meters).¹¹ The release height incorporates both the physical release height from the construction equipment (i.e., the height of the exhaust pipe) and plume rise after it leaves the exhaust pipe. Plume rise is due to both the high temperature of the exhaust and the high velocity of the exhaust gas. It should be noted that when modeling an area source, plume rise is not calculated by the AERMOD dispersion model as it would do for a point source (exhaust stack). Therefore, the release height from an area source used to represent emissions from sources with plume rise, such as construction equipment, was based on the height the exhaust plume is expected to achieve, not just the height of the top of the exhaust pipe.

For modeling fugitive PM_{2.5} emissions, an area source with a near-ground level release height of 7 feet (2 meters) was used. Fugitive dust emissions at construction sites come from a variety of sources, including truck and equipment travel, grading activities, truck loading (with loaders) and unloading (rear or bottom dumping), loaders and excavators moving and transferring soil and other materials, etc. All of these activities result in fugitive dust emissions at various heights at the point(s) of generation. Once generated, the dust plume will tend to rise as it moves downwind across the site and exit the site at a higher elevation than when it was generated. For all these reasons, a 7-foot release height was used as the average release height across the construction site. Emissions from the construction equipment and on-road vehicle travel were distributed throughout the modeled area sources.

AERMOD Inputs and Meteorological Data

The modeling used a five-year meteorological data set (2013-2017) from the San Francisco International Airport prepared for use with the AERMOD model by the Air District. Construction emissions were modeled as occurring Monday through Friday between 8:00 a.m. to 5:00 p.m., when most of construction is expected to occur. Annual DPM and PM_{2.5} concentrations from construction activities during the 2026-2027 period were calculated at nearby sensitive receptors using the model. Receptor heights of 5 feet (1.5 meters) were used to represent the breathing height in the nearby residences.¹² A receptor height of 3 feet (1 meter) was used to represent the breathing height of children at the nearby school.

Summary of Construction Health Risk Impacts

The maximum increased cancer risks were calculated using the modeled TAC concentrations combined with Air District CEQA guidance for age sensitivity factors and exposure parameters.

¹⁰ Bay Area Air District, *Appendix E of the 2022 CEQA Air Quality Guidelines*, April 2023.

¹¹ California Air Resource Board, 2007. *Proposed Regulation for In-Use Off-Road Diesel Vehicles, Appendix D: Health Risk Methodology*. April. Web: <https://ww3.arb.ca.gov/regact/2007/ordiesl07/ordiesl07.htm>

¹² Bay Area Air District, *Appendix E of the 2022 CEQA Air Quality Guidelines*, April 2023.

Age-sensitivity factors reflect the greater sensitivity of infants and small children to cancer causing TACs. Third trimester, infant, child, and adult exposures were assumed to occur at all residences during the entire construction period, while child exposures were assumed at the nearby school.

Non-cancer health hazards and maximum PM_{2.5} concentrations were also calculated. The maximum modeled annual PM_{2.5} concentration was calculated based on combined exhaust and fugitive concentrations. The maximum computed HI value was based on the ratio of the maximum DPM concentration modeled and the chronic inhalation DPM reference exposure level of 5 µg/m³.

The modeled maximum annual DPM and PM_{2.5} concentrations were identified at nearby sensitive receptors to find the MEI. Results of this assessment indicated that the construction MEI was located on the first floor (5 feet above the ground) of an adjacent single-family residence west of the project site. The location of the MEI and nearby sensitive receptors are shown in Figure 1. Table 4 summarizes the maximum cancer risks, PM_{2.5} concentrations, and health hazard indexes for project related construction activities. *Attachment 2* to this report includes the emission calculations used for construction modeling and the cancer risk calculations.

Construction risk impacts are shown in Table 4. The unmitigated maximum cancer risks from construction activities at the construction MEI would exceed the single-source significance threshold. However, with the incorporation of the *Mitigation Measure AQ-1* and the City's General Plan Policy HP-3.12 for dust control, the mitigated cancer risk would no longer exceed the significance threshold. The annual PM_{2.5} concentration and HI from construction activities would be below the single-source significance thresholds with and without mitigation.

Additionally, modeling was conducted to predict the cancer risks, non-cancer health hazards, and maximum PM_{2.5} concentrations associated with construction activities at the nearby school. The maximum increased cancer risks were adjusted using child exposure parameters at the school. As shown in Table 4, the uncontrolled risk values at this location does not exceed The Air District single-source significance thresholds.

Table 4. Construction Risk Impacts at the Off-Site MEI

Source		Cancer Risk (per million)	Annual PM _{2.5} (µg/m ³)	Hazard Index
Project Construction	Unmitigated	12.43 (infant)	0.05	0.01
	Mitigated*	2.30 (infant)	0.03	<0.01
Bay Area Air District Single-Source Threshold		>10.0	>0.3	>1.0
Exceed Threshold?	Unmitigated	Yes	<i>No</i>	<i>No</i>
	Mitigated*	<i>No</i>	<i>No</i>	<i>No</i>
Maximum School Impact – Hoover Elementary School				
Project Construction	Unmitigated	2.76 (child)	0.02	<0.01
Bay Area Air District Single-Source Threshold		>10.0	>0.3	>1.0
Exceed Threshold?	Unmitigated	<i>No</i>	<i>No</i>	<i>No</i>

* Construction equipment with Tier 4 Interim engines as Mitigation and basic BMPs.

Figure 1. Location of Project Construction Site, Off-Site Sensitive Receptors, and Maximum TAC Impact (MEI)

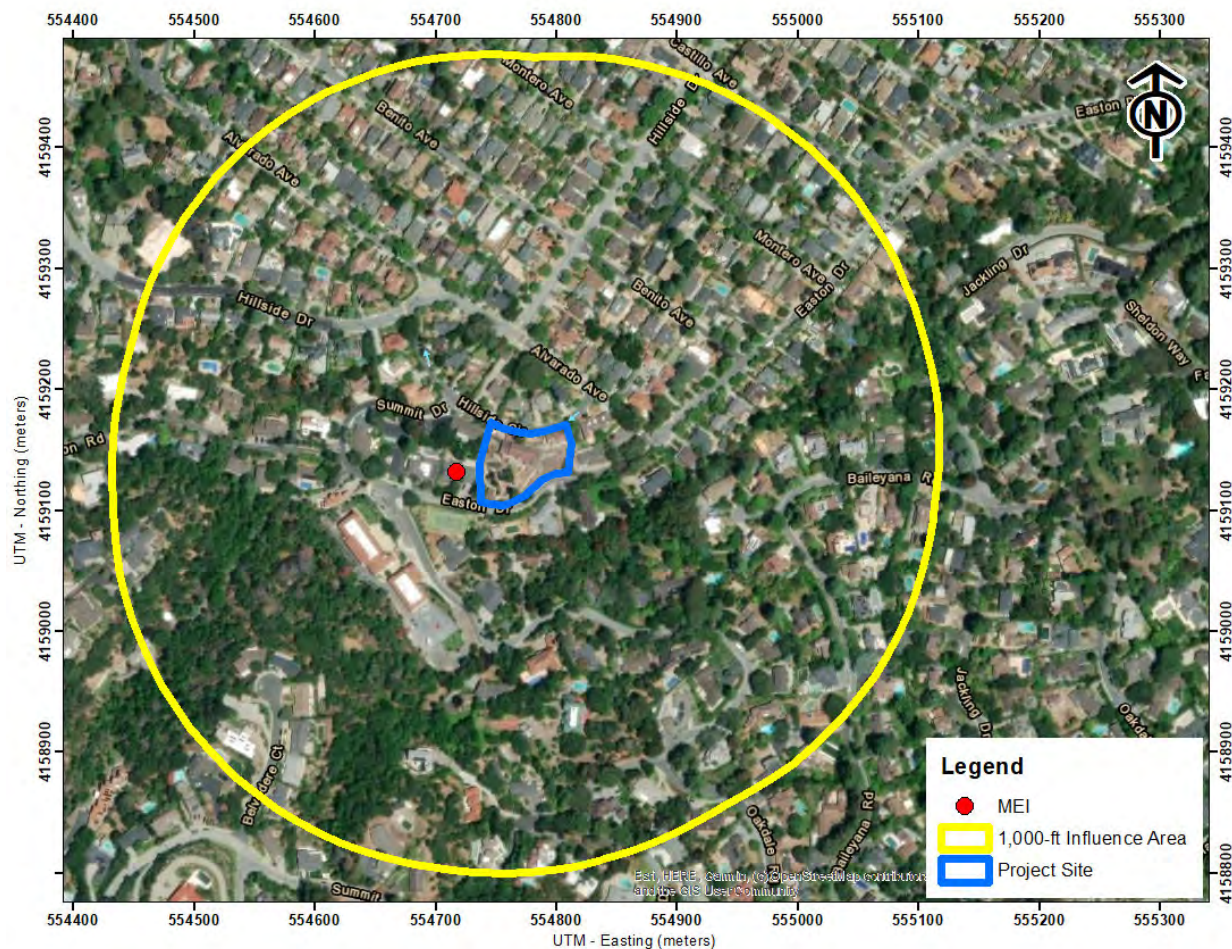


Cumulative Health Risk Impacts

Cumulative health risk assessments look at all substantial sources of TACs located within 1,000 feet of a project site (i.e., influence area) that can affect sensitive receptors. These sources include rail lines, highways, busy surface streets, and stationary sources identified by the Air District.

A review of the project area using the Air District's geographic information systems (GIS) screening maps identified the existing health risks from nearby roadway and stationary sources at the MEI. Local roadways within the 1,000-foot influence area could have cumulative health risk impacts at the MEI. There were no stationary sources located within the 1,000-foot influence area. Figure 2 shows the locations of the sources affecting the MEI within the influence area. Health risk impacts from these sources upon the MEI are reported in Table 5. Details of the cumulative screening and health risk calculations are included in *Attachment 3*.

Figure 2. Project Site and Nearby TAC and PM_{2.5} Sources



Nearby Local Roadways

The project site is located in a residential area with neighborhood streets. Cancer risk, PM_{2.5} concentrations, and HI associated with traffic on the nearby roadways were estimated using the Air District screening values provided via GIS data files (i.e., raster files).¹³ The Air District raster files provide screening-level cancer risk, PM_{2.5} concentrations, and HI for roadways within the Bay Area and were produced using AERMOD and 20x20-meter emissions grid. The raster file uses EMFAC2021 data for vehicle emissions and fleet mix for roadways and includes Appendix E of the Air District's CEQA Air Quality Guidance for risk assessment assumptions. These estimates represent conservative risks reflective of 2022 conditions and are meant to provide a conservative estimate of future conditions, which do not reflect the increased proportion of zero emission motor vehicles that will result in lower future emissions.¹⁴ These screening values are considered higher than values that would be obtained with refined modeling methods. These raster data are based on region-wide emissions rather than just those that occur within 1,000 feet of the project. More information regarding the assumptions used to develop the screening layers can be found in

¹³ Bay Area Air District, *Health Risk Screening and Modeling*, 2022. Web: <https://www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/ceqa-tools/health-risk-screening-and-modeling>

¹⁴ Bay Area Air District, *2022 CEQA Air Quality Guidelines Appendix E, Section 9*, April 2023.

Sections 6 and 7 in Appendix E of the Air District’s 2022 CEQA Guidance.¹⁵ Screening-level cancer risk, PM_{2.5} concentration, and HI for the cumulative roadway impacts at the construction MEI are listed in Table 5.

Bay Area Air District Permitted Stationary Sources

The Air District’s *Permitted Stationary Sources 2022* GIS website¹⁶ is a mapping tool that identifies the location of nearby stationary sources and their estimated risk and hazard impacts. There were no identified sources found within the project’s 1,000-foot influence area using this tool.

Summary of Cumulative Health Risk Impact at Construction MEI

Table 5 reports both the project and cumulative health risk impacts at the sensitive receptors most affected by project construction (i.e., the MEI). The project’s unmitigated construction cancer risk exceeds its Air District single-source threshold. With the implementation of *Mitigation Measure AQ-1* and the City’s General Plan Policy HP-3.12 for dust control, the project’s cancer risk would be reduced to a level below the single-source threshold and would also not exceed the cumulative-source threshold. The annual PM_{2.5} concentration and HI, unmitigated and mitigated, do not exceed the single-source or cumulative-source thresholds.

Table 5. Impacts from Combined Sources at Off-Site MEI

Source		Cancer Risk (per million)	Annual PM _{2.5} (µg/m ³)	Hazard Index
Project Impacts				
Project Construction	Unmitigated	12.43 (infant)	0.05	0.01
	Mitigated*	2.30 (infant)	0.03	<0.01
Bay Area Air District Single-Source Threshold		>10.0	>0.3	>1.0
Exceed Threshold?	Unmitigated	Yes	No	No
	Mitigated*	No	No	No
Cumulative Impacts				
Cumulative Roadways – Air District Screening GIS Data		2.30	0.11	0.01
Cumulative Total	Unmitigated	14.73	0.16	0.02
	Mitigated	4.60	0.14	<0.02
Bay Area Air District Cumulative Source Threshold		>100	>0.8	>10.0
Exceed Threshold?	Unmitigated	No	No	No
	Mitigated	No	No	No

Mitigation Measure AQ-1: Use construction equipment that has low diesel particulate matter exhaust emissions.

Implement a feasible plan to reduce diesel particulate matter emissions by 30 percent such that increased cancer risk from construction would be reduced below TAC significance levels as follows:

¹⁵ Bay Area Air District, 2022 CEQA Air Quality Guidelines Appendix E, Sections 6 and 7, April 2023.

¹⁶ Bay Area Air District, Stationary Source Screening Map, 2024. Web: <https://baaqmd.maps.arcgis.com/apps/webappviewer/index.html?id=845658c19eae4594b9f4b805fb9d89a3>

1. All construction equipment larger than 25 horsepower used at the site for more than two continuous days or 20 hours total shall meet U.S. EPA Tier 4 Interim emission standards for PM (PM₁₀ and PM_{2.5}), if feasible, otherwise,

Alternatively, the applicant may develop another construction operations plan demonstrating that the construction equipment used on-site would achieve a reduction in construction diesel particulate matter emissions by 30 percent or greater. Elements of the plan could include a combination of some of the following measures:

- Installation of electric power lines during early construction phases to avoid use of diesel portable equipment,
- Use of electrically-powered equipment,
- Forklifts and aerial lifts used for exterior and interior building construction shall be electric or propane/natural gas powered,
- Change in construction build-out plans to lengthen phases, and
- Implementation of different building techniques that result in less diesel equipment usage.

Such a construction operations plan would be subject to review by an air quality expert and approved by the City prior to construction.

Effectiveness of Mitigation Measure AQ-1

CalEEMod was used to compute emissions associated with these measures assuming that all equipment met U.S. EPA Tier 4 Interim engine standards and the City's General Plan Policy HP-3.12 for dust control were included. With these implemented, the project's construction cancer risk levels (assuming infant exposure) would be reduced by 81 percent to 2.30 per million. As a result, the project's construction risks would be reduced below the Air District single-source threshold.

Supporting Documentation

Attachment 1 includes the CalEEMod outputs for project construction emissions. Also included are any modeling assumptions.

Attachment 2 includes the construction health risk assessment. This includes the summary of the dispersion modeling and the cancer risk calculations for construction. The AERMOD dispersion modeling files for this assessment, which are quite voluminous, are available upon request and would be provided in digital format.

Attachment 3 includes the cumulative health risk screening and calculations from sources affecting the construction MEI.

Attachment 1: CalEEMod Input Assumptions and Outputs

Construction Criteria Air Pollutants							
Unmitigated	ROG	NOX	PM10 Exhaust	PM2.5 Exhaust	PM2.5 Fugitive	CO2e	
Year	Tons					MT	
Construction Equipment							
2026	0.04	0.43	0.02	0.01	0.01	109.70	
2027	0.16	0.55	0.02	0.02	0.001	144.99	
	Total Construction Emissions						
Tons	0.21	0.98	0.04	0.03		254.69	
Pounds/Workdays	Average Daily Emissions					Workdays	
2026	0.50	4.96	0.18	0.17			175
2027	1.30	4.35	0.16	0.14			251
Threshold - lbs/day	54.0	54.0	82.0	54.0			
	Total Construction Emissions						
Pounds	415.49	1959.69	71.65	65.95		0.00	
Average	0.98	4.60	0.17	0.15		0.00	426.00
Threshold - lbs/day	54.0	54.0	82.0	54.0			

Number of Days Per Year

2026	5/1/2026	12/31/26	245	175
2027	1/1/27	12/16/2027	350	251
			595	426 Total Workdays

Phase	Start Date	End Date	Days/Week	Workdays
Demolition	5/1/2026	6/17/2026	5	34
Site Preparation	6/18/2026	6/22/2026	5	3
Grading	6/23/2026	7/1/2026	5	7
Building Construction	7/11/2026	10/29/2027	5	340
Paving	11/24/2027	12/16/2027	5	17
Architectural Coating	10/30/2027	11/23/2027	5	17
Trenching	7/2/2026	7/10/2026	5	7

Air Quality/Noise Construction Information Data Request

Project Name: 1385 Hillside Circle, Burlingame DEFAULTS

Complete ALL Portions in Yellow

See Equipment Type TAB for type, horsepower and load factor

Project Size	3 Dwelling Units	0.86 total project acres disturbed
	15,126 s.f. residential	
	s.f. retail	
	s.f. office/commercial	
	s.f. other, specify:	
	s.f. parking garage	spaces
	s.f. parking lot	spaces
Construction Days (i.e., M-F)	to	
Construction Hours	am to	pm

Pile Driving? Y/N?

Project include on-site GENERATOR OR FIRE PUMP during project OPERATION (not construction)? Y/N? ____

IF YES (if BOTH separate values) -->

Kilowatts/Horsepower: ____

Fuel Type: ____

Location in project (Plans Desired if Available):

DO NOT MULTIPLY EQUIPMENT HOURS/DAY BY THE QUANTITY OF EQUIPMENT

Quantity	Description	HP	Load Factor	Hours/day	Total Work Days	Avg. Hours per day	HP Annual Hours	Comments
	Demolition	Start Date:	5/1/2026	Total phase:	34			Overall Import/Export Volumes
		End Date:	6/17/2026					
1	Concrete/Industrial Saws	33	0.73	8	34	8	6552	Demolition Volume
	Excavators	36	0.38			0	0	Square footage of buildings to be demolished
1	Rubber-Tired Dozers	367	0.4	1	34	1	4991	(or total tons to be hauled)
2	Tractors/Loaders/Backhoes	84	0.37	6	34	6	12681	13,820 square feet or
	Other Equipment?							2 Hauling volume (tons)
								Any pavement demolished and hauled? Est. 0 tons
	Site Preparation	Start Date:	6/18/2026	Total phase:	3			
		End Date:	6/22/2026					
1	Graders	148	0.41	8	3	8	1456	
	Rubber Tired Dozers	367	0.4			0	0	
1	Tractors/Loaders/Backhoes	84	0.37	8	3	8	746	
	Other Equipment?							
	Grading / Excavation	Start Date:	6/23/2026	Total phase:	7			Soil Hauling Volume
		End Date:	7/1/2026					Export volume = Est. 250 cubic yards?
	Excavators	36	0.38			0	0	Import volume = Est. 250 cubic yards?
1	Graders	148	0.41	6	7	6	2549	
1	Rubber Tired Dozers	367	0.4	6	7	6	6166	
	Concrete/Industrial Saws	33	0.73			0	0	
1	Tractors/Loaders/Backhoes	84	0.37	7	7	7	1523	
	Other Equipment?							
	Trenching/Foundation	Start Date:	7/2/2026	Total phase:	7			
		End Date:	7/10/2026					
1	Tractor/Loader/Backhoe	84	0.37	8	7	8	1740	
1	Excavators	36	0.38	8	7	8	766	
	Other Equipment?							
	Building - Exterior	Start Date:	7/11/2026	Total phase:	340			Cement Trucks? Est. 44 Total Round-Trips
		End Date:	10/29/2027					
1	Cranes	367	0.29	4	340	4	144745	Electric? (Y/N) Otherwise assumed diesel
2	Forklifts	82	0.2	6	340	6	66912	Liquid Propane (LPG)? (Y/N) Otherwise Assumed diesel
	Generator Sets	14	0.74			0	0	Or temporary line power? (Y/N)
2	Tractors/Loaders/Backhoes	84	0.37	8	340	8	169075	
	Welders	46	0.45			0	0	
	Other Equipment?							
	Building - Interior/Architectural Coating	Start Date:	10/30/2027	Total phase:	17			
		End Date:	11/23/2027					
1	Air Compressors	37	0.48	6	17	6	1812	
	Aerial Lift	46	0.31			0	0	
	Other Equipment?							
	Paving	Start Date:	11/24/2027	Total phase:	17			
		Start Date:	12/16/2027					
4	Cement and Mortar Mixers	10	0.56	6	17	6	2285	Asphalt? ____ cubic yards or Est. 0 round trips?
1	Pavers	81	0.42	7	17	7	4048	
	Paving Equipment	89	0.36			0	0	
1	Rollers	36	0.38	7	17	7	1628	
1	Tractors/Loaders/Backhoes	84	0.37	7	17	7	3699	
	Other Equipment?							
	Additional Phases	Start Date:		Total phase:				
		Start Date:						
						#DIV/0!	0	
						#DIV/0!	0	
						#DIV/0!	0	
						#DIV/0!	0	
						#DIV/0!	0	

Equipment types listed in "Equipment Types" worksheet tab.

Equipment listed in this sheet is to provide an example of inputs

It is assumed that water trucks would be used during grading

Add or subtract phases and equipment, as appropriate

Modify horsepower or load factor, as appropriate

Complete one sheet for each project component

25-018 1385 Hillside Circle, Burlingame BMPs T4F Const Detailed Report

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1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	25-018 1385 Hillside Circle, Burlingame BMPs T4F Const
Construction Start Date	5/1/2026
Operational Year	2028
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	4.60
Precipitation (days)	44.8
Location	1385 Hillside Cir, Burlingame, CA 94010, USA
County	San Mateo
City	Burlingame
Air District	Bay Area AQMD
Air Basin	San Francisco Bay Area
TAZ	1233
EDFZ	1
Electric Utility	Peninsula Clean Energy
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.29

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
Single Family Housing	3.00	Dwelling Unit	0.86	15,126	35,139	0.00	9.00	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

Sector	#	Measure Title
Construction	C-5	Use Advanced Engine Tiers

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Unmit.	1.06	10.2	0.43	2.30	2.73	0.39	1.06	1.46	2,509
Mit.	0.20	2.02	0.04	2.30	2.34	0.04	1.06	1.10	2,509
% Reduced	82%	80%	91%	—	14%	90%	—	24%	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Unmit.	12.6	4.93	0.19	0.14	0.31	0.17	0.03	0.19	1,398
Mit.	12.6	2.12	0.06	0.14	0.21	0.06	0.03	0.09	1,398
% Reduced	1%	57%	68%	—	34%	68%	—	52%	—
Average Daily (Max)	—	—	—	—	—	—	—	—	—
Unmit.	0.90	2.99	0.11	0.11	0.20	0.10	0.03	0.11	876
Mit.	0.67	0.58	0.02	0.11	0.12	0.02	0.03	0.04	876
% Reduced	25%	81%	83%	—	38%	82%	—	61%	—
Annual (Max)	—	—	—	—	—	—	—	—	—
Unmit.	0.16	0.55	0.02	0.02	0.04	0.02	0.01	0.02	145
Mit.	0.12	0.10	< 0.005	0.02	0.02	< 0.005	0.01	0.01	145
% Reduced	25%	81%	83%	—	38%	82%	—	61%	—

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—
2026	1.06	10.2	0.43	2.30	2.73	0.39	1.06	1.46	2,509
2027	0.48	4.67	0.17	0.03	0.20	0.15	0.01	0.16	1,396
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—
2026	0.50	4.93	0.19	0.03	0.22	0.17	0.01	0.18	1,398
2027	12.6	4.67	0.17	0.14	0.31	0.15	0.03	0.19	1,396
Average Daily	—	—	—	—	—	—	—	—	—
2026	0.24	2.38	0.09	0.11	0.20	0.08	0.03	0.11	663
2027	0.90	2.99	0.11	0.02	0.13	0.10	0.01	0.11	876
Annual	—	—	—	—	—	—	—	—	—
2026	0.04	0.43	0.02	0.02	0.04	0.01	0.01	0.02	110
2027	0.16	0.55	0.02	< 0.005	0.02	0.02	< 0.005	0.02	145

2.3. Construction Emissions by Year, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—
2026	0.20	2.02	0.04	2.30	2.34	0.04	1.06	1.10	2,509
2027	0.13	0.75	0.03	0.03	0.05	0.03	0.01	0.03	1,396
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—
2026	0.13	0.76	0.03	0.03	0.05	0.03	0.01	0.03	1,398
2027	12.6	2.12	0.06	0.14	0.21	0.06	0.03	0.09	1,396

Average Daily	—	—	—	—	—	—	—	—	—
2026	0.06	0.51	0.01	0.11	0.12	0.01	0.03	0.04	663
2027	0.67	0.58	0.02	0.02	0.04	0.02	0.01	0.02	876
Annual	—	—	—	—	—	—	—	—	—
2026	0.01	0.09	< 0.005	0.02	0.02	< 0.005	0.01	0.01	110
2027	0.12	0.10	< 0.005	< 0.005	0.01	< 0.005	< 0.005	< 0.005	145

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Unmit.	0.47	0.08	< 0.005	0.17	0.17	< 0.005	0.04	0.05	229
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Unmit.	0.45	0.09	< 0.005	0.17	0.17	< 0.005	0.04	0.05	221
Average Daily (Max)	—	—	—	—	—	—	—	—	—
Unmit.	0.46	0.09	< 0.005	0.16	0.17	< 0.005	0.04	0.04	218
Annual (Max)	—	—	—	—	—	—	—	—	—
Unmit.	0.08	0.02	< 0.005	0.03	0.03	< 0.005	0.01	0.01	36.1

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Mobile	0.07	0.05	< 0.005	0.17	0.17	< 0.005	0.04	0.04	179
Area	0.40	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.46

Energy	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	45.0
Water	—	—	—	—	—	—	—	—	0.46
Waste	—	—	—	—	—	—	—	—	4.18
Refrig.	—	—	—	—	—	—	—	—	0.11
Total	0.47	0.08	< 0.005	0.17	0.17	< 0.005	0.04	0.05	229
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Mobile	0.07	0.05	< 0.005	0.17	0.17	< 0.005	0.04	0.04	171
Area	0.38	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Energy	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	45.0
Water	—	—	—	—	—	—	—	—	0.46
Waste	—	—	—	—	—	—	—	—	4.18
Refrig.	—	—	—	—	—	—	—	—	0.11
Total	0.45	0.09	< 0.005	0.17	0.17	< 0.005	0.04	0.05	221
Average Daily	—	—	—	—	—	—	—	—	—
Mobile	0.07	0.05	< 0.005	0.16	0.16	< 0.005	0.04	0.04	168
Area	0.39	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.23
Energy	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	45.0
Water	—	—	—	—	—	—	—	—	0.46
Waste	—	—	—	—	—	—	—	—	4.18
Refrig.	—	—	—	—	—	—	—	—	0.11
Total	0.46	0.09	< 0.005	0.16	0.17	< 0.005	0.04	0.04	218
Annual	—	—	—	—	—	—	—	—	—
Mobile	0.01	0.01	< 0.005	0.03	0.03	< 0.005	0.01	0.01	27.8
Area	0.07	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.04
Energy	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.45
Water	—	—	—	—	—	—	—	—	0.08
Waste	—	—	—	—	—	—	—	—	0.69
Refrig.	—	—	—	—	—	—	—	—	0.02

Total	0.08	0.02	< 0.005	0.03	0.03	< 0.005	0.01	0.01	36.1
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2.6. Operations Emissions by Sector, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Mobile	0.07	0.05	< 0.005	0.17	0.17	< 0.005	0.04	0.04	179
Area	0.40	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.46
Energy	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	45.0
Water	—	—	—	—	—	—	—	—	0.46
Waste	—	—	—	—	—	—	—	—	4.18
Refrig.	—	—	—	—	—	—	—	—	0.11
Total	0.47	0.08	< 0.005	0.17	0.17	< 0.005	0.04	0.05	229
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Mobile	0.07	0.05	< 0.005	0.17	0.17	< 0.005	0.04	0.04	171
Area	0.38	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Energy	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	45.0
Water	—	—	—	—	—	—	—	—	0.46
Waste	—	—	—	—	—	—	—	—	4.18
Refrig.	—	—	—	—	—	—	—	—	0.11
Total	0.45	0.09	< 0.005	0.17	0.17	< 0.005	0.04	0.05	221
Average Daily	—	—	—	—	—	—	—	—	—
Mobile	0.07	0.05	< 0.005	0.16	0.16	< 0.005	0.04	0.04	168
Area	0.39	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.23
Energy	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	45.0
Water	—	—	—	—	—	—	—	—	0.46
Waste	—	—	—	—	—	—	—	—	4.18

Refrig.	—	—	—	—	—	—	—	—	0.11
Total	0.46	0.09	< 0.005	0.16	0.17	< 0.005	0.04	0.04	218
Annual	—	—	—	—	—	—	—	—	—
Mobile	0.01	0.01	< 0.005	0.03	0.03	< 0.005	0.01	0.01	27.8
Area	0.07	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.04
Energy	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.45
Water	—	—	—	—	—	—	—	—	0.08
Waste	—	—	—	—	—	—	—	—	0.69
Refrig.	—	—	—	—	—	—	—	—	0.02
Total	0.08	0.02	< 0.005	0.03	0.03	< 0.005	0.01	0.01	36.1

3. Construction Emissions Details

3.1. Demolition (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.44	4.09	0.13	—	0.13	0.12	—	0.12	855
Demolition	—	—	—	0.43	0.43	—	0.07	0.07	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.38	0.01	—	0.01	0.01	—	0.01	79.6
Demolition	—	—	—	0.04	0.04	—	0.01	0.01	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	< 0.005	—	< 0.005	< 0.005	—	< 0.005	13.2
Demolition	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.00	0.08	0.08	0.00	0.02	0.02	81.2
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.54	< 0.005	0.09	0.09	< 0.005	0.02	0.03	378
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	7.23
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.05	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	35.2
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.20
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.83

3.2. Demolition (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.10	1.47	0.02	—	0.02	0.02	—	0.02	855
Demolition	—	—	—	0.43	0.43	—	0.07	0.07	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.14	< 0.005	—	< 0.005	< 0.005	—	< 0.005	79.6
Demolition	—	—	—	0.04	0.04	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	< 0.005	—	< 0.005	< 0.005	—	< 0.005	13.2
Demolition	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.02	0.02	0.00	0.08	0.08	0.00	0.02	0.02	81.2
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.54	< 0.005	0.09	0.09	< 0.005	0.02	0.03	378
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	7.23
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.05	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	35.2
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.20
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.83
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3.3. Site Preparation (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.44	3.74	0.19	—	0.19	0.17	—	0.17	861
Dust From Material Movement	—	—	—	0.21	0.21	—	0.02	0.02	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.08
Dust From Material Movement	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005	1.17
Dust From Material Movement	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.00	0.04	0.04	0.00	0.01	0.01	40.6
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.32
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.4. Site Preparation (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.08	0.42	0.02	—	0.02	0.02	—	0.02	861
Dust From Material Movement	—	—	—	0.21	0.21	—	0.02	0.02	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—

Off-Road Equipment	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.08
Dust From Material Movement	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	1.17
Dust From Material Movement	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.00	0.04	0.04	0.00	0.01	0.01	40.6
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.32
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Grading (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.02	9.19	0.42	—	0.42	0.39	—	0.39	1,720
Dust From Material Movement	—	—	—	2.07	2.07	—	1.00	1.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.18	0.01	—	0.01	0.01	—	0.01	33.0
Dust From Material Movement	—	—	—	0.04	0.04	—	0.02	0.02	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	< 0.005	—	< 0.005	< 0.005	—	< 0.005	5.46
Dust From Material Movement	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.02	0.01	0.00	0.06	0.06	0.00	0.01	0.01	60.9
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	1.03	0.01	0.17	0.17	0.01	0.05	0.05	728

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.12
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	14.0
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.18
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.31

3.6. Grading (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.16	0.84	0.03	—	0.03	0.03	—	0.03	1,720
Dust From Material Movement	—	—	—	2.07	2.07	—	1.00	1.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	< 0.005	—	< 0.005	< 0.005	—	< 0.005	33.0
Dust From Material Movement	—	—	—	0.04	0.04	—	0.02	0.02	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	5.46
Dust From Material Movement	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.02	0.01	0.00	0.06	0.06	0.00	0.01	0.01	60.9
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.02	1.03	0.01	0.17	0.17	0.01	0.05	0.05	728
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.12
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	14.0
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.18
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	2.31

3.7. Building Construction (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.49	4.81	0.19	—	0.19	0.17	—	0.17	1,309
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.49	4.81	0.19	—	0.19	0.17	—	0.17	1,309
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.17	1.64	0.06	—	0.06	0.06	—	0.06	446
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.30	0.01	—	0.01	0.01	—	0.01	73.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	8.76
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	9.49
Hauling	< 0.005	0.10	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	71.2
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	8.34
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	9.47
Hauling	< 0.005	0.11	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	71.1
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.85

Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	3.23
Hauling	< 0.005	0.04	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	24.2
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.47
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.53
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	4.01

3.8. Building Construction (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	0.64	0.02	—	0.02	0.02	—	0.02	1,309
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	0.64	0.02	—	0.02	0.02	—	0.02	1,309
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.22	0.01	—	0.01	0.01	—	0.01	446
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	73.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	8.76
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	9.49
Hauling	< 0.005	0.10	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	71.2
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	8.34
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	9.47
Hauling	< 0.005	0.11	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	71.1
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.85
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	3.23
Hauling	< 0.005	0.04	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	24.2
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.47
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.53
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	4.01

3.9. Building Construction (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.48	4.56	0.17	—	0.17	0.15	—	0.15	1,309
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.48	4.56	0.17	—	0.17	0.15	—	0.15	1,309
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.28	2.69	0.10	—	0.10	0.09	—	0.09	774
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.49	0.02	—	0.02	0.02	—	0.02	128
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	8.60
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	9.27
Hauling	< 0.005	0.10	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	69.5
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	8.11
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	9.25
Hauling	< 0.005	0.10	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	69.4
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	4.81
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.47
Hauling	< 0.005	0.06	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	41.0
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.80
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	6.79

3.10. Building Construction (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	0.64	0.02	—	0.02	0.02	—	0.02	1,309
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	0.64	0.02	—	0.02	0.02	—	0.02	1,309
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	0.38	0.01	—	0.01	0.01	—	0.01	774
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	< 0.005	—	< 0.005	< 0.005	—	< 0.005	128
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	8.60
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	9.27
Hauling	< 0.005	0.10	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	69.5
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	8.11

Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	9.25
Hauling	< 0.005	0.10	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	69.4
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	4.81
Vendor	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	5.47
Hauling	< 0.005	0.06	< 0.005	0.01	0.01	< 0.005	< 0.005	< 0.005	41.0
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.80
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.91
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	6.79

3.11. Paving (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.48	4.15	0.17	—	0.17	0.15	—	0.15	826
Paving	0.00	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.19	0.01	—	0.01	0.01	—	0.01	38.5
Paving	0.00	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—

Off-Road Equipment	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	6.37
Paving	0.00	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	0.04	0.03	0.00	0.14	0.14	0.00	0.03	0.03	131
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	6.14
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.02
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.12. Paving (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.23	2.09	0.06	—	0.06	0.06	—	0.06	826
Paving	0.00	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.10	< 0.005	—	< 0.005	< 0.005	—	< 0.005	38.5
Paving	0.00	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	< 0.005	—	< 0.005	< 0.005	—	< 0.005	6.37
Paving	0.00	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	0.04	0.03	0.00	0.14	0.14	0.00	0.03	0.03	131
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	0.01	0.01	0.00	< 0.005	< 0.005	6.14
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.02
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.13. Architectural Coating (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	0.83	0.02	—	0.02	0.02	—	0.02	134
Architectural Coatings	12.5	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	6.24
Architectural Coatings	0.58	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005	1.03
Architectural Coatings	0.11	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.62

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.08
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.14. Architectural Coating (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.65	< 0.005	—	< 0.005	< 0.005	—	< 0.005	134
Architectural Coatings	12.5	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	< 0.005	—	< 0.005	< 0.005	—	< 0.005	6.24
Architectural Coatings	0.58	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005	1.03
Architectural Coatings	0.11	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	1.62
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.08
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.15. Trenching (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.20	1.86	0.06	—	0.06	0.05	—	0.05	433
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	8.31
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005	1.38
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.00	0.04	0.04	0.00	0.01	0.01	40.6
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.74
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.12
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.16. Trenching (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.81	0.01	—	0.01	0.01	—	0.01	433
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.02	< 0.005	—	< 0.005	< 0.005	—	< 0.005	8.31
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	1.38
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.01	0.01	0.00	0.04	0.04	0.00	0.01	0.01	40.6
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.74
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.12
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	0.07	0.05	< 0.005	0.17	0.17	< 0.005	0.04	0.04	179
Total	0.07	0.05	< 0.005	0.17	0.17	< 0.005	0.04	0.04	179
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	0.07	0.05	< 0.005	0.17	0.17	< 0.005	0.04	0.04	171
Total	0.07	0.05	< 0.005	0.17	0.17	< 0.005	0.04	0.04	171
Annual	—	—	—	—	—	—	—	—	—
Single Family Housing	0.01	0.01	< 0.005	0.03	0.03	< 0.005	0.01	0.01	27.8
Total	0.01	0.01	< 0.005	0.03	0.03	< 0.005	0.01	0.01	27.8

4.1.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	0.07	0.05	< 0.005	0.17	0.17	< 0.005	0.04	0.04	179
Total	0.07	0.05	< 0.005	0.17	0.17	< 0.005	0.04	0.04	179
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	0.07	0.05	< 0.005	0.17	0.17	< 0.005	0.04	0.04	171
Total	0.07	0.05	< 0.005	0.17	0.17	< 0.005	0.04	0.04	171
Annual	—	—	—	—	—	—	—	—	—
Single Family Housing	0.01	0.01	< 0.005	0.03	0.03	< 0.005	0.01	0.01	27.8
Total	0.01	0.01	< 0.005	0.03	0.03	< 0.005	0.01	0.01	27.8

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	0.41
Total	—	—	—	—	—	—	—	—	0.41
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	0.41
Total	—	—	—	—	—	—	—	—	0.41
Annual	—	—	—	—	—	—	—	—	—

Single Family Housing	—	—	—	—	—	—	—	—	0.07
Total	—	—	—	—	—	—	—	—	0.07

4.2.2. Electricity Emissions By Land Use - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	0.41
Total	—	—	—	—	—	—	—	—	0.41
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	0.41
Total	—	—	—	—	—	—	—	—	0.41
Annual	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	0.07
Total	—	—	—	—	—	—	—	—	0.07

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	44.6
Total	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	44.6

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	44.6
Total	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	44.6
Annual	—	—	—	—	—	—	—	—	—
Single Family Housing	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.38
Total	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.38

4.2.4. Natural Gas Emissions By Land Use - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	44.6
Total	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	44.6
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	44.6
Total	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	44.6
Annual	—	—	—	—	—	—	—	—	—
Single Family Housing	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.38
Total	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.38

4.3. Area Emissions by Source

4.3.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Hearths	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Consumer Products	0.32	—	—	—	—	—	—	—	—
Architectural Coatings	0.06	—	—	—	—	—	—	—	—
Landscape Equipment	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.46
Total	0.40	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.46
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Hearths	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Consumer Products	0.32	—	—	—	—	—	—	—	—
Architectural Coatings	0.06	—	—	—	—	—	—	—	—
Total	0.38	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Hearths	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Consumer Products	0.06	—	—	—	—	—	—	—	—
Architectural Coatings	0.01	—	—	—	—	—	—	—	—
Landscape Equipment	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.04
Total	0.07	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.04

4.3.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Hearths	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Consumer Products	0.32	—	—	—	—	—	—	—	—
Architectural Coatings	0.06	—	—	—	—	—	—	—	—
Landscape Equipment	0.01	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.46
Total	0.40	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.46
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Hearths	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Consumer Products	0.32	—	—	—	—	—	—	—	—
Architectural Coatings	0.06	—	—	—	—	—	—	—	—
Total	0.38	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Hearths	0.00	0.00	0.00	—	0.00	0.00	—	0.00	0.00
Consumer Products	0.06	—	—	—	—	—	—	—	—
Architectural Coatings	0.01	—	—	—	—	—	—	—	—
Landscape Equipment	< 0.005	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.04
Total	0.07	< 0.005	< 0.005	—	< 0.005	< 0.005	—	< 0.005	0.04

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	0.46
Total	—	—	—	—	—	—	—	—	0.46
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	0.46
Total	—	—	—	—	—	—	—	—	0.46
Annual	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	0.08
Total	—	—	—	—	—	—	—	—	0.08

4.4.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	0.46
Total	—	—	—	—	—	—	—	—	0.46
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	0.46
Total	—	—	—	—	—	—	—	—	0.46
Annual	—	—	—	—	—	—	—	—	—

Single Family Housing	—	—	—	—	—	—	—	—	0.08
Total	—	—	—	—	—	—	—	—	0.08

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	4.18
Total	—	—	—	—	—	—	—	—	4.18
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	4.18
Total	—	—	—	—	—	—	—	—	4.18
Annual	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	0.69
Total	—	—	—	—	—	—	—	—	0.69

4.5.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	4.18

Total	—	—	—	—	—	—	—	—	4.18
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	4.18
Total	—	—	—	—	—	—	—	—	4.18
Annual	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	0.69
Total	—	—	—	—	—	—	—	—	0.69

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	0.11
Total	—	—	—	—	—	—	—	—	0.11
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	0.11
Total	—	—	—	—	—	—	—	—	0.11
Annual	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	0.02
Total	—	—	—	—	—	—	—	—	0.02

4.6.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	0.11
Total	—	—	—	—	—	—	—	—	0.11
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	0.11
Total	—	—	—	—	—	—	—	—	0.11
Annual	—	—	—	—	—	—	—	—	—
Single Family Housing	—	—	—	—	—	—	—	—	0.02
Total	—	—	—	—	—	—	—	—	0.02

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—

Total	—	—	—	—	—	—	—	—	—
-------	---	---	---	---	---	---	---	---	---

4.7.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—

4.8.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—

4.9.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—

Total	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—

Annual	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—

Removed	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—

4.10.4. Soil Carbon Accumulation By Vegetation Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—

4.10.5. Above and Belowground Carbon Accumulation by Land Use Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—

4.10.6. Avoided and Sequestered Emissions by Species - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Demolition	Demolition	5/1/2026	6/17/2026	5.00	34.0	—
Site Preparation	Site Preparation	6/18/2026	6/22/2026	5.00	3.00	—
Grading	Grading	6/23/2026	7/1/2026	5.00	7.00	—
Building Construction	Building Construction	7/11/2026	10/29/2027	5.00	340	—
Paving	Paving	11/24/2027	12/16/2027	5.00	17.0	—
Architectural Coating	Architectural Coating	10/30/2027	11/23/2027	5.00	17.0	—
Trenching	Trenching	7/2/2026	7/10/2026	5.00	7.00	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Demolition	Tractors/Loaders/Back hoes	Diesel	Average	2.00	6.00	84.0	0.37
Demolition	Rubber Tired Dozers	Diesel	Average	1.00	1.00	367	0.40
Demolition	Concrete/Industrial Saws	Diesel	Average	1.00	8.00	33.0	0.73
Site Preparation	Graders	Diesel	Average	1.00	8.00	148	0.41
Site Preparation	Tractors/Loaders/Back hoes	Diesel	Average	1.00	8.00	84.0	0.37
Grading	Graders	Diesel	Average	1.00	6.00	148	0.41
Grading	Rubber Tired Dozers	Diesel	Average	1.00	6.00	367	0.40
Grading	Tractors/Loaders/Back hoes	Diesel	Average	1.00	7.00	84.0	0.37
Building Construction	Cranes	Diesel	Average	1.00	4.00	367	0.29

Building Construction	Forklifts	Diesel	Average	2.00	6.00	82.0	0.20
Building Construction	Tractors/Loaders/Back hoes	Diesel	Average	2.00	8.00	84.0	0.37
Paving	Tractors/Loaders/Back hoes	Diesel	Average	1.00	7.00	84.0	0.37
Paving	Cement and Mortar Mixers	Diesel	Average	4.00	6.00	10.0	0.56
Paving	Pavers	Diesel	Average	1.00	7.00	81.0	0.42
Paving	Rollers	Diesel	Average	1.00	7.00	36.0	0.38
Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48
Trenching	Tractors/Loaders/Back hoes	Diesel	Average	1.00	8.00	84.0	0.37
Trenching	Excavators	Diesel	Average	1.00	8.00	36.0	0.38

5.2.2. Mitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Demolition	Tractors/Loaders/Back hoes	Diesel	Tier 4 Final	2.00	6.00	84.0	0.37
Demolition	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	1.00	367	0.40
Demolition	Concrete/Industrial Saws	Diesel	Tier 4 Final	1.00	8.00	33.0	0.73
Site Preparation	Graders	Diesel	Tier 4 Final	1.00	8.00	148	0.41
Site Preparation	Tractors/Loaders/Back hoes	Diesel	Tier 4 Final	1.00	8.00	84.0	0.37
Grading	Graders	Diesel	Tier 4 Final	1.00	6.00	148	0.41
Grading	Rubber Tired Dozers	Diesel	Tier 4 Final	1.00	6.00	367	0.40
Grading	Tractors/Loaders/Back hoes	Diesel	Tier 4 Final	1.00	7.00	84.0	0.37
Building Construction	Cranes	Diesel	Tier 4 Final	1.00	4.00	367	0.29
Building Construction	Forklifts	Diesel	Tier 4 Final	2.00	6.00	82.0	0.20

Building Construction	Tractors/Loaders/Back hoes	Diesel	Tier 4 Final	2.00	8.00	84.0	0.37
Paving	Tractors/Loaders/Back hoes	Diesel	Tier 4 Final	1.00	7.00	84.0	0.37
Paving	Cement and Mortar Mixers	Diesel	Average	4.00	6.00	10.0	0.56
Paving	Pavers	Diesel	Tier 4 Final	1.00	7.00	81.0	0.42
Paving	Rollers	Diesel	Tier 4 Final	1.00	7.00	36.0	0.38
Architectural Coating	Air Compressors	Diesel	Tier 4 Final	1.00	6.00	37.0	0.48
Trenching	Tractors/Loaders/Back hoes	Diesel	Tier 4 Final	1.00	8.00	84.0	0.37
Trenching	Excavators	Diesel	Tier 4 Final	1.00	8.00	36.0	0.38

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Demolition	—	—	—	—
Demolition	Worker	10.0	11.7	LDA,LDT1,LDT2
Demolition	Vendor	—	8.40	HHDT,MHDT
Demolition	Hauling	4.68	20.0	HHDT
Demolition	Onsite truck	—	—	HHDT
Site Preparation	—	—	—	—
Site Preparation	Worker	5.00	11.7	LDA,LDT1,LDT2
Site Preparation	Vendor	—	8.40	HHDT,MHDT
Site Preparation	Hauling	0.00	20.0	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	7.50	11.7	LDA,LDT1,LDT2
Grading	Vendor	—	8.40	HHDT,MHDT

Grading	Hauling	9.00	20.0	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—
Building Construction	Worker	1.08	11.7	LDA,LDT1,LDT2
Building Construction	Vendor	0.32	8.40	HHDT,MHDT
Building Construction	Hauling	0.88	20.0	HHDT
Building Construction	Onsite truck	—	—	HHDT
Paving	—	—	—	—
Paving	Worker	17.5	11.7	LDA,LDT1,LDT2
Paving	Vendor	—	8.40	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT
Architectural Coating	—	—	—	—
Architectural Coating	Worker	0.22	11.7	LDA,LDT1,LDT2
Architectural Coating	Vendor	—	8.40	HHDT,MHDT
Architectural Coating	Hauling	0.00	20.0	HHDT
Architectural Coating	Onsite truck	—	—	HHDT
Trenching	—	—	—	—
Trenching	Worker	5.00	11.7	LDA,LDT1,LDT2
Trenching	Vendor	—	8.40	HHDT,MHDT
Trenching	Hauling	0.00	20.0	HHDT
Trenching	Onsite truck	—	—	HHDT

5.3.2. Mitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Demolition	—	—	—	—
Demolition	Worker	10.0	11.7	LDA,LDT1,LDT2
Demolition	Vendor	—	8.40	HHDT,MHDT

Demolition	Hauling	4.68	20.0	HHDT
Demolition	Onsite truck	—	—	HHDT
Site Preparation	—	—	—	—
Site Preparation	Worker	5.00	11.7	LDA,LDT1,LDT2
Site Preparation	Vendor	—	8.40	HHDT,MHDT
Site Preparation	Hauling	0.00	20.0	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	7.50	11.7	LDA,LDT1,LDT2
Grading	Vendor	—	8.40	HHDT,MHDT
Grading	Hauling	9.00	20.0	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—
Building Construction	Worker	1.08	11.7	LDA,LDT1,LDT2
Building Construction	Vendor	0.32	8.40	HHDT,MHDT
Building Construction	Hauling	0.88	20.0	HHDT
Building Construction	Onsite truck	—	—	HHDT
Paving	—	—	—	—
Paving	Worker	17.5	11.7	LDA,LDT1,LDT2
Paving	Vendor	—	8.40	HHDT,MHDT
Paving	Hauling	0.00	20.0	HHDT
Paving	Onsite truck	—	—	HHDT
Architectural Coating	—	—	—	—
Architectural Coating	Worker	0.22	11.7	LDA,LDT1,LDT2
Architectural Coating	Vendor	—	8.40	HHDT,MHDT
Architectural Coating	Hauling	0.00	20.0	HHDT
Architectural Coating	Onsite truck	—	—	HHDT
Trenching	—	—	—	—

Trenching	Worker	5.00	11.7	LDA,LDT1,LDT2
Trenching	Vendor	—	8.40	HHDT,MHDT
Trenching	Hauling	0.00	20.0	HHDT
Trenching	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
Architectural Coating	30,630	10,210	0.00	0.00	—

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (cy)	Material Exported (cy)	Acres Graded (acres)	Material Demolished (Building Square Footage)	Acres Paved (acres)
Demolition	0.00	0.00	0.00	13,820	—
Site Preparation	—	—	1.50	0.00	—
Grading	250	250	5.25	0.00	—
Paving	0.00	0.00	0.00	0.00	0.03

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	2	61%	61%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
Single Family Housing	0.03	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2026	0.00	100.0	0.03	< 0.005
2027	0.00	100.0	0.03	< 0.005

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Single Family Housing	28.3	28.6	25.7	10,213	239	242	217	86,273

5.9.2. Mitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
Single Family Housing	28.3	28.6	25.7	10,213	239	242	217	86,273

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

Hearth Type	Unmitigated (number)
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Single Family Housing	—
Wood Fireplaces	0
Gas Fireplaces	0
Propane Fireplaces	0
Electric Fireplaces	0
No Fireplaces	0
Conventional Wood Stoves	0
Catalytic Wood Stoves	0
Non-Catalytic Wood Stoves	0
Pellet Wood Stoves	0

5.10.1.2. Mitigated

Hearth Type	Unmitigated (number)
Single Family Housing	—
Wood Fireplaces	0
Gas Fireplaces	0
Propane Fireplaces	0
Electric Fireplaces	0
No Fireplaces	0
Conventional Wood Stoves	0
Catalytic Wood Stoves	0
Non-Catalytic Wood Stoves	0
Pellet Wood Stoves	0

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
30630.149999999998	10,210	0.00	0.00	—

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	180

5.10.4. Landscape Equipment - Mitigated

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	180

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Single Family Housing	18,555	6.00	0.0330	0.0040	138,666

5.11.2. Mitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
Single Family Housing	18,555	6.00	0.0330	0.0040	138,666

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Single Family Housing	108,799	356,044

5.12.2. Mitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
Single Family Housing	108,799	356,044

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Single Family Housing	2.22	—

5.13.2. Mitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
Single Family Housing	2.22	—

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
Single Family Housing	Average room A/C & Other residential A/C and heat pumps	R-410A	2,088	< 0.005	2.50	2.50	10.0
Single Family Housing	Household refrigerators and/or freezers	R-134a	1,430	0.12	0.60	0.00	1.00

5.14.2. Mitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
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Single Family Housing	Average room A/C & Other residential A/C and heat pumps	R-410A	2,088	< 0.005	2.50	2.50	10.0
Single Family Housing	Household refrigerators and/or freezers	R-134a	1,430	0.12	0.60	0.00	1.00

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
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5.15.2. Mitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
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5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor
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5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)
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5.17. User Defined

Equipment Type	Fuel Type
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5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres
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5.18.1.2. Mitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres
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5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres
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5.18.1.2. Mitigated

Biomass Cover Type	Initial Acres	Final Acres
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5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)
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5.18.2.2. Mitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)
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6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	7.10	annual days of extreme heat
Extreme Precipitation	8.60	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	24.0	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about $\frac{3}{4}$ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters

Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.

The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.

The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.

The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.

The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	10.6
AQ-PM	24.1

AQ-DPM	41.7
Drinking Water	42.5
Lead Risk Housing	63.6
Pesticides	0.00
Toxic Releases	33.4
Traffic	15.7
Effect Indicators	—
CleanUp Sites	0.00
Groundwater	42.2
Haz Waste Facilities/Generators	16.6
Impaired Water Bodies	77.3
Solid Waste	39.0
Sensitive Population	—
Asthma	12.4
Cardio-vascular	12.1
Low Birth Weights	75.1
Socioeconomic Factor Indicators	—
Education	7.82
Housing	34.8
Linguistic	15.6
Poverty	5.55
Unemployment	53.9

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	89.5547286

Employed	87.36045169
Median HI	96.90748107
Education	—
Bachelor's or higher	91.87732581
High school enrollment	100
Preschool enrollment	71.52572822
Transportation	—
Auto Access	58.83485179
Active commuting	84.60156551
Social	—
2-parent households	86.03875273
Voting	96.20171949
Neighborhood	—
Alcohol availability	40.79301938
Park access	49.76260747
Retail density	38.71423072
Supermarket access	6.313358142
Tree canopy	94.55921981
Housing	—
Homeownership	77.96740665
Housing habitability	72.00051328
Low-inc homeowner severe housing cost burden	38.07262928
Low-inc renter severe housing cost burden	45.30989349
Uncrowded housing	75.52932119
Health Outcomes	—
Insured adults	94.43089953
Arthritis	0.0
Asthma ER Admissions	79.5

High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	81.0
Cognitively Disabled	91.4
Physically Disabled	98.6
Heart Attack ER Admissions	88.4
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	19.6
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0
Children	15.5
Elderly	57.3
English Speaking	86.2
Foreign-born	39.7
Outdoor Workers	70.9

Climate Change Adaptive Capacity	—
Impervious Surface Cover	70.6
Traffic Density	36.2
Traffic Access	64.1
Other Indices	—
Hardship	4.1
Other Decision Support	—
2016 Voting	98.1

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	16.0
Healthy Places Index Score for Project Location (b)	97.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
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Characteristics: Utility Information	Burlingame default clean energy provider is Peninsula Clean Energy. PCE 2023 rate = 6 lb/MWh.
Construction: Construction Phases	Defaults - added trenching. Ratioed to match provided start date and construction length provided by applicant. Reviewed and confirmed by applicant.
Construction: Off-Road Equipment	Defaults - added trenching.
Land Use	Total lot acreage from correspondence and total square footage from site plans.
Construction: Trips and VMT	Building Construction = Est. 44 concrete truck round trips (0.88 trips/day).
Construction: On-Road Fugitive Dust	Air District BMPs = 15 mph. Required by Burlingame general plan policy HP-3.12.
Operations: Hearths	No hearths.
Operations: Water and Waste Water	Wastewater treatment 100% aerobic - no septic tanks or lagoons.

25-018 1385 Hillside Circle, Burlingame BMPs T4I HRA Detailed Report

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1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	25-018 1385 Hillside Circle, Burlingame BMPs T4I HRA
Construction Start Date	5/1/2026
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	4.60
Precipitation (days)	44.8
Location	1385 Hillside Cir, Burlingame, CA 94010, USA
County	San Mateo
City	Burlingame
Air District	Bay Area AQMD
Air Basin	San Francisco Bay Area
TAZ	1233
EDFZ	1
Electric Utility	Peninsula Clean Energy
Gas Utility	Pacific Gas & Electric
App Version	2022.1.1.29

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description
Single Family Housing	3.00	Dwelling Unit	0.86	15,126	35,139	0.00	9.00	—

1.3. User-Selected Emission Reduction Measures by Emissions Sector

Sector	#	Measure Title
Construction	C-5	Use Advanced Engine Tiers

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Unmit.	1.04	9.35	0.42	2.08	2.50	0.39	1.00	1.39	1,757
Mit.	0.24	5.42	0.07	2.08	2.11	0.06	1.00	1.04	1,757
% Reduced	77%	42%	84%	—	15%	84%	—	25%	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Unmit.	12.6	4.83	0.19	0.01	0.19	0.17	< 0.005	0.17	1,314
Mit.	12.6	4.52	0.09	0.01	0.09	0.08	< 0.005	0.08	1,314
% Reduced	1%	6%	55%	—	51%	54%	—	53%	—
Average Daily (Max)	—	—	—	—	—	—	—	—	—
Unmit.	0.90	2.94	0.11	0.08	0.17	0.10	0.03	0.11	821
Mit.	0.71	2.92	0.02	0.08	0.10	0.02	0.03	0.04	821
% Reduced	21%	< 0.5%	81%	—	42%	80%	—	61%	—
Annual (Max)	—	—	—	—	—	—	—	—	—
Unmit.	0.16	0.54	0.02	0.02	0.03	0.02	< 0.005	0.02	136
Mit.	0.13	0.53	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	136
% Reduced	21%	< 0.5%	81%	—	42%	80%	—	61%	—

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—
2026	1.04	9.35	0.42	2.08	2.50	0.39	1.00	1.39	1,757
2027	0.48	4.57	0.17	< 0.005	0.17	0.15	< 0.005	0.15	1,313
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—
2026	0.50	4.83	0.19	< 0.005	0.19	0.17	< 0.005	0.17	1,314
2027	12.6	4.58	0.17	0.01	0.17	0.15	< 0.005	0.16	1,313
Average Daily	—	—	—	—	—	—	—	—	—
2026	0.24	2.28	0.09	0.08	0.17	0.08	0.03	0.11	578
2027	0.90	2.94	0.11	< 0.005	0.11	0.10	< 0.005	0.10	821
Annual	—	—	—	—	—	—	—	—	—
2026	0.04	0.42	0.02	0.02	0.03	0.01	< 0.005	0.02	95.7
2027	0.16	0.54	0.02	< 0.005	0.02	0.02	< 0.005	0.02	136

2.3. Construction Emissions by Year, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—
2026	0.24	5.42	0.07	2.08	2.11	0.06	1.00	1.04	1,757
2027	0.18	4.52	0.02	< 0.005	0.03	0.02	< 0.005	0.02	1,313
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—
2026	0.18	4.52	0.02	< 0.005	0.03	0.02	< 0.005	0.02	1,314
2027	12.6	4.52	0.09	0.01	0.09	0.08	< 0.005	0.08	1,313

Average Daily	—	—	—	—	—	—	—	—	—
2026	0.08	2.11	0.02	0.08	0.10	0.02	0.03	0.04	578
2027	0.71	2.92	0.02	< 0.005	0.02	0.02	< 0.005	0.02	821
Annual	—	—	—	—	—	—	—	—	—
2026	0.02	0.38	< 0.005	0.02	0.02	< 0.005	< 0.005	0.01	95.7
2027	0.13	0.53	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	136

3. Construction Emissions Details

3.1. Demolition (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.44	4.09	0.13	—	0.13	0.12	—	0.12	855
Demolition	—	—	—	0.43	0.43	—	0.07	0.07	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.04	0.38	0.01	—	0.01	0.01	—	0.01	79.6
Demolition	—	—	—	0.04	0.04	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.07	< 0.005	—	< 0.005	< 0.005	—	< 0.005	13.2
Demolition	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.02	0.01	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	5.24
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.08	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	17.4
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.48
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.62
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.08
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.27

3.2. Demolition (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	4.12	0.07	—	0.07	0.06	—	0.06	855
Demolition	—	—	—	0.43	0.43	—	0.07	0.07	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—

Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.38	0.01	—	0.01	0.01	—	0.01	79.6
Demolition	—	—	—	0.04	0.04	—	0.01	0.01	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.07	< 0.005	—	< 0.005	< 0.005	—	< 0.005	13.2
Demolition	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.02	0.01	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	5.24
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.08	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	17.4
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.48
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.62
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.08
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.27

3.3. Site Preparation (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.44	3.74	0.19	—	0.19	0.17	—	0.17	861
Dust From Material Movement	—	—	—	0.21	0.21	—	0.02	0.02	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.08
Dust From Material Movement	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005	1.17
Dust From Material Movement	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.01	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.62
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.02
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.4. Site Preparation (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.13	3.48	0.02	—	0.02	0.02	—	0.02	861
Dust From Material Movement	—	—	—	0.21	0.21	—	0.02	0.02	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	< 0.005	—	< 0.005	< 0.005	—	< 0.005	7.08
Dust From Material Movement	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005	1.17
Dust From Material Movement	—	—	—	< 0.005	< 0.005	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.01	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.62
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.02
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Grading (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	1.02	9.19	0.42	—	0.42	0.39	—	0.39	1,720
Dust From Material Movement	—	—	—	2.07	2.07	—	1.00	1.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.18	0.01	—	0.01	0.01	—	0.01	33.0
Dust From Material Movement	—	—	—	0.04	0.04	—	0.02	0.02	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.03	< 0.005	—	< 0.005	< 0.005	—	< 0.005	5.46
Dust From Material Movement	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.02	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	3.93
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.15	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	33.4
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—

Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.64
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.11

3.6. Grading (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.22	5.26	0.03	—	0.03	0.03	—	0.03	1,720
Dust From Material Movement	—	—	—	2.07	2.07	—	1.00	1.00	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.10	< 0.005	—	< 0.005	< 0.005	—	< 0.005	33.0
Dust From Material Movement	—	—	—	0.04	0.04	—	0.02	0.02	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—

Off-Road Equipment	< 0.005	0.02	< 0.005	—	< 0.005	< 0.005	—	< 0.005	5.46
Dust From Material Movement	—	—	—	0.01	0.01	—	< 0.005	< 0.005	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.02	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	3.93
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.01	0.15	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	33.4
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.64
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.11

3.7. Building Construction (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.49	4.81	0.19	—	0.19	0.17	—	0.17	1,309

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.49	4.81	0.19	—	0.19	0.17	—	0.17	1,309
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.17	1.64	0.06	—	0.06	0.06	—	0.06	446
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.30	0.01	—	0.01	0.01	—	0.01	73.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.57
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.89
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	3.27
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.55
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.89
Hauling	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	3.26
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.19
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.30
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.11
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.03

Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.05
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.18

3.8. Building Construction (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.18	4.50	0.02	—	0.02	0.02	—	0.02	1,309
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.18	4.50	0.02	—	0.02	0.02	—	0.02	1,309
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.06	1.53	0.01	—	0.01	0.01	—	0.01	446
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.28	< 0.005	—	< 0.005	< 0.005	—	< 0.005	73.8
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.57
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.89
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	3.27

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.55
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.89
Hauling	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	3.26
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.19
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.30
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.11
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.03
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.05
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.18

3.9. Building Construction (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.48	4.56	0.17	—	0.17	0.15	—	0.15	1,309
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.48	4.56	0.17	—	0.17	0.15	—	0.15	1,309
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.28	2.69	0.10	—	0.10	0.09	—	0.09	774
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.05	0.49	0.02	—	0.02	0.02	—	0.02	128
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.55
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.88
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	3.21
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.54
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.88
Hauling	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	3.21
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.32
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.52
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.90
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.05
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.09
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.31

3.10. Building Construction (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.18	4.50	0.02	—	0.02	0.02	—	0.02	1,309
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.18	4.50	0.02	—	0.02	0.02	—	0.02	1,309
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	2.66	0.01	—	0.01	0.01	—	0.01	774
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.49	< 0.005	—	< 0.005	< 0.005	—	< 0.005	128
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.55
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.88
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	3.21
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.54
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.88
Hauling	< 0.005	0.02	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	3.21

Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.32
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.52
Hauling	< 0.005	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	1.90
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.05
Vendor	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.09
Hauling	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.31

3.11. Paving (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.48	4.15	0.17	—	0.17	0.15	—	0.15	826
Paving	0.00	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	0.19	0.01	—	0.01	0.01	—	0.01	38.5
Paving	0.00	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	6.37
Paving	0.00	—	—	—	—	—	—	—	—

Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	0.03	0.01	0.00	0.01	0.01	0.00	< 0.005	< 0.005	8.73
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.41
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.12. Paving (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.26	4.36	0.09	—	0.09	0.08	—	0.08	826
Paving	0.00	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.20	< 0.005	—	< 0.005	< 0.005	—	< 0.005	38.5
Paving	0.00	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	6.37
Paving	0.00	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	0.03	0.01	0.00	0.01	0.01	0.00	< 0.005	< 0.005	8.73
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.41
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.07
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.13. Architectural Coating (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.11	0.83	0.02	—	0.02	0.02	—	0.02	134
Architectural Coatings	12.5	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.01	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	6.24
Architectural Coatings	0.58	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005	1.03
Architectural Coatings	0.11	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.11
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—

Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.14. Architectural Coating (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.02	1.07	0.03	—	0.03	0.03	—	0.03	134
Architectural Coatings	12.5	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.05	< 0.005	—	< 0.005	< 0.005	—	< 0.005	6.24
Architectural Coatings	0.58	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005	1.03

Architectural Coatings	0.11	—	—	—	—	—	—	—	—
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.11
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	< 0.005
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.15. Trenching (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.20	1.86	0.06	—	0.06	0.05	—	0.05	433
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	8.31
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005	1.38
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.01	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.62
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.16. Trenching (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
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Onsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.07	2.28	0.04	—	0.04	0.03	—	0.03	433
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.04	< 0.005	—	< 0.005	< 0.005	—	< 0.005	8.31
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Off-Road Equipment	< 0.005	0.01	< 0.005	—	< 0.005	< 0.005	—	< 0.005	1.38
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Worker	0.01	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	2.62
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Average Daily	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.05
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—
Worker	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.00	< 0.005	< 0.005	0.01
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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4. Operations Emissions Details

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—

4.10.4. Soil Carbon Accumulation By Vegetation Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—

4.10.5. Above and Belowground Carbon Accumulation by Land Use Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—

4.10.6. Avoided and Sequestered Emissions by Species - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	ROG	NOx	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—

Avoided	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Demolition	Demolition	5/1/2026	6/17/2026	5.00	34.0	—
Site Preparation	Site Preparation	6/18/2026	6/22/2026	5.00	3.00	—
Grading	Grading	6/23/2026	7/1/2026	5.00	7.00	—
Building Construction	Building Construction	7/11/2026	10/29/2027	5.00	340	—
Paving	Paving	11/24/2027	12/16/2027	5.00	17.0	—
Architectural Coating	Architectural Coating	10/30/2027	11/23/2027	5.00	17.0	—
Trenching	Trenching	7/2/2026	7/10/2026	5.00	7.00	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Demolition	Tractors/Loaders/Back hoes	Diesel	Average	2.00	6.00	84.0	0.37
Demolition	Rubber Tired Dozers	Diesel	Average	1.00	1.00	367	0.40
Demolition	Concrete/Industrial Saws	Diesel	Average	1.00	8.00	33.0	0.73
Site Preparation	Graders	Diesel	Average	1.00	8.00	148	0.41
Site Preparation	Tractors/Loaders/Back hoes	Diesel	Average	1.00	8.00	84.0	0.37
Grading	Graders	Diesel	Average	1.00	6.00	148	0.41
Grading	Rubber Tired Dozers	Diesel	Average	1.00	6.00	367	0.40
Grading	Tractors/Loaders/Back hoes	Diesel	Average	1.00	7.00	84.0	0.37
Building Construction	Cranes	Diesel	Average	1.00	4.00	367	0.29
Building Construction	Forklifts	Diesel	Average	2.00	6.00	82.0	0.20
Building Construction	Tractors/Loaders/Back hoes	Diesel	Average	2.00	8.00	84.0	0.37

Paving	Tractors/Loaders/Back hoes	Diesel	Average	1.00	7.00	84.0	0.37
Paving	Cement and Mortar Mixers	Diesel	Average	4.00	6.00	10.0	0.56
Paving	Pavers	Diesel	Average	1.00	7.00	81.0	0.42
Paving	Rollers	Diesel	Average	1.00	7.00	36.0	0.38
Architectural Coating	Air Compressors	Diesel	Average	1.00	6.00	37.0	0.48
Trenching	Tractors/Loaders/Back hoes	Diesel	Average	1.00	8.00	84.0	0.37
Trenching	Excavators	Diesel	Average	1.00	8.00	36.0	0.38

5.2.2. Mitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Demolition	Tractors/Loaders/Back hoes	Diesel	Tier 4 Interim	2.00	6.00	84.0	0.37
Demolition	Rubber Tired Dozers	Diesel	Tier 4 Interim	1.00	1.00	367	0.40
Demolition	Concrete/Industrial Saws	Diesel	Tier 4 Interim	1.00	8.00	33.0	0.73
Site Preparation	Graders	Diesel	Tier 4 Interim	1.00	8.00	148	0.41
Site Preparation	Tractors/Loaders/Back hoes	Diesel	Tier 4 Interim	1.00	8.00	84.0	0.37
Grading	Graders	Diesel	Tier 4 Interim	1.00	6.00	148	0.41
Grading	Rubber Tired Dozers	Diesel	Tier 4 Interim	1.00	6.00	367	0.40
Grading	Tractors/Loaders/Back hoes	Diesel	Tier 4 Interim	1.00	7.00	84.0	0.37
Building Construction	Cranes	Diesel	Tier 4 Interim	1.00	4.00	367	0.29
Building Construction	Forklifts	Diesel	Tier 4 Interim	2.00	6.00	82.0	0.20
Building Construction	Tractors/Loaders/Back hoes	Diesel	Tier 4 Interim	2.00	8.00	84.0	0.37
Paving	Tractors/Loaders/Back hoes	Diesel	Tier 4 Interim	1.00	7.00	84.0	0.37

Paving	Cement and Mortar Mixers	Diesel	Average	4.00	6.00	10.0	0.56
Paving	Pavers	Diesel	Tier 4 Interim	1.00	7.00	81.0	0.42
Paving	Rollers	Diesel	Tier 4 Interim	1.00	7.00	36.0	0.38
Architectural Coating	Air Compressors	Diesel	Tier 4 Interim	1.00	6.00	37.0	0.48
Trenching	Tractors/Loaders/Back hoes	Diesel	Tier 4 Interim	1.00	8.00	84.0	0.37
Trenching	Excavators	Diesel	Tier 4 Interim	1.00	8.00	36.0	0.38

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Demolition	—	—	—	—
Demolition	Worker	10.0	0.50	LDA,LDT1,LDT2
Demolition	Vendor	—	0.50	HHDT,MHDT
Demolition	Hauling	4.68	0.50	HHDT
Demolition	Onsite truck	—	—	HHDT
Site Preparation	—	—	—	—
Site Preparation	Worker	5.00	0.50	LDA,LDT1,LDT2
Site Preparation	Vendor	—	0.50	HHDT,MHDT
Site Preparation	Hauling	0.00	0.50	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	7.50	0.50	LDA,LDT1,LDT2
Grading	Vendor	—	0.50	HHDT,MHDT
Grading	Hauling	9.00	0.50	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—

Building Construction	Worker	1.08	0.50	LDA,LDT1,LDT2
Building Construction	Vendor	0.32	0.50	HHDT,MHDT
Building Construction	Hauling	0.88	0.50	HHDT
Building Construction	Onsite truck	—	—	HHDT
Paving	—	—	—	—
Paving	Worker	17.5	0.50	LDA,LDT1,LDT2
Paving	Vendor	—	0.50	HHDT,MHDT
Paving	Hauling	0.00	0.50	HHDT
Paving	Onsite truck	—	—	HHDT
Architectural Coating	—	—	—	—
Architectural Coating	Worker	0.22	0.50	LDA,LDT1,LDT2
Architectural Coating	Vendor	—	0.50	HHDT,MHDT
Architectural Coating	Hauling	0.00	0.50	HHDT
Architectural Coating	Onsite truck	—	—	HHDT
Trenching	—	—	—	—
Trenching	Worker	5.00	0.50	LDA,LDT1,LDT2
Trenching	Vendor	—	0.50	HHDT,MHDT
Trenching	Hauling	0.00	0.50	HHDT
Trenching	Onsite truck	—	—	HHDT

5.3.2. Mitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Demolition	—	—	—	—
Demolition	Worker	10.0	0.50	LDA,LDT1,LDT2
Demolition	Vendor	—	0.50	HHDT,MHDT
Demolition	Hauling	4.68	0.50	HHDT
Demolition	Onsite truck	—	—	HHDT
Site Preparation	—	—	—	—

Site Preparation	Worker	5.00	0.50	LDA,LDT1,LDT2
Site Preparation	Vendor	—	0.50	HHDT,MHDT
Site Preparation	Hauling	0.00	0.50	HHDT
Site Preparation	Onsite truck	—	—	HHDT
Grading	—	—	—	—
Grading	Worker	7.50	0.50	LDA,LDT1,LDT2
Grading	Vendor	—	0.50	HHDT,MHDT
Grading	Hauling	9.00	0.50	HHDT
Grading	Onsite truck	—	—	HHDT
Building Construction	—	—	—	—
Building Construction	Worker	1.08	0.50	LDA,LDT1,LDT2
Building Construction	Vendor	0.32	0.50	HHDT,MHDT
Building Construction	Hauling	0.88	0.50	HHDT
Building Construction	Onsite truck	—	—	HHDT
Paving	—	—	—	—
Paving	Worker	17.5	0.50	LDA,LDT1,LDT2
Paving	Vendor	—	0.50	HHDT,MHDT
Paving	Hauling	0.00	0.50	HHDT
Paving	Onsite truck	—	—	HHDT
Architectural Coating	—	—	—	—
Architectural Coating	Worker	0.22	0.50	LDA,LDT1,LDT2
Architectural Coating	Vendor	—	0.50	HHDT,MHDT
Architectural Coating	Hauling	0.00	0.50	HHDT
Architectural Coating	Onsite truck	—	—	HHDT
Trenching	—	—	—	—
Trenching	Worker	5.00	0.50	LDA,LDT1,LDT2
Trenching	Vendor	—	0.50	HHDT,MHDT
Trenching	Hauling	0.00	0.50	HHDT

Trenching	Onsite truck	—	—	HHDT
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5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
Architectural Coating	30,630	10,210	0.00	0.00	—

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (cy)	Material Exported (cy)	Acres Graded (acres)	Material Demolished (Building Square Footage)	Acres Paved (acres)
Demolition	0.00	0.00	0.00	13,820	—
Site Preparation	—	—	1.50	0.00	—
Grading	250	250	5.25	0.00	—
Paving	0.00	0.00	0.00	0.00	0.03

5.6.2. Construction Earthmoving Control Strategies

Control Strategies Applied	Frequency (per day)	PM10 Reduction	PM2.5 Reduction
Water Exposed Area	2	61%	61%

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
Single Family Housing	0.03	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O
2026	0.00	100.0	0.03	< 0.005
2027	0.00	100.0	0.03	< 0.005

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres
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5.18.1.2. Mitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres
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5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres
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5.18.1.2. Mitigated

Biomass Cover Type	Initial Acres	Final Acres
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5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)
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5.18.2.2. Mitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)
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6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	7.10	annual days of extreme heat
Extreme Precipitation	8.60	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	24.0	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about $\frac{3}{4}$ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters

Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A

Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.

The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.

The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	N/A	N/A	N/A	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.

The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.

The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	10.6
AQ-PM	24.1
AQ-DPM	41.7
Drinking Water	42.5
Lead Risk Housing	63.6
Pesticides	0.00
Toxic Releases	33.4
Traffic	15.7
Effect Indicators	—
CleanUp Sites	0.00
Groundwater	42.2
Haz Waste Facilities/Generators	16.6
Impaired Water Bodies	77.3
Solid Waste	39.0
Sensitive Population	—
Asthma	12.4
Cardio-vascular	12.1
Low Birth Weights	75.1
Socioeconomic Factor Indicators	—
Education	7.82
Housing	34.8
Linguistic	15.6
Poverty	5.55
Unemployment	53.9

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	89.5547286
Employed	87.36045169
Median HI	96.90748107
Education	—
Bachelor's or higher	91.87732581
High school enrollment	100
Preschool enrollment	71.52572822
Transportation	—
Auto Access	58.83485179
Active commuting	84.60156551
Social	—
2-parent households	86.03875273
Voting	96.20171949
Neighborhood	—
Alcohol availability	40.79301938
Park access	49.76260747
Retail density	38.71423072
Supermarket access	6.313358142
Tree canopy	94.55921981
Housing	—
Homeownership	77.96740665
Housing habitability	72.00051328
Low-inc homeowner severe housing cost burden	38.07262928
Low-inc renter severe housing cost burden	45.30989349

Uncrowded housing	75.52932119
Health Outcomes	—
Insured adults	94.43089953
Arthritis	0.0
Asthma ER Admissions	79.5
High Blood Pressure	0.0
Cancer (excluding skin)	0.0
Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	81.0
Cognitively Disabled	91.4
Physically Disabled	98.6
Heart Attack ER Admissions	88.4
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	19.6
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	0.0
SLR Inundation Area	0.0

Children	15.5
Elderly	57.3
English Speaking	86.2
Foreign-born	39.7
Outdoor Workers	70.9
Climate Change Adaptive Capacity	—
Impervious Surface Cover	70.6
Traffic Density	36.2
Traffic Access	64.1
Other Indices	—
Hardship	4.1
Other Decision Support	—
2016 Voting	98.1

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	16.0
Healthy Places Index Score for Project Location (b)	97.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	No
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification
Characteristics: Utility Information	Burlingame default clean energy provider is Peninsula Clean Energy. PCE 2023 rate = 6 lb/MWh.
Construction: Construction Phases	Defaults - added trenching. Ratioed to match provided start date and construction length provided by applicant. Reviewed and confirmed by applicant.
Construction: Off-Road Equipment	Defaults - added trenching.
Land Use	Total lot acreage from correspondence and total square footage from site plans.
Construction: Trips and VMT	Building Construction = Est. 44 concrete truck round trips (0.88 trips/day). HRA = 0.5 mile trip length for localized emissions.
Construction: On-Road Fugitive Dust	Air District BMPs = 15 mph. Required by Burlingame general plan policy HP-3.12.
Operations: Hearths	No hearths.
Operations: Water and Waste Water	Wastewater treatment 100% aerobic - no septic tanks or lagoons.

Attachment 2: Project Construction Dispersion Modeling Inputs and Risk Calculations

Construction Health Risk Assessment and Calculations

1385 Hillside Circle, Burlingame, CA

DPM Emissions and Modeling Emission Rates - Unmitigated

Construction Year	Activity	DPM (ton/year)	Area Source	DPM Emissions			Modeled Area (m ²)	DPM Emission Rate (g/s/m ²)
				(lb/yr)	(lb/hr)	(g/s)		
2026	Construction	0.0160	CON_DPM	31.9	0.01365	1.72E-03	3,675	4.68E-07
2027	Construction	0.0196	CON_DPM	39.2	0.01677	2.11E-03	3,675	5.75E-07
Total		0.0356		71.2	0.0304	0.0038		

Construction Hours

hr/day = 9 (M-F 8am - 5pm)

days/yr = 260

hours/year = 2340

DPM Construction Emissions and Modeling Emission Rates - With Mitigation

Construction Year	Activity	DPM (ton/year)	Area Source	DPM Emissions			Modeled Area (m ²)	DPM Emission Rate (g/s/m ²)
				(lb/yr)	(lb/hr)	(g/s)		
2026	Construction	0.0029	CON_DPM	5.9	0.00251	3.16E-04	3,675	8.61E-08
2027	Construction	0.0037	CON_DPM	7.3	0.00312	3.94E-04	3,675	1.07E-07
Total		0.0066		13.2	0.0056	0.0007		

Construction Hours

hr/day = 9 (M-F 8am - 5pm)

days/yr = 260

hours/year = 2340

1385 Hillside Circle, Burlingame, CA

PM2.5 Fugitive Dust Emissions for Modeling - Unmitigated

Construction		Area	PM2.5 Emissions				Modeled Area	PM2.5 Emission Rate
Year	Activity	Source	(ton/year)	(lb/yr)	(lb/hr)	(g/s)	(m ²)	g/s/m ²
2026	Construction	CON_FUG	0.0047	9.4	0.00402	5.06E-04	3,675	1.38E-07
2027	Construction	CON_FUG	0.00004	0.1	0.00003	4.00E-06	3,675	1.09E-09
Total			0.0047	9.5	0.0041	0.0005		

Construction Hours

hr/day = 9 (M-F 8am - 5pm)
days/yr = 260
hours/year = 2340

PM2.5 Fugitive Dust Construction Emissions for Modeling - With Mitigation

Construction		Area	PM2.5 Emissions				Modeled Area	PM2.5 Emission Rate
Year	Activity	Source	(ton/year)	(lb/yr)	(lb/hr)	(g/s)	(m ²)	g/s/m ²
2026	Construction	CON_FUG	0.0047	9.4	0.00402	5.06E-04	3,675	1.38E-07
2027	Construction	CON_FUG	0.00004	0.1	0.00003	4.00E-06	3,675	1.09E-09
Total			0.0047	9.5	0.0041	0.0005		

Construction Hours

hr/day = 9 (M-F 8am - 5pm)
days/yr = 260
hours/year = 2340

1385 Hillside Circle, Burlingame, CA
Construction Health Impact Summary

Maximum Impacts at MEI Location - Without Mitigation

Emissions Year						
	Maximum Concentrations		Cancer Risk (per million)		Hazard Index (-)	Maximum Annual PM2.5 Concentration (µg/m ³)
	Exhaust PM10/DPM (µg/m ³)	Fugitive PM2.5 (µg/m ³)				
			Infant/Child	Adult		
2026	0.0328	0.0214	5.82	0.09	0.01	0.05
2026	0.0402	0.0002	6.61	0.12	0.01	0.04
Total	-	-	12.43	0.21		-
Maximum	0.0402	0.0214	-	-	0.01	0.05

Maximum Impacts at MEI Location - With Mitigation

Emissions Year						
	Maximum Concentrations		Cancer Risk (per million)		Hazard Index (-)	Maximum Annual PM2.5 Concentration* (µg/m ³)
	Exhaust PM10/DPM (µg/m ³)	Fugitive PM2.5 (µg/m ³)				
			Infant/Child	Adult		
2026	0.0060	0.0214	1.07	0.02	0.001	0.03
2026	0.0075	0.0002	1.23	0.02	0.001	0.01
Total	-	-	2.30	0.04	-	-
Maximum	0.0075	0.0214	-	-	0.001	0.03

- Tier 4 Interim Engines and basic BMPs Mitigation.

Maximum Impacts at Redwood High School

Construction Year	Unmitigated Emissions				
	Maximum Concentrations		Child Cancer Risk (per million)	Hazard Index (-)	Maximum Annual PM2.5 Concentration ($\mu\text{g}/\text{m}^3$)
	Exhaust PM10/DPM ($\mu\text{g}/\text{m}^3$)	Fugitive PM2.5 ($\mu\text{g}/\text{m}^3$)			
2026	0.0176	0.0055	1.24	0.004	0.02
2027	0.0216	0.0000	1.52	0.004	0.02
Total	-	-	2.76	-	-
Maximum	0.0216	0.0055	-	0.004	0.02

1385 Hillside Circle, Burlingame, CA - Construction Impacts - Without Mitigation
Maximum DPM Cancer Risk and PM2.5 Calculations From Construction
Impacts at Off-Site MEI Location - 1.5 meter receptor height

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor (mg/kg-day)⁻¹
 ASF = Age sensitivity factor for specified age group
 ED = Exposure duration (years)
 AT = Averaging time for lifetime cancer risk (years)
 FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10⁻⁶

Where: C_{air} = concentration in air (µg/m³)
 DBR = daily breathing rate (L/kg body weight-day)
 A = Inhalation absorption factor
 EF = Exposure frequency (days/year)
 10⁻⁶ = Conversion factor

Values

Age --> Parameter	Infant/Child			Adult
	3rd Trimester	0 - 2	2 - 16	16 - 30
ASF =	10	10	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	572	261
A =	1	1	1	1
EF =	350	350	350	350
AT =	70	70	70	70
FAH =	1.00	1.00	1.00	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

Construction Cancer Risk by Year - Maximum Impact Receptor Location

Exposure Year	Exposure Duration (years)	Age	Infant/Child - Exposure Information			Infant/Child Cancer Risk (per million)	Adult - Exposure Information			Adult Cancer Risk (per million)	Maximum		
			DPM Conc (ug/m3)		Age Sensitivity Factor		Modeled		Age Sensitivity Factor		Hazard Index	Fugitive PM2.5	Total PM2.5
			Year	Annual			DPM Conc (ug/m3)						
0	0.25	-0.25 - 0*	2026	0.0328	10	0.45	2026	0.0328	-	-			
1	1	0 - 1	2026	0.0328	10	5.38	2026	0.0328	1	0.09	0.01	0.02	0.05
2	1	1 - 2	2027	0.0402	10	6.61	2027	0.0402	1	0.12	0.01	0.0002	0.04
3	1	2 - 3		0.0000	3	0.00		0.0000	1	0.00			
4	1	3 - 4		0.0000	3	0.00		0.0000	1	0.00			
5	1	4 - 5		0.0000	3	0.00		0.0000	1	0.00			
6	1	5 - 6		0.0000	3	0.00		0.0000	1	0.00			
7	1	6 - 7		0.0000	3	0.00		0.0000	1	0.00			
8	1	7 - 8		0.0000	3	0.00		0.0000	1	0.00			
9	1	8 - 9		0.0000	3	0.00		0.0000	1	0.00			
10	1	9 - 10		0.0000	3	0.00		0.0000	1	0.00			
11	1	10 - 11		0.0000	3	0.00		0.0000	1	0.00			
12	1	11 - 12		0.0000	3	0.00		0.0000	1	0.00			
13	1	12 - 13		0.0000	3	0.00		0.0000	1	0.00			
14	1	13 - 14		0.0000	3	0.00		0.0000	1	0.00			
15	1	14 - 15		0.0000	3	0.00		0.0000	1	0.00			
16	1	15 - 16		0.0000	3	0.00		0.0000	1	0.00			
17	1	16-17		0.0000	1	0.00		0.0000	1	0.00			
18	1	17-18		0.0000	1	0.00		0.0000	1	0.00			
19	1	18-19		0.0000	1	0.00		0.0000	1	0.00			
20	1	19-20		0.0000	1	0.00		0.0000	1	0.00			
21	1	20-21		0.0000	1	0.00		0.0000	1	0.00			
22	1	21-22		0.0000	1	0.00		0.0000	1	0.00			
23	1	22-23		0.0000	1	0.00		0.0000	1	0.00			
24	1	23-24		0.0000	1	0.00		0.0000	1	0.00			
25	1	24-25		0.0000	1	0.00		0.0000	1	0.00			
26	1	25-26		0.0000	1	0.00		0.0000	1	0.00			
27	1	26-27		0.0000	1	0.00		0.0000	1	0.00			
28	1	27-28		0.0000	1	0.00		0.0000	1	0.00			
29	1	28-29		0.0000	1	0.00		0.0000	1	0.00			
30	1	29-30		0.0000	1	0.00		0.0000	1	0.00			
Total Increased Cancer Risk						12.43				0.21			

* Third trimester of pregnancy

1385 Hillside Circle, Burlingame, CA - Construction Impacts - With Mitigation
Maximum DPM Cancer Risk and PM2.5 Calculations From Construction
Impacts at Off-Site MEI Location - 1.5 meter receptor height

Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x FAH x 1.0E6

Where: CPF = Cancer potency factor (mg/kg-day)⁻¹

ASF = Age sensitivity factor for specified age group

ED = Exposure duration (years)

AT = Averaging time for lifetime cancer risk (years)

FAH = Fraction of time spent at home (unitless)

Inhalation Dose = C_{air} x DBR x A x (EF/365) x 10⁻⁶

Where: C_{air} = concentration in air (µg/m³)

DBR = daily breathing rate (L/kg body weight-day)

A = Inhalation absorption factor

EF = Exposure frequency (days/year)

10⁻⁶ = Conversion factor

Values

Age --> Parameter	Infant/Child			Adult
	3rd Trimester	0 - 2	2 - 16	16 - 30
ASF =	10	10	3	1
CPF =	1.10E+00	1.10E+00	1.10E+00	1.10E+00
DBR* =	361	1090	572	261
A =	1	1	1	1
EF =	350	350	350	350
AT =	70	70	70	70
FAH =	1.00	1.00	1.00	0.73

* 95th percentile breathing rates for infants and 80th percentile for children and adults

Construction Cancer Risk by Year - Maximum Impact Receptor Location

Exposure Year	Exposure Duration (years)	Age	Infant/Child - Exposure Information			Infant/Child Cancer Risk (per million)	Adult - Exposure Information			Adult Cancer Risk (per million)
			DPM Conc (ug/m3)		Age Sensitivity		Modeled		Age Sensitivity	
			Year	Annual	Factor		DPM Conc (ug/m3)	Factor	Year	
0	0.25	-0.25 - 0*	2026	0.0060	10	0.08	2026	0.0060	-	-
1	1	0 - 1	2026	0.0060	10	0.99	2026	0.0060	1	0.02
2	1	1 - 2	2027	0.0075	10	1.23	2027	0.0075	1	0.02
3	1	2 - 3		0.0000	3	0.00		0.0000	1	0.00
4	1	3 - 4		0.0000	3	0.00		0.0000	1	0.00
5	1	4 - 5		0.0000	3	0.00		0.0000	1	0.00
6	1	5 - 6		0.0000	3	0.00		0.0000	1	0.00
7	1	6 - 7		0.0000	3	0.00		0.0000	1	0.00
8	1	7 - 8		0.0000	3	0.00		0.0000	1	0.00
9	1	8 - 9		0.0000	3	0.00		0.0000	1	0.00
10	1	9 - 10		0.0000	3	0.00		0.0000	1	0.00
11	1	10 - 11		0.0000	3	0.00		0.0000	1	0.00
12	1	11 - 12		0.0000	3	0.00		0.0000	1	0.00
13	1	12 - 13		0.0000	3	0.00		0.0000	1	0.00
14	1	13 - 14		0.0000	3	0.00		0.0000	1	0.00
15	1	14 - 15		0.0000	3	0.00		0.0000	1	0.00
16	1	15 - 16		0.0000	3	0.00		0.0000	1	0.00
17	1	16-17		0.0000	1	0.00		0.0000	1	0.00
18	1	17-18		0.0000	1	0.00		0.0000	1	0.00
19	1	18-19		0.0000	1	0.00		0.0000	1	0.00
20	1	19-20		0.0000	1	0.00		0.0000	1	0.00
21	1	20-21		0.0000	1	0.00		0.0000	1	0.00
22	1	21-22		0.0000	1	0.00		0.0000	1	0.00
23	1	22-23		0.0000	1	0.00		0.0000	1	0.00
24	1	23-24		0.0000	1	0.00		0.0000	1	0.00
25	1	24-25		0.0000	1	0.00		0.0000	1	0.00
26	1	25-26		0.0000	1	0.00		0.0000	1	0.00
27	1	26-27		0.0000	1	0.00		0.0000	1	0.00
28	1	27-28		0.0000	1	0.00		0.0000	1	0.00
29	1	28-29		0.0000	1	0.00		0.0000	1	0.00
30	1	29-30		0.0000	1	0.00		0.0000	1	0.00
Total Increased Cancer Risk						2.30				0.04

* Third trimester of pregnancy

Maximum		
Hazard Index	Fugitive PM2.5	Total PM2.5
0.001	0.02	0.03
0.001	0.0002	0.01

1385 Hillside Circle, Burlingame, CA - Construction Impacts - Without Mitigation
Maximum DPM Cancer Risk and PM2.5 Calculations From Construction
Impacts at Hoover Elementary School - 1 meter - Child Exposure

Student Cancer Risk (per million) = CPF x Inhalation Dose x ASF x ED/AT x 1.0E6

Where: CPF = Cancer potency factor (mg/kg-day)⁻¹

ASF = Age sensitivity factor for specified age group

ED = Exposure duration (years)

AT = Averaging time for lifetime cancer risk (years)

Inhalation Dose = C_{air} x SCAF x 8-Hr BR x A x (EF/365) x 10⁻⁶

Where: C_{air} = concentration in air (µg/m³)

SCAF = School Child Adjustment Factor (unitless) for source operation and exposures different than 8 hours/day

= (24/SHR) x (7days/SDay) x (SCHR/8 hrs)

SHR = Hours/day of emission source operation

SDay = Number of days per week of source operation

SCHR = School operation hours while emission source in operation

8-Hr BR = Eight-hour breathing rate (L/kg body weight-per 8 hrs)

A = Inhalation absorption factor

EF = Exposure frequency (days/year)

10⁻⁶ = Conversion factor

Values

	Infant	Child
Age -->	0 - <2	2 - <16
Parameter		
ASF =	10	3
DPM CPF =	1.10E+00	1.10E+00
8-Hr BR* =	1200	520
SCHR =	9	9
SHR =	9	9
SDay =	5	5
A =	1	1
EF =	250	250
AT =	70	70
SCAF =	4.20	4.20

* 95th percentile 8-hr breathing rates for moderate intensity activities

Construction Cancer Risk by Year - Maximum Preschool Impact Receptor Location

Exposure Year	Exposure Duration (years)	Age	Child - Exposure Information			Child Cancer Risk (per million)	Maximum		
			DPM Conc (ug/m3)		Age*		Hazard Index	Fugitive PM2.5	Total PM2.5
			Year	Annual	Sensitivity Factor				
1	1	5 - 6	2026	0.0176	3	1.24	0.004	0.005	0.02
2	1	6 - 7	2027	0.0216	3	1.52	0.004	0.00004	0.02
Total Increased Cancer Risk						2.76			

* Children assumed to be 5 years or older with 2 years of exposure to construction emissions.

Attachment 3: Cumulative Health Risk Screening and Calculations from Existing TAC Sources

BAAQMD RASTER Screening Data – Roadway Cancer Risk Impacts at the MEI



BAAQMD RASTER Screening Data – Roadway PM_{2.5} Concentration Impacts at the MEI



BAAQMD RASTER Screening Data – Roadway Hazard Index Impacts at the MEI

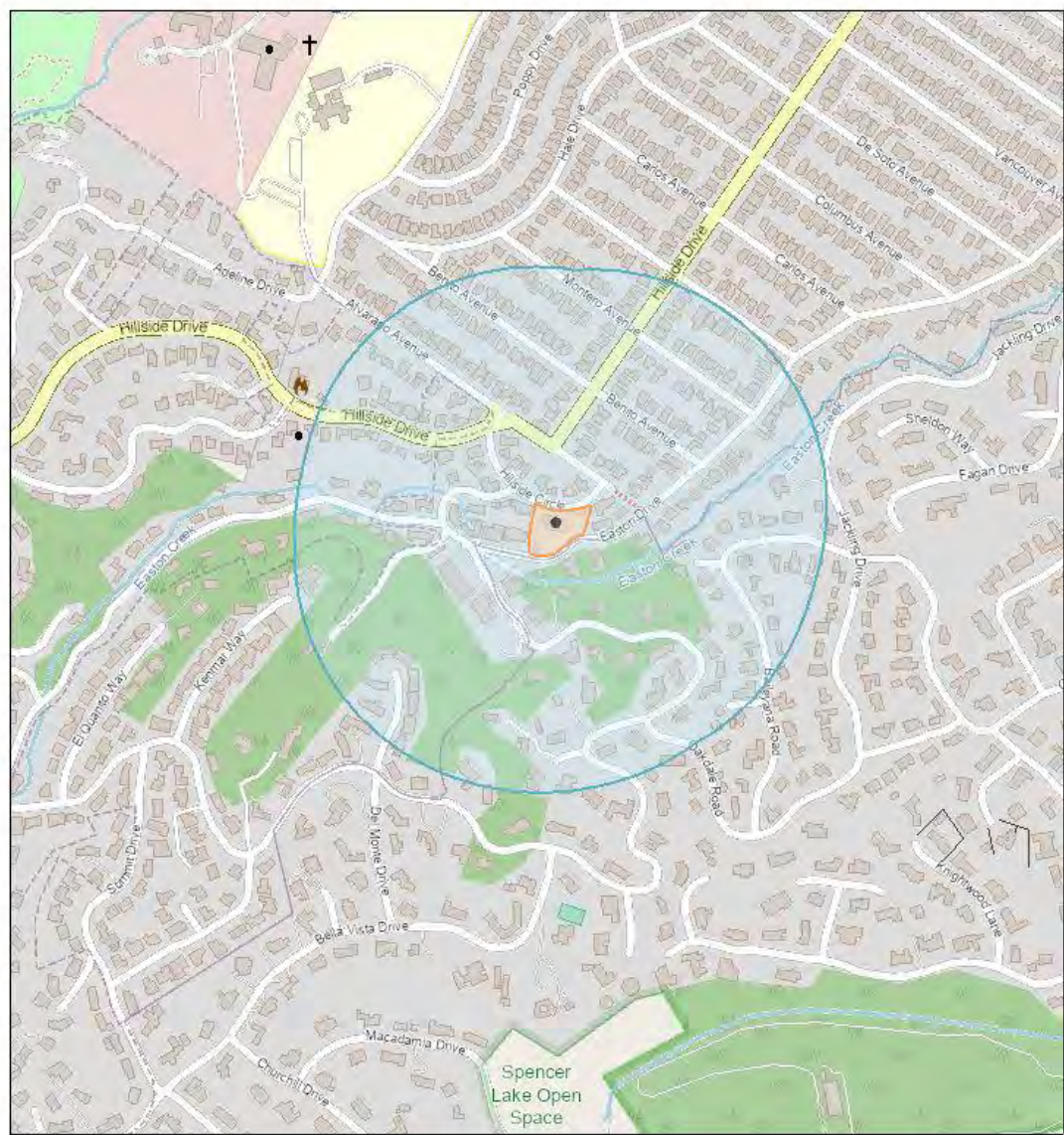


Screening Report

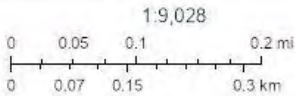
Area of Interest (AOI) Information

Area : 4,017,970.43 ft²

Feb 7 2025 9:55:44 Pacific Standard Time



- Permitted Stationary Sources



Map data © OpenStreetMap contributors, Microsoft, Facebook, Inc. and its affiliates, Esri Community Maps contributors, Map layer by Esri

Summary

Name	Count	Area(ft²)	Length(ft)
Permitted Stationary Sources	0	N/A	N/A

NOTE: A larger buffer than 1,000 may be warranted depending on proximity to significant sources.

1385 HILLSIDE CIRCLE CONSTRUCTION NOISE & VIBRATION ASSESSMENT

Burlingame, California

April 18, 2025

◆ ◆ ◆

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Job No.: 25-018

INTRODUCTION

The approximately 0.86-acre project site is located at 1385 Hillside Circle in the City of Burlingame, California. Existing development on-site consists of an approximately 4,900 square foot, two-story primary residence; an approximately 1,550 square foot secondary residence in the northeastern corner of the site; and an approximately 680 square foot detached garage in the southwestern corner of the site. The site is bounded by Hillside Circle to the north and Easton Drive to the south, with a steep slope toward Easton Drive. The site is surrounded by other single-family residences. The project proposes to demolish the existing improvements on-site, to subdivide the parcel into three individual lots, and construct three single-family houses.

This report summarizes the results of construction noise and vibration analysis completed for the proposed project and is divided into three sections: 1) the Setting Section provides a brief description of the fundamentals of environmental noise and groundborne vibration, summarizes applicable regulatory criteria, and describes the existing noise environment; 2) the Construction Noise Analysis Section discusses the predicted construction noise levels generated from similar projects, compares the predicted levels to applicable regulations established by the City of Burlingame and the Federal Transit Administration (FTA), and presents conditions of approval, where applicable, to reduce impacts at surrounding sensitive land uses to a less-than-significant level; and 3) the Construction Vibration Analysis Section discusses the vibration levels estimated at existing buildings surrounding the project site, compares the predicted levels to applicable regulations established by the City of Burlingame and the State of California, and presents conditions of approval to be reduce impacts to a less-than-significant level.

SETTING

Fundamentals of Environmental Noise

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by its *pitch* or its *loudness*. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (*frequency*) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is the intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1.

TABLE 1 Definition of Acoustical Terms Used in this Report

Term	Definition
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20 micro Pascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e. g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
L_{max} , L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01} , L_{10} , L_{50} , L_{90}	The A-weighted noise levels exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Handbook of Acoustical Measurements and Noise Control, Harris, 1998.

There are several methods of characterizing sound. The most common in California is the *A-weighted sound level (dBA)*. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2. Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This *energy-equivalent sound/noise descriptor* is called L_{eq} . The most common averaging period is hourly, but L_{eq} can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The *Community Noise Equivalent Level (CNEL)* is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels. The *Day/Night Average Sound Level (DNL or L_{dn})* is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

Effects of Noise

Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noises of sufficient intensity (above 35 dBA) and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA L_{dn} . Typically, the highest steady traffic noise level during the daytime is about equal to the L_{dn} and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses. Typical structural attenuation is 12 to 17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling.¹ Sleep and speech interference is therefore possible when exterior noise levels are about 57 to 62 dBA L_{dn} with open windows and 65 to 70 dBA L_{dn} if the windows are closed. Levels of 55 to 60 dBA are common along collector streets and secondary arterials, while 65 to 70 dBA is a typical value for a primary/major arterial. Levels of 75 to 80 dBA are normal noise levels

¹ Based on the U.S. Department of Transportation Federal Highway Administration document "Highway Traffic Noise: Analysis and Abatement Guidance" (2010) and data from Illingworth & Rodkin, Inc. noise monitoring projects.

TABLE 2 Typical Noise Levels in the Environment

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110 dBA	Rock band
Jet fly-over at 1,000 feet		
	100 dBA	
Gas lawn mower at 3 feet		
	90 dBA	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80 dBA	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	70 dBA	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60 dBA	
		Large business office
Quiet urban daytime	50 dBA	Dishwasher in next room
Quiet urban nighttime	40 dBA	Theater, large conference room
Quiet suburban nighttime		
	30 dBA	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20 dBA	
	10 dBA	Broadcast/recording studio
	0 dBA	

Source: Technical Noise Supplement (TeNS), California Department of Transportation, November 2009.

at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, those facing major roadways and freeways typically need special glass windows.

Annoyance

Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation between noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues to be disagreement about the relative annoyance of these different sources. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 50 dBA L_{dn} . At a L_{dn} of about 60 dBA, approximately 12 percent of the population is highly annoyed. When the L_{dn} increases to 70 dBA, the percentage of the population highly annoyed increases to about 25 to 30 percent of the population. There is, therefore, an increase of about 2 percent per dBA between a L_{dn} of 60 to 70 dBA. Between a L_{dn} of 70 to 80 dBA, each decibel increase increases by about 3 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the L_{dn} is 60 dBA, approximately 30 to 35 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 3 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 4 percent increase in the percentage of the population highly annoyed.²

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² Kryter, Karl D. The Effects of Noise on Man. Menlo Park, Academic Press, Inc., 1985.

Fundamentals of Groundborne Vibration

Ground vibration consists of rapidly fluctuating motions or waves with an average motion of zero. Several different methods are typically used to quantify vibration amplitude. One method is the Peak Particle Velocity (PPV). The PPV is defined as the maximum instantaneous positive or negative peak of the vibration wave. In this report, a PPV descriptor with units of mm/sec or in/sec is used to evaluate construction generated vibration for building damage and human complaints. Table 3 displays the reactions of people and the effects on buildings that continuous or frequent intermittent vibration levels produce. The guidelines in Table 3 represent syntheses of vibration criteria for human response and potential damage to buildings resulting from construction vibration.

Construction activities can cause vibration that varies in intensity depending on several factors. The use of pile driving and vibratory compaction equipment typically generates the highest construction related groundborne vibration levels. Because of the impulsive nature of such activities, the use of the PPV descriptor has been routinely used to measure and assess groundborne vibration and almost exclusively to assess the potential of vibration to cause damage and the degree of annoyance for humans.

The two primary concerns with construction-induced vibration, the potential to damage a structure and the potential to interfere with the enjoyment of life, are evaluated against different vibration limits. Human perception to vibration varies with the individual and is a function of physical setting and the type of vibration. Persons exposed to elevated ambient vibration levels, such as people in an urban environment, may tolerate a higher vibration level.

Structural damage can be classified as cosmetic only, such as paint flaking or minimal extension of cracks in building surfaces; minor, including limited surface cracking; or major, that may threaten the structural integrity of the building. Safe vibration limits that can be applied to assess the potential for damaging a structure vary by researcher. The damage criteria presented in Table 3 include several categories for ancient, fragile, and historic structures, the types of structures most at risk to damage. Most buildings are included within the categories ranging from “Historic and some old buildings” to “Modern industrial/commercial buildings”. Construction-induced vibration that can be detrimental to the building is very rare and has only been observed in instances where the structure is at a high state of disrepair and the construction activity occurs immediately adjacent to the structure.

The annoyance levels shown in Table 3 should be interpreted with care since vibration may be found to be annoying at lower levels than those shown, depending on the level of activity or the sensitivity of the individual. To sensitive individuals, vibrations approaching the threshold of perception can be annoying. Low-level vibrations frequently cause irritating secondary vibration, such as a slight rattling of windows, doors, or stacked dishes. The rattling sound can give rise to exaggerated vibration complaints, even though there is very little risk of actual structural damage.

TABLE 3 Reaction of People and Damage to Buildings from Continuous or Frequent Intermittent Vibration Levels

Velocity Level, PPV (in/sec)	Human Reaction	Effect on Buildings
0.01	Barely perceptible	No effect
0.04	Distinctly perceptible	Vibration unlikely to cause damage of any type to any structure
0.08	Distinctly perceptible to strongly perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
0.1	Strongly perceptible	Threshold at which there is a risk of damage to fragile buildings with no risk of damage to most buildings
0.25	Strongly perceptible to severe	Threshold at which there is a risk of damage to historic and some old buildings.
0.3	Strongly perceptible to severe	Threshold at which there is a risk of damage to older residential structures
0.5	Severe - Vibrations considered unpleasant	Threshold at which there is a risk of damage to new residential and modern commercial/industrial structures

Source: Transportation and Construction Vibration Guidance Manual, California Department of Transportation, April 2020.

Regulatory Background

The proposed project would be subject to noise-related regulations, plans, and policies established within documents prepared by the FTA, the State of California, and the City of Burlingame. These documents are implemented during the environmental review process to limit noise and vibration exposure at existing noise-sensitive land uses.

Federal Transit Administration. The Federal Transit Administration (FTA) has identified construction noise thresholds in the *Transit Noise and Vibration Impact Assessment Manual*,³ which limit daytime construction noise to 80 dBA L_{eq} at residential land uses, to 85 dBA L_{eq} at commercial and office uses, and to 90 dBA L_{eq} at industrial land uses.

California Department of Transportation (Caltrans) Transportation and Construction Vibration Guidance Manual (Guidance). The Caltrans Guidance updated in April 2020 included construction vibration limits of 0.5 in/sec PPV at new residential and modern/commercial structures, 0.3 in/sec PPV at older residential structures, and a conservative limit of 0.25 in/sec PPV at historic and some old buildings (see Table 3).

Community Safety Element of the Burlingame General Plan. The Community Safety Element in the Burlingame General Plan includes a section related to noise and vibration. This noise section sets forth goals and policies to protect residents and visitors to Burlingame from excessive noise and disruptive ground vibration. The following goals and policies are applicable to the proposed project:

³ Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual*, FTA Report No. 0123, September 2018.

Goal CS-4: Protect residents and visitors to Burlingame from excessive noise and disruptive ground vibration.

- CS-4.10** Require development projects subject to discretionary approval to assess potential construction noise impacts on nearby sensitive uses and to minimize impacts on those uses consistent with Municipal Code provisions.
- CS-4.13** Require a vibration impact assessment for proposed projects in which heavy-duty construction equipment would be used (e.g., pile driving, bulldozing) within 200 feet of an existing structure or sensitive receptor. If applicable, require all feasible mitigation measures to be implemented to ensure that no damage or disturbance to structures or sensitive receptors would occur.

City of Burlingame Municipal Code. The Building Construction Section of the Municipal Code establishes allowable hours of construction in the City of Burlingame. Chapter 18.07.110 states:

“No person shall erect (including excavation and grading), demolish, alter or repair any building or structure other than between the hours of eight a.m. and seven p.m. on weekdays, and nine a.m. and six p.m. on Saturdays, except in circumstances where continuing work beyond legal hours is necessary to building or site integrity, including (but not limited to) large concrete pours, environmental considerations, state or federal requirements, or in cases where it is in the interest of public health and safety, and then only with written approval from the building official, which shall be granted for no longer than necessary to complete the portion of the project for which the exception was granted. No person shall erect (including excavation and grading), demolish, alter or repair any building or structure on Sundays or on holidays, except in the circumstances described earlier in this paragraph, and then only with written approval from the building official, which shall be granted for no longer than necessary to complete the portion of the project for which the exception was granted. For the purpose of this section, holidays are the days set forth in Section 13.04.100 of this code. The restrictions stated in this section shall not apply to work that does not require a permit under any applicable law or regulation, or to work that takes place inside a completely enclosed building and does not exceed the exterior ambient noise level per the BMC 25.58.050.

In the Bayfront Commercial (BFC), Innovative Industrial (I/I) and Rollins Road Mixed Use (RRMU) zones only, construction work may begin at seven a.m. instead of eight a.m. on weekdays. However, the use of chainsaws, jackhammers, pile-drivers or pneumatic impact wrenches shall be prohibited from seven a.m. to eight a.m., unless written approval is granted by the building official pursuant to an exception listed in the above paragraph.”

Existing Noise Environment

The project is located along Hillside Circle in Burlingame, California. The site is an existing residential building. Surrounding land uses include single-family residences to the east and west, north opposite Hillside Circle, and south opposite Easton Drive.

The noise environment at the site and in the surrounding area results primarily from vehicular traffic along local roadways and periodic aviation traffic associated with the San Francisco International Airport.

According to the Existing (2017) and 2040 noise contour plots included in the Burlingame General Plan,⁴ ambient noise levels at the project site and the surrounding area would be below 60 dBA CNEL. These noise levels would represent the existing ambient noise environment at the project site and surrounding areas.

CONSTRUCTION NOISE ANALYSIS

Construction of the proposed project would occur in seven phases, lasting for approximately 19 months from demolition to completion. Hours of construction are expected to be 7:00 a.m. to 7:00 p.m. on weekdays. Construction phases for the proposed project would include demolition (lasting about 1.5 months); utilities and building foundation (lasting about 1 month); building interiors and exteriors (lasting about 16 months), and paving (lasting about 1 month). During each phase of construction, there would be a different mix of equipment operating, and noise levels would vary by phase and vary within phases, based on the amount of equipment in operation and the location at which the equipment is operating.

Noise impacts resulting from construction depend upon the noise generated by various pieces of construction equipment, the timing and duration of noise-generating activities, and the distance between construction noise sources and noise-sensitive areas. Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day (e.g., early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise-sensitive land uses, or when construction lasts over extended periods of time.

Section 18.07.110 of the City's Municipal Code limits construction hours to between 7:00 a.m. and 7:00 p.m. on weekdays, to between 9:00 a.m. and 6:00 p.m. on Saturdays, and to between 10:00 a.m. to 6:00 p.m. on Sundays and holidays. However, the City of Burlingame does not establish noise level thresholds for construction activities. This analysis uses the noise limits established by the FTA to quantify the level of significance due to substantial temporary construction noise. The FTA identifies construction noise limits in the *Transit Noise and Vibration Impact Assessment Manual*. During daytime hours, an exterior threshold of 80 dBA L_{eq} shall be enforced at residential land uses.

Construction noise levels vary on a day-to-day basis, depending on the type and amount of equipment operating on-site and the specific task that is being completed on a particular day. Construction activities generate considerable amounts of noise, especially during earth-moving activities when heavy equipment is used. The highest maximum noise levels generated by project construction typically range from about 80 to 90 dBA L_{max} at a distance of 50 feet from the noise source (Table 4).

⁴ MIG, "Burlingame General Plan," November 2019.

TABLE 4 Construction Equipment, 50-foot Noise Emission Limits

Equipment Category	L _{max} Level (dBA) ^{1,2}	Impact/Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor ³	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	105	Impact
Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

Notes: ¹ Measured at 50 feet from the construction equipment, with a “slow” (1 sec.) time constant.

² Noise limits apply to total noise emitted from equipment and associated components operating at full power while engaged in its intended operation.

³ Portable Air Compressor rated at 75 cfm or greater and that operates at greater than 50 psi.

Typical hourly average construction-generated noise levels for residential buildings would range from 72 to 88 dBA L_{eq} , as measured at a distance of 50 feet from the center of the site during busy construction periods (e.g., earth moving equipment, impact tools, etc.), as shown in Table 5. The noise levels associated with construction of the building interiors would be substantially less than the noise levels associated with demolition and structural activities. Construction-generated noise levels drop off at a rate of about 6 dBA per doubling of the distance between the source and receptor.

TABLE 5 Hourly Average Noise Levels for Construction Equipment at 50 feet

	Domestic Housing		Office Building, Hotel, Hospital, School, Public Works		Industrial Parking Garage, Religious Amusement & Recreations, Store, Service Station		Public Works Roads & Highways, Sewers, and Trenches	
	I	II	I	II	I	II	I	II
Ground Clearing	83	83	84	84	84	83	84	84
Excavation	88	75	89	79	89	71	88	78
Foundations	81	81	78	78	77	77	88	88
Erection	81	65	87	75	84	72	79	78
Finishing	88	72	89	75	89	74	84	84

I – All pertinent equipment operational at site.

II – Minimum required equipment operational at site.

Source: United States Environmental Protection Agency, 1973, Legal Compilation on Noise, Vol. 1, p. 2-104.

Construction phases would include Demolition, Site Preparation, Grading/Excavation, Trenching/Foundation, Building–Exterior, Building-Interior/Architectural Coating, and Paving. During each phase of construction, there would be a different mix of equipment operating, and noise levels would vary by phase and vary within phases, based on the amount of equipment in operation and the location at which the equipment is operating. Equipment expected to be used in each construction phase are summarized in Table 6 along with the quantity of each type of equipment, the reference noise level at 50 feet assuming the operation of the two loudest pieces of construction equipment, and the estimated noise levels at the nearest residential buildings projected from the center of the construction activity by phase.

The Federal Highway Administration's (FHWA's) Roadway Construction Noise Model (RCNM) was used to calculate the hourly average noise levels anticipated for the worst-case scenario for each construction phase based on the equipment list provided by the applicant at the time of this study. RCNM includes representative sound levels for the most common types of construction equipment and the approximate usage factors of such equipment that were developed based on an extensive database of information gathered during the construction of the Central Artery/Tunnel Project in Boston, Massachusetts (CA/T Project or "Big Dig"). The usage factors represent the percentage of time that the equipment would be operating at full power.

The predicted construction noise levels in Table 6 indicates that project construction activities measured from the center of the project site would not generate noise levels exceeding 80 dBA L_{eq} at closest existing noise-sensitive residential land uses to the south, east and west, but would be up

to 80 dBA L_{eq} at the nearest residential land-use to the north. These noise levels could occasionally exceed the FTA standards when construction is located adjacent to shared property lines.

Conditions of Approval 1:

Implement Best Management Practices to Reduce Construction Noise. The City shall incorporate the following practices into the construction documents to be implemented by the project contractor.

- Maximize the physical separation between noise generators and noise receptors. Such separation includes, but is not limited to, the following measures:
 - Use heavy-duty mufflers for stationary equipment and barriers around particularly noisy areas of the site or around the entire site;
 - Use shields, impervious fences, or other physical sound barriers to inhibit transmission of noise to sensitive receptors;
 - Locate stationary equipment to minimize noise impacts on the community; and
 - Minimize backing movements of equipment.
- Use quiet construction equipment whenever possible.
- Impact equipment (e.g., jack hammers and pavement breakers) shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically-powered tools. Compressed air exhaust silencers shall be used on other equipment. Other quieter procedures, such as drilling rather than using impact equipment, shall be used whenever feasible.
- Prohibit unnecessary idling of internal combustion engines.
- In compliance with Chapter 18.07.110 of the Municipal Code, construction activities, including truck traffic coming to and from the construction site for any purpose, shall be limited to the hours between 7:00 a.m. and 7:00 p.m., Monday through Friday, Saturdays between 9:00 a.m. and 6:00 p.m., and Sundays and Holidays between 10:00 a.m. and 6:00 p.m., unless permission is granted with a development permit or other planning approval.
- Construction staging areas shall be established at locations that will create the greatest distance between the construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.
- Avoid the use of circular saws, miter/chop saws, and radial arm saws near the adjoining noise-sensitive receptors. Where feasible, shield saws with a solid screen with material having a minimum surface density of 2 lbs/ft² (e.g., such as ¾" plywood).

- Control noise from construction workers' radios to a point where they are not audible at existing residences bordering the project site.
- During interior construction, locate noise-generating equipment within the building to break the line-of-sight to the adjoining receptors.
- The project sponsor shall designate a "disturbance coordinator" for construction activities. The coordinator would be responsible for responding to any local complaints regarding construction noise and vibration. The coordinator would determine the cause of the noise or vibration complaint and would implement reasonable measures to correct the problem.
- The construction contractor shall send advance notice to neighborhood residents within 50 feet of the project site regarding the construction schedule and including the telephone number for the disturbance coordinator at the construction site.

Since construction of the proposed project would take up to 19 months to complete, implementation of Condition of Approval 1 would reduce construction noise levels emanating for the site, limit construction hours, and minimize disruption and annoyance. The implementation of the above conditions of approval would reduce the temporary construction impact to a **less-than-significant** level at the noise-sensitive receptors in the vicinity.

TABLE 6 Construction Noise Levels at Nearby Receptors

Phase	Construction Equipment (Quantity)	Calculated Hourly Average L_{eq} (dBA) at Nearest Residences From Operation of Two Loudest Pieces of Construction Equipment at Acoustic Center of Construction Activities				
		Noise Level at 50 feet	North (85ft)	West (95 ft)	East (100 ft)	South (120 ft)
Demolition	Concrete Saw (1)* Rubber-Tired Dozer (1) Tractor/Loader/Backhoe (2)*	85	80	79	79	77
Site Preparation	Tractor/Loader/Backhoe (1)* Grader (1)*	84	79	78	78	76
Grading/Excavation	Grader (1)* Rubber Tired Dozer (1) Tractor/Loader/Backhoe (1)*	84	79	78	78	76
Trenching/Foundation	Tractor/Loader/Backhoe (1)* Excavator (1)*	82	77	76	76	74
Building - Exterior	Crane (1)* Forklift (2) Tractor/Loader/Backhoe (1)*	81	76	75	75	73
Building - Interior/Architectural Coating	Air Compressor (1)*	74	69	68	68	66
Paving	Cement and Mortar Mixers (4)* Pavers (1) Roller (1) Tractor/Loader/Backhoe (1)*	81	77	76	75	74

*Denotes two loudest pieces of construction equipment per phase

CONSTRUCTION VIBRATION ANALYSIS

The construction of the project may generate perceptible vibration when heavy equipment or impact tools are used. Vibration levels would vary depending on soil conditions, construction methods, and equipment used. Table 7 presents typical vibration levels that could be expected from construction equipment at a distance of 25 feet. Project construction activities, such as drilling, the use of jackhammers, rock drills and other high-power or vibratory tools, and rolling stock equipment (tracked vehicles, compactors, etc.), may generate substantial vibration in the immediate vicinity. Jackhammers typically generate vibration levels of 0.035 in/sec PPV, and drilling typically generates vibration levels of 0.09 in/sec PPV at a distance of 25 feet.

The City of Burlingame does not specify a construction vibration limit that should be used to regulate vibration produced by construction equipment. This analysis uses the vibration limits established by the California Department of Transportation (Caltrans) to identify the potential for substantial vibration levels. Caltrans establishes vibration limits of 0.5 in/sec PPV at new residential and modern/commercial structures, 0.3 in/sec PPV at older residential structures, and a conservative limit of 0.25 in/sec PPV at historic and some old buildings (see Table 3). The 0.3 in/sec PPV vibration limit would be applicable at nearby residential buildings.

Using the reference vibration levels at 25 feet, Table 7 also shows the vibration levels calculated at various distances representing nearby buildings. Vibration levels are highest close to the source and then attenuate with increasing distance at the rate $(D_{\text{ref}}/D)^{1.1}$, where D is the distance from the source in feet and D_{ref} is the reference distance of 25 feet. Construction vibration levels due to heavy construction are conservatively calculated to reach 0.368 in/sec PPV at 15 feet, representing the nearest structures to the west, 0.210 in/sec PPV at 25 feet, representing the nearest structure to the east, 0.098 in/sec PPV at 50 feet, representing the nearest structure to the south, and 0.086 in/sec PPV at 55 feet representing the nearest structure to the north. The use of a vibratory roller, or the dropping of heavy equipment, within 25 feet of the nearest structure to the west could result in vibration levels exceeding the 0.25 in/sec PPV limit recommended by the California Department of Transportation. Additionally, these same activities could result in vibration levels exceeding the 0.3 in/sec PPV limit within 20 feet of the surrounding buildings, resulting in a significant impact.

At these locations and in other surrounding areas where vibration would not be expected to cause damage, vibration levels may still be perceptible. However, as with any type of construction, this would be anticipated and would not be considered significant, given the intermittent and short duration of the phases that have the highest potential of producing vibration.

TABLE 7 Construction Equipment Vibration Levels

Equipment		PPV at 25 ft. (in/sec)	Vibration Levels at Nearest Residential Buildings (in/sec PPV)			
			West (10 ft)	East (25 ft)	South (50 ft)	North (55 ft)
Clam shovel drop		0.202	0.354	0.202	0.094	0.085
Hydromill (slurry wall)	In soil	0.008	0.014	0.008	0.004	0.003
	In rock	0.017	0.030	0.017	0.008	0.007
Vibratory Roller		0.210	0.368	0.210	0.098	0.088
Hoe Ram		0.089	0.156	0.089	0.042	0.037
Large bulldozer		0.089	0.156	0.089	0.042	0.037
Caisson drilling		0.089	0.156	0.089	0.042	0.037
Loaded trucks		0.076	0.133	0.076	0.035	0.032
Jackhammer		0.035	0.061	0.035	0.016	0.015
Small bulldozer		0.003	0.005	0.003	0.001	0.001
Small Vibratory Roller (CAT CP433E 8-ton vibratory compactor)		0.087	0.153	0.087	0.041	0.037

Source: Transit Noise and Vibration Impact Assessment Manual, Federal Transit Administration, Office of Planning and Environment, U.S. Department of Transportation, FTA Report No. 0123, September 2018, as modified by Illingworth & Rodkin, Inc., March 2025.

Conditions of Approval 2:

The following measures shall be implemented during all phases of demolition and construction to reduce vibration levels to less than 0.3 in/sec PPV at adjacent buildings.

- Place operating equipment on the construction site as far as possible from vibration-sensitive receptors.
- Use smaller vibratory rolling equipment, for example the Caterpillar model CP433E vibratory compactor, within 20 feet of the adjacent buildings to reduce vibration levels to 0.3 in/sec PPV or less.
- Select demolition methods not involving impact tools.
- Avoid dropping heavy equipment, such as a clam shovel drop, within 20 feet of the adjacent residential building west of the site.
- Designate a person responsible for registering and investigating claims of excessive vibration. The contact information of such person shall be clearly posted on the construction site.

The implementation of these measures would reduce the impact to a less-than-significant level.

PRIMARY RECORD

Primary # _____
HRI # _____
Trinomial _____
NRHP Status Code 6Z

Other Listings _____
Review Code _____ Reviewer _____ Date _____

Page 1 of 28 Resource name(s) or number (assigned by recorder) 1385 Hillside Circle

P1. Other Identifier: 2810 Hillside Circle (address c. 1927 - c.1934); 10 Hillside Circle (address c. 1935 - 1976)

***P2. Location:** ☐ Not for Publication ☒ Unrestricted

***a. County** San Mateo

Date 1999

***b. USGS 7.5' Quad** San Mateo, Calif.

***c. Address** 1385 Hillside Circle

City Burlingame

Zip 94010

d. UTM: (Give more than one for large and/or linear resources) Zone _____, _____ mE/ _____ mN

***e. Other Locational Data:** Assessor's Parcel Number 027-282-050

***P3a. Description:**

1385 Hillside Circle is located on an irregularly-shaped through-lot of approximately 0.9 acres on the south side of Hillside Circle extending to Easton Drive, between Alvarado Avenue and Summit Drive. The subject property is located in the Burlingame Hills neighborhood of Burlingame's Easton Addition. Built circa 1916, 1385 Hillside Circle is a 5,700-square-foot two-story-over-two-level-basement wood-frame residence. It appears to have originally been designed in a Craftsman style and later altered to an eclectic Mediterranean Revival style in a substantial 1941 remodel. Due to the sloped topography of the site, the building appears to be two stories at the primary façade, but includes two exposed basement levels at the rear façade. Additionally, the building features complex massing with a central two-story volume flanked by one-story volumes with varied roof lines and two multi-faceted towers. The irregular-plan building, clad in stucco and wood shingle siding, sits on a concrete foundation and features a gabled roof clad in Spanish clay tiles. The roof form includes overhanging eaves with exposed rafter and purlin tails and decorative wood brackets. The gable ends of the roof forms have a simple wood fascia. The residence contains four brick chimneys: one interior; two exterior chimneys, on the west and south facades; and one partially-exterior chimney. A curved driveway runs under a wood porte-cochere supported by square stone columns, in front of the primary entrance. A veranda at the rear of the building is covered by a wood trellis. All the windows on the main residence are wood sash windows set in simple wood frames. Typical window types include one-lite casement windows and one-lite hung windows. Multi-lite casement and fixed windows are also found throughout. Typical doors are fully-glazed wood double-doors. The property includes two non-original detached garages, one to the northeast of the main residence fronting Hillside Circle and one to the southwest fronting Easton Drive. (See Continuation Sheet, page 2.)

***P3b. Resource Attributes:** HP2. Single Family Residence, HP29. Landscape architecture, HP4. Ancillary Buildings, HP46. Walls/gate/fences, HP19. Bridges.

***P4. Resources Present:** ☒ Building ☒ Structure ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other

P5a. Photo



P5b. Photo: (view and date)

View of the primary (north) façade,
September 24, 2018.

***P6. Date Constructed/Age and**

Sources: ☒ Historic ☐ Prehistoric ☐ Both
c. 1916 (water tap records)

***P7. Owner and Address:**

Deirdre Meola
4 Bayhill Place
Half Moon Bay, CA 94019

***P8. Recorded by:**

Page & Turnbull, Inc.
417 Montgomery Street, 8th Floor San
Francisco, CA 94104

***P9. Date Recorded:**

10/18/2018

***P10. Survey Type:**

Intensive

***P11. Report Citation:** None

***Attachments:** ☐ None ☐ Location Map ☐ Sketch Map ☒ Continuation Sheet ☒ Building, Structure, and Object Record
☐ Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record
☐ Artifact Record ☐ Photograph Record ☐ Other (list)

***P3a. Description (continued):**

The primary (north) façade of 1385 Hillside Circle faces north, fronting Hillside Circle (**Figure 1**).¹ Fully clad in painted wood shingles, the primary façade includes overhanging eaves with exposed rafter tails and decorative wood brackets. An extension of the side-gabled main roof delineates the first and second stories. The façade has typical original wood casement windows and fully-glazed double doors, but all of the first story windows and doors have been covered by non-original metal security gates.

The primary façade features three main volumes, the easternmost one-story cross-gabled volume, the middle two-story side-gabled volume, and the westernmost one-story side-gabled volume (**Figure 2**). The easternmost volume includes a typical double-doors with undivided sidelites and transoms, flanked by typical double-casement windows with transoms on either side (**Figure 3**). A tile-floored patio surrounded by a stucco-clad wall wraps around to the west side of the residence (**Figure 4**). One level of the basement is exposed below the easternmost volume behind a stone retaining wall and includes one wood door (**Figure 5**). The central, two-story volume features, from east to west (left to right) on the first story: a typical (one-lite) casement window; typical double-casement window with transom; typical double-doors with transom; typical double-casement window with transom; two leaded-glass casement windows; and two sets of typical double-casement windows with transoms (**Figure 6 and Figure 7**). Two banks of four typical casement windows and two banks of three typical casement windows are located on the second story of the central volume (**Figure 7 and Figure 8**).

The westernmost, one story volume of the primary façade includes a large fixed leaded glass window and a port-cochere which extends perpendicular from above the main entrance (**Figure 9 and Figure 10**). The port-cochere is a wood pergola with flat, Spanish clay tile-clad roof, supported by square masonry columns. The main entrance features a 32-lite beveled-glass wood door flanked by two 16-lite beveled-glass sidelites (**Figure 11**). An engaged battered column is located at the west corner of the primary façade and extends up to a simple wood board belt course. A non-original metal handrail is surface-mounted at the west corner of the primary façade.



Figure 1. Aerial photograph of 1385 Hillside Circle. Approximate boundary of subject property outlined in orange.
Source: Google Maps, 2018. Edited by Page & Turnbull.

¹ The primary façade of 1385 Hillside Circle faces slightly northeast of true north, but for the purposes of this report the facades will be referred to as primary (north), east, rear (south), and west.



Figure 2: Primary (north) façade of 1385 Hillside Circle, looking south (February 2018). Source: Google Street View, 2018.



Figure 3. Easternmost volume of the primary façade, facing south.



Figure 4. Tile-clad patio wraps around the northeast corner of the main residence, looking east.



Figure 5. Exposed basement level behind a stone retaining wall at the northeast corner of the residence, looking southwest.

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Figure 6. Partial view of central, two-story volume at primary façade, looking southeast.



Figure 7. Partial view of central, two-story volume at primary façade, looking southwest.



Figure 8. Two banks of three typical casement windows at the second story of the central volume, looking south.



Figure 9. Fixed, leaded glass window adjacent the primary entrance, looking southwest.



Figure 10. Port-cochere at main entrance on the westernmost volume on the primary façade, looking southwest.



Figure 11. Primary entrance and engaged battered column at the northwest corner of the primary façade, looking south.

West Façade

The west façade of the residence is primarily composed of a one-story gabled volume, with a partially exposed basement level (**Figure 12**). The gabled roof includes an overhang with exposed purlin tails. A second one-story gable roof form is set back from the west façade and the west side of the central two-story volume of the residence also features a gabled roof (**Figure 13**). The two-story volume does not have any openings on the west side, but includes a partially-exterior brick chimney. The west façade is clad in stucco up to a simple wood belt course and is clad in typical wood shingles above. Four engaged battered columns are evenly spaced across the west façade, creating three bays. These battered columns originally supported the roof over an open porch, that was enclosed, likely during the 1941 remodel. The first, northernmost bay contains a large, fixed leaded glass window. The second, central bay contains two typical (one-lite) casement windows. The third, southernmost bay contains a multi-lite window wall with inset arched, fully-glazed double doors. The arched doors lead out onto a tile-clad, cantilevered balcony enclosed by a wrought-iron railing. The balcony is supported by exposed wood beams with curved wood brackets, and wraps around to the south façade. Below the balcony is a single wood slab door that accesses one of the basement levels.



Figure 12. Partial view of the west façade, looking east.



Figure 13. Detail view of staggered roof forms above the west façade, looking southeast.

South Façade

The rear (south) façade of 1385 Hillside Circle features a complex combination of volume and rooflines (**Figure 14** and **Figure 15**). The primary volumes include a two-story central volume with a side gabled, one-story volume on the west and a projecting front-gabled, one-story volume on the east. Projecting south from the central two-story volume is a round, multi-faceted two-story tower clad in typical wood shingles and capped by a Spanish clay tile-clad roof. At the intersection of the central volume and projecting eastern volume is a second, one-story eight-sided tower also clad with typical wood shingles and capped by a Spanish clay tile-clad roof. Generally, the first story is clad in stucco and the second story is clad in wood shingles. A porch, enclosed by a stucco-clad wall and covered by a wood trellis supported by battered stucco-clad columns, spans the length of the rear façade from the west side to the southeastern tower.

At the west end of the rear façade is an entryway of the same design and configuration as on the west façade, with fully-glazed arched double doors set into a window wall (**Figure 16**). Matching arched glazing infills two of the bays of the otherwise open porch, set between battered columns. To the east are two typical, undivided fully-glazed double doors set on either side of an exterior brick chimney (**Figure 17**). Further east are two typical double doors with sidelites on either side of the projecting tower bay (**Figure 18**). The tower bay features six typical casement windows on both the first and second stories (**Figure 19**). At the second story, west of the tower is a bank of four windows, two casement windows flanking two fixed windows, and east of the tower is a bank of four casement windows.

The one-story southeastern tower includes typical double doors accessing the east end of the porch and three pairs of typical double-casement windows (**Figure 20**). The southeastern tower is primarily clad in stucco, but has shingle cladding at the top portion which extends above the porch trellis (**Figure 21**). To the east of the southeast tower is a one-story, projecting gabled volume which features four hung wood-sash windows (**Figure 22**). The overhanging eaves of the gable roof element are supported by exposed purlin tails. The rear porch is primarily concrete but is clad in tile at the west end (**Figure 23**).

Toward the west end of the rear porch are brick stairs that lead down to the rear garden, enclosed by a non-original wrought-iron gate (**Figure 24**). An arched fountain is inset in the west façade at the basement level along the brick stairs, and feature

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polychromatic glazed tile (**Figure 25**). Two basement levels are exposed on the rear façade and feature stucco cladding. To the east of the brick staircase are six wood-sash hung windows at the upper basement level. Concrete steps lead to a recessed wood slab door accessing the upper basement level (**Figure 26**). To the east is a multi-lite wood window, and at the east end of the upper basement level is a set of 21-lite double-casement windows. The lower basement level is only partially exposed at the southeast corner of the residence. The southeast corner is chamfered at the basement levels and the chamfered portion has a 21-lite double-casement window at the upper basement level and a 15-lite casement window at the lower basement level (**Figure 27**).



Figure 14. Bird's-eye view of the rear (south) façade of 1385 Hillside Circle. Source: Google Maps, 2018.



Figure 15. Partial view of east end of west façade, looking up and north.



Figure 16. West end of rear façade, looking west.



Figure 17. Typical double-doors and exterior brick chimney.



Figure 18. Typical double-doors with sidelites adjacent tower.



Figure 19. Projecting two-story tower with six casement windows at each level.



Figure 20. One-story tower at east end of the rear porch, looking east.



Figure 21. One-story southeast tower has stucco and wood shingle cladding, looking east.



Figure 22. Projecting front-gabled bay at the east end of the rear façade, adjacent the southeast tower.



Figure 23. Rear porch covered by a wood trellis, supported by battered columns. Stairs down to the rear garden are located toward the west end of the porch.



Figure 24. Brick steps leading down from rear porch down to the rear gardens.



Figure 25. Inset arched fountain with decorative tiles at the southwest corner of the rear façade.



Figure 26. Exterior access door to the upper basement level on the rear façade.



Figure 27. Southeast corner with chamfered sides at the two basement levels.

East Façade

The east façade is stucco-clad at the two basement levels and clad in wood shingles at the first story (**Figure 28**). The cross-gable roof of the east façade features overhanging eaves and exposed purlin tails under the gable end. The lower basement level has two recessed wood slab doors set at an angle to the east façade (**Figure 29**). The upper level basement includes, from south to north (left to right), a 21-lite double-casement window, 15-lite casement window, 14-lite double-casement window, brick exterior chimney, 8-lite double-casement window, and 12-lite double-casement window (**Figure 30**). The two windows north of the chimney are covered by non-original metal safety gates. The first story includes, from south to north, a double-hung window, typical casement, typical double-casement window, and two sets of typical, fully-glazed double-doors flanking the brick exterior chimney. The double-door each lead to a small balconette with tile flooring, supported by wood brackets and enclosed by an original wrought-iron railing (**Figure 31**). Non-original metal safety gates extend above the railings to fully enclose the balconettes.



Figure 28. Partial view of east façade, looking west.



Figure 29. Recessed doors at lower basement level.



Figure 30. Multi-lite casement and double-casement windows at upper basement level, looking southwest.



Figure 31. Enclosed balconettes on the east façade, looking west.

Garages

The subject property includes two detached garages, one fronting Hillside Circle and one fronting Easton Drive. The Hillside Circle garage has a rectangular plan and is capped by a cross-gable roof clad in Spanish clay tile with exposed rafter and purlin tails (**Figure 32**). The garage has wood shingle siding that matches the main residence and features two fully-glazed, five-leaf wood accordion folding garage doors. A wood door accesses the garage on the west side. A projecting addition on the south side has a non-original fully-glazed aluminum sliding door and several skylights. Non-original skylights are also located in the southwest portion of the garage roof (**Figure 33**).

The Easton Drive garage is composed of two rectangular masses with gabled roofs clad in asphalt shingles with exposed rafter and purlin tails (**Figure 34**). The garage has wood shingle siding that matches the main residence and features a partially-glazed, six-leaf wood accordion folding garage door (**Figure 35**). A partially-glazed wood door accesses the garage from the north side and fixed and casement wood windows are located on the east and west sides.



Figure 32. Detached garage fronting Hillside Circle, looking south.



Figure 33. Interior view of garage fronting Hillside Circle, including non-original skylights.



Figure 34. Two gabled masses comprise the detached garage fronting Easton Drive, looking southeast.



Figure 35. Detached garage fronting Easton Drive, looking north.

Landscaping and Site Design

The subject property features extensive landscaping and site design. A curved fieldstone driveway loops under a port-cochere at the main entrance to the residence (**Figure 36**). Running along Hillside Circle is a unique reinforced concrete fence that features a design of textured loops and circles set on and between posts that resemble tree trunks (**Figure 37**). Concrete pots also designed to resemble tree trunks sit on top of the fence posts (**Figure 38**). A concrete fountain sunken into ground level in the front yard, east of the driveway (**Figure 39**).

Pathways and stairs flanked by uncoursed rubble stone retaining walls and railings lead around the east and west sides of the main residence, connecting to a network of paths through the heavily wooded property (**Figure 40**). Except for small sections of path and stairs around the Hillside Circle garage and west of the main residence, the majority of the paths and stairs are uncoursed stone (**Figure 41**). Mature trees, shrubs, and overgrown ground covering create an informal landscaping amongst the paths and landscape features. Site features include a concrete bench, two bridges over what appears to be a former water feature, and a small gazebo. The two concrete bridges are flanked by railings with a design of textured concrete circles and tree trunk posts which matches the fence along Hillside Circle (**Figure 42 and Figure 43**). The gazebo features five fluted Classical concrete columns with Ionic capitals, topped with a wood dome (**Figure 44 and Figure 45**).



Figure 36. Curved fieldstone driveway.



Figure 37. Concrete fence along Hillside Circle featuring texture loops and tree trunk motifs.



Figure 38. Concrete post, also textured to resemble a tree trunk, is attached to the top of the post.



Figure 39. Sunken concrete fountain with frog sculpture.



Figure 40. Uncoursed stone steps, paths, and retaining walls which wind through the heavily wooded and sloped property.



Figure 41. Concrete path located east of the stairs running along the east façade of the main residence.

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Figure 42. One of two concrete bridges with decorative railings with posts textured to resemble tree trunks.



Figure 43. Concrete bridge over what appears to be an overgrown, former water feature.



Figure 44. Gazebo structure and concrete bench located in a landscaped area of the site.



Figure 45. Concrete Classical columns support the wood domed roof of the gazebo.

Neighborhood Setting

The subject property is on the border with the neighboring city of Hillsborough, on the edge of the Burlingame Hills neighborhood, immediately adjacent Burlingame's Easton Addition. The adjacent neighborhood of Easton Addition contains many homes built in Craftsman and revival styles, built primarily in the 1920s and 30s (**Figure 46**). The block across the street from the subject property, bounded by Hillside Circle and Alvarado Avenue, was originally a park at the turnaround of a short-lived streetcar line in the 1910s.² This block was developed with eight houses in the 1930s, including 1388 Hillside Circle which was built in 1936 (**Figure 47**).³ Just two properties west, at the intersection of Easton and Summit drives is the Spanish Colonial Revival style Hoover Elementary School campus which opened in 1930 (**Figure 48**).

The subject property is on a hilly, irregularly-shaped block bounded by Hillside Circle, Summit Drive, Alvarado Avenue and Easton Drive. Until 1950, the subject property was the only residence on the block, as all of the lots were owned by the same family. After the property was sold in the early 1950s, the surrounding lots were sold and developed between 1952 to 1955 (except for one property developed in 1988 at 2101 Summit Drive).⁴ These homes are generally postwar California Ranch houses, such as 2800 Easton Drive, built in 1953 (**Figure 49**).

² Garrison, *Burlingame*, 40-41.

³ Aerial photograph of Burlingame, Flight C-6660, Frame 275, Fairchild Aerial Surveys, March 23, 1941. See Figure 55.

⁴ Construction dates of surrounding homes are from Zillow.com, a real estate website which uses county assessor data.

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Figure 46. 1412 Alvarado Avenue, a Tudor Revival style home in Easton Addition, on the border with Burlingame Hills, built in 1935.



Figure 47. 1388 Hillside Circle, across the street from the subject property, built in 1936.



Figure 48. Hoover Elementary School, 2220 Summit Drive, originally opened in 1930.



Figure 49. 2800 Easton Drive, built in 1953, located one property over from 1385 Hillside Circle.

BUILDING, STRUCTURE, AND OBJECT RECORD

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*NRHP Status Code 6Z

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B1. Historic name: 2810 Hillside Circle (address c. 1927 - c.1934); 10 Hillside Circle (address c. 1935 - 1976)

B2. Common name: 1385 Hillside Circle

B3. Original Use: Single-Family Residence

B4. Present use: Single-Family Residence

*B5. Architectural Style: California Craftsman/Eclectic Mediterranean Revival

*B6. Construction History:

No original construction permit application for 1385 Hillside Circle is on file at the Burlingame Community Development Department or the San Mateo County Building Department. As such, an exact year of construction is unknown. However, based on a water tap record dated May 15, 1916, it appears that the residence was likely constructed circa 1916, when it was connected to the municipal water system (**Figure 50**).⁵ This date is consistent with other primary source information, including the fact that original owner, George Campe, listed "Hillside Circle" as his residence on his World War I draft card in 1918.⁶ The residence appears on the 1921 Sanborn fire insurance map, which is the oldest available map depicting the subject property (**Figure 52**).⁷ Campe owned all of the lots on the approximately 3.5-acre block bounded by Hillside Circle, Alvarado Avenue, Easton Drive and Summit Drive; as did subsequent owners until 1951.

According to the 1921 Sanborn map, the subject property was largely rectangular in plan with a projecting bay at the southeast corner and a recessed open porch on the south façade. The original massing included a two-story central volume and flanking one-story wings. A one-story, square-plan auxiliary building was located northwest of the intersection of Easton and Summit drives, outside of the current property boundaries. The only building permit application permit on file for 1385 Hillside Drive is a reroofing permit dated 1992; however, several alterations and remodels are known to have occurred at the property.

(See Continuation Sheet, page 15.)

*B7. Moved? ☒ No ☐ Yes ☐ Unknown Date: _____ Original Location: _____

*B8. Related Features: Two detached garages; concrete fences; concrete and stone bridges; gazebo; fountains; stone paths and retaining walls; and mature live oak trees.

B9a. Architect: Architect unknown

b. Builder: Builder unknown

*B10. Significance: Theme: Residential Architecture Area Burlingame Hills

Period of Significance 1916 Property Type Single-Family Residential Applicable Criteria C/3

Historic Context:

City of Burlingame

The lands that would become the City of Burlingame were initially part of *Rancho San Mateo*, a Mexican-era land grant given to Cayetano Arena by Governor Pio Pico in 1845. Over the next four decades, the lands passed through the hands of several prominent San Francisco businessmen, including William Howard (purchased 1848) and William C. Ralston (purchased 1856). In 1866, Ralston sold over 1,000 acres to Anson Burlingame, the US Minister to China. Following Burlingame's death in 1870, the land reverted to Ralston and eventually to Ralston's business partner, William Sharon.

(See Continuation Sheet, page 15.)

B11. Additional Resource Attributes:

(HP29) – designed landscape, (HP46) – decorative concrete fence, (HP12) – two concrete and stone pedestrian bridges, (HP4) -- two detached garages

*B12. References: See Continuation Sheet, page 22.

B13. Remarks: None

*B14. Evaluator: Hannah Simonson, Page & Turnbull, Inc.

*Date of Evaluation: October 18, 2018

(This space reserved for official comments.)

Source: San Mateo County Assessor-County Clerk-Recorder, 2018. Property highlighted in orange. Modified by Page & Turnbull.



⁵ Water Tap Record. 1385 Hillside Circle, Burlingame, CA. May 5, 1916. Burlingame Historical Society.

⁶ U.S. World War I Draft Registration Cards, accessed via Ancestry.com.

⁷ Sanborn Map Company, Fire Insurance Map, 1921, Sheet 39.

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***B6. Construction History (continued):**

Between 1921 and 1949, the property was significantly expanded and remodeled. A real estate advertisement posted in 1949 states that the house was “completely rebuilt and redecorated in 1941 at a cost exceeding \$50,000.”⁸ An aerial photograph of Burlingame, depicting 1385 Hillside Circle, indicates that by March 1941, including a second tower on the south side of the residence (**Figure 55**). A photograph taken during the 1946 search and seizure of Arthur Bell's estate illustrates that the second-story volume of the residence had been expanded to the east and a porte-cochere extended perpendicular from the primary entrance (**Figure 56**). The photograph also indicates that the primary façade and upper portions of the secondary facades had been clad in wood shingles, windows had been covered by metal security gates, and the former open, covered porch supported by battered columns on the west façade had been fully enclosed. The 1949 Sanborn map further illustrates that the residence had been expanded to the east and a rounded tower was added near the southeast corner. The 1949 map notes the presence of a basement level, which the 1921 map does not (**Figure 53**).

The 1949 Sanborn maps also illustrates that two detached garages had been constructed, one large rectangle-plan garage fronting Hillside Circle, and one smaller garage with attached cottage fronting Easton Drive. The auxiliary building shown on the 1921 Sanborn map was demolished by 1949, and a greenhouse and auxiliary building are indicated at the intersection of Summit Drive and Canyon Road. After the subject property was sold in the early 1950s, the new owners sold off the undeveloped parcels and nine new residences were constructed on the block in the 1950s. As a result of these sales and new construction, many of the original landscape features associated with 1385 Hillside Circle were demolished. An exact catalog of original landscape features is not known, but evidence of landscaping throughout the site is visible in the March 1941 aerial photograph where residences now exist. Other known alterations include the rear expansion and installation of skylights on the detached garage fronting Hillside Circle. Decorative chimney caps were removed sometime between 1963 and the 1990s (**Figure 57 - Figure 59**).

Building permit applications on file at the Burlingame Community Development Department record the following alterations:

Date	Permit #	Owner	Description
4/16/1992	9210182	Robert W. Regan	Garage re-roof only. Composition re-roof 728 square feet.

Also including in the Burlingame Community Development Department files is a letter addressed to owners R. W. and L. C. Regan, dated January 16, 1976, stating that the house address had been changed from 10 Hillside Circle to 1385 Hillside Circle.⁹

***B10. Significance (continued):**

Very little formal development occurred during this period, with most of the land used for dairy and stock farm operations. In 1893, William Sharon's trustee, Francis G. Newlands, proposed the development of the Burlingame Country Club as an exclusive semi-rustic destination for wealthy San Franciscans. A railroad depot was constructed in 1894, concurrent with small-scale subdivisions in the vicinity of Burlingame Avenue.

During this time, El Camino Real acted as a de facto dividing line between large country estates to the west and the small village of Burlingame to the east. The latter developed almost exclusively to serve the needs of the wealthy estate owners. Burlingame began to develop in earnest with the arrival of an electric streetcar line between San Mateo and San Francisco in 1903. However, the 1906 earthquake and fires had a far more dramatic impact on the area. Hundreds of San Franciscans who had lost their homes began relocating to Burlingame, which boomed with the construction of new residences and businesses. Over the next two years, the village's population grew from 200 to 1,000. In 1908, Burlingame incorporated as a city, and in 1910, annexed the north adjacent town of Easton. The following year, the Burlingame Country Club area was also annexed to the City. By 1920, Burlingame's population had increased to 4,107.¹⁰

Easton Addition & Burlingame Hills Neighborhood

The subject property was constructed in the Burlingame Hills neighborhood, a subdivision on land that was formerly part of *Rancho Buri Buri*, a 15,000 acre Mexican-era land grant.¹¹ By about 1859, Darius Ogden (D.O.) Mills and his sister Adeline Mills Easton had purchased the vast majority of land in what is now north Burlingame from the Sanchez family that owned *Rancho Buri Buri*.¹² Adeline's husband Ansel I. Easton died in 1868, leaving the family's large estate to his son Ansel Mills Easton.¹³ Easton subdivided his families estate beginning in 1905 to create the town of Easton. A portion of Easton's subdivided land was annexed by

⁸ “Sacrifice Sale to Highest Bidder,” Peninsula Real Estate Ads, *San Francisco Chronicle*, April 3, 1949.

⁹ Page & Turnbull also researched building permit applications at the San Mateo County Building Department since the subject property was in unincorporated San Mateo County until 1964, but no permit records were on file.

¹⁰ Joanne Garrison, *Burlingame: Centennial 1908-2008* (Burlingame, CA: Burlingame Historical Society, 2007).

¹¹ “Explore the History of Burlingame,” Burlingame Historical Society, accessed October 3, 2018, <https://burlingamehistory.org/history-of-burlingame/>.

¹² Garrison, *Burlingame*, 30-31.

¹³ Joanne Garrison and Burlingame Historical Society, “Ansel I. Easton and Adeline Easton,” Peninsula Royalty: The Founding Families of Burlingame-Hillsborough, accessed October 3, 2018, <https://burlingamefoundingfamilies.wordpress.com/easton-introduction/ansel-i-easton/>.

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Burlingame in 1910, known as the Easton Addition. In 1913, Easton established a battery-operated streetcar line that ran from Carmelita Avenue and California Drive up to Hillside Drive and Alvarado as a means of spurring development.¹⁴ In the same year, Easton subdivided Burlingame Hills, which included the hilly area southwest of the Easton Addition at the end of Hillside Drive, an area outside incorporated Burlingame.¹⁵ The line closed in 1918 when sales and home development failed to materialize. Easton Drive, designed by National Parks Superintendent Mark Daniels, was called "one of the finest scenic roads in the West" when it was completed around 1914, and terminated at the highest point of Burlingame Hills, providing scenic views that reportedly attracted hundreds of motorists every weekend.¹⁶

At the beginning of the 1920s, the Easton Addition and Burlingame Hills neighborhoods were still sparsely populated, but the mobility provided by private automobiles spurred an explosion in development in the 1920s and 30s.¹⁷ Several schools, including Hoover Elementary School (1930) opened to serve the growing community. By the close of the 1940s, Easton Addition was nearly fully developed, and Burlingame Hills was increasingly developed. The former crescent-shaped park at the end of Hillside Drive, encompassed by Hillside Circle and Alvarado Avenue, which marked the termination point of Easton's failed streetcar line was also developed with residences by the 1940s. A brick pergola installed in the at intersection of Alvarado Avenue and Hillside Drive as streetcar stop is still extant, although now surrounded by homes.

In 1943, the Burlingame Chamber of Commerce invited Burlingame Hills residents to incorporate into Burlingame, but the residents declined.¹⁸ Much of Burlingame Hills continues to be unincorporated as of 2018, although the area around Hillside Circle which includes the subject property at 1385 Hillside Circle has been incorporated by Burlingame.

1385 Hillside Circle

In 1913, Ansel M. Easton subdivided Block 3 of Burlingame Hills, bounded by Hillside Circle, Alvarado Avenue, Easton Drive and Summit Drive, into nine lots. Around this time, several prominent automobile salesmen were reported to be building homes in Burlingame Hills, and auto salesman John George Campe appears to have followed suit.¹⁹ Campe, who went by the name George, purchased all nine lots at an unknown date, but is listed at Hillside Circle as early as 1918.²⁰ In 1919, Campe hosted a massive barbeque celebration for his Campe Motor Company employees at is Hillside Circle residence, at which he reportedly set up an outdoor bar in the Neoclassical gazebo (extant) with electricity-rigged alcoholic drink trays to playfully shock guests.²¹

The earliest historic photographs of the 1385 Hillside Circle residence found during research are undated, but appear to be early photographs from the 1910s or 1920s, taken by Moulin Studios – a photography studio known to have photographed the Burlingame and Burlingame Hills area during this time.²² The photographs depict a large Craftsman style residence with a battered column porch, overhanging eaves, and exposed rafter tails on a heavily wooded lot with numerous oak trees. An open porch spans the west façade of the residence and the second-story central volume appears to span about half the length that it does currently.²³ A rear view of the residence shows an open porch or pergola, which appears to be covered by a trellis, on the south side of the building, and no tower volumes.

The construction dates of the numerous landscape features related to the primary residence are unknown. The looped tree trunk fence does not appear in the earliest known photographs of the house, but stylistically appears to date to the early twentieth century. The stone retaining walls and Neoclassical gazebo are known to date to as early as 1919, as they are depicted in photographs and cartoons illustrating newspaper articles about George Campe's infamous barbeque parties (**Figure 54**). An account from the 1970s described the property's landscape:

[C]areful observers, sneaking peeks through live oaks and eucalyptus, can glimpse a scene that will transport them. Man-made waterworks once flowed down cascading falls from the house and beneath the sculptured "tree-trunk" bridge (lower left) – now it's dry, choked with leaves but it still creates the illusion, of another slower-paced time. A labyrinth of curving walks will bring

¹⁴ Garrison, *Burlingame*, 40-41.

¹⁵ Burlingame Hills, San Mateo County, California subdivision map, dated July 7, 1913 signed by Ansel M. Easton, accessed through the San Mateo County Assessor-County Clerk-Recorder property maps portal.

¹⁶ "Auto Men Building Peninsula Homes," *San Francisco Chronicle*, September 26, 1914.

¹⁷ Garrison, *Burlingame*, 48.

¹⁸ Garrison, *Burlingame*, 102.

¹⁹ "Auto Men Building Peninsula Homes," *San Francisco Chronicle*, September 26, 1914.

²⁰ U.S. World War I Draft Registration Cards, accessed via Ancestry.com.

²¹ "Chevrolet Sales Force Has Big Feats At Campe's Home," *San Francisco Chronicle*, November 16, 1919.

²² Moulin Studios, a multi-generational photography studio active from 1906 to the present, maintains copyright of their photography, and has a strict use and permissions policy. Although low-resolution copies of two photographs of 1385 Hillside Circle on file at the Burlingame Historical Society were viewed during research, permission to reproduce copies of the photos was not granted for this report.

²³ Only the portion of the second-story volume containing two banks of three casement windows on the primary façade existed in these early photographs, indicating that the second-story volume was expanded to the east.

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you back from where you started if you don't watch out, and can lead to a circle of old stonework
– platform for a columned temple is now crowned with flowerets of moss.²⁴

The subject property did not have a street number until the mid-1920s, circa 1927, at which point it was addressed 2810 Hillside Circle. After reportedly losing much of his fortune during the Great Depression, George Campe sold the property to Scott F. Ennis and his wife Anne in 1932. The property was re-addressed 10 Hillside Circle in 1935, which was the address until 1976 when the address was changed to 1385 Hillside Circle.

Anne Ennis sold the subject property in 1941, several years after her husband died, to Ruby V. Chapman, the wife of known religious cult leader Arthur "The Voice" Bell. In the same year, the residence was renovated at a cost of \$50,000. Although the details of the renovation are not known, this is likely when the house was significantly expanded.²⁵ The house was expanded to the east and two towers were constructed on the south side of the residence. Furthermore, early photographs show the house to be a Craftsman style residence, but when Chapman and Bell were forced to sell the property at the end of the decade, the house was described as a "16 room Mediterranean residence."²⁶ It appears that the extensive 1941 remodel also resulted in a new architectural style, and is likely when the roof was clad in Spanish clay tiles. The landscape was also described as containing four lily ponds and terraces, 300 oak trees, and numerous shrubs and fruit trees. In 1946, the property was seized by U.S. Deputy Marshal Raymond W. Ryan and his assistants on the order of federal bankruptcy referee Burton J. Wyman, during bankruptcy proceedings against Arthur Bell's religious organization, Christ's Church of the Golden Rule.²⁷ The raid reportedly discovered at least \$12,000 in furnishing, much of which was "unwrapped" and a trapdoor leading to a secret room. When interviewed, the property's caretaker, R. W. Olds, stated that Bell had never actually lived in the residence. 1385 Hillside Circle was one of Bell's many investments throughout the state, many of which were held under his wife's name. It appears that he and his wife were never full-time residents. In 1949, Chapman and Bell were forced to give up the property, along with another holding – the former Salvation Army training center at 801 Silver Avenue, San Francisco – but the property does not appear to have been sold until 1951, after months on the market and several failed auctions.²⁸

The next owners and residents, Thomas J. and Ann T. Chapman, sold six parcels, and most of a seventh parcel, of the 3.5 acre block surrounding the subject main residence and two detached garages, over the course of the early 1950s (**Figure 51**).²⁹ Between 1952 and 1955, nine new residences were constructed on the block, resulting in the demolition of many associated landscape features. The Chapmans resided at 1385 Hillside Circle for five years, before selling to Jason C. Causey, a physician, and his wife Cathleen. Previously in unincorporated San Mateo County, the subject property was annexed to the City of Burlingame in August 1964.³⁰ In 1965, the Causeys sold the property to another physician, Robert Regan, and his family.

Owner and Occupant History

Research has identified John George Campe and Ada Hazel Campe as the original owners and occupants of 1385 Hillside Circle. Born in 1885 in California to German parents, George Campe became financially successful in the burgeoning automobile industry of the late 1910s and 1920s.³¹ By 1919, Campe was the head of two firms – the George Campe Motor Company which distributed Chevrolet cars out of its Van Ness Avenue showroom in San Francisco, and Pacific States Motors which sold Daniels Eight and Scripps-Booth vehicles.³² Campe was known for hosting lavish barbeque picnics for his employees at his estate at 1385 Hillside Circle – the raucous events were called everything from a "friendly riot" to a "three ring circus."³³ In 1924, Campe showed the first Chryslers in his San Francisco showroom, and was noted as one of the "outstandingly successful Chrysler distributors" until 1926, when he retired from the automobile business. After a few-year stint selling Bosch electric radios, Campe returned to automobile sales in 1932, but appears to have suffered financially due to the economic collapse of the Great Depression. The Campes were forced to sell their estate in 1932. After much acclaim for his business successes in the 1910s and 1920s, Campe disappeared from the public eye in the 1930s and died in 1944.³⁴

²⁴ *Boutique & Village* (June 1, 1976), clipping available at Burlingame Historical Society.

²⁵ "Sacrifice Sale to Highest Bidder," Peninsula Real Estate Ads, *San Francisco Chronicle*, April 3, 1949.

²⁶ "Auction! By Order of the Ecclesiastical Society of Christ's Church of the Golden Rule," real estate advertisement, *San Francisco Chronicle*, May 24, 1950.

²⁷ "U.S. Takes Over Bell Mansion," *San Mateo Times*, February 13, 1946.

²⁸ "Bell Mansion to be Auctioned," *San Mateo Times*, March 31, 1951; and "Sacrifice Sale to Highest Bidder," Peninsula Real Estate Ads, *San Francisco Chronicle*, April 3, 1949.

²⁹ No familial connection between Ruby V. Chapman and Thomas J. Chapman was discovered during the course of research for this report, which included investigation of historic newspapers and public records available through Ancestry.com. However, Ruby V. Chapman and Arthur Bell were very secretive about their identities and dealings, so it is not definitively known whether Thomas J. Chapman might be a relative.

³⁰ Burlingame Water Tap Record, 10 Hillside Circle; now addressed 1385 Hillside Circle, the water tap record on file at the Burlingame Historical Society includes a note stating that the property was "annex to City 8/25/64."

³¹ "Horseless Carriage: History of Auto Progress," *San Francisco Chronicle*, January 28, 1940.

³² "Campe Forms Second Firm to Handel Daniels Eight Cars," *San Francisco Chronicle*, July 6, 1919.

³³ "Barbeque Riot Ends in Frolic," *Oakland Tribune*, September 30, 1923.

³⁴ California Death Index, accessed via Ancestry.com.

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Scott F. Ennis and his wife Anne owned the subject property after the Campes. Scott Ennis was a successful businessman as the president of the Pacific Fruit Exchange at the time that he purchased 1385 Hillside Circle in 1932. The director or officer of several corporations and chairman of the Pacific Coast transportation advisory board, Ennis was also involved in Masonic activities and was elected "illustrious potentate" of the Islam Temple of the Mystic Shrine, a fraternal society within Freemasonry more commonly known as the "Shriners," in 1934.³⁵ Ennis worked as a waterfront laborer packing fruit in Sacramento as a young man before talking his way into a position as a clerk. At the age of just 21, Ennis became the youngest assemblyman to serve on the state legislature up to that point. In 1937, Ennis died from injuries sustained in an automobile accident, at the age of 65.³⁶ Anne Ennis and their three children remained at 1385 Hillside Circle after Scott Ennis's death until selling the property to Ruby V. Chapman in 1941.

Very little is known about Ruby V. Chapman, who married the much younger Arthur Lowler Osborn Fontaine Bell, also known as "The Voice" among numerous other aliases – the notorious and intentionally mysterious leader of the Mankind United cult.³⁷ Feeding off the anxiety felt during the Great Depression, the charismatic former real estate salesman, started the group Mankind United in 1934, peddling a conspiracy that a group of anonymous millionaires called the "Sponsors" were working to thwart a plot by the "Hidden Rulers" and "Money Changers" to create a slave state. Posing as the go-between the Sponsors and Mankind United followers, Bell encouraged proselytization by promising that a utopia based on universal employment and a short work week would be realized when the organization reached 200,000,000 followers. Bell, who claimed to have several doubles and to be able to teleport, funded his own lavish lifestyle by selling a book, *Mankind United* at \$2.50 per copy.³⁸ Due to the organization's secrecy, an exact number of followers is not known, but the group was thought to number in the tens of thousands at its peak in the late 1930s.

In 1943, Arthur Bell and his lieutenant George G. Ashwell, were sentenced to five years in federal prison for wartime sedition after "witnesses had testified that the leaders of Mankind United had defrauded followers of more than \$800,000, urged them to forget Pearl Harbor, to disregard selective service regulations, and to refuse to purchase war bonds."³⁹ However, Bell was released on bond pending appeals to the conviction, and in the meantime Bell and Chapman began investing millions of dollars in property throughout San Francisco and Los Angeles.⁴⁰ In addition to the 1385 Hillside Circle property, which they reportedly never lived in full time, the couple acquired several hotels, businesses, clubs and ranches which eventually totaled about \$3,500,000 in value.⁴¹ In 1944, Bell established a church – Christ's Church of the Golden Rule – a thinly veiled continuation of Mankind United's philosophy and teachings, and an attempt to dodge federal taxes. Followers were required to give up all financial assets and possessions before moving into communal living arrangements, where they worked for the Church. After the Federal Bureau of Investigation (FBI) and the House Un-American Activities Committee (HUAC) questioned Bell and monitored him and his Christ's Church of the Golden Rule for nearly two years, Bell was charged with embezzlement of church funds – complicated by the fact that Bell threw the church into bankruptcy and elusive ownership.⁴² Bell's organization was placed in receivership and 1385 Hillside Circle, along with other real estate assets, was seized by the federal government and eventually sold at auction in 1951. During this period, following accusations and evidence of embezzlement and fraud, many followers of Christ's Church of the Golden Rule broke away from Bell and formed a commune near Ukiah, in Northern California. Little is known about Bell's life or activities in the 1950s and onward after he faded from the spotlight.

After being owned by Ruby Chapman and Arthur Bell, but unoccupied, for about a decade, Thomas J. and Anne T. Chapman purchased the property at 1385 Hillside Circle in 1951. Thomas Chapman owned a Buick dealership in San Bruno for 13 years before selling the firm in 1954, and founded Chapman & Mino Co., an insurance and investment firm, with business partner Daniel G. Mino.⁴³ The Chapmans resided at the property for about six years before selling the residence to Jason C. and Cathleen C. Causey. Beyond their professions, little is known about the Chapmans or the Causeys. In 1965, the Causeys sold the property to Robert W. and Lucienne C. Regan. Robert Regan appears to have been a successful physician, working at Burlingame Medical Group. Dr. Robert Regan is also known for acting as personal physician to Patricia "Patty" Hearst during her trial in the federal courts in San Francisco for her involvement in a bank robbery while she was kidnapped by the Symbionese Liberation Army.⁴⁴ The

³⁵ "Mystic Shrine Confers Honor on Scott Ennis," *San Francisco Chronicle*, January 12, 1934.

³⁶ "Scott Ennis Dies in S.F. of Auto Injuries," *San Mateo Times*, November 10, 1937.

³⁷ In addition to historic newspaper articles cited in this report, information about Arthur Bell and Mankind United is largely adapted from Greg Polcyn and Vanessa Richardson. "Mankind United – Arthur Bell," *Cults* (podcast), Episodes 54 and 55, Parcast, accessed October 8, 2018, <https://www.parcast.com/cults/>.

³⁸ "Arthur Bell, Maybe," *San Francisco Chronicle*, December 7, 1941.

³⁹ "Bell, Ashwell Get Five Years in U.S. Prison," *San Mateo Times*, May 11, 1943.

⁴⁰ "Bell and Wife Put Millions in Property," *San Mateo Times*, February 25, 1944.

⁴¹ "Profit's Prophet," *TIME*, May 21, 1945.

⁴² "Records in Arthur Bell Case Missing," *San Francisco Chronicle*, October 23, 1946; Earl C. Behrens, "'Voice's Wide Land Holding Still a Riddle,'" *San Francisco Chronicle*, March 25, 1944; and William Flynn, "Mankind United: Golden Rule 'Church' is Charged with Defrauding Alameda Widow of Home," *San Francisco Chronicle*, August 26, 1944.

⁴³ "New Insurance Firm Formed," *San Mateo Times*, January 14, 1955.

⁴⁴ Theo Wilson, "Pick Panel of 36 Prospective Hearst Jurors," *San Francisco Chronicle*, February 2, 1976; and Stephen Cook, "Patty sick, trial delayed – court takes up side issues," *San Francisco Examiner*, March 11, 1976.

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Regans had eight children, and lived at 1385 Hillside Circle for over fifty years until their deaths. The subject property is currently owned by Deirdre Meola, one of the daughters of Robert and Lucienne Regan.

The following table outlines the ownership and occupancy history of 1385 Hillside Circle, compiled from Burlingame city directories, City of Burlingame Ownership Cards on file at the Burlingame Historical Society, and public records such as the United States Census and World War I draft cards available through Ancestry.com:

Years of Ownership/Occupation ⁴⁵	Name(s) of Owners (known owners in bold) and Tenants	Occupation (if listed)
c.1916 – 1932	George & Ada H. Campe	Automobile sales, Campe Motor Company
1932 – 1941	Scott F & Anne Ennis	President of Pacific Fruit Exchange
1941-1951 1942	Mrs. R. V. Chapman R. H. Huggins	Wife of Arthur "The Voice" Bell
1951 – 1957	Thomas J. & Anne T. Chapman	Automobile Dealer / Insurance Salesman
1957 – 1965	Jason C. & Cathleen C. Causey	Physician
1965 – 2018	Robert W. Regan Lucienne C. Regan	Physician
2015 – present	Deirdre Meola (née Regan)	

Significance Evaluation:

The property at 1385 Hillside Circle is not currently listed in the National Register of Historic Places (National Register) or the California Register of Historical Resources (California Register). The building is not included in the 2012 California Historical Resources Information System (CHRIS) directory of properties in the historic property data file, indicating that no record of previous survey or evaluation is on file with the California Office of Historic Preservation (OHP). The City of Burlingame does not currently have a register of historic properties beyond the Downtown Specific Plan Draft Inventory of Historic Resources, on which the subject property is not listed, and therefore the property is not listed locally.⁴⁶

Criterion A/1 (Events)

1385 Hillside Circle does not appear to be individually eligible for listing in the National Register under Criterion A or in the California Register under Criterion 1 (Events) for its association with any events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States. The residence was constructed circa 1916, several years before the development of Burlingame Hills, and the adjacent Easton Addition expanded rapidly in the 1920s. While one of only a handful of early residences in the area, the subject property is not the earliest, nor does its construction appear to be related to subsequent pattern of development in the area. George Campe, the original owner and occupant of 1385 Hillside Circle, owned all nine lots of the block bounded by Hillside Circle, Alvarado Avenue, Easton Drive and Summit Drive. Thus, except for the residence at 1385 Hillside Circle and several small associated auxiliary buildings such as garages and a greenhouse, the block remained undeveloped until the early 1950s, decades after the surrounding neighborhood was largely developed. The property does not appear to rise to a level of significance necessary to be individually eligible for the National Register or California Register under Criterion A/1.

Criterion B/2 (Persons)

1385 Hillside Circle does not appear to be individually eligible for listing in the National Register under Criterion B or the California Register under Criterion 2 (Persons). Several colorful characters are associated with the property at 1385 Hillside Circle. The most notorious, Arthur "The Voice" Bell, was the leader of the Mankind United organization and its successor, Christ's Church of the Golden Rule. While the property became tied up in legal complications related to Bell's fraudulent activities with these organizations, Bell does not appear to have ever lived at 1385 Hillside Circle. Thus, the subject property does not appear to be eligible under Criterion B/2 through its association with Bell. The original owner and occupant, George Campe, was a very successful automobile salesman during a period of rapid growth in the industry. Campe is one of a number of automobile salesman in San Francisco who helped to pioneer the sale of relatively affordable cars to a wide consumer base in the 1920s. Campe's professional accomplishments are best associated with his Van Ness Avenue showrooms on Auto Row in San Francisco, rather than his private residence; furthermore these showroom properties are most likely to be significant within a broader context of automobile sales and development of the industry, rather than for their association with one salesman. Little information was uncovered about Thomas and Anne Chapman or Jason and Cathleen Causey, who do not appear to have made contributions to local, state, or national history such that they would be found significant under Criterion B/2. While Robert Regan appears to have

⁴⁵ Years of ownership and occupation are approximate based on Burlingame city directories, public records available through Ancestry.com, and City of Burlingame Ownership Cards on file at the Burlingame Historical Society. These records do not always specify the exact date of purchase or occupation. For the purpose of this table, only the known years of ownership or occupation are included.

⁴⁶ Carey & Company, "Inventory of Historic Resources: Burlingame Downtown Specific Plan," October 6, 2008.

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been a successful physician and is known to have been Patty Hearst's personal physician during her trial, he does not appear to have made any contributions to the field of medicine or played a significant role in the trial of Patty Hearst such that 1385 Hillside Circle would be eligible under Criterion B/2. Therefore, research indicates that 1385 Hillside Circle does not appear to be individually eligible for listing under Criterion B/2 (Persons).

Criterion C/3 (Architecture)

1385 Hillside Circle would be individually eligible for listing in the National Register under Criterion C or the California Register under Criterion 3 (Architecture) as a good example of a California Craftsman residence if it still exhibited its original circa 1916 design and characteristics. Although no architect, builder, or landscape architect was identified during the course of research, early photographs of the building indicate that the residence, as originally designed, embodied the distinctive characteristics of a California Craftsman style. Sited on a large, wooded estate, the residence as initially constructed was representative of early twentieth century development in Burlingame Hills prior to the suburban development of the neighborhood and nearby Easton Addition in the 1920s and 30s. However, the residence has been altered such that it no longer conveys its original design or style, and is therefore not individually eligible for the National Register under Criterion C or the California Register under Criterion 3 (Architecture). A detailed discussion of the integrity of 1385 Hillside Circle is provided below.

Criterion D/4 (Information Potential)

The "potential to yield information important to the prehistory or history of California" typically relates to archeological resources, rather than built resources. When National Register Criterion D/California Register Criterion 4 (Information Potential) does relate to built resources, it is for cases when the building itself is the principal source of important construction-related information. The analysis of the property at 1385 Hillside Circle for eligibility under Criterion D/4 is beyond the scope of this report.

Integrity Evaluation:

In order to qualify for listing in any local, state, or national historic register, a property or landscape must possess significance under at least one evaluative criterion as described above and retain integrity. Integrity is defined by the California Office of Historic Preservation as "the authenticity of an historical resource's physical identity by the survival of certain characteristics that existing during the resource's period of significance," or more simply defined as "the ability of a property to convey its significance."⁴⁷ Based on the definitions of the seven aspects of integrity, the property at 1385 Hillside Circle does not retain integrity of design, materials, workmanship, setting, feeling or association.⁴⁸

The residence at 1385 Hillside Circle retains integrity of location because the subject building has not been moved, and remains in its historic location on the site. The subject property does not retain integrity of design, materials or workmanship due to extensive alterations and additions that appear to have primarily occurred in 1941, with additional alterations throughout subsequent decades. No building permits related to the main residence are on file at the Burlingame Community Development Department or San Mateo County Building Department; however, analysis of Sanborn maps, historic photographs and aerial photographs, accounts in newspaper articles, and visual inspection indicate that major alterations have occurred. One major renovation is reported to have occurred in 1941, when the massing, form, and style of the residence were all significantly altered. The residence was altered from a California Craftsman residence to an eclectic Mediterranean Revival style with a Spanish clay tile roof, and the building was expanded with several additions. The footprint was squared off with an expansion to the east, two towers were constructed on the south side of the building, the second-story volume was expanded, and an original open entry porch was fully enclosed. By 1946, likely as part of the 1941 remodel, a porte-cochere was constructed at the main entrance. Large metal security gates have also been installed, covering all openings on the primary façade except the main entrance. Due to these cumulative additions and alterations, the subject property is unable to convey its significance for association with California Craftsman style architecture through its materials, workmanship or design. The alterations during various eras have also obscured the sense of a particular period of time, resulting in a loss of integrity of feeling and association with early Burlingame Hills development by prominent automobile salesman George Campe. Furthermore, the residence does not retain integrity of setting due to the demolition of much of the landscape and associated features in the 1950s when surrounding parcels were sold off and developed for new residences. As originally designed, the residence would have been prominent and isolated on a spacious estate, but is now surrounded suburban development.

While the subject property retains integrity of location, the additions and alterations to the buildings and surrounding landscaping has cumulatively diminished the integrity of design, materials, workmanship, setting, feeling, and association, resulting in the property's loss of overall historic integrity.

⁴⁷ California Office of Historic Preservation Department of Parks and Recreation, *Technical Assistance Series No. 7: How to Nominate a Resource to the California Register of Historical Resources* (Sacramento: California Office of State Publishing, September 4, 2001) 11.

⁴⁸ National Park Service. "National Register Bulletin Number 15: How to Apply the National Register Criteria for Evaluation." Washington, D.C.: National Park Service.

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Conclusion

The residence at 1385 Hillside Circle was constructed in circa 1916 within the Burlingame Hills neighborhood, on a block which was annexed by the City of Burlingame in 1964. The subject property was not found to be significant for any events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States or any significant persons. The architect, builder, and/or landscape architect of the property are unknown. Early photographic evidence illustrates that the building was designed in a Craftsman style. Based on this limited photographic evidence, the building did once appear to be a strong representation of the Craftsman architectural style, which was popular in Burlingame and in California more broadly at the time, as applied to an early 1900s estate residence. The residence appears to have included many character-defining features of the Craftsman style, including asymmetrical massing, an open porch supported by battered columns, a gable roof, overhanging eaves with exposed rafter and purlin tails, and wood brackets. However, the residence has been significantly altered and expanded over time, and much of the landscape and its associated features have been lost to development, such that the property has lost integrity of setting, design, materials, workmanship, feeling, and association. The property is no longer representative of its 1916 period of significance as an early California Craftsman style estate in Burlingame Hills, and has been altered to an eclectic style with Mediterranean Revival elements. As such, the California Historical Resource Status Code (CHRSC) of "6Z" has been assigned to the property, meaning that it was "Found ineligible for NR, CR or Local designation through survey evaluation."⁴⁹

This conclusion does not address whether the building would qualify as a contributor to a potential historic district. A cursory inspection of the surrounding area of Burlingame Hills and Easton Addition, particularly the blocks within the Easton Addition and the crescent-shaped block between Hillside Circle and Alvarado Avenue, reveals a high concentration of early-twentieth-century residences that warrant further study. However, the subject property is located on a block that contains residences built in the 1950s, except for one residence built in 1988. Additional research and evaluation of the Burlingame Hills and Easton Addition neighborhoods as a whole would need to be conducted to verify the neighborhood's eligibility as a historic district.

⁴⁹ California State Office of Historic Preservation, Department of Parks and Recreation, *Technical Assistance Bulletin No. 8: User's Guide to the California Historical Resource Status Codes & Historical Resource Inventory Directory* (Sacramento, November 2004), 5.

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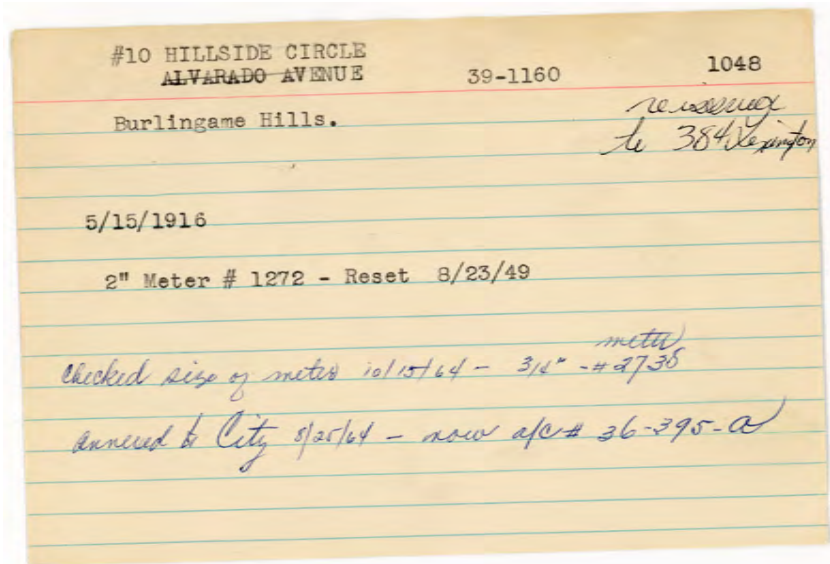


Figure 50. Water tap record for 1385 Hillside Circle. Source: Burlingame Historical Society.



Figure 51. Assessor's Map, County of San Mateo, Calif., Burlingame Hills. Subject property outlined in orange. Source: San Mateo County Assessor-County Clerk-Recorder Property Maps Portal. Edited by Page & Turnbull.

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Figure 52. 1921 Sanborn fire insurance map. Approximate current subject property boundary shaded in orange; former property boundary (until c. 1951) indicated by orange dashed line.

Source: San Francisco Public Library. Edited by Page & Turnbull.

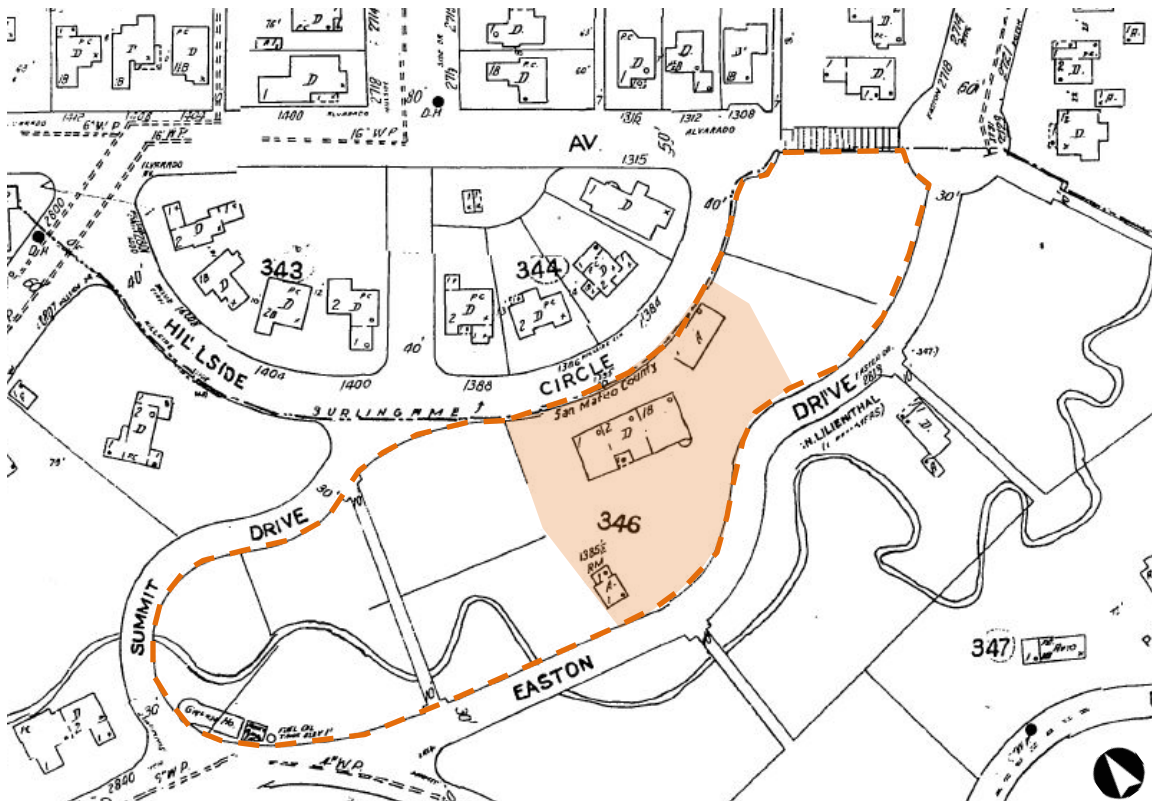


Figure 53. 1949 Sanborn fire insurance map. Approximate current subject property boundary shaded in orange; former property boundary (until c. 1951) indicated by orange dashed line. Source: San Francisco Public Library. Edited by Page & Turnbull.



Figure 54. "Chevrolet Sales Force Has Big Feast at Campe's Home," *San Francisco Chronicle*, November 16, 1919.
Source: Newspapers.com.

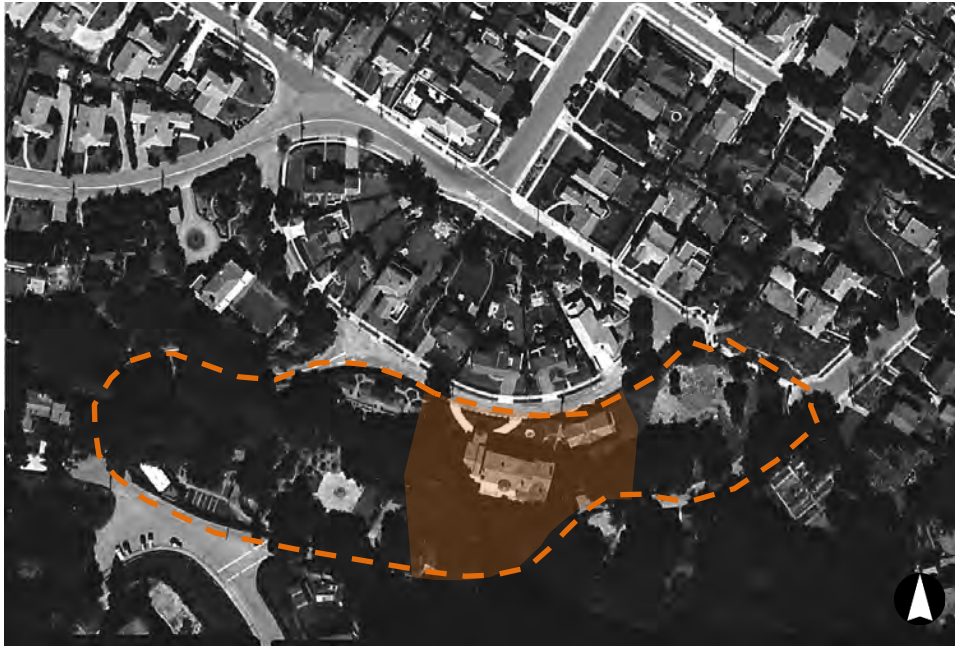


Figure 55. 1385 Hillside Circle, aerial view (1941). Approximate current subject property boundary shaded in orange; former property boundary (until c. 1951) indicated by orange dashed line. Detached garages located to the northeast and southwest of the main residence. A former greenhouse and other landscape features that were demolished when the block was developed in the 1950s are also visible.

Source: Aerial photograph of Burlingame, Flight C-6660, Frame 275, Fairchild Aerial Surveys, March 23, 1941.



Figure 56. 1385 Hillside Circle, looking southeast toward primary (north) and west facades (February 2, 1946), by photographer C. H. Smith. Source: UC Berkeley Bancroft Library, San Francisco News-Call Bulletin Newspaper Photograph Archive, BANC PIC 1959.010—NEG pt. 2, 140715.4:4.

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Figure 57. 1385 Hillside Circle, looking southeast toward primary (north) and west facades (June 1963).
Source: Burlingame Historical Society.



Figure 58. 1385 Hillside Circle, looking southeast toward primary façade (June 1963).
Source: Burlingame Historical Society.

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Figure 59. 1385 Hillside Circle, looking southeast at northwest corner (undated, circa 1990s).
Source: Burlingame Historical Society.