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Laurelwood Data Center
(19-SPPE-01)

Data Response Set 1A
(Responses to Data Requests 1 to 65
Staff Queries 1 to 17)

Submitted to
California Energy Commission

Prepared by
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Introduction

Attached are MECP1 Santa Clara 1, LLC's (MECP or the Applicant) responses to the California Energy Commission (CEC) Data Request, Set 1 regarding the Laurelwood Data Center (LDC) (19-SPPE-01) Small Power Plant Exemption (SPPE). In addition, this submittal includes responses to informal data requests from Staff received via email March 13, 2019, March 20, 2019, and March 22, 2019.

The responses are grouped by individual discipline or topic area. Within each discipline area, the responses are presented in the same order as the CEC presented them and are keyed to the Data Request numbers.

New or revised graphics or tables are numbered in reference to the Data Request number. For example, the first table used in response to Data Request 28 would be numbered Table DR28-1. The first figure used in response to Data Request 28 would be Figure DR28-1, and so on. Figures or tables from the LDC SPPE that have been revised have "R1" following the original number, indicating revision 1.

Additional tables, figures, or documents submitted in response to a data request (for example, supporting data, stand-alone documents such as plans, folding graphics, etc.) are found at the end of each discipline-specific section and are not sequentially page-numbered consistently with the remainder of the document, though they may have their own internal page numbering system.

Project Description (1–14)

Background: UPS and Diesel Backup Generator Operation

Staff needs to understand the various strategies that would be used by Laurelwood Data Center (LDC) to ensure continuous operation of the facility to serve clients storing data at LDC. Page 2-2 of the project description states that the standby generator system includes a 5-to-make-4 design configuration. Page 2-2 also states that there would be a total of 56 standby generators, but only 33 generators operating at 100 percent of their maximum rated output are required to support the operation of LDC under peak summer-time ambient conditions (99 MW of backup generator output). However, the 5-to-make-4 design could mean there could be a total of about 45 (rounded from 56×4/5) generators operating at the same time. Staff needs to understand whether only 33 backup generators would run at 100 percent of their maximum rated output or more engines would be operated at partial loads.

Data Requests

1) *Please explain the strategies planned to keep LDC grid connected and data customer's servers operating and in adequately conditioned space.*

   a. *What grid transient, outage or power quality events would trigger isolation from the grid?*

      Response: There are an undefined number of potential events that could impact Silicon Valley Power (SVP) service to degrade or fail, however, generally a loss or severe degradation of power (utility outages or short circuit / fault event) via a 50/51 relay (overcurrent protection relay) would trigger isolation..

   b. *What equipment redundancies would LDC install to maintain grid connection, and how and when would they be relied on to avoid loss of grid connection?*

      Response: This 60 kilovolt (kV) looped feeder feeds into three transformers in a N+1 configuration. The LDC only requires two transformers to operate at full capacity. In the event of a transformer failure or required maintenance, the redundant transformer would carry the load of the failed transformer and continue to operate the LDC, eliminating the need to isolate LDC from the grid.

   c. *Could the UPS allow the LDC to "ride through" some grid transient, outage or power quality events?*

      Response: The UPS has a rectifier and inverter to "clean" power from SVP. When the electrical supply is outside pre-determined tolerances, generally determined to be a voltage range of +10%, -15% of AC nominal voltage or a frequency range of 60 Hz +/-5%, the UPS will transfer to bypass deliver generator-produced power..

2) *If connection to the grid is lost, what are the sequence/timing of responses that occur at LDC:*

   a. *How quickly is isolation of LDC and the UPS from the grid?*

      Response: Load will transfer from the utility to UPS battery power within 0.1 seconds, after which the UPS signals the generators to start. Load is then transferred from the UPS to the generator within 90 seconds and remains that way until equipment controls determine utility power is available and stable.

   b. *How does LDC rely on the UPS for the data servers and bays?*

      Response: LDC relies on the UPS to a) "clean" utility power, and b) provide critical load power during transfer between utility and onsite electricity sources.

c. *What is the sizing of UPS relative to server bay demand?*

Response: The UPS is sized to deliver power to support 100 percent of the server bay demand for up to 10 minutes.

d. *What is the reliance on the UPS for building conditioning and emergency equipment?*

Response: The UPS provides power to the fire/security alarm systems and building management system (BMS)/control systems. The mechanical plant has certain components (control panels) which are backed by small 120 volt circuits derived from UPS sources separate from the mechanical plant. The mechanical equipment will not be powered from UPS sources.

e. *When do the diesel-fueled emergency generators start?*

Response: The standby generators start once utility power is lost and a start signal is sent from the UPS system to the standby generators. This typically occurs within 90 seconds of a control alarm sensing loss of utility power.

f. *What is the amount of time needed for the emergency generators to reach their specific operating load, and how is that load determined or adjusted?*

Response: The standby generators accept load within 90 seconds of receiving a start request from the UPS system. The standby generator operating load is defined by the UPS based on electrical demand of the load.

g. *Does the UPS condition power output from the emergency generators and does the UPS recharge from the emergency generators?*

Response: The UPS conditions power from the standby generators to equipment within the data center white spaces only (i.e. computer equipment racks). Mechanical, lighting, general receptacle power, etc. (building loads) will not be conditioned. The standby generators do not charge the UPS batteries. UPS recharge is only provided by electrical service from the utility.

h. *Does the UPS condition power from the emergency generators for building loads?*

Response: The UPS conditions power from the standby generators to equipment within the data center white spaces only (i.e. computer equipment racks). Mechanical, lighting, general receptacle power, etc. (building loads) will not be conditioned.

3) *Please clarify whether only 33 backup generators would be needed to run at 100 percent of their maximum rated output or whether more engines would run at partial loads.*

Response: 20 generators for each building are expected to operate at 80 percent load to support the full building loads including the roof mechanical systems (in the case of an emergency and utilization at 100% of the maximum electrical utility of the LDC at 99 MW). Any load supported by a failed generator will be replaced with a redundant generator. A house generator system will be designated bringing the total running generators to 21 for one building and 41 for both buildings.

4) *Please describe any other strategies entities that would rent space at LDC might employ to ensure their own continued operation or data integrity, such as possibly using a "mirror site" located off-site that their data/operations would migrate to, allowing shutdown of their server bays at LDC due to a short-term loss of power from SVP.*

Response: The Applicant believes that prospective tenants must be able to entrust their mission critical operations to the LDC and rely on the LDC to perform in a first-class manner for a mission

critical facility irrespective of potential mitigation strategies at their disposal in the event of a loss of utility power. The Applicant believes that prospective tenants have developed and may deploy strategies to improve the resiliency and redundancy of their operations. Depending on the business model of the prospective tenant, this includes a range from no measures beyond the facility's back up generation to "mirroring sites" allowing a customer to move operations off-site in the event of an outage. Given the economic investment to deploy the IT infrastructure a site with a duplicate mirror would be an extraordinary expense. The ability to move operations off-site is merely another level of redundancy but not a suitable economic alternative to back up generation. As a result, all prospective tenants, expect any facility to provide sufficient back up generation and Applicant's business model necessitates we meet those requirements.

5) *Please describe any strategy or plan for refueling the fuel tanks during emergency operation if the diesel-fueled emergency generators were to operate more than 48 hours, which is the capacity of each fuel tank (shown on page 2-19).*

Response: The Applicant will contract with multiple fuel suppliers to provide delivery within 48 hours of a request to ensure fuel availability. Based on discussions with Silicon Valley Power, extended outages are not common occurrences (see the response to DR-12).

Background: Interconnection

The Laurelwood Data Center (LDC) application Section 2.1 indicated that LDC includes an onsite 60 kV substation with an electrical supply line that would connect to a Silicon Valley Power (SVP) 60 kV line. Understanding the proposed interconnection to SVP would assist staff in determining the likelihood that back-up generators would be needed to operate and thus what the potential impacts could be if they are. Staff needs more detailed information on the 60-kV substation, 60 kV interconnection line, and pole information, than was provided in the project description.

Data Requests

6) *Please provide the name(s) of the existing SVP 60 kV line(S) that would supply power to the LDC.*

Response: The 60-kV line that the project will interconnect with is the SVP Northwest Loop.

7) *Please describe the interconnection to the SVP system. Is the LDC connecting though a single radial 60 kV line? Is the connection through a looped system where either of two connections could supply 100-percent of the LDC site load?*

Response: The LDC substation will be interposed on SVP's Northwest Loop between two 60 kV facilities. Figure DR-7 presents SVP's electrical system showing the Northwest Loop terminal ends at their 115 kV receiving stations (#1 and #2). These receiving stations are connected to the greater Bulk Electric System (BES). Each 115k V receiving station steps the voltage down to our service territory transmission voltage of 60 kV. Reliability is maintained such that, if there is a fault along any section of the Northwest Loop, electric service is still supplied from the receiving station at either end.

8) *Please provide a complete one-line diagram for the new 60 kV LDC Substation. Show all equipment ratings including bay arrangement of the breakers, disconnect switches, buses, redundant transformers or equipment, etc. that would be required for interconnection of the LDC project.*

Response: Figure DR-8 provides a conceptual one-line diagram.

9) *Please provide the conductor type, current carrying capacity, and conductor size for the tie-line that would be required for interconnecting the LDC to the SVP 60 kV system.*

   Response: The Applicant consulted with SVP and they have indicated the conductor will be ACCR with current carrying capacity of 310 MVA, and a conductor size of 715 double bundle.

10) *Please provide pole configurations which support the tie-line from LDC to the SVP 60 kV system. Show proposed pole structure configurations and measurements.*

    Response: SVP designs poles specifically for each configuration and past practice has been to use tubular steel poles. Figure DR-10 provides the SVP's typical 60 kV pole configuration with dimensions.

11) *Please provide a map showing the proposed tie-line route.*

    Response: Figure DR-11 shows the proposed distribution line route.

12) *Please provide the expected frequency of outages of the 60 KV system that would serve the LDC. If this 60-kV line has experienced any historical SVP power supply outage, what was the associated cause, duration and recovery process?*

    Response: SVP expects an outage frequency on the 60 kV system of zero. Systemwide, SVP has had one outage on the SRS-Central 60 kV line in the past 5 years. The cause of this outage was a bird coming in contact with the 60 kV line. Duration of the outage was 40 minutes. SVP maintenance staff inspected the line in order to locate the fault and when it was determined to be safe to re-energize the line, SVP re-energized the line. No customers lost power during this outage since SVP's grid is a looped system and not radial.

13) *Please identify all other data centers using the 60-kV line proposed to interconnect to LDC.*

    Response: The Applicant unaware of other data centers that may be connected to the Northwest loop 60 kV line.

14) *If there are any other data centers on the 60-kV line that LDC proposes to interconnect to, have any of the data centers experienced an SVP power supply outage(s)?*

    a. *What was the cause, duration, recovery process from the outage(s)?*

       Response: See the response to DR-12.

    b. *Are there breakers on the 60-kV line or disconnect switch(es) and did they isolate the faults?*

       Response: There are breakers/disconnect switches and they did isolate the faults.

    c. *What was the response to the outage(s) by the data centers to the outage (i.e., initiated operation of some or all back up generation equipment, data offshoring, data center planned shutdown, etc.)?*

       Response: There was no loss of power. Therefore, information on what actions other data centers had taken is unknown.

Air Quality (16-47)

Background: Air Quality District Application

The Laurelwood Data Center (LDC) applicant is or will be processing a permit application with the Bay Area Air Quality Management District (BAAQMD or district). Staff will need copies of all correspondence between the applicant and the district in a timely manner in order to stay up to date on any issues that arise before the Commission Decision has been recorded.

Data Requests

15) *Please provide copies of all substantive district correspondence regarding the application to the district, including e-mails, within one week of submittal or receipt. This request is in effect until the Commission Decision has been recorded.*

Response: The Applicant will provide copies of all substantive correspondence to the Bay Area Air Quality Management District (BAAQMD) within one week of submittal.

Background: NOx Emissions Offsets

Table 3.3-4 on page 3.3-9 of the application shows that the annual NOX emissions of the project would be 99.4 tons per year (tpy), based upon operating the backup generators up to 50 hours per year of non-emergency operation. The application states that NOx emissions will be fully offset through the air permitting process. Staff needs to understand how the applicant would get any required offsets. If the project's NOx potential to emit (PTE) could be limited to 35 tpy, the project should qualify for offsets provided from the BAAQMD's Small Facility Banking Account according to BAAQMD Rule 2-2-302.

Data Requests

16) *Please provide evidence showing that the NOx emissions of the project would be fully offset.*

Response: The Applicant will be submitting an air permit application for the LDC standby generators to the BAAQMD by mid-April 2019. A review of the BAAQMD's Regulation 2, Rule 1 requires the Applicant to secure written authorization from the BAAQMD Air Pollution Control Officer (APCO), in the form of an authority to construct permit, prior to the time a project "puts in place, builds, erects, installs, modifies, modernizes, alters or replaces any article, machine, equipment or other contrivance, the use of which may cause, reduce or control the emission of air contaminants". Furthermore, Rule 1 provides that "The APCO shall deny an authority to construct or a permit to operate if the APCO finds that the subject of the application would not or does not comply with any emission limitations or other regulations of the District (including but not limited to the BACT and offsets requirements in Regulations 2-2-301 through 2-2-303), or with applicable permit conditions or federal or California laws or regulations, or if any required fees have not been paid". Therefore, the Applicant's submittal of the air permit application to the BAAQMD provides the necessary evidence, at this phase of the permitting process, to ensure the Laurelwood Data Center, including the standby generators, will fully comply with applicable BAAQMD regulations.

17) *Please discuss whether the project's NOx PTE could be limited to 35 tpy, so that it may qualify for offsets provided from the BAAQMD's Small Facility Banking Account.*

Response: The Applicant will be requesting in the Authority to Construct Permit Application that the BAAQMD limit the project's NO_X potential to emit to 35 tons per year.

Background: NOx Emission Factor

Appendix 3.3B, Table 2 shows that the calculated NOx emissions using the emission factor as 7.28 grams per horsepower-hour (g/hp-hr), which is much higher than the EPA and ARB Tier 2 diesel engine emission standard of 4.8 g/hp-hr (NMHC + NOx) according to the Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition (CI) Engines (Title 17, California Code of Regulations, section 93115.6, Table 1). The Caterpillar specification sheet says the engine is a Tier 2 engine and also lists the emissions factor at 7.28 g/hp-hr for nominal operations at potential site variation conditions. Staff needs to know under what operating conditions would the emission factors be higher than the Tier 2 emission standard. Staff needs to understand how the proposed engines meet Tier 2 emission standards.

Data Requests

18) *Please explain under what operating conditions the diesel-fueled engines would emit pollutants at a higher rate than the Tier 2 emission standard.*

Response: The Applicant does not believe there are any conditions under which the LDC standby generators will exceed the Tier 2 emission standards. The standby generator specifications transmitted to the CEC staff via email on March 18, 2019 show that the proposed engines meet the Environmental Protection Agency's (EPA) Tier 2 standards. The Applicant expects these engines, as certified by the manufacturer, to comply with the EPA/California Air Resource Board's diesel engine emission standard of 4.8 grams per horsepower-hour (g/hp-hr) of non-methane hydrocarbons plus NO_X. It is the Applicant's opinion that presenting air emission estimates based on the EPA Tier 2 emission standards without supporting documentation would have been inadequate for Staff analysis. Therefore, the Applicant used the more conservative emissions data provided in the equipment vendors specification for the purpose of demonstrating the project's air quality impacts and demonstrate compliance with all applicable Laws, Ordinances, Regulations, and Standards (LORS).

19) *Please justify that the proposed engine meets Tier 2 emission standards.*

Response: As noted in the response to DR-18, the proposed LDC standby generators are EPA Tier 2 compliant and the Applicant expects them to meet the Tier 2 emission standards as certified by the manufacturer.

20) *Please justify the use of the higher NOx emission factor in the NOx emissions estimates.*

Response: As noted in the response to DR-18, the higher NO_X emission factors and resulting NO_X emission estimates were used to provide a more conservative analysis of the project's air quality impacts. Even with the use of these conservative emission factors, modeling demonstrated that the project's air quality impacts would not be significant.

21) *If necessary, please re-calculate the NOx emissions based on emission factors that are representative of actual emissions and engines, and the testing and maintenance events expected for the project.*

Response: As noted in the response to DR-18, the vendor's specification states that the engines will meet the EPA's Tier 2 standards, as certified by the manufacturer, dependent on site variations. The higher NO_X emission rates were used for modeling to demonstrate that the project's air quality impacts would not be significant, even under conservative assumptions. To present a more reasonable expectation of the project's operational emissions, Table DR-21 shows the project's daily and annual criteria pollutant emissions based on the EPA's Tier 2 certified emission rates and all 56 generators operating at 100 percent load. Detailed calculations are provided in Attachment DR-21, which includes a revised version of the SPPE Application Appendix 3.3B.

As shown, NO_X emissions from the standby generators will exceed the BAAQMD's daily and annual limits, such that Best Available Control Technology (BACT) and emission offsets will still be required.

Table DR-21 Criteria Pollutant Emissions from All Standby Generators

Evaluation Period	Pollutant	Emission Factor (g/hp-hr)[d]	Emissions	BAAQMD Thresholds	Exceeds Threshold?
Average Daily Emissions (lb/day)[a]	NO_x[c]	3.78	287	54	Yes
	VOCs	0.19	14.7	54	No
	CO	0.67	50.9	--	N/A
	SO_2	4.65E-03	0.35	--	N/A
	PM_{10}	0.01	1.02	82	No
	$PM_{2.5}$	0.01	1.02	54	No
Maximum Annual Emissions (tons per year)[b]	NO_x[c]	3.78	51.6	10	Yes
	VOCs	0.19	2.65	10	No
	CO	0.67	9.16	--	N/A
	SO_2	4.65E-03	0.06	--	N/A
	PM_{10}	0.01	0.18	15	No
	$PM_{2.5}$	0.01	0.18	10	No

[a] The average daily emissions were derived from the maximum annual emissions, assuming 12 months per year and 30 days per month.

[b] The maximum annual emissions were estimated assuming that all 56 generators would operate 50 hours per year.

[c] NO_X emissions will be fully offset through the air permitting process with the BAAQMD.

[d] Emission factors taken from EPA's list of certified nonroad compression ignition engines, assuming the project's generators would be best represented by the certification for Caterpillar's 2017 HCPXL78.1NZS family.

-- = No mass-based threshold has been adopted for this pollutant

N/A = Not applicable because no mass-based threshold is available

Background: Emergency Generator Engine Testing and Maintenance

Table 2-4 on page 2-24 of the project description shows the annual expected testing and maintenance events. Table 2-4 shows that the monthly testing would be 8 times per year and the quarterly testing would be 3 times per year. Staff needs to understand why monthly and quarterly testing is not needed for the remaining 4 months and 1 quarter. Staff needs to know how quickly the engines would reach the testing or maintenance loads of 50 percent or 100 percent.

The applicant modeled impacts of the engines for the 100-percent load case. However, 100-percent load does not always result in worst-case ground-level impacts. During lower load testing or maintenance operations, differences in emission rates, exhaust temperatures, and exhaust velocities could lead to lower plume rise and less dispersion, which could result in higher ground-level impacts. Staff needs to know whether the engines would be required to stay at certain load points other than those shown in Table 2-4 for substantial time (more than half an hour). Staff needs to know the impacts of the engines at these load points.

Table 2-4 shows hourly fuel consumption rate of 160 gallons/hour (gal/hr) for both 50 percent load and 100 percent load cases. Page 3 of 4 of the Caterpillar specification sheet for C175-16 Diesel Generator Sets provided by Jerry Salamy of Jacobs on March 18, 2019 in response to a staff email shows different fuel consumption rates. For example, for standby operation, the fuel consumption rates for 50 percent load with fan and 100 percent load with fan are shown as 130.4 gal/hr and 214.2 gal/hr respectively.

Data Requests

22) *Please explain why monthly testing would only be needed for 8 times per year and quarterly testing would only be needed for 3 times per year, instead of 12 times per year and 4 times per year respectively.*

Response: Table 2-4 in the SPPE application identifies a total of 15 specific tests (monthly, quarterly, annual, etc.) of at least ½ hour duration. Some of the tests serve two purposes in order to reduce the operating schedule for the standby generators. For instance, the three quarterly tests are also counted as monthly tests, as is one of the annual tests. Likewise, one of the annual tests counts towards the quarterly test requirements.

23) *Please explain why the hourly fuel consumption rates shown in Table 2-4 are not consistent with those shown in the Caterpillar specification sheet.*

Response: The fuel consumption provided in Table 2-4 of the SPPE application was not intended to define fuel consumption for the purposes of estimating air emissions but to provide an expectation of the general operating profile for the standby generators. The data shown on the Caterpillar specification sheet represents fuel consumption for the proposed standby generators.

24) *Please provide detailed (e.g., minute-by-minute) engine testing and maintenance profile for each event shown in Table 2-4.*

Response: The minute by minute break down for each testing and maintenance event identified in Table 2-4 is provided below. These events are manually initiated by a facility employee who records applicable data to ensure proper generator operation. The Applicant expects to operate one engine at a time and up to 5 engines per day while performing testing and maintenance activities.

Monthly Generator 25-minute test:

- Minute 1 - Start Generator
- Minute 2 - Inspect Generator exhaust smoke for proper color.
- Minute 4 - Verify Generator Has reached operating temp of 180*F
- Minute 6 - Inspect for oil leaks, fuel leaks, coolant leaks, exhaust leaks
- Minute 11 - Inspect fuel tank/ fuel deliver system for leaks and proper operation
- Minute 13 - Take temp readings of exhaust system to verify it has reach 915*F to prevent wet stacking
- Minute 15 - Shut Generator off and let the 10 min cool down cycle take place
- Minute 25 - Test is complete

Quarterly Generator 25-minute Test:

- Minute 1 - Start Generator
- Minute 2 - Inspect Generator exhaust smoke for proper color.
- Minute 4 - Verify Generator Has reached operating temp of 180*F
- Minute 6 - Inspect for oil leaks, fuel leaks, coolant leaks, exhaust leaks
- Minute 11 - Inspect fuel tank/ fuel deliver system for leaks and proper operation
- Minute 13 - Take temp readings of exhaust system to verify it has reach 915*F to prevent wet stacking
- Minute 15 - Shut Generator off and let the 10 min cool down cycle take place
- Minute 25 - Test is complete

Annual Generator 2-hour Test:

- Minute 1 - Start Generators and Let it get to 180*F operating temp.
- Minute 3 - Start the load bank and set to 25% Load for 37 min
- Minute 40 - Increase load bank setting to 50% Load for 40 min Perform Generator Run Logs
- Minute 80 - Increase load bank setting to 80% Load for 30 min
- Minute 110 - Decrease the load bank to 0% load. And shut Generator off to initiate 10 min cool down cycle.
- Minute 120 - Test complete Perform Generator Run Logs

3-year Medium Voltage Breaker / Transformer Testing:

- Minute 1 - Start Generator and let it reach 180*F operating temp.
- Minute 3 - Transfer UPS system from Utility to Generator
- Minute 7 - Verify UPS has transferred to Generator, Verify system kW, and Voltage
- Minute 8 - Isolate Medium Voltage breaker and transformer from utility power.
- Minute 10 - Rack out Medium Voltage breaker from medium voltage switchgear
- Minute 15 - Release vendor to perform breaker and transformer testing.
- Minute 158 - Breaker/ Transformer testing is complete. Rack Medium Voltage Breaker back into Switchgear
- Minute 160 - Energize Utility power to Breaker and Transformer
- Minute 164 - Verify voltage at the Breaker
- Minute 166 - Transfer UPS from Generator to Utility Power
- Minute 168 - Verify UPS has transferred to Utility Power, Verify system kW, and Voltage
- Minute 170 - Shut Generator off and start the 10 min cool down cycle.
- Minute 180 - Maintenance complete

25) *Please provide impacts analysis of the engines at 50 percent load during the monthly testing events.*

Response: The Applicant will prepare an air quality impacts analysis where all 56 standby generators operate at 50 percent load for up to 50 hours per year. The results of this analysis will be submitted to the CEC in mid-April 2019.

In terms of describing potential effects, the Applicant believes the original, 100 percent load analysis performed in the SPPE Application, Table 3.3-8 Standby Generator Operating Assumptions, which assumed that all of the backup generators were running at once (an impossible event), provides a conservative analysis (and over-predicts) potential air quality impacts from monthly testing.

26) *Please provide impacts analyses of the engines at intermediate load points if they would be required to stay at these load points for more than half an hour.*

Response: The Applicant will prepare an air quality impacts analysis where all 56 standby generators operate at 75 percent load for up to 50 hours per year. The results of this analysis will be submitted to the CEC in mid-April 2019. The Applicant believes that this analysis, together with the original 100 percent load analysis and the 50 percent load analysis to be provided in response to DR-25, will sufficiently depict the range of air quality impacts expected from project operation.

27) *When conducting readiness testing and maintenance, what is the load served by the electricity generated by the diesel-fueled generators? Please explain how the electricity produced during testing or maintenance would be used.*

Response: No load is served during testing and maintenance. When conducting readiness testing and maintenance, the engines are operated at a specified level without any load on the generator and no electricity is produced.

Background: Standby Condition

Note "a" under Appendix 3.3B, Table 3 states that the hourly emission rates are for the diesel generator in standby operation only (i.e., excludes startup or shutdown emissions from normal operation). Page 3 of 4 of the Caterpillar specification sheet for C175-16 Diesel Generator Sets provided by Jerry Salamy of Jacobs on March 18, 2019 in response to a staff email includes emission factors for standby, mission critical, prime, and continuous operation scenarios. The NOx emission factors for prime operation (6.33 g/hp-hr for nominal condition and 7.59 g/hp-hr for potential site variation conditions) would be higher than those for standby operation (6.07 g/hp-hr for nominal condition and 7.28 g/hp-hr for potential site variation conditions). Staff needs to understand whether the emissions during standby operation would be representative of those during the testing and maintenance events shown in Table 2-4.

Data Requests

28) *Please explain the meanings of standby, mission critical, prime, and continuous operation scenarios defined on page 4 of 4 of the Cat specification sheet as they would apply to LDC.*

Response: A 2013 Caterpillar document with definitions of these and other operating scenario terms is provided as Attachment DR-28.

29) *Please provide emissions during startup and shutdown to compare with the standby operation emissions.*

Response: The standby generators do not have a significant startup or shutdown period. Similar to an automobile engine, the standby generators reach full load operating rates within 30 to 60 seconds of initiating a start. Likewise, the shutdown occurs in a similar duration.

30) *Please explain whether the emission rates during standby operation shown in Appendix 3.3B, Table 3 would be representative of the testing and maintenance events shown in Table 2-4.*

Response: The emissions shown in Table DR-21 are representative of the full load testing and maintenance events shown in Table 2-4 of the SPPE application, except for the monthly tests (at a 50 percent load factor) where the emissions will be approximately ½ of those shown in Table DR-21.

Background: Stack Exit Velocity

Staff noticed that the applicant used the stack exit velocity of 121.75 meters per second (m/s), stack diameter of 0.36 m (14 inches [in]), and stack height of 12.19 m (40 feet [ft]) in the impacts analyses. The modeled stack exit velocity is much higher than the normally expected upper bound of 50 m/s in AERMOD. Using higher stack exit velocity would lead to lower modeled ground-level impacts.

Data Requests

31) *Please confer with the vendor to make sure that the modeled stack diameter and stack height would be representative of the actual stack parameters.*

Response: Per communication on April 1, 2019, the vendor has clarified that a stack diameter of 20 inches is more representative of the actual stack. The as-modeled stack height of 40 feet is still considered representative.

32) *If necessary, please revise the impacts analysis using the stack parameters that are representative of the actual stack parameters.*

Response: The Applicant will prepare a revised air quality impacts analysis and health risk assessment (HRA) which incorporates the stack diameter of 20 inches. The results of this analysis will be submitted to the CEC in mid-April 2019.

Background: Rural or Urban Dispersion Option

The air quality modeling files provided by the applicant show that the applicant used the rural dispersion option in AERMOD. However, other projects in the area have used urban dispersion option. In addition, BAAQMD may have guidance on the population to be used with the urban dispersion option for the region.

Data Request

33) *Please confirm with BAAQMD about whether the project needs to be modeled using the urban dispersion option and the population to be used with the urban dispersion option. Please justify the choice of dispersion option.*

Response: The Applicant initially used the rural dispersion option to provide a more conservative estimate of the project's air quality impacts[1]. However, for consistency with other projects in the area, the Applicant will prepare a revised air quality impacts analysis and HRA which uses the urban dispersion option in AERMOD, in conjunction with the other revisions incorporated in response to DR-32. The results of this analysis will be submitted to the CEC no later than mid-April 2019.

Background: NO2 National Ambient Air Quality Standard Impacts

Table 3.3-11 on page 3.3-16 of the application shows comparison of modeled results to the National Ambient Air Quality Standards (NAAQS). Table 3.3-11 shows the maximum modeled 1-hour NO2 impact to be 101.16 µg/m3. However, the air quality modeling CD provided by the applicant shows higher impacts than 101.16 µg/m3. The following provides an example of the higher impacts shown in the AERMOD output file 'Operation\AERMOD\NO2\5yrs\ aermod.out', as shown herein. The 1-hour NO2 NAAQS of 188 µg/m3 would be computed to be exceeded according to this AERMOD output file. However, the form of the federal standard is expressed as the 8th highest one-hour value averaged over three years, making it difficult to evaluate for intermittent engine operations.

[1] Per EPA's *AERMOD Implementation Guide* (2018), "To account for the dispersive nature of the "convective-like" boundary layer that forms during nighttime conditions due to the urban heat island effect, AERMOD enhances the turbulence for urban nighttime conditions over that which is expected in the adjacent rural, stable boundary layer." More turbulence, here associated with the urban heat island effect, typically results in improved dispersion and reduced ground-level concentrations.

Data Requests

34) *Please provide the maximum modeled 1-hour NO2 NAAQS impact to be consistent with the AERMOD output file 'Operation\AERMOD\NO2\5yrs\ aermod.out'.*

Response: The AERMOD output file provided in 'Operation\AERMOD\NO2\5yrs\' was used to determine the 1-hour NO_2 concentration for comparison to the California Ambient Air Quality Standard (CAAQS). A new AERMOD output file will be provided to demonstrate compliance with the National Ambient Air Quality Standard (NAAQS) as part of the revised analysis provided in response to DR-32 and DR-33. The results of this analysis will be submitted to the CEC no later than mid-April 2019.

35) *Please describe how the applicant determined the 8th highest annual value averaged over three years for intermittent engine operations.*

Response: Per Section 3.2.15 of the EPA's *User's Guide for the AMS/EPA Regulatory Model (AERMOD)* (2018), "For the 1-hour NO_2 standard, the modeled design value is based on the 98th-percentile of the daily maximum 1-hour values, which is represented by the eighth-highest of the daily maximum 1-hour values across the year…For typical multi-year modeling analysis based on 5 years of NWS meteorological data, the modeled design value is the 5-year average of the eighth-highest values daily maximum 1-hour values for NO_2." Section 3.7.2 of the *User's Guide for the AMS/EPA Regulatory Model (AERMOD)* goes on to explain how AERMOD has incorporated enhancements to help facilitate modeling analyses required to demonstrate compliance with the NAAQS. Accordingly, the Applicant used AERMOD's intrinsic functionality to derive a 5-year averaged 8th-highest value that could be extracted directly from the 5-year output file.

36) *If necessary, please revise the 1-hour NO2 modeling to show compliance with the 1-hour NO2 NAAQS of 188 µg/m3.*

Response: Please see the response to DR-34.

Background: Emission Control Efficiency

Page 3.3-8 of the application indicates that all generators would be equipped with a Miratech LTR® Diesel Particulate Filter System, which is expected to control particulate matter by at least 85 percent. Note 7 under Appendix 3.3B, Table 2, shows that the control technology includes the combination of an oxidation catalyst and a diesel particulate filter. The application does not show the control efficiency or the manufacturer of the oxidation catalyst. Staff needs to understand whether or not the control efficiency drops at lower loads during short periods of testing or maintenance. Staff needs to understand how control efficiencies are maintained with intermittent operations. These effects were not quantified in the application.

Data Requests

37) *Please provide the EPA certificates for the Miratech LTR® Diesel Particulate Filter System and the oxidation catalyst.*

Response: Attachment DR-37 is the California Air Resources Board (CARB) Executive Order DE-14-005-05 for the Miratech LTR Diesel Particulate Filter (DPF) System. The LDC standby generators meet the applicable terms and conditions of the Executive Order, i.e., the engines are EPA Tier 2 over 750 horsepower, meets a 0.22 grams per brake horsepower hour diesel particulate matter or less, does not employ exhaust gas recirculation/oxidation catalyst/selective catalytic reduction/pre-DPF, and the engines are new and will be well maintained. Based on this Executive Order, the CARB verified control level for particulate matter is "at least 85 percent reduction".

38) *Please describe how post-combustion control efficiencies are maintained during intermittent operations for testing and maintenance.*

Response: The DPF operates like any other particulate filter system by collecting particles that enter the unit. As shown on the Executive Order DE-14-005-05 (Attachment DR-37), the DPF proposed for the LDC standby generators are applicable to "Stationary Emergency Standby Power Generation". Furthermore, the DPF includes a monitoring system that documents the unit's performance to ensure compliance with the Executive Order DE-14-005-05.

39) *Please explain whether the control efficiency during intermittent operations was considered in the emission rates shown in the application.*

Response: Please see the response to DR-38.

Background: Cumulative Impacts Analysis

Staff needs a cumulative modeling analysis, or additional justification why an air quality cumulative modeling analysis is not needed for this project, to complete the staff analysis for cumulative air quality impacts.

Data Requests

40) *Please provide a list from the BAAQMD of large stationary source projects with permitted emissions, for projects with greater than 5 tons per year of permitted emissions of any single criteria pollutant, located within six miles of the project site, including projects that have been recently permitted, or are in the process of being permitted and are reasonably foreseeable.*

Response: As shown in Table DR-21, LDC's operational NO_X emissions exceed the BAAQMD's CEQA significance threshold. The BAAQMD developed its CEQA significance thresholds by considered the emission levels above which a project's individual emissions are cumulatively considerable, potentially resulting in significant adverse air quality impact.[2]

However, Table DR-21 does not include mitigation by the BAAQMD's regulations, specifically Regulation 2, Rule 2, Section 2-2-302. As noted in the response to DR-17, the Applicant will request an annual NOx limit of less than 35 tons per year, making the project eligible for the BAAQMD to provide the needed offsets from the Small Facility Banking Account. Table DR-40 provides a comparison of the LDC operational emissions to the BAAQMD CEQA thresholds with this required mitigation incorporated. The incorporation of the required NOx mitigation, in the form of offsets, reduces LDC's operational air quality impacts to a less than significant level. As noted above, the BAAQMD considers a project to not result in a cumulatively significant impact if the emission levels are below the BAAQMD's CEQA thresholds. Therefore, the LDC operational emissions are not cumulatively considerable.

[2] http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en, page 2-1.

Table DR-40 Criteria Pollutant Emissions BAAQMD CEQA Significance Threshold Comparison

	Average Daily Emissions (lbs/day)[a]					
	VOC	CO	NOX	SO2	PM10	PM2.5
Standby Generators	9.5	32.7	184.4	0.3	0.7	0.7
Mobile Sources	0.1	2.5	2.2	0.0	0.2	0.1
Facility Upkeep	22.4	4.4	5.2	0.0	0.4	0.4
Unmitigated Project Emissions	31.9	39.6	191.8	0.3	1.3	1.1
Mitigation[b]	0.0	0.0	194.4	0.0	0.0	0.0
Total Mitigated Emissions	31.9	39.6	-2.6	0.3	1.3	1.1
BAAQMD Daily Thresholds of Significance	54	--	54	--	82	54
Exceeds Daily Threshold (Y/N)?	N	N	N	N	N	N
Annual Operation	Maximum Annual Emissions (tpy)					
	VOC	CO	NOX	SO2	PM10	PM2.5
Standby Generators	2.6	9.2	51.6	0.1	0.2	0.2
Mobile Sources	0.0	0.5	0.4	0.0	0.0	0.0
Facility Upkeep	4.1	0.8	1.0	0.0	0.1	0.1
Unmitigated Project Emissions	6.8	10.4	35.0	0.1	0.3	0.3
Mitigation[c]	0.0	0.0	35.0	0.0	0.0	0.0
Total Mitigated Emissions	6.8	10.4	0.0	0.1	0.3	0.3
BAAQMD Annual Thresholds of Significance	10	--	10	--	15	10
Exceeds Annual Threshold (Y/N)?	N	N	N	N	N	N

[a] Assumes 5 standby generators are tested for 1 hour each per day.

[b] Based on a requested annual NOx limit of less than 35 tons per year divided by 12 months per year and 30 days per month.

[c] Based on a requested annual NOx limit of less than 35 tons per year.

41) Please provide a cumulative impacts modeling analysis in consultation with Energy Commission staff, if necessary, based on the project list provided by BAAQMD.

Response: As noted in the response to DR-40, with the incorporation of the mitigation required by the BAAQMD's regulations, the LDC's air quality impacts are reduced to less than significant and are therefore, not cumulatively considerable.

Background: Construction Impacts Analysis

The applicant provided ground-level impacts analysis for criteria pollutants during operation of the project. The applicant did not provide ground-level impacts analysis for criteria pollutants during construction of the project. Staff needs justification for not doing ground-level impacts analysis for criteria pollutants during construction.

Data Requests

42) *Please justify why ground-level impacts analysis was not done for criteria pollutants during construction of the project.*

Response: The BAAQMD has established significance thresholds for evaluating whether a project's individual emissions would be cumulatively considerable. According to the BAAQMD's *California Environmental Quality Act Air Quality Guidelines* (2017), "If daily average emissions of construction-related criteria air pollutants or precursors would exceed any applicable threshold of significance…, the project would result in a significant cumulative impact," and additional analysis would be required. As shown in Table 3.3-3 of the SPPE application, the project's daily average construction emissions do not exceed the BAAQMD's significance thresholds. Therefore, project construction will not result in a significant cumulative impact and further analysis, including dispersion modeling to determine ground-level concentrations, is not warranted.

43) *Please provide ground-level impacts analysis for criteria pollutants during construction of the project to show compliance with the California Ambient Air Quality Standards (CAAQS) and NAAQS.*

Response: Please see the response to DR-42.

Background: Seasonal Hour NO_2 Background Data

Page 3.3-14 of the application states that the NO_2 impacts analysis includes the seasonal hour (SEASHR) background data. The application states that this background profile was developed conservatively using the high-first-high seasonal background concentrations observed from the EPA Air Quality System station in San Jose, California (Site ID 060850005). The application also states that a copy of the SEASHR profile and its development is included in Appendix 3.3-C. Staff was only able to find the SEASHR profile in the spreadsheet version of the Appendix 3.3-C. Staff was not able to verify how the SEASHR profile was developed. Staff needs more information to verify the development of the SEASHR profile.

Data Request

44) *Please provide the original data files and programming to verify the development of the seasonal hour background NO_2 data.*

Response: The 1-hour NO2 background profiles used by the Applicant were calculated as a SEASHR profile that provides a single background value for each hour of the day for each of the four seasons. Data for these background profiles were obtained from EPA's Air Quality System (AQS) Website3, as measured at AQS Monitor Site ID 060850005 located at 158B Jackson Street in San Jose, California for years 2015, 2016, and 2017. For each hour of the day for each season, the average concentration of the three most recent and complete years is calculated. For purposes of CAAQS modeling, the background profile uses the high-1st-high hourly values averaged across the three most recent and complete years of data. For purposes of NAAQS modeling, the background profile conservatively uses the high-2nd-high hourly values, averaged across the three most recent and complete years of data, to represent the 98th percentile. The high-2nd-high values are determined to be the 98th percentile based upon any single season having no more than 92 possible data points for any given hour. A copy of the raw data and methodology used in the development of these background profiles is included in Attachment DR-44.

[3] Accessible at https://aqs.epa.gov/api.

Background: Meteorological Data Processing

The application describes how the AERMOD-ready meteorological data were processed. The applicant provided these files in the air quality modeling CD. However, the applicant did not provide the input data files used in AERMET to verify the development of the AERMOD-ready meteorological data. Staff needs these files to verify the development of the AERMOD-ready meteorological data. Staff needs to verify the reference height for surface wind measurement of 7.9 m shown in the AERMOD-ready meteorological data files, instead of the normal height of 10 m. In addition, staff needs to know whether the BAAQMD has accepted the use of the AERMOD-ready meteorological data provided by the applicant.

Data Requests

45) Please provide the input data files used in AERMET to verify the development of the AERMOD-ready meteorological data.

Response: The Applicant requested AERMOD-ready meteorological data from the BAAQMD for use with this project, but it was not received until March 13, 2019, which is after the SPPE application was submitted to the CEC. A copy of this correspondence is provided in Attachment DR-45. Rather than providing copies of the AERMET input data files, as requested, the Applicant plans to incorporate the BAAQMD-provided meteorological data into the revised modeling being prepared in response to DR-32, DR-33, and DR-34. The Applicant does not expect use of this meteorological data to materially affect the project's impacts as both datasets are anticipated to have been processed in the same manner, following EPA guidance, and utilizing surface data from the San Jose International Airport and upper-air sounding data from the Oakland International Airport. The revised modeling results will be submitted to the CEC in mid-April 2019.

46) Please verify that the reference height for surface wind measurement of 7.9 m is correct.

Response: Please see response to DR-45.

47) Please consult with BAAQMD to make sure the AERMOD-ready meteorological data used in the application are acceptable.

Response: As noted in the response to DR-45, BAAQMD's James Cordova provided AERMOD-ready meteorological data on March 13, 2019 which will be incorporated into the Applicant's revised air quality impacts analysis and HRA. Although this data transmittal does not constitute the BAAQMD's approval of the use of this data in the analysis, Mr. Cordova suggests approval lies with the reviewing agency (BAAQMD) based on a justification of the representativeness of the data selected for use. Of the two surface stations located in the vicinity of the project site, the San Jose International Airport is most representative of the project site given its proximity to the project site itself and its similar spatial orientation and distance from the San Francisco Bay.

Biological Resources (48-49)

Background: Development and Design Details

The SPPE Application lacks specificity for some components of the on- and off-site improvements for the LDC. Energy Commission staff requires the following information listed below to analyze potential impacts of proposed project improvements on biological resources.

Data Requests

48) *The Project Description Overview section (2.1) of the SPPE Application, mentions a public easement along the southern edge of the project site and an approximately 600-foot-long electrical supply line supported by three distribution poles to be located within this easement. Please provide more information about this offsite improvement area, including the alignment and boundaries of the easement relative to property boundaries, and a detailed figure showing exact placement of these three poles and the 600-foot-long electrical supply line.*

Response: The poles will be located within an approximate 75-foot corridor which was surveyed as part of the SPPE application. In addition, LDC will avoid potential impacts by assuring that no poles or construction activities will occur within San Tomas Aquino Creek or the immediate surrounding area as shown in Figure DR-11.

Consistent with the Commission's informational requirements, the Applicant has identified and surveyed the linear corridor for the three distribution poles. Applicant and SVP are currently in discussions regarding pole locations, and if likely pole placements can be identified, the Applicant and SVP will share the expected locations. However, consistent with past practice, the final pole placement within the surveyed corridor will be determined in the field during construction..

49) *Please provide more descriptive information and detailed figures for the following.*

a. *Bioswales, including the landscape planting and the impervious surface areas that will drain to these structures. Also, clarify if the bioswales will function as retention ponds during flood events.*

Response: Figures DR49-1a through DR49-1e presents the conceptual LDC landscaping and drainage plan. As noted, the bioretention areas will be approximately 2.5 feet with a 4-inch perforated drainage pipe. The bioretention areas drain to a perimeter storm drain line that exits the site at the northern corner and connects to the City of Santa Clara's storm drain system via an existing connection. The bioretention areas will be landscaped with a combination of shrubs (Large Cape Rush and El Campo Cape Rush) and grasses (Lindhiemer's Muhly and Rigens Deer Grass).

b. *Staging and Laydown areas for all on- and off-site improvements, including the parking areas and wire pull sites*

Response: All staging and laydown areas will be located within the project boundaries for the LDC site. No offsite laydown and staging areas are required or proposed.

Cultural Resources (50-59)

Background: Missing Data

Staff has noted areas of text in the Cultural Resources section of the application (MECP1 2019: Section 3.5) for small power plant exemption (SPPE) that possess unclear source citations or references. Some portions of the cultural resources inventory (Alonso and Castells 2019) have similar problems. Unambiguous supporting documentation and citations would permit staff to assess the information contained in the application and complete its independent analysis of the application.

Data Requests

50) *Section 3.5.1 of the application cites NPS (2007) to support its setting section (MECP1 2019:3.5-1). Section 3.5.5 (References) lacks a bibliographic entry for NPS (2007) but contains an entry for NPS (2018) (see MECP1 2019:3.5-8). Please either provide bibliographic information for NPS (2007) or correct the in-text citation.*

    Response: Attachment DR-50 presents the revised SPPE application Section 3.5, in underline/strikethrough mode, with the bibliographic citation corrected.

51) *Section 3.5.5 (References) contains an entry for National Park Service (NPS 2018). Section 3.5 does not appear to have cited this source in the text. Please delete or correct the entry, if applicable.*

    Response: Attachment DR-50 presents the revised SPPE application Section 3.5 with the NPS 2018 citation corrected.

52) *Section 3.5.1 of the application refers to a geologic map of Santa Clara County, citing USGS (2006) (MECP1 2019:3.5-1). The application describes the cited source as a topographic map (MECP1 2019:3.5-8). Is the bibliographic entry correct?*

    Response: Attachment DR-50 presents the revised SPPE application Section 3.5 with the geologic map citation corrected.

53) *When describing the historic Pacific Gas and Electric Northern Receiving Station Scott #2, the application cites Supernowicz (2013) (see MECP1 2019:3.5-6). Section 3.5.5 (References) does not have a corresponding bibliographic entry. Please provide it or correct the in-text citation, as appropriate.*

    Response: Attachment DR-50 presents the revised SPPE application Section 3.5 with the Supemowicz (2013) citation corrected.

54) *Section 3.5 of the application states that a records search identified 135 previously recorded cultural resource studies in the records search area (MECP1 2019:3.5-5). Alonso and Castells (2019:16) writes that the records search revealed 136 such studies. Please reconcile these two numbers.*

    Response: The record search identified 135 previously recorded cultural resource studies in the record search area.

55) *Section 3.5 of the application identifies 54 previous cultural resources studies as having occurred in the project area (MECP1 2019:3.5-5; see also Alonso and Castells 2019:16). Staff counts 53 such studies in Alonso and Castells (2019: Table A-1). Please reconcile these two numbers.*

    Response: Attachment DR-55 presents a revised Cultural Resources Technical Report (CRTR) previously provided in the SPPE application as Appendix 3.5A. The list of cultural resource

studies is provided as Appendix A, Table A-1 and identifies 54 previous cultural resource studies in the project area.

56) *The references section of the cultural resources investigation report (Alonso and Castells 2019:25–29) contains bibliographic entries that do not have in-text citations (Pages 1972; Font 1930; NPS 2006). Please insert text citations as appropriate or delete the entries from References.*

Response: An updated reference section for the CRTR is provided as Attachment DR-55.

Background

According to Alonso and Castells' (2019:18–19) description of the archaeological and historic architectural surveys, only limited portions of the project area were subjected to archaeological survey. Figure 1-2 in Alonso and Castells (2019) does not depict the areas surveyed. In addition, the description of archaeological survey does not describe the ground surface conditions along the proposed transmission line route.

Data Requests

57) *Please revise Figure 1-2 or provide a figure that depicts the areas subject to archaeological and historic architectural surveys. The figure shall be at 7.5-minute scale (1:24,000) and on a topographic imagery base.*

Response: Attachment DR-55 presents a revised Cultural Resources Technical Report (CRTR) previously provided in the SPPE application as Appendix 3.5A. The CRTR includes the revised Figure 1-2 which identifies the archaeological and historic architectural surveys on a topographic imagery base.

58) *Please provide staff with a description of methods and ground surface conditions in the proposed transmission line alignment.*

Response: A Phase I intensive pedestrian survey of the Project area was conducted by PaleoWest archaeologist, Patrick Zingerella, on February 11, 2019. The pedestrian archaeological survey was conducted inclusive of the Project site, linear facility routes, and extending out no less than 200 feet around project components and 50 feet to either side of the right-of-way of the Project linear facility routes per CEC required survey methods as shown in Figure 1-3 of the CRTR provided as Attachment DR-55. The architectural history survey was conducted inclusive of the Project site and a one-parcel deep buffer from the proposed plant site boundaries and along the routes of all linear facilities in order to identify, inventory, and characterize structures and districts over 45 years of age or that are considered to be significant per CEC required survey methods.

The survey was conducted by walking parallel transects across the entirety of the Project area spaced at 10- to 15-meter (33- to 50-feet) intervals, when possible. The Project area was recorded with digital photographs for use in the report. Photographs included general views of the topography and vegetation density, and other relevant images. A photo log was maintained to include, at a minimum, photo number, date, orientation, photo description, and comments. The surveyor carefully inspected all areas likely to contain or exhibit sensitive cultural resources to ensure discovery and documentation of and visible, potentially significant cultural resources located within the Project area. In addition, the exteriors of the buildings within the Project area were analyzed, photographed, and recorded. Any building or structure determined to have been built prior to 1974 or to be potentially eligible for the CRHR or the Local Register were formally evaluated on DPR 523 series forms.

Historical and prehistoric site indicators were noted where present. Historical site indicators include fence lines, ditches, standing buildings, objects or structures such as sheds, or

concentrations of materials at least 45 years in age, such as domestic refuse (e.g., glass bottles, ceramics, toys, buttons or leather shoes), refuse from other pursuits such as agriculture (e.g., metal tanks, farm machinery parts, horse shoes) or structural materials (e.g., nails, glass window panes, corrugated metal, wood posts or planks, metal pipes and fittings, railroad spurs, etc.). Prehistoric site indicators include areas of darker soil with concentrations of ash, charcoal, animal bone (burned or unburned), shell, flaked stone, ground stone, pottery, or even human bone.

59) *In the event that the applicant has not surveyed the proposed transmission line alignment for the presence of cultural resources, please arrange for cultural resource professionals to survey the proposed route consistent with the standards contained in the California Code of Regulations, Title 20, Section 1704(b)(2), Appendix B(g)(2)(C). In addition, the cultural resources professionals shall provide an addendum to the Laurelwood Data Center cultural resources report (Alonso and Castells 2019) that documents the methods and results of the addendum survey.*

Response: The electrical distribution line alignment was surveyed as noted in DR-58.

Tribal Cultural Resources (60)

Background: Native American Consultation

The applicant's consultant conducted Native American consultation as part of the assessment. From Alonso and Castells' (2019:43–44) record of Native American contacts and comments, two California Native American tribes, Indian Canyon Mutsun Band of Costanoan and The Ohlone Indian Tribe, requested the results of the records search and the pedestrian survey. The record does not indicate whether the documents were sent to the tribes.

Data Requests

60) *Did the applicant's consultant send the results of the record search and the pedestrian survey documents to Indian Canyon Mutsun Band of Costanoan and The Ohlone Indian Tribe? If the documents were not sent to them, what was the reason for not doing so? If the applicant's consultant did send the tribes the requested documents, please provide a record of communication.*

Response: The Ohlone Indian Tribe was sent a final copy of the Phase 1 report on April 3, 2019. The Indian Canyon Mutsun Band of Costanoan tribe was sent a copy of the Phase 1 report with survey results and record search summary on February 26, 2019. Copies of the transmittal letters are provided as Attachment DR-60.

Utilities and Service Systems (61-65)

Data Requests

61) *State law requires that a water supply assessment (WSA) of a project be completed when certain criteria are met. The proposed project meets the definition of a project in accordance with the applicable regulations. In addition, the City of Santa Clara requires a WSA be completed for the proposed project. Staff understands the applicant has submitted an application for a WSA. A copy of the WSA is needed for staff to complete a CEQA analysis of the projects effects on the local water supply in a dry, multiple dry, and normal year. Regulations also allow the water supplier (City of Santa Clara) 120 days and a possible extension of 60 more days to prepare a WSA, which is outside the 135-day timeline for Energy Commission staff to process the SPPE.*

a. *Please provide a copy of the WSA required by the City of Santa Clara and state law.*

Response: A copy of the WSA application has been provided as Attachment DR-61. In this application, the Applicant has determined that the maximum annual water demand is 1,325 acre-feet. It should be noted that during historic water use during the drought years of 2012 to 2017 was 1,164 acre-feet per year, or about 88 percent of LDC's maximum annual water use. The previous project site owner commenced shutdown of the operations beginning in 2016 due to relocation of operations. As a result, water use significantly dropped between 2016 to 2018.

b. *If a WSA has not been completed please provide a schedule showing when it will be completed.*

Response: Please see response to DR-61a.

62) *A CEQA analysis should consider proposed water uses relative to the baseline. Staff needs to know the historic water use at the site to determine the total change in water use. Please provide records or data showing water use at the site for the past 20 years.*

Response: Water use for the past 15 years at the LDC site is provided in Table DR-62. The average water use over this period is 1,469 acre-feet per year. Table DR-62 clearly shows that previous water use at the site is significantly higher than LDC's proposed water use of 1,325 acre-feet per year.

Table DR-62 Historic Water Use at Proposed Project Site

Year	Water Use Per Year	
	Cubic Meters	Acre-Feet
2004	2,208,824	1,791
2005	2,333,372	1,892
2006	2,278,132	1,847
2007	2,366,944	1,919
2008	2,487,528	2,017
2009	2,165,928	1,756
2010	2,499,036	2,026
2011	2,183,748	1,770
2012	2,054,792	1,666
2013	2,133,296	1,729
2014	1,305,404	1,058
2015	1,534,012	1,244

Table DR-62 Historic Water Use at Proposed Project Site

Year	Water Use Per Year	
	Cubic Meters	Acre-Feet
2016	1,219,164	988
2017	366,036	297
2018	50,156	41
	Average	1,469

Source: Email between Matt Muell and Allison Torbitt, Nixon Peabody LLP, April 1, 2019.

63) *The City has eligibility criteria for a site to receive recycled water. Please provide information showing how the eligibility criteria apply to the proposed project.*

Response: A recycled water line is located adjacent to the site and the Applicant is in discussions with the City of Santa Clara to determine if sufficient capacity exist to support project needs for those uses where recycled water use is appropriate (such as landscaping and other non-contact water uses where Title 22 water use is required or appropriate).

64) *The application did not include any information about natural gas consumption or telecommunication needs for the project and what demands that could place on the local infrastructure. Please provide information on what the needs would be and how they could affect local infrastructure.*

Response: The LDC is an all electric facility, so the LDC does not require natural gas service. Space heating and hot water requirements will be electric. In addition, the previous owner has removed existing natural gas supply lines as part of their demolition plan.

The Applicant is in early discussions with fiber optics providers to provide fiber-based telecommunications services. The Applicant anticipates fiber being provided to the facility via established rights of way as is the industry common practice. Applicant anticipates working with private commercial fiber providers such as CenturyLink, Zayo, AT&T, and others. In general, these companies have significant infrastructure in place and serving LDC tenants will likely be a net addition of infrastructure due to the industry's propensity to overbuild when serving any data center.

65) *According to the City of Santa Clara 2015 Urban Water Management Plan, the surface water supply from San Francisco Public Utilities Commission (SFPUC) might be curtailed in a multi-year drought scenario. The project is located in an area that is solely served with water from SFPUC. If the supply from SFPUC to the city is curtailed, the city would replace it with their ground water supply or surface water from the Santa Clara Valley Water District. Since groundwater accounts for more than two thirds of the city's supplies, most of the replacement water, if not all, would likely come from groundwater. The groundwater basin has been in decline for the past two decades. Relying on more water from the wells would stress the groundwater resource even further and could result in a significant cumulative impact. Please describe how the project would mitigate this potential impact to the groundwater resource.*

Response: As a retail water customer, the LDC project will receive potable and recycled water from the City of Santa Clara, which has an obligation to serve the project site. Any interruption in the delivery of water from the SFPUC will affect all City of Santa Clara businesses and residents. Water service for retail customers would proceed consistent with applicable LORS and LDC would operate consistent with the requirements for all water customers in the same retail class.

Staff Queries, March 13, 2019, Air Quality (1-4)

1. *Appendices 3.3-A through 3.3-E include detailed emissions and impacts calculations. Staff needs original spreadsheet files of these estimates with live, embedded formulas to complete analysis of the project. Please provide the spreadsheet versions of Appendices 3.3-A through 3.3-E worksheets with the embedded formulas live and intact.*

   Response: On March 18, 2019, as requested, the following files were provided electronically to Staff:

   - Microsoft Excel workbooks for Appendices 3.3A to 3.3E (renamed DR_AIR_1_App_3.3X);
   - CalEEMod output for the facility upkeep emission estimates (Excel workbook and PDF);
   - Standby generator specification sheets; and
   - Tables identifying the excess cancer risk and acute/chronic hazard indices for the point of maximum impact.

2. *The applicant estimated the construction emissions based on applicant's own spreadsheets with emission factors from CalEEMod, EMFAC2014, and AP-42. The applicant estimated the facility upkeep emissions during operation using CalEEMod. Staff needs all the inputs/assumptions that the applicant used in the spreadsheets and in CalEEMod as well as the output files to check the emissions estimates. Please provide the input and output files for CalEEMod and any inputs/assumptions and output files used for emission calculations.*

   Response: Please see response to SQ-1.

3. *The applicant estimated the emissions of the engines based on the manufacturer's performance data sheets, 'CAT_C175-3MW-performance.pdf' and 'CAT_C175-3MW-specsheet.pdf', which were mentioned under Appendix 3.3B, Table 2. Staff needs these data sheets to complete analysis of the project. Please provide copies of these manufacturer's performance data sheets.*

   Response: Please see response to SQ-1.

4. *The application did not provide point of maximum impact (PMI) in Appendix 3.3D, Tables 3 and 4 for construction and Appendix 3.3E, Table 3 for operation. Therefore, for both construction and operation, please provide the health risk impacts (including cancer risk, chronic non-cancer health index, acute non-cancer hazard index, and UTM coordinates) at PMI.*

   Response: Please see response to SQ-1.

Staff Queries, March 20, 2019, Land Use (5)

5. *The applicant's Land Use analysis states that approximately 26 percent of the site would be covered by landscaping, thus complying with the zoning district's requirement that 25 percent of the site be landscaped. However, just from looking at Figure 2-1, landscaping does not appear to comprise 25 percent or more of the site. I would like the applicant to provide clarification and support for the statement that landscaping covers approximately 26 percent of the site. Support could include a more detailed landscaping plan and calculations of landscaping are.*

   Response: Inadvertently the sidewalk area was defined as landscaping in Figure 2-1 within the SPPE application. This has now been rectified and a new site drawing showing all landscaping (without the sidewalk included) has been provided as Figures DR 49-1a through 49-1e. A figure showing the total landscaping will be provided by the end of April.

Staff Queries, March 20, 2019, Transportation (6)

6. *The Laurelwood Transportation section requires some clarification on the construction traffic totals listed in Table 3.17-4 Construction Traffic Impacts on page 3.17-7. It looks as if the number of "Delivery/Haul Trucks" and "Delivery/Haul Trucks PCE" were added together with the number of "Workers" to generate the "Total Construction Traffic in PCE". Please confirm the totals for the construction traffic in PCE.*

   Response: An inadvertent transcription error was made in Table 3.17-4 which does not affect the analyses. Total construction PCE AM Construction traffic should be 260 PCE and total PM Construction traffic should be 290 PCE. Revised Table 3.17-4 is provided below:

Table 3.17-4 Construction Trip Generation

Trip Type	ADT	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
Delivery/Haul Trucks		20	20	40	30	30	60
Delivery/Haul Trucks PCE (1.5)		30	30	60	45	45	90
Workers		200	0	200	0	200	200
Total Construction Traffic in PCE		-	-	260	-	-	290

Staff Queries, March 22, 2019, Geology (7-12)

7. *Attachment 3.19-1 is referenced at page 3.19-2 of the document but we can't find it. It appears to be the application for a WSA that the owner may have submitted. Can you send us that attachment?*

   Response: See the response to Data Request #61 above for a copy of the Applicant's submittal of the Water Supply Assessment to the City of Santa Clara.

8. *In section 2.4 of the application it was stated that two geotechnical investigations had been completed, including drilling to a depth of 80 feet. A copy of both of these geotechnical reports are necessary to verify subsurface conditions. The citations for these reports are: Draft Geotechnical Investigation, 2201 Laurelwood Road, Santa Clara California, Project 1075-1-2, by Cornerstone Earth Group (2019) and Preliminary Geotechnical investigation Santa Clara 2001 Laurelwood Road, Report No. 302733, prepared for Edgecore by TRC Companies (2018)?*

   Response: The Final Geotechnical Investigation by Cornerstone Earth Group is provided as Attachment SQ-8. A copy of the Geotechnical Investigation prepared by TRC Companies referenced in the SPPE application was provided to the Applicant under a non-disclosure agreement and cannot be provided and should thus not be referenced further.

9. *A map of the existing underground infrastructure that is being removed by the previous owner of the property would be useful (but is not required for our analyses). The depth of removal was indicated at 8-feet below existing grade. This information may allow us to be less restrictive of cultural and paleontological resource monitoring requirements?*

   Response: The previous owner's demolition of the existing structures is currently ongoing and exact data is not available at this time. Generally, demolition is required to remove subsurface facilities up to 8 feet below grade. Figure SQ 10-1 identifies the depth of excavation throughout the project site.

10. *What is the maximum depth of excavation expected during construction of the facility?*

    Response: Figure SQ 10-1 identifies the depth of excavation throughout the project site.

11. *In section 2.2.2 the applicant indicated that each standby generator has a 10,300 gallon fuel tank for 48 hours of operation (indicating a three MW generator burns about 215 gallons of fuel per hour). This would suggest that there would be almost 576,800 gallons of diesel stored on-site. While in section 2.7.1 it could be implied that there will only be one 10,300 gallon diesel tank for the entire backup generator system, even though there are two separate backup generator systems, located on opposite sides of each main building suggesting increased impact associated with additional piping. Please clarify how many diesel tanks are proposed and the amount and depth of piping that will be needed for the storage system?*

    Response: Each standby generator will include a 10,300-gallon storage tank. The standby generators will be mounted on a structural steel frame with the fuel storage tank located below the engine, between the frame rails (a "belly tank"). The fuel storage tanks will be filled from a hose provided by the fuel delivery truck directly into each standby generator's fuel tank. No subsurface diesel fuel piping is expected as all fuel tanks are aboveground.

12. *In section 2.4, the applicant states it would take 1 month to build the project. I assume they meant 15 months. Which is correct?*

    Response: Construction is expected to take 15 months.

Staff Queries, March 22, 2019, Cultural (13-17)

Background: Proposed Ground Disturbance

The proposed project would include the installation of three transmission line poles, construction of several bioswales (and associated drainage system?), and construction of building and structure foundations. The application, however, does not disclose the horizontal and vertical extent of ground disturbance required to construct these elements of the proposed project.

Staff Queries

13. *Please describe the type, depth, and horizontal extent of ground disturbance required to install the transmission line poles, bioswales, subsurface drainage and all building and structure foundations. A table similar to Table 1-1 in Alonso and Castells (2019), with the addition of disturbance method, would be useful.*

    In addition to the information described in the previous bullet, the application does not map some of the project elements, most notably the transmission line poles. It is unclear whether subsurface drainage features would be associated with the bioswales. Please provide a map showing the location of the transmission line poles and, if applicable, any subsurface drainage features.?

    Response: A figure showing depth of excavation/soil surface has been provided as Figure SQ 10-1.

    The Applicant and SVP are currently in discussions regarding pole locations and final pole placement will be determined during construction. The poles will be located within an approximate 75-foot corridor which was surveyed as part of the SPPE Application. In addition, no poles or construction activities will be located within San Tomas Aquino Creek or the immediate surrounding area as shown in Figure DR 11-1, Please also see DR-48.

    When constructed, depth of the excavation is anticipated to be approximately 20 feet and will be installed via an augur truck.

    Figures DR 49-1a through DR 49-1e presents the conceptual LDC landscaping and drainage plan. As noted, the bioretention areas will be approximately 2.5 feet with a 4-inch perforated drainage pipe. The bioretention areas drain to a perimeter storm drain line that exits the site at the northern corner and connects to the City of Santa Clara's storm drain system via an existing connection.

Background: Staging and Laydown Areas

Staff Query

The application does not indicate where construction staging and laydown would occur.

14. *Please describe how construction staging and laydown would be handled and map the locations to be used for these purposes.*

    Response: All staging and laydown areas will be located within the project boundaries for the LDC site. No offsite laydown and staging areas are required or proposed.

Background: Confidential Filings

Staff Queries

The application does not include the confidential filings for Cultural Resources.

15. *Please provide the results of the February 4, 2019, literature search from the Northwest Information Center (NWIC) of the California Historical Resources Information System (CHRIS).*

    Response: The results of the literature search were submitted March 25, 2019 and March 26, 2016 under request for confidentiality. Additional studies not included in the March 25th and 26th filing will be submitted separately under a repeated request for confidential designation as Attachment SQ-15.

16. *Please provide a copy of the USGS 7.5' quadrangle map (at 1:24,000 scale) under confidential cover of the literature search area delineating the areas of all past surveys and previously recorded cultural resources. The map shall include CHRIS identifying numbers for the surveys and previously recorded cultural resources. Copies also shall be provided of all technical reports whose survey coverage is wholly or partly within the area surveyed for the project, or which provide information on any archaeological excavations or architectural surveys within the literature search area (Basin 1983, 1995; Brady 2015; Busby 1999a, 1999b, 2000, 2002a, 2002b; Busby et al. 1998; Corbett and Minor 1998; D'Oro 2017; Hammerle 2015; HRA 2013; Hylkema 1998; Kaijonkoski et al. 2012; King and King 1973; Oosterhous et al. 2002; Parsons 1983; Rountree and Mellon 1982; Sikes 2007; Sikes et al. 2006; Supernowicz 2015; SWCA 2006; Whitaker 2016?*

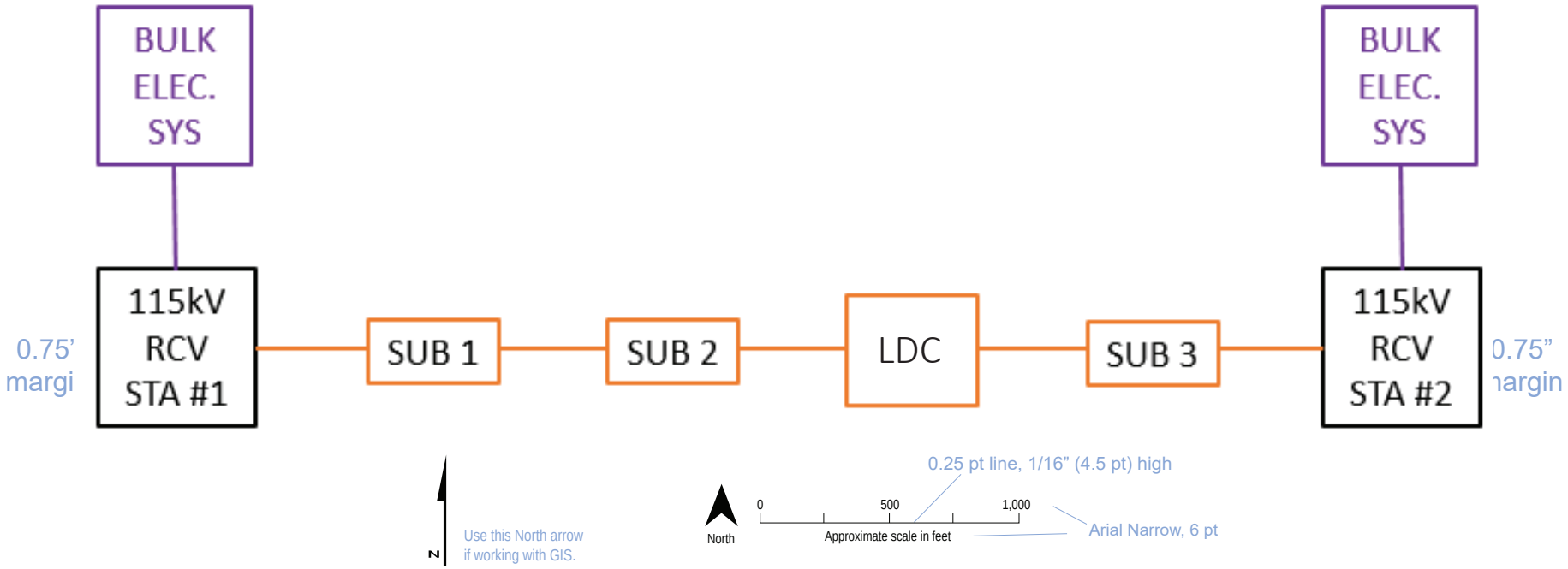
    Response: The results of the USGS 7.5' quadrangle map were submitted March 25, 2019 and March 26, 2016 under a request for confidential designation.

17. *Please provide copies of California Department of Parks and Recreation (DPR) 523 forms for all cultural resources identified in the literature search as being 45 years or older or of exceptional importance as defined in the National Register Bulletin Guidelines.?*

    Response: The results of the California DPR 523 forms were submitted March 25, 2019 and March 26, 2016 under a request for confidential designation.

Figures

0.75”
margin



Footer, or Slugline:
Arial Narrow, 6pt.
Always include JETT number and Filename.

Figure Number and Title - Arial Narrow, bold, 10/12
Figure Caption - Arial Narrow, 10/12
Figure Caption (if necessary) - Arial Narrow, 10/12

Figure D-7
Interconnection to the SVP system
Laurelwood Data Center
Santa Clara, California

Logo: 1.5-in wide
space = h space of logo
(Module 3.1.3, page 88 of Jacobs Style Guide)

JACOBS®

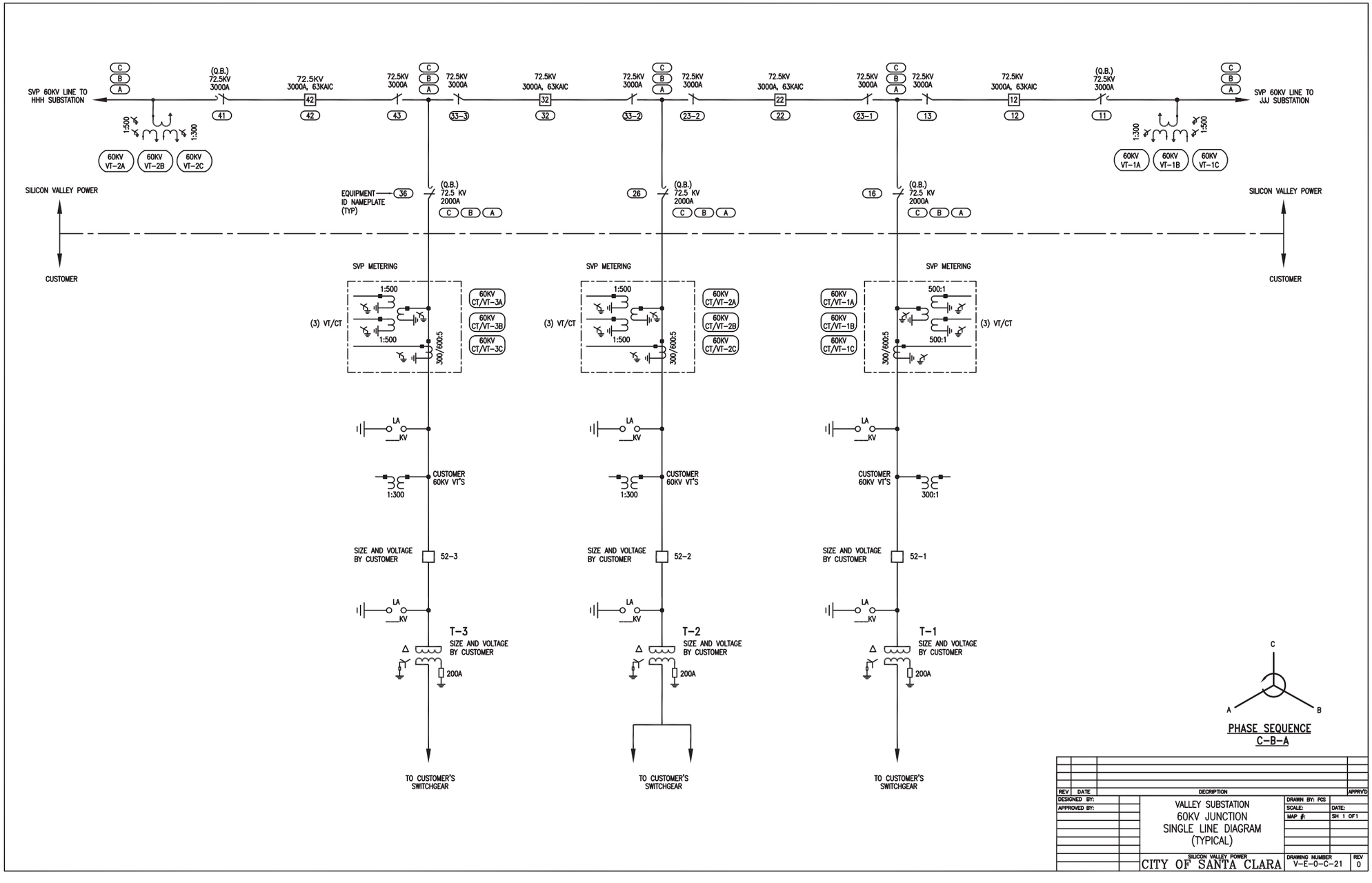


Figure DR-8 SVP
Typical Substation One-Line Diagram
Laurelwood Data Center
Santa Clara, California

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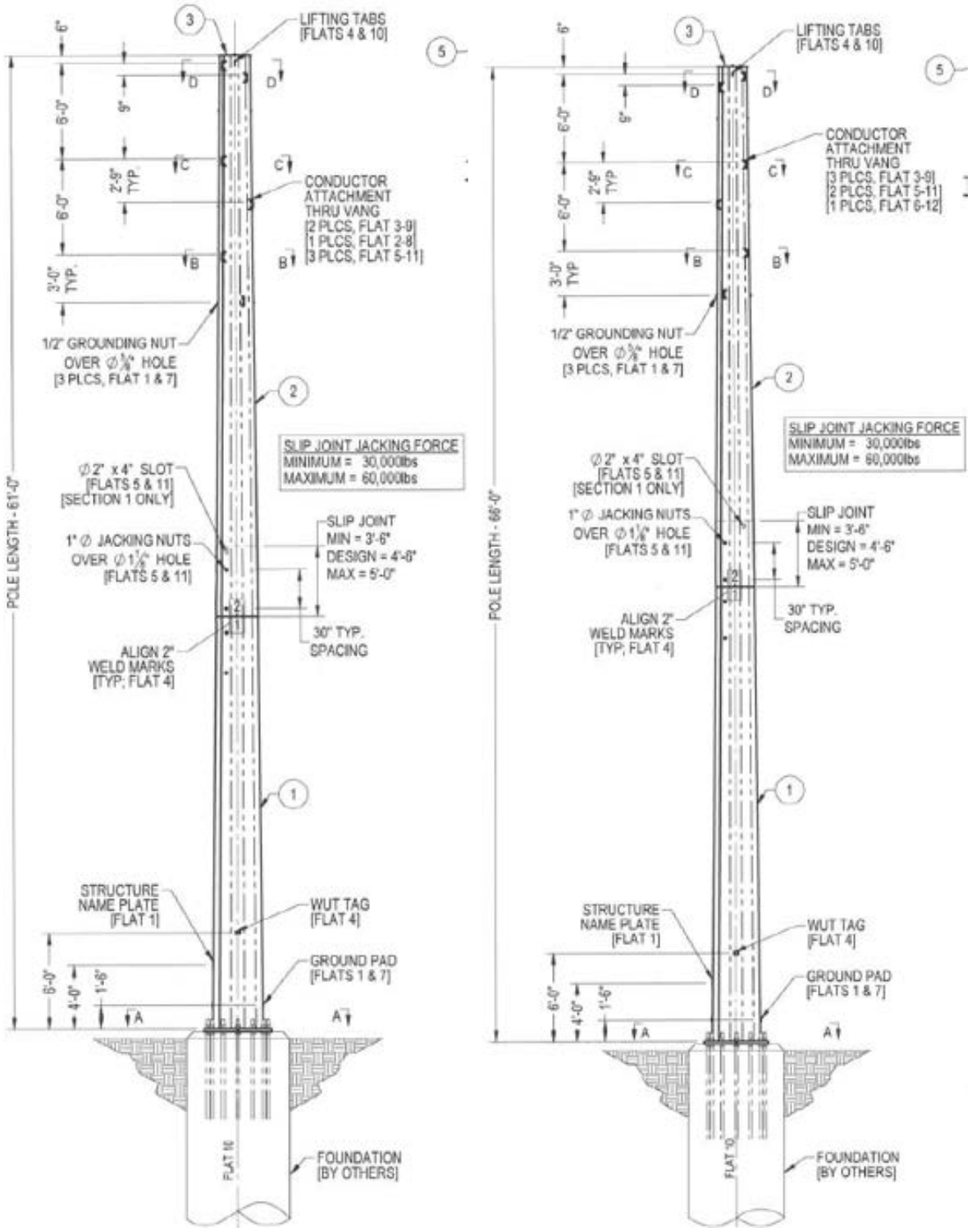

Figure DR-10
Typical SVP 60kV Pole Configurations
Laurelwood Data Center
Santa Clara, California

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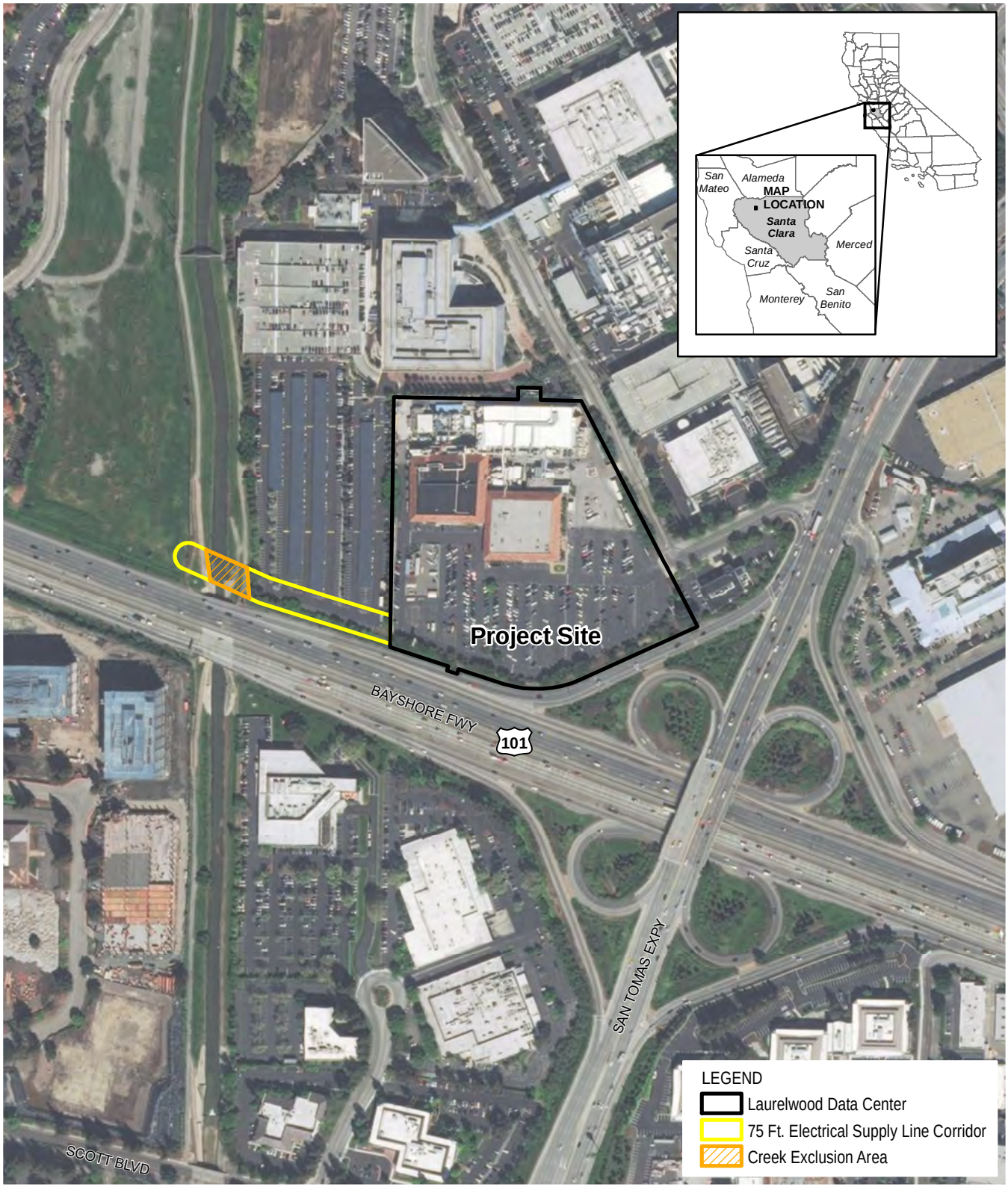

Source:
ESRI Service Layer

N

0 400 800

Approximate scale in feet

Figure DR-11
Electrical Supply Line Corridor
Laurelwood Data Center
Santa Clara, California

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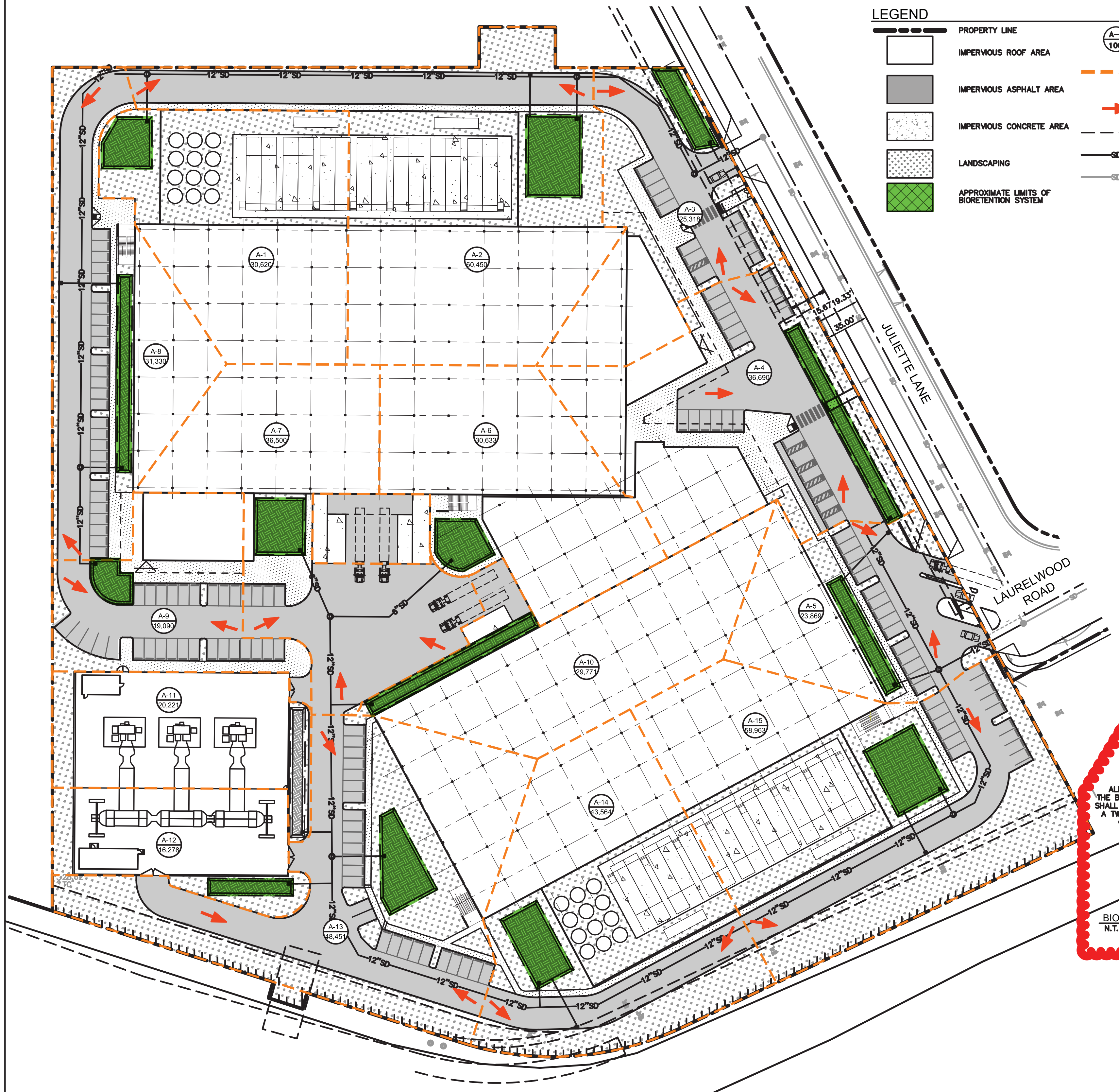
\\BROOKSIDEFILES\GIS_SHARE\ENBG\00_PROJ\E\EDGECORE\GIS\MAPS\REPORT\FIGDR-11_LOCATIONMAP.MXD 4/4/2019 5:59:20 PM



LEGEND

- PROPERTY LINE
- IMPERVIOUS ROOF AREA
- IMPERVIOUS ASPHALT AREA
- IMPERVIOUS CONCRETE AREA
- LANDSCAPING
- APPROXIMATE LIMITS OF BIORETENTION SYSTEM
- (A-1 / 100) DENOTES SUBAREA DESIGNATION / DENOTES DRAINAGE AREA IN S.F.
- DENOTES DRAINAGE MANAGEMENT AREA (DMA) BOUNDARY
- PROPOSED SURFACE FLOW DIRECTION
- EXISTING EASEMENT LINE
- PROPOSED STORM DRAIN LINE
- EXISTING STORM DRAIN LINE

EARTHWORK

CUT:	13000	CY
FILL:	19000	CY
NET:	6000	CY (FILL)

THE ABOVE QUANTITIES ARE APPROXIMATE IN PLACE VOLUMES CALCULATED FROM THE EXISTING GROUND TO THE PROPOSED FINISHED GRADE. EXISTING GROUND IS DEFINED BY THE CONTOURS AND SPOT GRADES ON THE BASE SURVEY. PROPOSED FINISHED GRADE IS DEFINED AS THE FINAL GRADE AS INDICATED ON THE GRADING PLAN(S).

THE EARTHWORK QUANTITIES ABOVE ARE FOR PERMIT PURPOSES ONLY. THEY HAVE NOT BEEN FACTORED TO ACCOUNT FOR CHANGES IN VOLUME DUE TO BULKING, CLEARING AND GRUBBING, SHRINKAGE, OVER- EXCAVATION AND RE-COMPACTION, AND CONSTRUCTION METHODS. NOR DO THEY ACCOUNT FOR THE THICKNESS OF PAVEMENT SECTIONS, FOOTINGS, SLABS, REUSE OF PULVERIZED MATERIALS THAT WILL UNDERLIE NEW PAVEMENTS, ETC. THE CONTRACTOR SHALL RELY ON THEIR OWN EARTHWORK ESTIMATES FOR BIDDING PURPOSES.

HYDROMODIFICATION APPLICABILITY

1. PER THE HYDROMODIFICATION MANAGEMENT PLAN (HMP) APPLICABILITY MAP FOR THE CITY OF SANTA CLARA, THIS PROJECT IS IN THE AREA CONSIDERED "CATCHMENTS DRAINING TO HARDENED CHANNEL AND/OR TIDAL AREAS," THEREFORE HM IS NOT REQUIRED FOR THIS PROJECT.

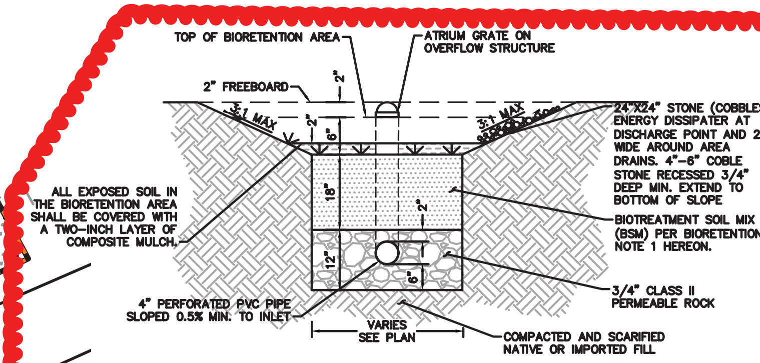
STORMWATER TREATMENT SUMMARY TABLE

DMA #	TOTAL AREA (SF)	PERVIOUS AREA (SF)	IMPERVIOUS AREA (SF)	REQUIRED TREATMENT AREA (SF) - 4% OF AREA	PROVIDED BIORETENTION TREATMENT AREA (SF)	TREATMENT FACILITY #	BMP TYPE
A-1	30,620	0	30620	1,225	2,100	BRS #1	BIORETENTION
A-2	60,450	0	60450	2,418	2,420	BRS #2	BIORETENTION
A-3	25,317	0	25317	1,013	1,047	BRS #3	BIORETENTION
A-4	39,690	0	39690	1,588	1,590	BRS #4	BIORETENTION
A-5	23,869	0	23869	955	988	BRS #5	BIORETENTION
A-6	30,633	0	30633	1,225	1,295	BRS #6	BIORETENTION
A-7	36,500	0	36500	1,460	1,550	BRS #7	BIORETENTION
A-8	31,330	0	31330	1,253	1,260	BRS #8	BIORETENTION
A-9	19,090	0	19090	764	1,706	BRS #9	BIORETENTION
A-10	29,771	0	29771	1,191	1,200	BRS #10	BIORETENTION
A-11	20,221	0	20221	809	812	BRS #11	BIORETENTION
A-12	16,278	0	16278	651	655	BRS #12	BIORETENTION
A-13	48,451	0	48451	1,938	1,970	BRS #13	BIORETENTION
A-14	43,563	0	43563	1,743	1,800	BRS #14	BIORETENTION
A-15	58,962	0	58962	2,358	2,376	BRS #15	BIORETENTION
TOTAL	514,745	0	514,745	20,590	22,769	–	–

BIORETENTION NOTES

1. BIORETENTION SOIL SHALL:
   - 1.1. ACHIEVE A LONG-TERM, IN PLACE INFILTRATION RATE OF AT LEAST 5 INCHES PER HOUR.*
   - 1.2. SUPPORT VIGOROUS PLANT GROWTH*
   - 1.3. CONSIST OF THE FOLLOWING MIXTURE OF FINE SAND AND COMPOST, MEASURED ON A VOLUME BASIS:
     60% – 70% SAND
     30%–40% COMPOST*

*REFERENCE APPENDIX C: SOIL SPECIFICATIONS OF THE SCVURPPP C.3 HANDBOOK



BIORETENTION SYSTEM (1)
N.T.S.

dcm dotterweich carlson mehner design, inc.

Kimley»Horn
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WWW.KIMLEY-HORN.COM

ENGINEER OF RECORD SEAL
REGISTERED PROFESSIONAL ENGINEER – MILES R. JOHNSON – RCE NO. 84307 – CIVIL – STATE OF CALIFORNIA

EDGECORE INTERNET REAL ESTATE
2201 LAURELWOOD ROAD, SANTA CLARA, CA 95054
A.P.N.:

JOB NO.:	094861004
PRINT DATE:	2/1/2019
DESIGNED BY:	BH
CHECKED BY:	KN
SET ISSUED:	
2/1/2019	ENTITLEMENTS
SHEET NAME:	PRELIMINARY DRAINAGE AREA MAP
SHEET NO.:	C4.0

K:\BAY_LDEV\097221001 - EDGECORE DATA CENTER\CAD\EXHIBITS\C4.0 PRELIM STORMWATER CONTROL PLAN.DWG 2/14/2019 1:43 PM NELSON, KARI

Figure DR 49-1a
Conceptual Landscaping and Drainage Plan
Laurelwood Data Center
Santa Clara, California

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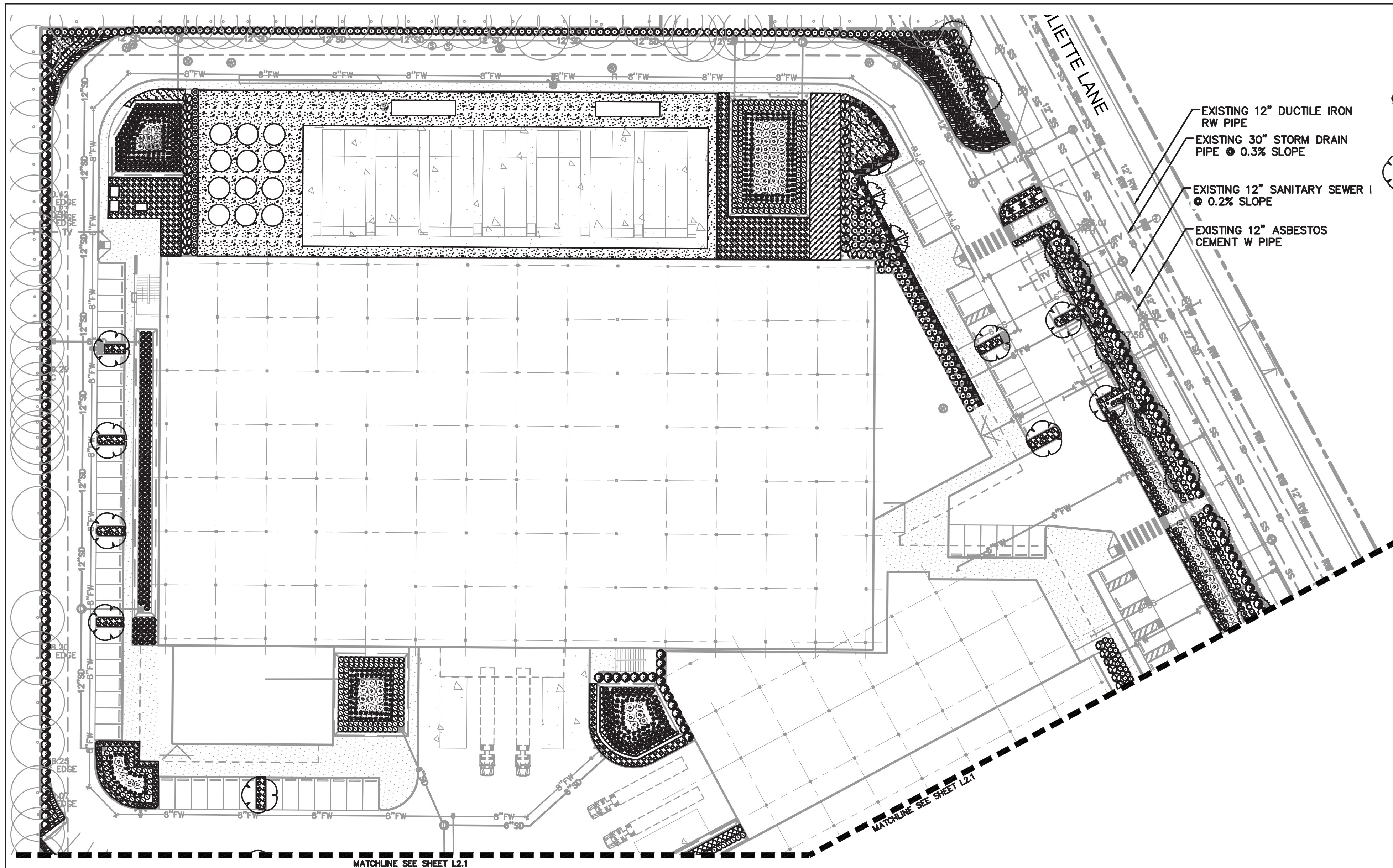

CONCEPTUAL PLANT LEGEND

(SEE SHEET L2.2 FOR FULL PLANT SCHEDULE AND NOTES)

TREES	CODE	BOTANICAL / COMMON NAME
	CD	CEDRUS DEODARA DEODAR CEDAR
	CW	CERCIS OCCIDENTALIS WESTERN REDBUD MULTI-TRUNK
	GI2	GLEDITSIA TRIACANTHOS INERMIS 'SUNBURST' SUNBURST COMMON HONEYLOCUST FRUITLESS VARIETY
	KP	KOELREUTERIA PANICULATA GOLDEN RAIN TREE
	PR	PLATANUS RACEMOSA CALIFORNIA SYCAMORE

EXISTING TREE	CODE	BOTANICAL / COMMON NAME
	ET	EXISTING TREE TO REMAIN, PROTECT IN PLACE REFERENCE TREE DISPOSITION TABLE FOR ADDITIONAL INFORMATION

SHRUBS	CODE	BOTANICAL / COMMON NAME
	AH	ARCTOSTAPHYLOS DENSIFLORA 'HOWARD MCMINN' HOWARD MCMINN MANZANITA
	CE	CHONDROPETALUM ELEPHANTINUM LARGE CAPE RUSH
	CE2	CHONDROPETALUM TECTORUM 'EL CAMPO' CAPE RUSH
	HA	HETEROMELES ARBUTIFOLIA TOYON
	LO	LIGUSTRUM OVALIFOLIUM CALIFORNIA PRIVET
	MS	MISCANTHUS SINENSIS 'ADAGIO' ADAGIO EULALIA GRASS
	MD	MUHLENBERGIA DUBIA PINE MUHLY
	ML	MUHLENBERGIA LINDHEIMERI LINDHEIMER'S MUHLY
	MR	MUHLENBERGIA RIGENS DEER GRASS
	OL	OLEA EUROPAEA 'LITTLE OLLIE' TM LITTLE OLLIE OLIVE
	PN	PHORMIUM TENAX 'DUSKY MAIDEN' DUSKY MAIDEN FLAX
	RC	RHAMNUS CALIFORNICA CALIFORNIA COFFEE BERRY
	RE	RHAMNUS CALIFORNICA 'EVE CASE' CALIFORNIA COFFEEBERRY
	RM	RHAMNUS CALIFORNICA 'MOUND SAN BRUNO' CALIFORNIA COFFEEBERRY
	RV	RIBES VIBURNIFOLIUM EVERGREEN CURRANT

GROUND COVERS	CODE	BOTANICAL / COMMON NAME
	AM2	ARCTOSTAPHYLOS X 'EMERALD CARPET' EMERALD CARPET MANZANITA
	BB	BOUTELOUA GRACILIS 'BLONDE AMBITION' BLUE GRAMA
	CG	CARISSA MACROCARPA 'GREEN CARPET' GREEN CARPET NATAL PLUM
	CH	CARISSA MACROCARPA 'HORIZONTALIS' NATAL PLUM
	CP	CARISSA MACROCARPA 'PROSTRATA' PROSTRATE NATAL PLUM
	D2	DECOMPOSED GRANITE
	FM	FESTUCA MAIREI ATLAS FESCUE

NOTE TO REVIEWER

1. FOR INFORMATION REGARDING TREES TO BE REMOVED, REFER TO TREE DISPOSITION PLANS ON SHEETS L1.1.
2. FOR FULL PLANT SCHEDULE AND ADDITIONAL INFORMATION ON PROPOSED PLANT MATERIAL SEE SHEET L2.2.

ALERT TO CONTRACTOR:

1. WHEN PERFORMING GRADING OPERATIONS DURING PERIODS OF WET WEATHER, PROVIDE ADEQUATE DEWATERING, DRAINAGE AND GROUND WATER MANAGEMENT TO CONTROL MOISTURE OF SOILS. REFER TO MASTER SITE SPECIFICATIONS.
2. ALL GENERAL CONTRACTOR WORK TO BE COMPLETED (EARTHWORK, FINAL UTILITIES, AND FINAL GRADING) BY THE MILESTONE DATE IN PROJECT DOCUMENTS.

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NOT FOR CONSTRUCTION

EDGECORE INTERNET REAL ESTATE
2201 LAURELWOOD ROAD,
SANTA CLARA, CA 95054

A.P.N.:

JOB NO.:	094861004
PRINT DATE:	2/1/2019
DESIGNED BY:	CC
CHECKED BY:	MM
SET ISSUED: 2/1/2019	ENTITLEMENTS
SHEET NAME:	LANDSCAPE PLAN
SHEET NO.:	L2.0

Figure DR 49-1b
Conceptual Landscaping and Drainage Plan
Laurelwood Data Center
Santa Clara, California

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CONCEPTUAL PLANT LEGEND

(SEE SHEET L2.2 FOR FULL PLANT SCHEDULE AND NOTES)

TREES	CODE	BOTANICAL / COMMON NAME
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	GI2	GLEDITSIA TRIACANTHOS INERMIS 'SUNBURST' SUNBURST COMMON HONEYLOCUST FRUITLESS VARIETY
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	PR	PLATANUS RACEMOSA CALIFORNIA SYCAMORE

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	ET	EXISTING TREE TO REMAIN, PROTECT IN PLACE REFERENCE TREE DISPOSITION TABLE FOR ADDITIONAL INFORMATION

SHRUBS	CODE	BOTANICAL / COMMON NAME
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	MD	MUHLENBERGIA DUBIA PINE MUHLY
	ML	MUHLENBERGIA LINDHEIMERI LINDHEIMER'S MUHLY
	MR	MUHLENBERGIA RIGENS DEER GRASS
	OL	OLEA EUROPAEA 'LITTLE OLLIE' TM LITTLE OLLIE OLIVE
	PN	PHORMIUM TENAX 'DUSKY MAIDEN' DUSKY MAIDEN FLAX
	RC	RHAMNUS CALIFORNICA CALIFORNIA COFFEE BERRY
	RE	RHAMNUS CALIFORNICA 'EVE CASE' CALIFORNIA COFFEEBERRY
	RM	RHAMNUS CALIFORNICA 'MOUND SAN BRUNO' CALIFORNIA COFFEEBERRY
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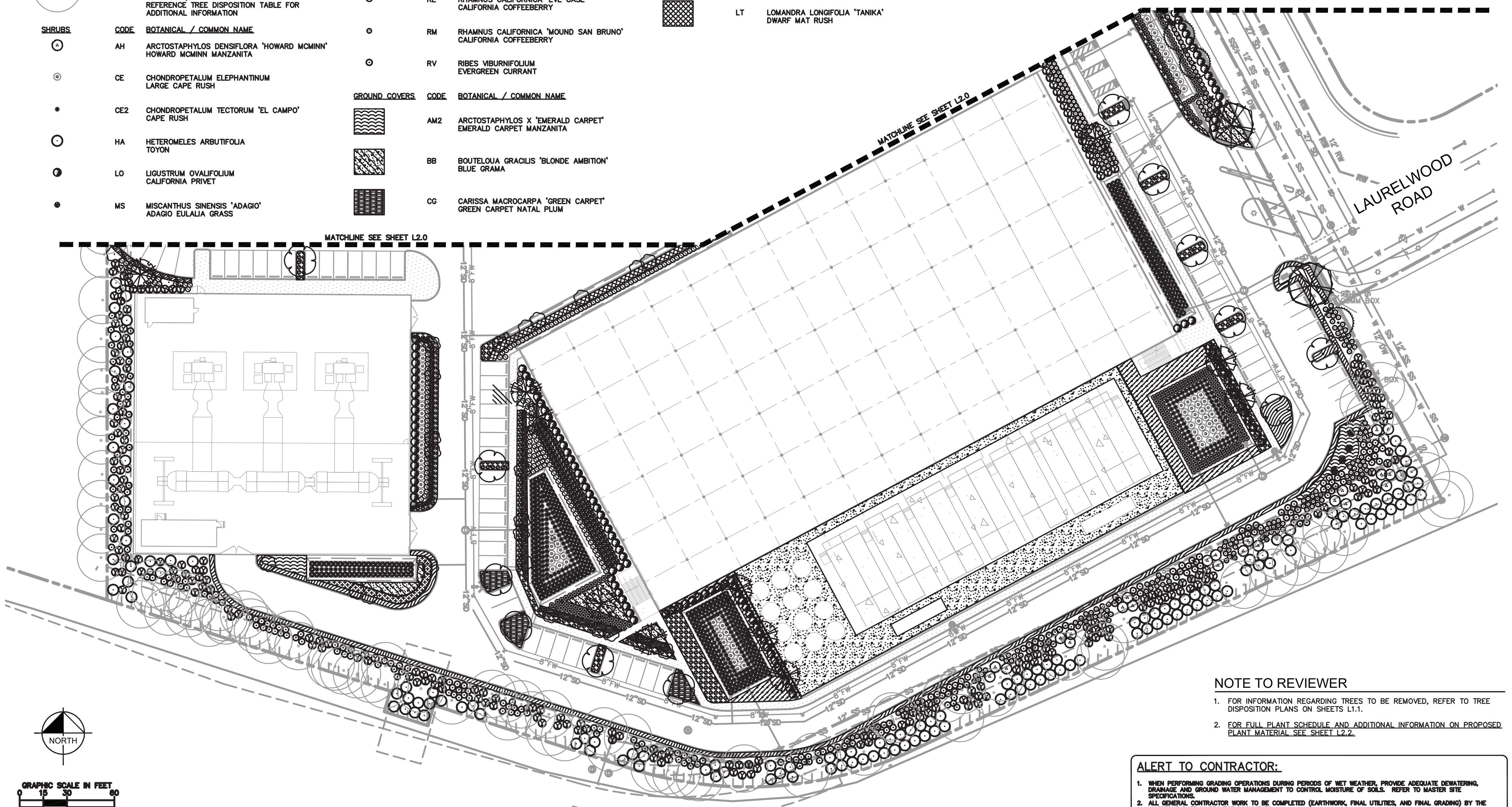
	CP	CARISSA MACROCARPA 'PROSTRATA' PROSTRATE NATAL PLUM
	D2	DECOMPOSED GRANITE
	FM	FESTUCA MAIREI ATLAS FESCUE
	JP	JUNCUS PATENS CALIFORNIA GRAY RUSH
	LB	LOMANDRA LONGIFOLIA 'BREEZE' DWARF MAT RUSH
	LT	LOMANDRA LONGIFOLIA 'TANIKA' DWARF MAT RUSH



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EDGECORE INTERNET REAL ESTATE
2201 LAURELWOOD ROAD,
SANTA CLARA, CA 95054

A.P.N.:

JOB NO.:	094861004
PRINT DATE:	2/1/2019
DESIGNED BY:	CC
CHECKED BY:	MM
SET ISSUED:	
2/1/2019	ENTITLEMENTS
SHEET NAME:	LANDSCAPE PLAN (2)
SHEET NO.:	L2.1

Figure DR 49-1c
Conceptual Landscaping and Drainage Plan
Laurelwood Data Center
Santa Clara, California

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CONCEPTUAL PLANT SCHEDULE

TREES	CODE	QTY	BOTANICAL NAME / COMMON NAME	CONT	HEIGHT/SPREAD	CAL
	CD	11	CEDRUS DEODARA / DEODAR CEDAR	24" BOX	8'-10' HT. X 4'-5' SPR.	1.5" CAL.
	CW	27	CERCIS OCCIDENTALIS / WESTERN REDBUD MULTI-TRUNK	15 GAL.	4-5' HT. X 3-4' SPR.	0.75" CAL.
	GI2	13	GLEDITSIA TRIACANTHOS INERMIS 'SUNBURST' / SUNBURST COMMON HONEYLOCUST FRUITLESS VARIETY	24" BOX	9'-11' HT. X 4'-5' SPR.	1.5" CAL.
	KP	22	KOELREUTERIA PANICULATA / GOLDEN RAIN TREE	24" BOX	9'-10' HT. X 3'-4' SPR.	1.5" CAL.
	PR	2	PLATANUS RACEMOSA / CALIFORNIA SYCAMORE	24" BOX	10-12' HT. X 4-5' SPR.	1.5" CAL.
EXISTING TREE	**CODE**	**QTY**	**BOTANICAL NAME / COMMON NAME**	**CONT**	**HEIGHT/SPREAD**	**CAL**
	ET	143	EXISTING TREE / TO REMAIN, PROTECT IN PLACE REFERENCE TREE DISPOSITION TABLE FOR ADDITIONAL INFORMATION	–		
SHRUBS	**CODE**	**QTY**	**BOTANICAL NAME / COMMON NAME**	**CONT.**	**SPACING**	**WUCOLS**
	AH	24	ARCTOSTAPHYLOS DENSIFLORA 'HOWARD MCMINN' / HOWARD MCMINN MANZANITA	5 GAL.	84" O.C.	LOW
	CE	207	CHONDROPETALUM ELEPHANTINUM / LARGE CAPE RUSH	5 GAL.	60" O.C.	LOW
	CE2	680	CHONDROPETALUM TECTORUM 'EL CAMPO' / CAPE RUSH	5 GAL.	36" O.C.	LOW
	HA	143	HETEROMELES ARBUTIFOLIA / TOYON	15 GAL.	84" O.C.	LOW
	LO	281	LIGUSTRUM OVALIFOLIUM / CALIFORNIA PRIVET	15 GAL.	60" O.C.	LOW
	MS	105	MISCANTHUS SINENSIS 'ADAGIO' / ADAGIO EULALIA GRASS	5 GAL.	36" O.C.	LOW
	MD	290	MUHLENBERGIA DUBIA / PINE MUHLY	1 GAL.	36" O.C.	LOW
	ML	485	MUHLENBERGIA LINDHEIMERI / LINDHEIMER'S MUHLY	1 GAL.	36" O.C.	LOW
	MR	687	MUHLENBERGIA RIGENS / DEER GRASS	1 GAL.	36" O.C.	LOW
	OL	121	OLEA EUROPAEA 'LITTLE OLLIE' TM / LITTLE OLLIE OLIVE	15 GAL.	48" O.C.	LOW
	PN	15	PHORMIUM TENAX 'DUSKY MAIDEN' / DUSKY MAIDEN FLAX	15 GAL.	42" O.C.	LOW
	RC	272	RHAMNUS CALIFORNICA / CALIFORNIA COFFEE BERRY	15 GAL.	60" O.C.	LOW
	RE	24	RHAMNUS CALIFORNICA 'EVE CASE' / CALIFORNIA COFFEEBERRY	15 GAL.	48" O.C.	LOW
	RM	308	RHAMNUS CALIFORNICA 'MOUND SAN BRUNO' / CALIFORNIA COFFEEBERRY	5 GAL.	36" O.C.	LOW
	RV	307	RIBES VIBURNIFOLIUM / EVERGREEN CURRANT	5 GAL.	48" O.C.	LOW
GROUND COVERS	**CODE**	**QTY**	**BOTANICAL NAME / COMMON NAME**	**CONT.**	**SPACING**	**WUCOLS**
	AM2	48	ARCTOSTAPHYLOS X 'EMERALD CARPET' / EMERALD CARPET MANZANITA	5 GAL.	48" O.C.	LOW
	BB	511	BOUTELOUA GRACILIS 'BLONDE AMBITION' / BLUE GRAMA	5 GAL.	24" O.C.	LOW
	CG	165	CARISSA MACROCARPA 'GREEN CARPET' / GREEN CARPET NATAL PLUM	5 GAL.	36" O.C.	LOW
	CH	459	CARISSA MACROCARPA 'HORIZONTALIS' / NATAL PLUM	5 GAL.	36" O.C.	LOW
	CP	1,006	CARISSA MACROCARPA 'PROSTRATA' / PROSTRATE NATAL PLUM	5 GAL.	36" O.C.	LOW
	DG	17,774 SF	DECOMPOSED GRANITE	–	–	–
	FM	95	FESTUCA MAIREI / ATLAS FESCUE	5 GAL.	24" O.C.	LOW
	JP	1,145	JUNCUS PATENS / CALIFORNIA GRAY RUSH	1 GAL.	24" O.C.	LOW
	LB	526	LOMANDRA LONGIFOLIA 'BREEZE' / DWARF MAT RUSH	5 GAL.	24" O.C.	LOW
	LT	312	LOMANDRA LONGIFOLIA 'TANIKA' / DWARF MAT RUSH	5 GAL.	24" O.C.	LOW

LANDSCAPE NOTES

1. THE SELECTION OF PLANT MATERIAL IS BASED ON CLIMATIC, AESTHETIC, AND MAINTENANCE CONSIDERATIONS.
2. GROUND COVER SHALL BE PLANTED AT A MAX SPACING OF 12" ON CENTER TO RESULT IN MAX COVERAGE WITHIN ONE YEAR OF INITIAL PLANTING.
3. ALL PLANTING AREAS SHALL BE PREPARED WITH APPROPRIATE SOIL AMENDMENTS, FERTILIZERS AND APPROPRIATE SUPPLEMENTS BASED UPON A SOILS REPORT FROM AN AGRICULTURAL SUITABILITY SOIL SAMPLE TAKEN FROM THE SITE.
4. GROUNDCOVERS OR ORGANIC SHREDDED BARK MULCH SHALL FILL IN BETWEEN SHRUBS TO SHIELD THE SOIL FROM THE SUN, EVAPOTRANSPIRATION, AND RUN-OFF.
5. ALL SHRUB BEDS SHALL BE MULCHED WITH ORGANIC SHREDDED BARK MULCH TO A 3" MINIMUM DEPTH TO HELP CONSERVE WATER, LOWER SOIL TEMPERATURE, AND REDUCE WEED GROWTH. THE SHRUBS SHALL BE ALLOWED TO GROW IN THEIR NATURAL FORMS.
6. ALL LANDSCAPE IMPROVEMENTS SHALL FOLLOW THE GUIDELINES SET FORTH BY THE CITY OF SANTA CLARA AND COUNTY OF SANTA CLARA.
7. ALL VEGETATION SHALL BE MAINTAINED FREE OF PHYSICAL DAMAGE OR INJURY FROM LACK OF WATER, EXCESS CHEMICAL FERTILIZER OR OTHER TOXIC CHEMICAL, BLIGHT OR DISEASE. ANY VEGETATION WHICH SHOWS SIGNS OF SUCH DAMAGE OR INJURY AT ANY TIME SHALL BE REPLACED BY THE SAME, SIMILAR, OR SUBSTITUTE VEGETATION OF A SIZE, FORM, AND CHARACTER WHICH WILL BE COMPARABLE AT FULL GROWTH.
9. ANY COMPACTED SOILS IN PLANTING AREAS SHALL BE RETURNED TO A "FRIABLE" CONDITIONS PRIOR TO THE INSTALLATION OF PLANT MATERIALS. FRIABLE CONDITION IS DEFINED AS AN EASILY CRUMBLED OR LOOSELY COMPACTED CONDITION WHEREBY THE ROOT STRUCTURE OF NEWLY PLANTED MATERIAL WILL BE ALLOWED TO SPREAD UNIMPEDED.
10. APPROXIMATE PLANT QUANTITIES ARE PROVIDED IN THE LEGEND FOR CONVENIENCE ONLY. THE CONTRACTOR IS RESPONSIBLE TO PROVIDE THE CORRECT QUANTITY OF PLANT MATERIAL REGARDLESS OF THE QUANTITIES INDICATED IN THE LEGEND.
11. PROVIDE WEED CONTROL PER SPECIFICATIONS.
12. PROVIDE AGRICULTURAL SUITABILITY AND FERTILITY TESTS. LANDSCAPE CONTRACTOR SHALL INCORPORATE ALL SOILS LAB RECOMMENDATIONS. FOR BIDDING PURPOSES, ASSUME THE FOLLOWING:
    AMEND TOPSOIL TO 6" DEPTH WITH:
    A.) 4 CUBIC YARDS NITROLIZED SOIL AMENDMENT
    B.) 15 LBS. 6-20-20 COMMERCIAL FERTILIZER
    C.) 15 LBS AGRICULTURAL GYPSUM
    D.) 10 LBS GRO POWER PLUS SOIL CONDITIONER OR APPROVED EQUAL
    PREPARE ALL BACKFILL SOIL AS RECOMMENDED BUT NO LESS PER CUBIC YARD THAN AS FOLLOWS:
    A.) 6-20-20 FERTILIZER
    B.) 4/5 CUBIC YARD SCREENED TOPSOIL
    C.) 1/5 CUBIC YARD NITROLIZED SOIL AMENDMENT
    D.) 1 LBS ORGANIC GYPSUM
    E.) 2 LBS GRO POWER PLUS SOIL CONDITIONER OR APPROVED EQUAL
13. FOR SOILS LESS THAN 6% ORGANIC MATTER IN THE TOP 6 INCHES OF SOIL, COMPOST AT A RATE OF A MINIMUM OF FOUR CUBIC YARDS PER 1,000 SQUARE FEET OF PERMEABLE AREA SHALL BE INCORPORATED TO A DEPTH OF SIX INCHES INTO THE SOIL.
14. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL PLANT MATERIAL AND IRRIGATION SYSTEMS PROPOSED AND EXISTING-TO-REMAIN FOR A PERIOD OF 90-DAYS AFTER COMPLETION OF CONSTRUCTION. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR THE EXISTING AND PROPOSED PLANT MATERIAL FOR A ONE-YEAR PERIOD STARTING AT FINAL ACCEPTANCE OF THE IMPROVEMENTS. DURING THIS PERIOD THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPLACING ANY DEAD OR IN-DECLINE PLANT MATERIAL OR DAMAGED IRRIGATION COMPONENTS IN-KIND.

I HAVE COMPLIED WITH THE CRITERIA OF THE WATER EFFICIENT LANDSCAPE ORDINANCE AND APPLIED THEM FOR THE EFFICIENT USE OF WATER IN THE LANDSCAPE CONCEPT DESIGN.

MATTHEW J. MORGAN, PLA 6256

LANDSCAPE DATA TABLE

CITY OF SANTA CLARA MUNICIPAL CODE	REQUIRED	PROVIDED
ZONE: LIGHT INDUSTRIAL		
TOTAL SITE AREA: 521,413 SF (11.97 ACRES)		
TOTAL LANDSCAPE AREA: 112,300 SF (2.58ACRES)		
TOTAL BUILDING PAD AREA: 184,273 SF (4.23ACRES)		
TOTAL VUA (VEHICULAR USE AREA): 117,500 (2.70ACRES)		
DEVELOPMENT CRITERIA - LANDSCAPE PROVISIONS		
TOTAL LANDSCAPE AREA COVERAGE	10% (OF TOTAL VUA AREA SPREAD EVENLY ACROSS VUA AND BUILDING FRONTAGE) 117,500 SF X 0.10 =11,750SF LANDSCAPE AREA	112,300 SF LANDSCAPE AREA
TREE MITIGATION	20 TREES REMOVED REPLACE AT 2:1 MIN. 24" BOX SIZE, OR 1:1 MIN. 48" BOX SIZE	REPLACED WITH: 49 TREES 24" BOX SIZE (REPLACES 16 TREES), EQUIVALENT OF 24 TREE REPLACEMENTS
DEVELOPMENT CRITERIA - VEHICULAR USE AREA (VUA)		
PARKING LOT SCREENING	30" HEIGHT MINIMUM LANDSCAPED BERM	LIMITED AREA FOR GRADING WITHIN THE BUILDING FRONTAGE. A DENSE LANDSCAPE SCREEN OF 30" HEIGHT MINIMUM WILL PROVIDE A BUFFER FROM THE STREET

dcm
dotterweich carlson mehner design, inc.

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LICENSED LANDSCAPE ARCHITECT — STATE OF CALIFORNIA

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SANTA CLARA, CA 95054

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SHEET NAME: LANDSCAPE NOTES

SHEET NO.: L2.2

\\PLSFP01\CA_PLS\PROJECT\BAY_LDEV\097221001 - EDGECORE DATA CENTER\CADD\EXHIBITS\L2.0 LANDSCAPE PLANTING 2/14/2019 3:02 PM BROCKWELL, NICOLETTA

Figure DR 49-1d
Conceptual Landscaping and Drainage Plan
Laurelwood Data Center
Santa Clara, California

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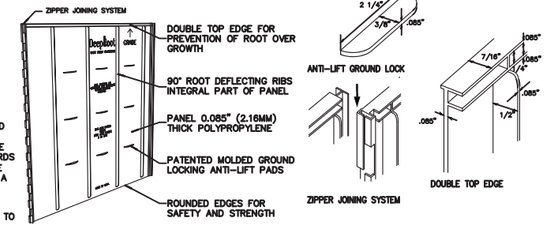
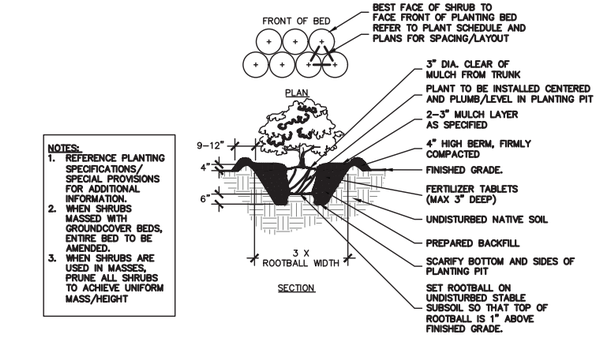
SPECIFIED TREE ROOT BARRIERS ARE A MECHANICAL BARRIER AND ROOT DEFLECTOR TO PREVENT TREE ROOTS FROM DAMAGING HARDSCAPES AND LANDSCAPES. ASSEMBLED IN 2' LONG MODULES LINEAR APPLICATIONS DIRECTLY BESIDE A HARDSCAPE ADJACENT TO ONE SIDE OF THE TREES (LINEAR PLANTING STYLE).

A. MATERIALS
1. THE CONTRACTOR SHALL FURNISH AND INSTALL TREE ROOT BARRIERS AS SPECIFIED. THE TREE ROOT BARRIERS SHALL BE PRODUCT # UB 48-2 AS MANUFACTURED BY DEEP ROOT PARTNERS, L.P. 530 WASHINGTON STREET, SAN FRANCISCO, CA 94111 (800-458-7668), OR APPROVED EQUAL. THE BARRIER SHALL BE BLACK, INJECTION MOLDED PANELS, OF 0.085" WALL THICKNESS IN MODULES 24" LONG BY 48" DEEP; MANUFACTURED WITH A MINIMUM 50% POST CONSUMER RECYCLED POLYPROPYLENE PLASTIC WITH ADDED ULTRAVIOLET INHIBITORS; RECYCLABLE. EACH PANEL SHALL HAVE:

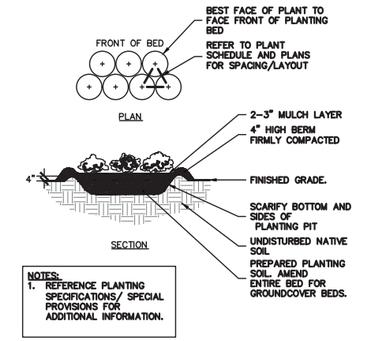
B. CONSTRUCTION AND INSTALLATION
1. THE CONTRACTOR SHALL INSTALL THE TREE ROOT BARRIERS WITH THE REQUIRED NUMBER OF PANELS FOR THE LENGTH SHOWN AND IN THE MANNER SHOWN ON THE DRAWINGS. ROOT BARRIER SHALL EXTEND 10' IN EACH DIRECTION FROM THE TRUNK OF THE TREE. VERTICAL ROOT DEFLECTING RIBS SHALL BE FACING INWARDS TO THE ROOT BALL AND THE TOP OF THE DOUBLE EDGE SHALL BE 1/2" ABOVE GRADE. EACH OF THE REQUIRED NUMBER OF PANELS SHALL BE CONNECTED IN A LINEAR FASHION AND PLACED ALONG THE ADJACENT HARDSCAPE.
2. EXCAVATION AND SOIL PREPARATION SHALL CONFORM TO THE DRAWINGS
3. THE TREE ROOT BARRIERS SHALL BE BACKFILLED ON THE OUTSIDE WITH 3/4" TO 1 1/2" GRAVEL OR CRUSHED ROCK AS SHOWN ON THE DRAWINGS. NO GRAVEL BACKFILL IS REQUIRED FOR A LINEAR PLANTING



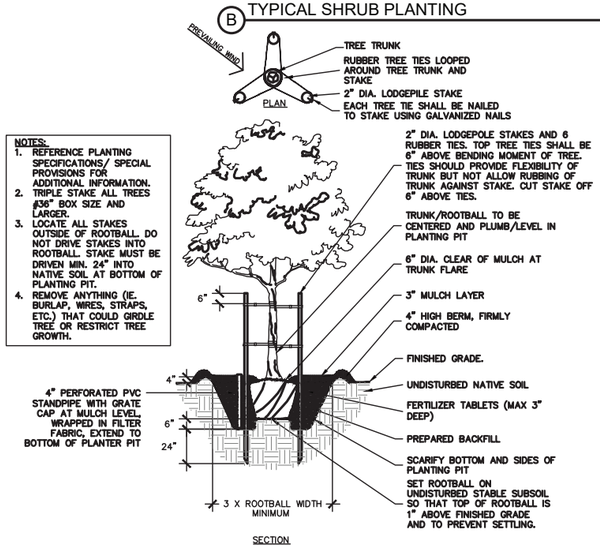
A 48" DEEP ROOT TREE BARRIER NTS



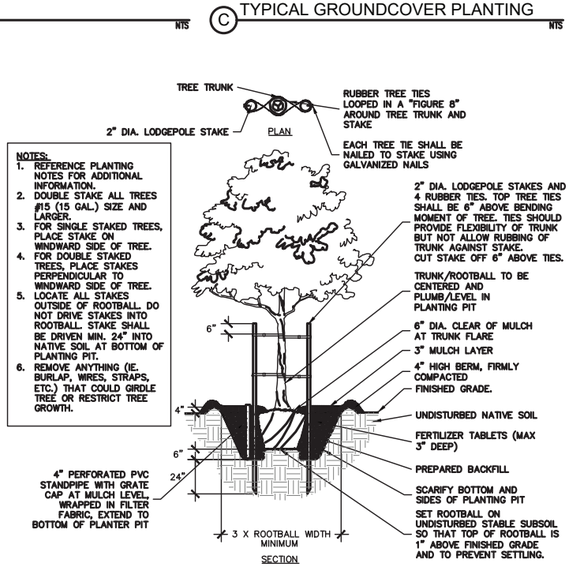
B TYPICAL SHRUB PLANTING NTS



C TYPICAL GROUNDCOVER PLANTING NTS



D 36" AND LARGER BOX TREE PLANTING NTS



E TYPICAL TREE PLANTING (UP TO 24" BOX) NTS

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SHEET NAME:
LANDSCAPE DETAILS

SHEET NO.: L2.3

Figure DR 49-1e
Conceptual Landscaping and Drainage Plan
Laurelwood Data Center
Santa Clara, California

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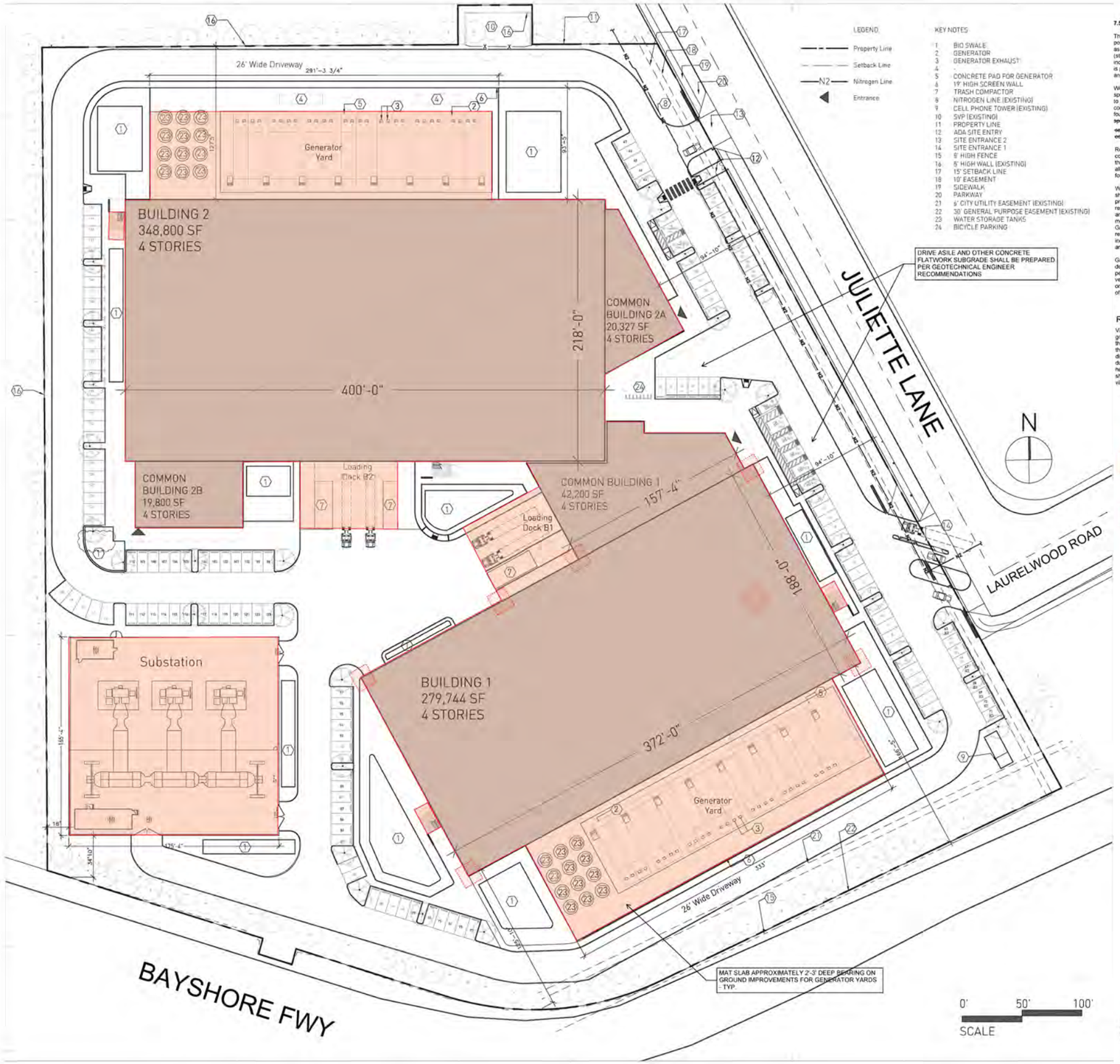

7.5.2 Ground Improvement Design Guidelines

The ground improvement columns will extend from building subgrade to near the bottom of the potentially liquefiable layers as necessary to meet the design criteria, estimated to be as deep as 25 feet below existing grades. The ground improvement design should reduce the total (static plus seismic) settlement to 1½ inches or less, with no more than ¾-inch of static nor 1-inch of seismic settlement allowed as a component of the total settlement. This total settlement is preliminary and this criteria should be confirmed collaboratively with the structural engineer and owner.

We anticipate a ground improvement element spacing of about 4 to 6 feet on center beneath spread footing foundations and 5 to 8 feet on center within slab-on-grade areas, including mats, to meet the performance criteria given above. Due to the variability and uncertainty of ground conditions, we recommend that ground improvement element spacing not exceed 6 feet in foundation areas, and 8 feet in slab-on-grade improvement areas. ~~We anticipate a tighter spacing will likely be required for the CLSM column methodology, as vibratory consolidation of sandy soils is typically more effective laterally at densification than non-vibratory displacement column construction.~~

Research indicates that pore pressure migration can affect even improved areas, and it is common to continue densification improvement to a distance outside of the building area. For that reason, ground improvement should be designed to provide adequate confinement around all foundations at the perimeter of the structure (at least one row of columns beyond the foundation limits) in addition to the foundation elements.

We recommend that the ground improvement design include, but not be limited to: 1) drawings showing the ground improvement layout, spacing and diameter; 2) the foundation layout plan, 3 proposed ground improvement length, 4) top and bottom elevations. We should be retained to review the ground improvement contractor's plan and settlement estimates prior to construction and to review and confirm that the contractor's ground improvement design will satisfactorily meet the design criteria based on the performance testing. Following the completion of the Ground Improvement Performance Testing ~~indicated below~~, a final ground improvement design report and calculation package, including support for the ground improvement design and indicating that the design criteria will be met, should be submitted to the design team for review and approval.

Ground improvement would generally be constructed as follows: 1) clear the site of existing demolition debris, 2) mass grading to the building pad subgrade elevation, 3) install performance test arrays to confirm the design spacing achieves the densification requirements, verified by CPT testing and additional liquefaction analyses, 4) install the ground improvement on the approved layout, and 5) re-compact top of building pad, as required, prior to construction of remainder of pad and the foundations.

RECOMMENDED GROUND IMPROVEMENT PROCEDURE

Vibro replacement and granular compaction piles are similar in that a probe is vibrated into the ground to the design depth and a compacted open-graded gravel column is constructed from the bottom up. The surrounding soils are densified by the displacement of the soil as well as the vibrations from consolidating and expanding the gravel column laterally. One of the disadvantages of these densification pile types are the noise and vibration (and sometimes dust) produced during construction. The vibrations may cause noise and vibrations that can be heard or felt off-site. Pre-drilling through surficial materials may reduce noise and vibration, and should be anticipated for improvement areas adjacent to the site that may be sensitive to vibrations.

VIBRO REPLACEMENT - STONE COLUMNS/ BELOW SPREAD FOOTINGS: 4'-6" ON-CENTER TYP. BELOW SLAB-ON-GRADE: 6'-8" ON-CENTER TYP. ESTIMATED DEPTH IS 25'-0" +/-

TYPICAL 3'-0" DEEP SPREAD FOOTING (SIZES MAY VARY) SUPPORTED ON ENGINEERED FILL AND GROUND IMPROVEMENTS. FOUNDATIONS ARE APPROXIMATELY SPACED 30' ON CENTER +/- AND SUPPORT STRUCTURAL STEEL FRAMED BUILDING. GRAPHICS ON SITE PLAN ARE FOR REFERENCE ONLY AND DO NOT SHOW TOTAL QUANTITY OR SIZES

NOTE: FOR UNSHADED AREAS EXTENT OF THE EXCAVATIONS WILL BE BETWEEN 2 AND 6 FEET BELOW GRADE, INCLUDING THE STORM DRAIN SYSTEM.

NOTE: FOR DRAWING CLARITY, DEMOLITION PLAN MAY NOT INDICATE ALL TRUCKS THAT ARE TO REMAIN. COORDINATE WORK WITH ALL TREES TO REMAIN INDICATED ON LANDSCAPE DRAWINGS

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PROJECT
EDGECORE INTERNET REAL ESTATE
EdgeCore Laurelwood
2201 Laurelwood Road
Santa Clara, California
PROJECT NUMBER 18.0011
PROPOSED SITE PLAN
SP102

Figure SQ 10-1
Proposed Excavation Depths
Laurelwood Data Center
Santa Clara, California

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Attachment DR-21
Revised Emissions Workbook

Appendix 3.3B, Table 1
Operation Emissions - Summary
EdgeCore LDC
Revised April 2019

Operation Criteria Pollutant Emissions with EPA Tier 2 Emission Factors

Annual Operation	Average Daily Emissions (lbs/day) [a]					
	VOC	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$
Standby Generators	14.7	50.9	287	0.35	1.02	1.02
Mobile Sources	0.11	2.47	2.22	0.02	0.22	0.10
Facility Upkeep [c]	22.4	4.42	5.22	0.03	0.40	0.40
Project Total	37.2	57.8	294	0.40	1.63	1.51
BAAQMD Daily Thresholds of Significance [b]	54	--	54	--	82	54
Exceeds Daily Threshold (Y/N)?	N	N	Y	N	N	N
Annual Operation	**Maximum Annual Emissions (tpy) [a]**					
	VOC	**CO**	**NO_X**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Standby Generators	2.65	9.16	51.6	0.06	0.18	0.18
Mobile Sources	0.02	0.45	0.41	0.00	0.04	0.02
Facility Upkeep	4.09	0.81	0.95	0.01	0.07	0.07
Project Total	6.75	10.4	53.0	0.07	0.30	0.27
BAAQMD Annual Thresholds of Significance [b]	10	--	10	--	15	10
Exceeds Annual Threshold (Y/N)?	N	N	Y	N	N	N

Operation GHG Emissions

Annual Operation	Maximum Annual Emissions (metric tons/year) [a]			
	CO_2	CH_4	N_2O	CO_2e
Standby Generators	6,121	0.25	0.05	6,142
Mobile Sources	299	0.01	0.00	300
Facility Upkeep	253,836	28.0	2.51	255,283
Project Total	260,256	28.2	2.56	261,726
BAAQMD Thresholds of Significance [b]	--	--	--	10,000
Exceeds Threshold (Y/N)? [d]	N	N	N	N

Notes:

[a] Emissions assume concurrent operation of all 56 standby diesel generators at 100% load, even though 33 are only expected to operate at any one time, and include emissions associated with offsite vehicles and ongoing facility upkeep.

[b] BAAQMD Thresholds of Significance taken from Table 2-1 of the *2017 CEQA Air Quality Guidelines* (BAAQMD, 2017).

[c] The following factors were used to convert facility upkeep emissions from tpy to lbs/day:

1 year =	365	days
1 ton =	2,000	lbs

[d] The GHG Threshold of Significance is pertinent to only stationary sources, such that only the standby generator emissions are compared.

Appendix 3.3B, Table 2
Standby Diesel Generator: Performance Data
EdgeCore LDC
Revised April 2019

Performance Data

Parameter	Units	EPA Tier 2 Certified Emission Factors Basis			Note
		100% Load	75% Load	50% Load	
Engine Power	BHP	4,423	3,364	2,305	1
Generator Power with Fan	MW	3.0	2.3	1.5	1, 2
Fuel Consumption	gal/hr	214.2	165.3	130.4	1, 2
Inlet Temperature	°F	131.3	127.8	126.9	1
Exhaust Stack Outlet Temperature	°F	891.9	865.8	858.0	1, 2
Exhaust Gas Outlet Flow Rate	ft^3/min (cfm)	25,620.0	20,121.0	17,314.7	1, 2
Wet Exhaust Volume Flow Rate (32°F and 29.98 in Hg)	ft^3/min (cfm)	9,320.0	7,463.6	6,460.8	1
Dry Exhaust Volume Flow Rate (32°F and 29.98 in Hg)	ft^3/min (cfm)	8,667.2	6,958.6	6,059.1	1
Heat Input	MMBtu/hr	29.6	22.8	18.0	3
Heating Value	MMBtu/gal	0.138	0.138	0.138	4
Operation					
Number of Standby Generators	units	56	56	56	5
Annual Hours of Operation per Unit	hrs/yr	50	50	50	6
Estimated Stack Emissions					
NO_X	g/hp-hr	3.78	3.78	3.78	2, 10
CO	g/hp-hr	0.67	0.67	0.67	2, 10
VOC	g/hp-hr	0.19	0.19	0.19	2, 10
PM	g/hp-hr	0.01	0.01	0.01	2, 7, 10
SO_2 - 15 ppmw Maximum Fuel Sulfur	lb/hp-hr	1.02E-05	1.04E-05	1.20E-05	8
Stack Height	ft	40	40	40	9
Stack Diameter	in	20	20	20	9

Notes:

1. Reflects representative generator OEM provided information (CAT-C175-3MW-performance.pdf).

2. Reflects representative generator technical specification information for Standby operation with potential site variation (CAT-C175-3MW-specsheet.pdf). Variations in generator load will change the estimated stack emissions, though all are conservatively assumed to be equal to the 100% load emission rates in the absence of more refined data.

3. Calculated from other data provided within the table.

4. The heating value of diesel is from 40 CFR 98, Table C-1 (for Distillate Fuel Oil No. 2).

5. Reflects intended project design. Although only 33 generators are expected to operate concurrently, emissions will conservatively assume all 56 could operate concurrently.

6. Regulatory limit for standby generators, per 17 CCR 93115.6.

7. Includes an 85% control of particulate matter with generator control technology. The control technology includes the combination of an oxidation catalyst and a diesel particulate filter.

8. 13 CCR 2281 limits the sulfur content of California diesel fuel to 15 ppmw (https://www.arb.ca.gov/fuels/diesel/081404dslregs.pdf). The following conversion factors were used to calculate a SO_2 emission factor from this sulfur content:

Density of Diesel Fuel (lb/gal):	7.05	[*AP-42* , Appendix A, Page A-6 (EPA, 1985)]
Molecular Weight of Sulfur:	32	
Molecular Weight of SO_2:	64	

9. Reflects information provided by project engineers (Re: Site plan alignment.msg).

10. The EPA Tier 2 Certified Emission Factors in units of g/kWh are presented below, based on the certification for Model Year 2017 Engine Family HCPXL78.1NZS as obtained from EPA's Nonroad Compression Ignition Engines Certification Database (https://www.epa.gov/compliance-and-fuel-economy-data/annual-certification-data-vehicles-engines-and-equipment):

Pollutant	EPA Tier 2 Certified Emission Factors (g/kWh)
NO_X	5.07
CO	0.90
VOC as NMHC	0.26
PM	0.12

The above were converted to units of g/hp-hr using the following factor: 1 kW = 1.341 hp.

Appendix 3.3B, Table 3
Standby Diesel Generator: Operation Emissions - Tier 2 Criteria Pollutants
EdgeCore LDC
Created April 2019

Units	100% Load		75% Load		50% Load	
	Per Generator	Facility-Wide [e]	Per Generator	Facility-Wide [e]	Per Generator	Facility-Wide [e]
NO_x Emissions						
(lb/hr) [a]	36.87	2,064	28.04	1,570	19.21	1,076
(lb/day) [b]	5.12	287	3.89	218	2.67	149
(lb/month) [c]	154	8,602	117	6,542	80.05	4,483
(lb/year) [d]	1,843	103,222	1,402	78,508	961	53,793
(tpy) [d]	9.22E-01	51.61	7.01E-01	3.93E+01	4.80E-01	2.69E+01
CO Emissions						
(lb/hr) [a]	6.54	366	4.98	279	3.41	191
(lb/day) [b]	0.91	50.90	0.69	38.71	0.47	26.53
(lb/month) [c]	27.27	1,527	20.74	1,161	14.21	796
(lb/year) [d]	327	18,324	249	13,936	171	9,549
(tpy) [d]	1.64E-01	9.16	1.24E-01	6.97E+00	8.53E-02	4.77E+00
VOC Emissions						
(lb/hr) [a]	1.89	106	1.44	80.52	0.99	55.17
(lb/day) [b]	0.26	14.70	0.20	11.18	0.14	7.66
(lb/month) [c]	7.88	441	5.99	336	4.11	230
(lb/year) [d]	94.53	5,293	71.89	4,026	49.26	2,759
(tpy) [d]	4.73E-02	2.65	3.59E-02	2.01E+00	2.46E-02	1.38E+00
SO_2 Emissions						
(lb/hr) [a]	0.05	2.54	0.03	1.96	0.03	1.54
(lb/day) [b]	0.01	0.35	0.00	0.27	0.00	0.21
(lb/month) [c]	0.19	10.57	0.15	8.16	0.11	6.44
(lb/year) [d]	2.27	127	1.75	97.89	1.38	77.22
(tpy) [d]	1.13E-03	0.06	8.74E-04	4.89E-02	6.89E-04	3.86E-02
PM Emissions						
(lb/hr) [a]	0.13	7.33	0.10	5.57	0.07	3.82
(lb/day) [b]	0.02	1.02	0.01	0.77	0.01	0.53
(lb/month) [c]	0.55	30.54	0.41	23.23	0.28	15.92
(lb/year) [d]	6.54	366	4.98	279	3.41	191
(tpy) [d]	3.27E-03	0.18	2.49E-03	1.39E-01	1.71E-03	9.55E-02

Notes:
[a] The hourly emission rates are for the diesel generator in standby operation only (i.e., excludes startup or shutdown emissions from normal operation).
[b] The daily emission rates are the monthly emission rates averaged over 30 days.
[c] The monthly emission rates are the yearly emission rates averaged over 12 months.
[d] The annual emission rates assume a maximum of 50 hours of operation per year for each standby generator.
[e] Facility-wide emissions assume all 56 generators could operate concurrently, although the project expects to operate no more than 33 generators at once.

Appendix 3.3B, Table 4
Standby Diesel Generator: Operation Emissions - Air Toxics
EdgeCore LDC
Revised April 2019

Assumptions:

Number of Generators	56	units
Annual Hours of Operation per Unit:	50	hrs/yr
Maximum Hourly Heat Input per Unit:	30	MMBtu/hr
Maximum Annual Heat Input per Unit:	1,478	MMBtu/yr

Pollutant	Emission Factors	Facility-Wide Emissions [b]			Per Generator Emissions [b]			Classification	
	lb/MMBtu [a]	lb/hr	lb/yr	tpy	lb/hr	lb/yr	tpy	TAC [c]	HAP [d]
Acenaphthene	4.68E-06	7.75E-03	3.87E-01	1.94E-04	1.38E-04	6.92E-03	3.46E-06	--	--
Acenaphthylene	9.23E-06	1.53E-02	7.64E-01	3.82E-04	2.73E-04	1.36E-02	6.82E-06	--	--
Acetaldehye [e]	2.52E-05	4.17E-02	2.09E+00	1.04E-03	7.45E-04	3.72E-02	1.86E-05	X	X
Acrolein [e]	7.88E-06	1.30E-02	6.52E-01	3.26E-04	2.33E-04	1.16E-02	5.82E-06	X	X
Anthracene	1.23E-06	2.04E-03	1.02E-01	5.09E-05	3.64E-05	1.82E-03	9.09E-07	--	--
Benz(a)anthracene	6.22E-07	1.03E-03	5.15E-02	2.57E-05	1.84E-05	9.19E-04	4.60E-07	X	--
Benzene [e]	7.76E-04	1.28E+00	6.42E+01	3.21E-02	2.29E-02	1.15E+00	5.73E-04	X	X
Benzo(a)pyrene	2.57E-07	4.25E-04	2.13E-02	1.06E-05	7.60E-06	3.80E-04	1.90E-07	X	--
Benzo(b)fluoranthene	1.11E-06	1.84E-03	9.19E-02	4.59E-05	3.28E-05	1.64E-03	8.20E-07	X	--
Benzo(g,h,I)perylene	5.56E-07	9.20E-04	4.60E-02	2.30E-05	1.64E-05	8.22E-04	4.11E-07	--	--
Benzo(k)fluoranthene	2.18E-07	3.61E-04	1.80E-02	9.02E-06	6.44E-06	3.22E-04	1.61E-07	X	--
Chrysene	1.53E-06	2.53E-03	1.27E-01	6.33E-05	4.52E-05	2.26E-03	1.13E-06	X	--
Dibenz(a,h)anthracene	3.46E-07	5.73E-04	2.86E-02	1.43E-05	1.02E-05	5.11E-04	2.56E-07	X	--
Diesel Particulate Matter [f]	--	7.33E+00	3.66E+02	1.83E-01	1.31E-01	6.54E+00	3.27E-03	X	--
Fluoranthene	4.03E-06	6.67E-03	3.34E-01	1.67E-04	1.19E-04	5.96E-03	2.98E-06	--	--
Fluorene	1.28E-05	2.12E-02	1.06E+00	5.30E-04	3.78E-04	1.89E-02	9.46E-06	--	--
Formaldehyde [e]	7.89E-05	1.31E-01	6.53E+00	3.27E-03	2.33E-03	1.17E-01	5.83E-05	X	X
Indeno(1,2,3-cd)pyrene	4.14E-07	6.85E-04	3.43E-02	1.71E-05	1.22E-05	6.12E-04	3.06E-07	X	--
Naphthalene	1.30E-04	2.15E-01	1.08E+01	5.38E-03	3.84E-03	1.92E-01	9.61E-05	X	X
Phenanthrene	4.08E-05	6.75E-02	3.38E+00	1.69E-03	1.21E-03	6.03E-02	3.02E-05	--	--
Propylene [e]	2.79E-03	4.62E+00	2.31E+02	1.15E-01	8.25E-02	4.12E+00	2.06E-03	X	--
Pyrene	3.71E-06	6.14E-03	3.07E-01	1.54E-04	1.10E-04	5.48E-03	2.74E-06	--	--
Toluene [e]	2.81E-04	4.65E-01	2.33E+01	1.16E-02	8.31E-03	4.15E-01	2.08E-04	X	X
Total PAH	2.12E-04	3.51E-01	1.75E+01	8.77E-03	6.27E-03	3.13E-01	1.57E-04	X	--
Xylenes [e]	1.93E-04	3.19E-01	1.60E+01	7.99E-03	5.71E-03	2.85E-01	1.43E-04	X	X
TOTAL HAPs		**2.47E+00**	**1.23E+02**	**6.17E-02**	**4.41E-02**	**2.21E+00**	**1.10E-03**		
TOTAL TACs		**1.44E+01**	**7.21E+02**	**3.61E-01**	**2.58E-01**	**1.29E+01**	**6.44E-03**		

Notes:

[a] Unless otherwise noted, the emission factors are from Section 3.4, Table 3.4-4 of *AP-42* (EPA, 1996).

[b] The only source of onsite air toxics is operation of the standby diesel generators. It was assumed that all 56 generators could operate concurrently.

[c] The Toxic Air Contaminants (TACs) were identified per the Bay Area Air Quality Management District's (BAAQMD) Rule 2-5, Table 2-5-1 (http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/Rules%20and%20Regs/reg%2002/rg0205.ashx).

[d] The Hazardous Air Pollutants (HAPs) were identified based on the EPA's list of HAPs (https://www.epa.gov/haps/initial-list-hazardous-air-pollutants-modifications).

[e] The emission factors are from Section 3.4, Table 3.4-3 of *AP-42* (EPA, 1996).

[f] Diesel particulate matter (PM) emissions were estimated from the criteria pollutant PM emissions.

Appendix 3.3B, Table 5
Standby Diesel Generator: Operation Emissions - GHGs
EdgeCore LDC
February 2019

Heat Input [a]

Total Standby Generator Diesel Use (PTE):	82,767	MMBtu/yr

Notes:

[a] The only source of onsite GHGs is operation of the standby diesel generators. It was conservatively assumed that all 56 generators could be operated concurrently.

GHG Emissions from Generator Operation

Pollutant	PTE Emissions (metric tons/year)
CO_2	6,121
CH_4	0.25
N_2O	0.05
CO_2 Equivalent (Total) [a]	6,142

Notes:

[a] The following global warming potentials were used to estimate CO_2 equivalent emissions, per 40 CFR Part 98, Table A-1:

CH_4 =	25
N_2O =	298

GHG Emission Factors [a]

Pollutant	Generator Emission Factor (kg/MMBtu)
CO_2	73.96
CH_4	3.00E-03
N_2O	6.00E-04

Notes:

[a] Emission factors from 40 CFR 98.33, Tables C-1 and C-2.

Appendix 3.3B, Table 6
Offsite Vehicles: Operation Emissions - Criteria Pollutants and GHGs
EdgeCore LDC
February 2019

Criteria Pollutant Emissions for Offsite Vehicle Operation

Emission Source	Number	Miles per Roundtrip [c]	Criteria Pollutant Emissions (lb/year) [d]					
			CO	VOC	SO_X	NO_X	PM_{10}	$PM_{2.5}$
Operation Worker Commute [a]	54	21.6	797.57	13.55	2.56	72.90	43.49	18.03
Material Deliveries [b]	20	14.6	103.97	25.32	3.19	738.67	35.84	18.39
		Total (lb/year)	**901.54**	**38.87**	**5.75**	**811.57**	**79.33**	**36.42**

Notes:

[a] Number of operational staff (daily) based on engineering estimates in Table 2.4-1 of "MECP1_Santa_Clara_1_SPPE_Data_Needs_1-23-19_Operational_Waste_Deliveries_Workers_Trips.xls."

[b] Number of material deliveries (daily) based on engineering estimates in Table 5.12-11 of "MECP1_Santa_Clara_1_SPPE_Data_Needs_1-23-19_Operational_Waste_Deliveries_Workers_Trips.xls."

[c] Roundtrip miles/day for Operation Worker Commute and Material Deliveries taken as the Urban, San Francisco Bay Area Air Basin H-W and C-NW values, respectively, from Table 4.2 of Appendix D of the *CalEEMod User's Guide* (BREEZE, 2017).

[d] Calculations assume that workers would be onsite: 365 days/year

GHG Emissions for Offsite Vehicle Operation

Emission Source	Number	Miles per Roundtrip [c]	GHG Emissions (metric tons/year) [d]			CO_2 Equivalent Emissions (metric tons/year) [e]
			CO_2	N_2O	CH_4	
Operation Worker Commute [a]	54	21.6	140.07	0.0015	0.0074	140.72
Material Deliveries [b, f]	20	14.6	159.17	0.0005	0.0006	159.33
		Total (metric tons/year)	**299.24**	**0.0020**	**0.0079**	**300.05**

Notes:

[a] Number of operational staff (daily) based on engineering estimates in Table 2.4-1 of "MECP1_Santa_Clara_1_SPPE_Data_Needs_1-23-19_Operational_Waste_Deliveries_Workers_Trips.xls."

[b] Number of material deliveries (daily) based on engineering estimates in Table 5.12-11 of "MECP1_Santa_Clara_1_SPPE_Data_Needs_1-23-19_Operational_Waste_Deliveries_Workers_Trips.xls."

[c] Roundtrip miles/day for Operation Worker Commute and Material Deliveries taken as the Urban, San Francisco Bay Area Air Basin H-W and C-NW values, respectively, from Table 4.2 of Appendix D of the *CalEEMod User's Guide* (BREEZE, 2017).

[d] Calculations assume that workers would be onsite: 365 days/year

[e] CO_2 equivalent emissions based on the following global warming potentials from 40 CFR 98, Table A-1:

CH_4: 25

N_2O: 298

[f] Idling CO_2 and CH_4 emissions are included for the material deliveries. Idling N_2O emissions were assumed negligible in the absence of an EMFAC-generated emission factor.

Appendix 3.3B, Table 7
Equations Used to Calculate Criteria Pollutant and GHG Emissions for Offsite Vehicles
EdgeCore LDC
February 2019

Emission Source	Pollutant(s)	Equation	Variables
Operation Worker Commute and Material Deliveries Vehicle Exhaust	CO, VOC, NO_X, SO_X, PM_{10}, and $PM_{2.5}$	E = N x VMT x D x EF / 453.6	E = Emissions (lb/year) N = Number of vehicles per day VMT = Vehicle miles traveled per roundtrip (miles/trip). Assumes one vehicle trip per day. D = Number of operational days per year EF = EMFAC2014 emission factor (g/mile) 453.6 = Conversion from g to lb
Material Deliveries Vehicle Idling	CO, VOC, NO_X, SO_X, PM_{10}, and $PM_{2.5}$	E = N x D x I x EF / 453.6	E = Emissions (lb/year) N = Number of vehicles per day D = Number of operational days per year I = Idle time per vehicle per day (idle-hr) EF = EMFAC2014 emission factor (g/idle-hr) 453.6 = Conversion from g to lb
Operation Worker Commute and Material Deliveries Vehicle Exhaust	CO_2	E = N x VMT x D / FE x EF x 0.001	E = Emissions (metric tons/year) N = Number of vehicles per day VMT = Vehicle miles traveled per roundtrip (miles/trip). Assumes one vehicle trip per day. D = Number of operational days per year FE = Fuel economy (mpg) EF = Emission factor (kg/gallon) 0.001 = Conversion from kg to metric tons
	CH_4 and N_2O	E = N x VMT x D x EF / 1,000 x 0.001	E = Emissions (metric tons/year) N = Number of vehicles per day VMT = Vehicle miles traveled per roundtrip (miles/trip). Assumes one vehicle trip per day. D = Number of operational days per year EF = Emission factor (g/mile) 1,000 = Conversion from g to kg 0.001 = Conversion from kg to metric tons
Material Deliveries Vehicle Idling	CO_2 and CH_4	E = N x D x I x EF / 1,000 x 0.001	E = Emissions (metric tons/year) N = Number of vehicles per day D = Number of operational days per year I = Idle time per vehicle per day (idle-hr) EF = EMFAC2014 emission factor (g/idle-hr) 1,000 = Conversion from g to kg 0.001 = Conversion from kg to metric tons

Appendix 3.3B, Table 8
Offsite Vehicles: Operation Emission Factors - Criteria Pollutants
EdgeCore LDC
February 2019

Offsite Vehicle Criteria Pollutant Emission Factors for Operation

Vehicle Type	Vehicle Class [a]	Exhaust Emission Factors (g/mile) [b, c]						Fuel Economy (mpg) [d]
		CO	VOC	SO_X	NO_X	PM_{10} [e]	$PM_{2.5}$ [e]	
Operation Worker Commute	Light-duty Auto/Truck	0.850	0.014	0.003	0.078	0.046	0.019	26.68
Material Deliveries	Heavy/Medium-duty Diesel	0.415	0.103	0.013	2.914	0.152	0.078	7.01
		Idling Emission Factors (g/idle-hr) [c]						Idle Time (idle-hrs/day) [f]
Material Deliveries	Heavy/Medium-duty Diesel	4.769	0.812	0.064	40.320	0.094	0.090	0.083

Notes:

[a] The vehicle classes are represented as follows:

Light-duty Auto/Truck: 50% LDA Gas, 25% LDT1 Gas, and 25% LDT2 Gas values, per Section 4.5 of Appendix A of the *CalEEMod User's Guide* (BREEZE, 2017).

Heavy/Medium-duty Diesel: 50% HHDT DSL and 50% MHDT DSL values, per Section 4.5 of Appendix A of the *CalEEMod User's Guide* (BREEZE, 2017).

[b] Facility operations are projected to begin in December 2020, based on information provided. Therefore, 2020 emission factors were conservatively used.

[c] Exhaust and idling emission factors from EMFAC2014 for the San Francisco Bay Area Air Basin (Santa Clara County), calendar year 2020. A speed of 40 mph was assumed for offsite vehicles and worker commutes, which is consistent with the CalEEMod defaults. An average temperature of 62°F and humidity of 63% were used per Table B-1 of *CT-EMFAC: A Computer Model to Estimate Transportation Project Emissions* (UC Davis, 2007).

[d] Fuel economy from the EMFAC2014 Web Database (http://www.arb.ca.gov/emfac/2014/) for the San Francisco Bay Area Air Basin (Santa Clara County), calendar year 2020, aggregated speed. Values were estimated by dividing the VMT (miles/day) by the Fuel Consumption (gal/day).

[e] Because of the small number of vehicles, it is assumed that the fugitive dust emissions from paved roads are negligible. As such, paved road emission factors are not included in these values.

[f] It is estimated that each material delivery vehicle idles for approximately 5 minutes each day.

Appendix 3.3B, Table 9
Offsite Vehicles: Operation Emission Factors - GHGs
EdgeCore LDC
February 2019

Offsite Vehicle GHG Emission Factors for Operation

Fuel / Vehicle Category Type	Emission Factor	Units	Emission Factor Source
CO_2 Emission Factors			
Gasoline	8.78	kg CO_2/gallon	The Climate Registry. 2018. *2018 Climate Registry Default Emission Factors* . Table 13.1. May.
Diesel	10.21	kg CO_2/gallon	
N_2O Emission Factors			
Gasoline Passenger Car Model Year 2014 [a]	0.0036	g N_2O/mile	The Climate Registry. 2018. *2018 Climate Registry Default Emission Factors* . Table 13.5. May.
Diesel Medium and Heavy-duty Truck Model Year 1960 - 2014 [a]	0.0048	g N_2O/mile	
CH_4 Emission Factors			
Gasoline Passenger Car Model Year 2014 [a]	0.0173	g CH_4/mile	The Climate Registry. 2018. *2018 Climate Registry Default Emission Factors* . Table 13.5. May.
Diesel Medium and Heavy-duty Truck Model Year 1960 - 2014 [a]	0.0051	g CH_4/mile	

Notes:

[a] Model Year 2014 was the most recent year of emission factors available. As a result, it was assumed representative of vehicles used for this project.

Offsite Vehicle GHG Idling Emission Factors for Operation

Vehicle Type	Vehicle Class [a]	Idling Emission Factors (g/idle-hr) [b]		Idle Time (idle-hrs/day) [c]
		CO_2	CH_4	
Material Deliveries	Heavy/Medium-duty Diesel	6,734.975	0.038	0.083

Notes:

[a] The Heavy/Medium-duty Diesel vehicle class is represented as 50% HHDT DSL and 50% MHDT DSL values, per Section 4.5 of Appendix A of the *CalEEMod User's Guide* (BREEZE, 2017).

[b] Idling emission factors from EMFAC2014 for the San Francisco Bay Area Air Basin (Santa Clara County), calendar year 2020. An average temperature of 62°F and humidity of 63% were used per Table B-1 of *CT-EMFAC: A Computer Model to Estimate Transportation Project Emissions* (UC Davis, 2007).

[c] It is estimated that each material delivery vehicle idles for approximately 5 minutes each day.

Appendix 3.3B, Table 10
Facility Upkeep: Operation Emissions - Criteria Pollutants and GHGs
EdgeCore LDC
February 2019

Criteria Pollutant Emissions for Facility Upkeep

Emission Source	Criteria Pollutant Emissions (tpy) [c]					
	CO	VOC	SO_X	NO_X	PM_{10}	$PM_{2.5}$
Area [a]	0.01	3.98	0.00	0.00	0.00	0.00
Energy [b]	0.80	0.10	0.01	0.95	0.07	0.07
Waste	0.00	0.00	0.00	0.00	0.00	0.00
Water	0.00	0.00	0.00	0.00	0.00	0.00
Total (tpy)	**0.81**	**4.09**	**0.01**	**0.95**	**0.07**	**0.07**

Notes:
[a] The Area Category includes emissions from architectural coating, consumer product use, and landscaping.
[b] The Energy Category accounts for natural gas use only, as CalEEMod does not estimate criteria pollutant emissions from electricity use.
[c] Emissions were estimated using CalEEMod (v. 2016.3.2), based on the square footage of buildings to be constructed and paved areas.

GHG Emissions for Facility Upkeep

Emission Source	GHG Emissions (metric tons/year) [c]			
	CO_2	N_2O	CH_4	CO_2e Equivalent
Area [a]	0.01	0.00	0.00	0.01
Energy [b]	253,327.70	2.38	11.43	254,322.42
Waste	185.53	0.00	10.96	459.65
Water	322.39	0.13	5.57	501.38
Total (metric tons/year)	**253,835.64**	**2.51**	**27.96**	**255,283.46**

Notes:
[a] The Area Category includes emissions from architectural coating, consumer product use, and landscaping.
[b] The Energy Category accounts for natural gas and electricity use.
[c] Emissions were estimated using CalEEMod (v. 2016.3.2), based on the square footage of buildings to be constructed, paved areas, and site-specific electricity intensity, as detailed below.

Facility Upkeep Details [a]

Feature	Area (square feet)
Building 1	279,744
Common Building 1	68,422
Building 2	348,800
Common Building 2A	20,327
Common Building 2B	19,800
Total Buildings	**737,093**
Paved Areas [b]	426,890

Notes:
[a] Data taken from the site plan and 'MECP1_Santa_Clara_1_SPPE_Data_Needs_01-11-19 working copy.xlsx'.
[b] The following factor was used to convert acres to square feet:

1 acre = 43,560 square feet

Calculation of Electricity Intensity

Parameter	Value
Annual Electricity Use (kWh/yr) [a]	867,240,000
Building Area (square feet)	737,093
Electricity Intensity (kWh/sqft-yr)	**1,176.57**

Notes:
[a] Calculated as 99 MW x 8,760 hours per year of operation.

EdgeCore - Facility Upkeep

San Francisco Bay Area Air Basin, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	737.09	1000sqft	16.92	737,093.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	64
Climate Zone	4			**Operational Year**	2020
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Project details reflective of Santa Clara County. PG&E conservatively selected as utility provider, although SVP will provide power to the project.

Land Use - Square footage taken as building areas from site plan.

Area Coating - Paved area square footage added for parking, as provided by project engineers.

Energy Use - Electricity energy intensity calculated as the total annual electricity use divided by the building square footage.

Construction Phase - Construction estimates calculated external to this model.

Vehicle Trips - Operational vehicle trip emissions calculated external to this model.

Grading - Grading emissions estimated external to this model.

EdgeCore - Facility Upkeep - San Francisco Bay Area Air Basin, Annual

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Parking	0	426890
tblConstructionPhase	NumDays	20.00	0.00
tblConstructionPhase	NumDays	10.00	0.00
tblConstructionPhase	NumDays	30.00	0.00
tblConstructionPhase	NumDays	300.00	0.00
tblConstructionPhase	NumDays	20.00	0.00
tblConstructionPhase	NumDays	20.00	0.00
tblEnergyUse	LightingElect	3.08	0.00
tblEnergyUse	NT24E	3.70	1,176.57
tblEnergyUse	T24E	1.48	0.00
tblLandUse	LandUseSquareFeet	737,090.00	737,093.00
tblVehicleTrips	ST_TR	1.32	0.00
tblVehicleTrips	SU_TR	0.68	0.00
tblVehicleTrips	WD_TR	6.97	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
2020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**			**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
2020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**			**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
		Highest		

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	3.9808	6.0000e-005	6.8200e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005			0.0132	4.0000e-005	0.0000	0.0141
Energy	0.1049	0.9532	0.8007	5.7200e-003		0.0724	0.0724		0.0724	0.0724			253,327.7042	11.4277	2.3793	254,322.4179
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000			185.5317	10.9646	0.0000	459.6470
Water						0.0000	0.0000		0.0000	0.0000			322.3889	5.5663	0.1337	501.3764
Total	**4.0856**	**0.9532**	**0.8075**	**5.7200e-003**	**0.0000**	**0.0725**	**0.0725**	**0.0000**	**0.0725**	**0.0725**			**253,835.6380**	**27.9587**	**2.5129**	**255,283.4553**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	3.9808	6.0000e-005	6.8200e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005			0.0132	4.0000e-005	0.0000	0.0141
Energy	0.1049	0.9532	0.8007	5.7200e-003		0.0724	0.0724		0.0724	0.0724			253,327.7042	11.4277	2.3793	254,322.4179
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000			185.5317	10.9646	0.0000	459.6470
Water						0.0000	0.0000		0.0000	0.0000			322.3889	5.5663	0.1337	501.3764
Total	**4.0856**	**0.9532**	**0.8075**	**5.7200e-003**	**0.0000**	**0.0725**	**0.0725**	**0.0000**	**0.0725**	**0.0725**			**253,835.6380**	**27.9587**	**2.5129**	**255,283.4553**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

EdgeCore - Facility Upkeep - San Francisco Bay Area Air Basin, Annual

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	2/12/2019	2/11/2019	5	0	
2	Site Preparation	Site Preparation	3/12/2019	3/11/2019	5	0	
3	Grading	Grading	3/26/2019	3/25/2019	5	0	
4	Building Construction	Building Construction	5/7/2019	5/6/2019	5	0	
5	Paving	Paving	6/30/2020	6/29/2020	5	0	
6	Architectural Coating	Architectural Coating	7/28/2020	7/27/2020	5	0	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 1,105,640; Non-Residential Outdoor: 368,547; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

EdgeCore - Facility Upkeep - San Francisco Bay Area Air Basin, Annual

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	2	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	310.00	121.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	62.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Site Preparation - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Site Preparation - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Site Preparation - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Grading - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Grading - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Grading - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Building Construction - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Building Construction - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Building Construction - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.6 Paving - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Paving	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.6 Paving - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Paving	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.6 Paving - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.7 Architectural Coating - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.7 Architectural Coating - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.7 Architectural Coating - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000			0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Light Industry	9.50	7.30	7.30	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.573139	0.040894	0.193976	0.114604	0.017740	0.005371	0.017133	0.024527	0.002545	0.002442	0.005942	0.000877	0.000812

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000			252,290.0709	11.4078	2.3602	253,278.6184
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000			252,290.0709	11.4078	2.3602	253,278.6184
NaturalGas Mitigated	0.1049	0.9532	0.8007	5.7200e-003		0.0724	0.0724		0.0724	0.0724			1,037.6333	0.0199	0.0190	1,043.7994
NaturalGas Unmitigated	0.1049	0.9532	0.8007	5.7200e-003		0.0724	0.0724		0.0724	0.0724			1,037.6333	0.0199	0.0190	1,043.7994

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	1.94445e+007	0.1049	0.9532	0.8007	5.7200e-003		0.0724	0.0724		0.0724	0.0724			1,037.6333	0.0199	0.0190	1,043.7994
Total		**0.1049**	**0.9532**	**0.8007**	**5.7200e-003**		**0.0724**	**0.0724**		**0.0724**	**0.0724**			**1,037.6333**	**0.0199**	**0.0190**	**1,043.7994**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Light Industry	1.94445e+007	0.1049	0.9532	0.8007	5.7200e-003		0.0724	0.0724		0.0724	0.0724			1,037.6333	0.0199	0.0190	1,043.7994
Total		**0.1049**	**0.9532**	**0.8007**	**5.7200e-003**		**0.0724**	**0.0724**		**0.0724**	**0.0724**			**1,037.6333**	**0.0199**	**0.0190**	**1,043.7994**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	8.6724e+008	252,290.0709	11.4078	2.3602	253,278.6184
Total		**252,290.0709**	**11.4078**	**2.3602**	**253,278.6184**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	8.6724e+008	252,290.0709	11.4078	2.3602	253,278.6184
Total		**252,290.0709**	**11.4078**	**2.3602**	**253,278.6184**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	3.9808	6.0000e-005	6.8200e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005			0.0132	4.0000e-005	0.0000	0.0141
Unmitigated	3.9808	6.0000e-005	6.8200e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005			0.0132	4.0000e-005	0.0000	0.0141

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	1.1014					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Consumer Products	2.8787					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Landscaping	6.4000e-004	6.0000e-005	6.8200e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005			0.0132	4.0000e-005	0.0000	0.0141
Total	**3.9808**	**6.0000e-005**	**6.8200e-003**	**0.0000**		**2.0000e-005**	**2.0000e-005**		**2.0000e-005**	**2.0000e-005**			**0.0132**	**4.0000e-005**	**0.0000**	**0.0141**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	1.1014					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Consumer Products	2.8787					0.0000	0.0000		0.0000	0.0000			0.0000	0.0000	0.0000	0.0000
Landscaping	6.4000e-004	6.0000e-005	6.8200e-003	0.0000		2.0000e-005	2.0000e-005		2.0000e-005	2.0000e-005			0.0132	4.0000e-005	0.0000	0.0141
Total	**3.9808**	**6.0000e-005**	**6.8200e-003**	**0.0000**		**2.0000e-005**	**2.0000e-005**		**2.0000e-005**	**2.0000e-005**			**0.0132**	**4.0000e-005**	**0.0000**	**0.0141**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	322.3889	5.5663	0.1337	501.3764
Unmitigated	322.3889	5.5663	0.1337	501.3764

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	170.452 / 0	322.3889	5.5663	0.1337	501.3764
Total		**322.3889**	**5.5663**	**0.1337**	**501.3764**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	170.452 / 0	322.3889	5.5663	0.1337	501.3764
Total		**322.3889**	**5.5663**	**0.1337**	**501.3764**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	185.5317	10.9646	0.0000	459.6470
Unmitigated	185.5317	10.9646	0.0000	459.6470

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	913.99	185.5317	10.9646	0.0000	459.6470
Total		**185.5317**	**10.9646**	**0.0000**	**459.6470**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	913.99	185.5317	10.9646	0.0000	459.6470
Total		**185.5317**	**10.9646**	**0.0000**	**459.6470**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Attachment DR-28
2013 Caterpillar Specification Sheet

CATERPILLAR®

Understanding Generator Set Ratings

Smart rating choices combined with the latest in onsite power generation systems can help match equipment to a specific application for optimal long-term performance and reliability

Chad Dozier
Market Development Manager
Electric Power Division

August 2013

INTRODUCTION

Generator set ratings may seem complex, but their basic purpose is simple: fit the application needs at the optimum reliability, performance, and cost. An improper rating means either buying more capacity than needed or risking shorter life to overhaul, more repairs, and more downtime. Ratings have changed in recent years, and more sophisticated switchgear can be integrated with generator sets. That means more flexibility to specify generating systems that closely match a specific installation requirement.

The key to choosing the right rating is to understand the application in detail. That means not only knowing the type of duty but also answering:

- What is the average load factor?
- What is the maximum required load?
- How many hours per year will the generator sets run?
- Will the generator sets be run isolated from or in parallel with the utility?

RATINGS DEFINED

Caterpillar defines five basic generator set ratings: Emergency Standby Power (ESP), Standby, Mission Critical Standby, Prime, and Continuous. Cat generator set ratings differ in certain respects from those defined by the industry standard ISO8528-1 (Table 1).

Table 1: ISO 8528 and Caterpillar Ratings			
ISO 8528 Rating		Caterpillar Rating	
Rating	Definition	Rating	Definition
Emergency Standby Power (ESP)	The maximum power available during a variable electrical power sequence, under the stated operating conditions, for which a generating set is capable of delivering in the event of a utility power outage or under test conditions for up to 200 hours of operation per year with maintenance intervals and procedures being carried out as prescribed by the manufactures. The permissible average power output over 24 hours of operation shall not exceed 70% of the ESP rating.	Emergency Standby Power (ESP)	Typical usage of 50 hours per year with a maximum of 200 hours per year with varying loads. Average variable load factor is 70% of the ESP rating. No overload is available. Not for maintained utility paralleling applications.
No ISO equivalent		Standby Power	Typical usage of 200 hours per year, with a maximum of 500 hours per year with varying loads. Average variable load factor is 70% of Standby rating. No overload is available. Not for maintained utility paralleling applications.
		Mission Critical Standby	Typical usage of 200 hours per year, with a maximum of 500 hours per year with varying loads. Average variable load factor is 85% of Standby rating. Typical peak demand of up to 100% of the rating for 5% of the operating time. No overload is available. Not for maintained utility paralleling applications. Typical application is data centers and healthcare.
Limited Time Running Power (LTP)	The maximum power available under the agreed operating conditions, for which the generating set is capable of delivering for up to 500 hours of operation per year with the maintenance intervals and procedures being carried out as prescribed by the manufacturers.	Load Management Guidelines (Prime Power Rating)	Load management is the deliberate control of loads on a generator set and/or utility to have the lowest possible electrical costs. Maximum of 500 hours per year with varying loads. Maximum load factor is 100%. Typical application is peak shaving.
Prime Running Power (PRP)	The maximum power which a generating set is capable of delivering continuously whilst supplying a variable electrical load when operated for an unlimited number of hours per year under the agreed operating conditions with the maintenance intervals and procedures being carried out as prescribed by the manufacturer. The permissible average power output over 24 hours of operation shall not exceed 70% of the PRP rating.	Prime Power	Unlimited hours of usage. Average variable load factor is 70% of the Prime Power rating. 10% overload available, but limited to 1 in 12 hours and not to exceed 25 hours per year. The 10% overload is available in accordance with ISO 3046-1. Life to overhaul of the engine is dependant on operating as outlined in ISO 8528, and time spent during operation above 70% load may affect the life to overhaul.
Continuous Operating Power (COP)	The maximum power which the generation set is capable of delivering continuously whilst supplying a constant electrical load when operated for an unlimited number of hours per year under the agreed operating conditions with the maintenance intervals and procedures being carried out as prescribed by the manufacturer.	Continuous Power	Unlimited hours of usage. Non-varying load factor is 70%-100% of the published Continuous Power rating. Typical pear demand is 100% of the continuous rating for 100% of the operating hours.

Table 1

Here are basic descriptions of the Cat genset ratings:

Standby
In this application, the generator set is capable of providing emergency backup power at the nameplate rating for the duration of an outage. The average load factor of a Standby rated generator set should be no more than 70% of the nameplate rating and applied to varying loads. A Standby generator set can run for a maximum of 500 hours per year. The normal standby rating is not for use in utility paralleling applications. For example, a 3 MW standby rated generator set will provide power for the duration of an outage. It should be run for up to 500 hours per year and have an average load factor of 2.1 MW.

Emergency Standby Power (ESP)
The ESP rating differs from the Standby rating only in the number of running hours allowed per year. ESP ratings allow a maximum running time of 200 hours per year at a 70% average load factor with varying load. An example of the Standby and ESP ratings are shown in Figure 1.

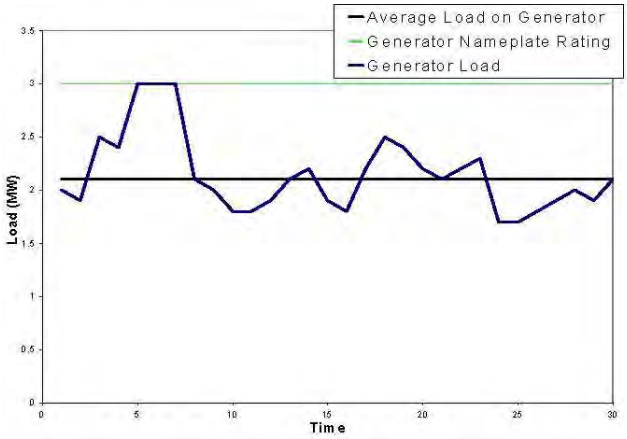

Figure 1: Example Load Profile – 3 MW Standby Rating

Mission Critical Standby
In this application, the generator set is capable of providing emergency backup power at the nameplate rating for the duration of an outage. The average load factor of a mission critical standby rated generator set should be no more than 85% of the nameplate rating with varying loads. A mission critical standby generator set can run for a maximum of 500 hours per year. Typical peak demand is 100% of the rating for maximum of 5% of the operating time. The mission critical standby rating is not for use in utility paralleling applications. An example of the mission critical standby rating is shown in Figure 2.

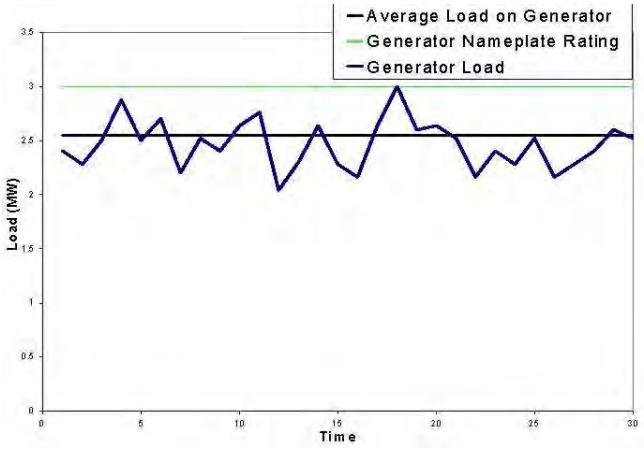

Figure 2: Example Load Profile: 3MW Mission Critical Standby Rating

For example, a 3 MW mission critical standby-rated generator set will provide power for the duration of an outage. It could be run for up to 500 hours per year and have an average load factor of up to 2.55 MW.

Prime

In this application, the generator set is capable of providing power to a varying load for an unlimited number of hours per year. A Prime rated generator set is capable of providing full nameplate rating for a period of time, but must have an average load factor of no more than 70% of the Prime rating. Ten percent overload is allowed for emergencies for a maximum of 1 hour in 12, and for no more than 25 hours per year. The standard prime rating is for use in either utility paralleling or isolated applications. For example, a 2.7 MW rated unit may provide the full nameplate rating for a short duration, but should have a maximum average load of 1.89 MW (not including generator set non-running time per ISO8528-1). The generator set can also provide 3 MW of power in emergencies as defined above. An example of the Prime rating is shown in Figure 3.

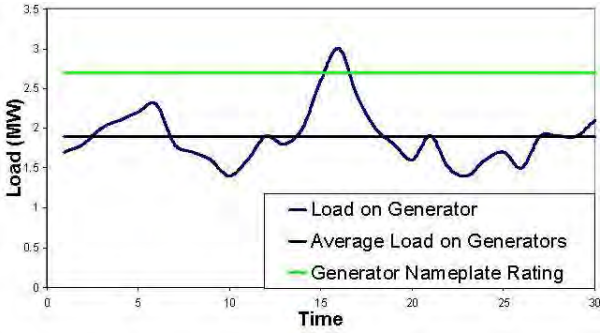

Figure 3: Example Load Profile: 2.7 MW Prime Rating

LOAD MANAGEMENT

A Prime rated generator applied under load management guidelines allows for a Prime rated generator set to be used in parallel with the utility. A Prime rated generator set under load management guidelines can run for a maximum of 500 hours per year. This generator set has the same nameplate rating as a Prime rated unit, but allows for an average load factor of up to 100%. The Prime rating with load management guidelines does not allow for a 10% overload capability. For example, these guidelines state that a 2.7 MW unit (same nameplate rating as the Prime rated unit) can be run at 2.7 MW for a maximum of 500 hours.

Load Management Practices

There are two basic load management practices: base loading and peak shaving. In base loading, the generator set operates at a fixed kW output, and the utility provides power for any peaks above that level. In this scenario the end user may export power to the grid if more power is being generated then is required by the facility loads, and the appropriate agreements with the utility are in place. An example of base loading is shown in Figure 4.

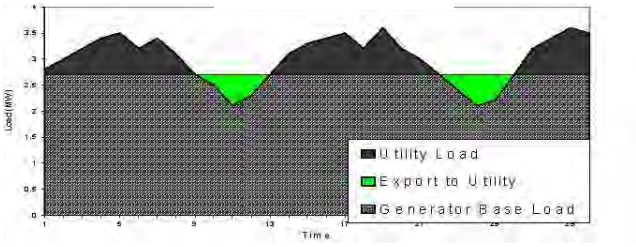

Figure 4: Example Load Profile – 2.7 MW Load Management (Base Loading)

In peak shaving, the utility provides a fixed amount of kW and the end user deploys the generators to pick up, or shave, demand peaks and any other load requirement over that fixed amount of load. Peak shaving can be used during times of the year when the utility has demand higher than its capacity. In this case, the utility provides incentives to generator set owners to use peak shaving to decrease the load demand from the grid. An example of peak shaving is shown in Figure 5.

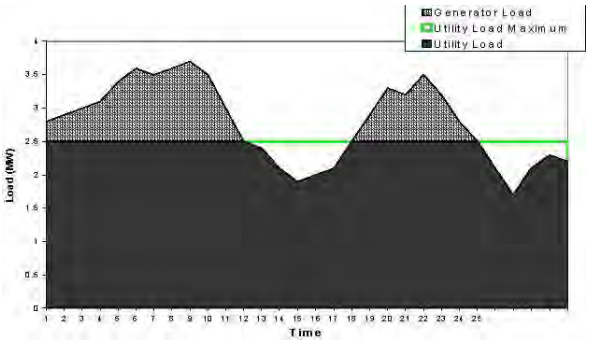

Figure 5: Example Load Profile – 2.7 MW Load Management (Peak Shaving)

Continuous

In this application, the generator set is able to provide power to a non-varying load for an unlimited number of hours per year. The average power output of the generator set is 70 -100% of the rating. The rating is designed to provide 100% of the rating for 100% of the operating hours. Typical Continuous rating applications include base loading in parallel with the utility and co-generation operations. An example of a continuous rated generator set is shown in Chart 6.

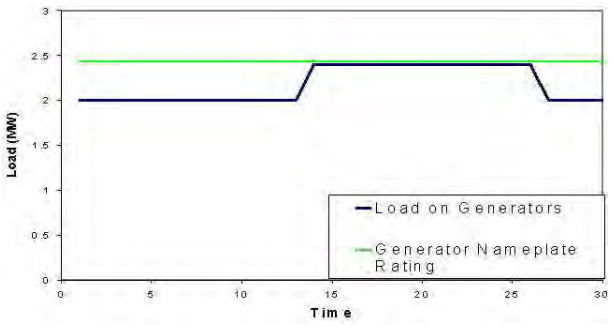

Figure 6: Example Load Profile – 2.5 MW Continuous Rating

Performing dual duty

Intelligent use of ratings also can help customers use power systems for the added purpose of load management. Here, advanced switchgear is part of the equation. In some applications there may be a desire to use backup generators for load management to produce an additional return on their investment. However, standby rated generator sets are not intended for operation in parallel with the utility. To perform utility paralleling applications a prime rating with load management guidelines or a continuous rated unit are appropriate. Paralleling switchgear combined with the correct prime rated units is required when operating under load management guidelines. The switchgear controls provide increased system flexibility allowing generator sets to operate in parallel with the utility. The switchgear is able to control the load on the generator sets

and monitor the power supplied from the utility. This ensures that the generator sets are providing the proper load and are not operating outside of their rating guidelines.

CONCLUSION

Regardless of the application, generator set ratings help ensure that customers' power needs are met and that generating equipment is protected from premature wear. Choosing the right rating means making the proper tradeoffs between run hours, peak load, and average load. The proper rating means the customer receives the optimum combination of installed cost and long-term cost of ownership.

ABOUT

About Caterpillar
For more than 85 years, Caterpillar Inc. has been making progress possible and driving positive and sustainable change on every continent. With 2012 sales and revenues of $65.9 billion, Caterpillar is a technology leader and the world's leading manufacturer of construction and mining equipment, clean diesel and natural gas engines and industrial gas turbines.

Diesel Solutions Center: www.Cat-ElectricPower.com
Online Community: https://caterpillar.lithium.com/t5/Electric-Power-Generation/ct-p/EPG
Facebook: http://www.facebook.com/Caterpillar.Electric.Power
YouTube: http://www.youtube.com/CatPowerGeneration

LEXE0047-03 August 2013

Attachment DR-37
CARB Executive Order DE-14-005-05

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER DE-14-005-05

Pursuant to the authority vested in the California Air Resources Board (CARB) by Health and Safety Code, Division 26, Part 5, Chapter 2; and pursuant to the authority vested in the undersigned by Health and Safety Code section 39515 and 39616 and Executive Order G-14-012;

This action relates to Verification under sections 2700 through 2711 of title 13 of the California Code of Regulations:

Miratech Group, LLC (Miratech)
MIRATECH® LTR™ DOC/DPF

CARB has reviewed Miratech's request for verification of the MIRATECH® LTR™ DOC/DPF. Based on an evaluation of the data provided, and pursuant to the terms and conditions specified below, the Executive Officer of CARB hereby finds that the MIRATECH® LTR™ DOC/DPF reduces emissions of diesel particulate matter (PM) consistent with a Level 3 device (greater than or equal to 85 percent reductions) (California Code of Regulations (CCR), title 13, sections 2702 (f) and (g) and section 2708) and complies with the CARB January 1, 2009, nitrogen dioxide (NO_2) limit (CCR, title 13, section 2702 (f) and section 2706 (a)). Accordingly, the Executive Officer determines that the system merits verification and, subject to the terms and conditions specified below, classifies the MIRATECH® LTR™ DOC/DPF as a Level 3 Plus for use with stationary emergency standby generators using engine families listed in Attachment 1.

This verification is subject to the following terms and conditions:

- The engine must be used in a stationary application associated with emergency standby generators and rated greater than or equal to 50 horsepower (hp).
- The engine must be certified for use in California or certified by the United States Environmental Protection Agency and the engine must be in its original certified configuration.
- The engine must be certified Tier 1, Tier 2, Tier 3, Tier 4i with a rated horse power between 50 and 75 or over 750, or Tier 4 Alt 20% NOx and PM, nonroad or stationary diesel engine meeting 0.22 grams per brake horsepower hour (g/bhp-hr) diesel particulate matter (PM) or less based on certification or in-use emissions testing (as tested on an appropriate steady-state certification cycle outlined in the CARB off-road regulations – similar to ISO 8178 D2).
- The engine must not employ exhaust gas recirculation (EGR).
- The engine must not have a pre-existing oxidation catalyst.

- The engine must not have a pre-existing diesel particulate filter.
- The engine must not have a pre-existing selective catalytic reduction.
- The engine must be four-stroke.
- The engine can be turbocharged or naturally-aspirated.
- Miratech must review actual operating conditions (duty cycle, baseline emissions, and engine exhaust backpressure and temperature profiles, and other pre-installation compatibility assessments as required in section 2706 (t) of title 13, of the CCR) prior to retrofitting an engine with the MIRATECH® LTR™ DOC/DPF to ensure compatibility.
- The engine should be well maintained and not consume lubricating oil at a rate greater than that specified by the engine manufacturer.
- The MIRATECH® LTR™ DOC/DPF must not be operated with fuel additives, as defined in section 2701 of title 13, of the CCR, unless explicitly verified for use with fuel additive(s).
- The other terms and conditions specified below.

Table 1: Conditions for the MIRATECH® LTR™ DOC/DPF

Parameter	Value
Application	Stationary Emergency Standby Power Generation
Size Range	Diesel engines rated greater than or equal to 50 hp
Engine Type	Diesel, with or without turbocharger, without EGR, mechanically or electronically controlled, Tier 1, Tier 2, Tier 3, Tier 4i with a rated horse power between 50 and 75 or over 750, or Tier 4 Alt 20% NOx and PM, certified to 0.22 g/bhp-hr or less of PM.
Minimum Exhaust Temperature for Filter Regeneration	260° Celsius / 500° Fahrenheit. At 550° Fahrenheit, regeneration takes approximately 45 minutes.
Maximum Consecutive Minutes Operating Below Passive Regeneration Temperature	720 Minutes
Number of Cold Start and 40 Minute Idle Sessions before Regeneration Required	18
Number of Hours of Operation Before Cleaning of Filter Required	Application Specific. 2000 Hours Typical.
Fuel	California diesel fuel with less than or equal to 15 ppm sulfur or a biodiesel blend provided that the biodiesel portion of the blend complies with ASTM D6751, the diesel portion of the blend complies with title 13 (CCR), sections 2281 and 2282, and the blend contains no more than 20 percent biodiesel by volume.
Verification Level	Level 3 Plus Verification: • PM - at least 85% reduction • NO_2 - meets January 2009 limit

This Executive Order is valid provided that installation instructions for MIRATECH® LTR™ DOC/DPF do not recommend tuning the engine to specifications different from those of the engine manufacturer. The product must not be used with any other systems or engine modifications without CARB and manufacturer approval.

The MIRATECH® LTR™ DOC/DPF is a passive diesel exhaust filter system. It consists of a filter housing, DOC, DPF, and monitoring system (backpressure sensor, temperature sensor, and a display unit that provides warnings when the filter becomes clogged or damaged).

Changes made to the design or operating conditions of MIRATECH® LTR™ DOC/DPF, as exempted by CARB, which adversely affect the performance of the engine's pollution control system, shall invalidate this Executive Order.

No changes are permitted to the MIRATECH® LTR™ DOC/DPF without CARB evaluation and approval. CARB must be notified in writing of any changes to any part of MIRATECH® LTR™ DOC/DPF. Failure to do so shall invalidate this Executive Order.

Marketing of the MIRATECH® LTR™ DOC/DPF using identification other than that shown in the Executive Order or for an application other than that listed in the Executive Order shall be prohibited unless prior approval is obtained from CARB.

As specified in the Diesel Emission Control Strategy Verification Procedure (CCR, title 13, section 2706 (j)), CARB assigns each Diesel Emission Control Strategy a family name. The designated family name for the verification as outlined above is:

CA/MES/2014/PM3+/N00/ST/DPF01

This designated family name must be used in reference to this Executive Order as part of the system labeling requirement. Labels attached to the MIRATECH® LTR™ DOC/DPF and the engine must be identical.

Proper engine maintenance is critical for the proper functioning of the diesel emission control strategy. The owner of the equipment on which the diesel emission control strategy is installed is strongly advised to adhere to all good engine maintenance practices. Failure to document proper engine maintenance, including keeping records of the engine's oil consumption, may be grounds for denial of a warranty claim.

The terms and conditions of this Executive Order must be satisfied regardless of where the system is sold in order for the system to be considered verified. Systems sold as verified, or which carry a CARB-approved label, must satisfy all the terms and conditions of this Executive Order.

Additionally, as stated in the Diesel Emission Control Strategy Verification Procedure, Miratech is responsible for honoring the record keeping requirements (CCR, title 13, section 2702), their warranty (CCR, title 13, section 2707), conducting in-use compliance testing (CCR, title 13, section 2709), and complying with the system labeling requirements (CCR, title 13, section 2706 (j)).

In addition, CARB reserves the right in the future to review this Executive Order and verification provided herein to assure that the verified add-on or modified part continues to meet the standards and procedures of CCR, title 13, section 2222, et seq and CCR, title 13, sections 2700 through 2711.

Systems verified under this Executive Order shall conform to all applicable California emissions regulations. This Executive Order does not release Miratech from complying with all other applicable regulations.

Violation of any of the above conditions shall be grounds for revocation of this Executive Order.

Executive Order DE-14-005-04 is hereby superseded and is of no further force and effect.

Executed at Sacramento, California, this 31st day of May 2018.

Richard W. Corey
Executive Officer
by

Cynthia Marvin, Chief
Transportation and Toxics Division

Attachment 1

Attachment DR-44
EPA's Air Quality Background Profiles

Attachment DR-44 EPA's Air Quality Background Profiles

Due to size, 5 copies of Attachment DR-44 have been provided electronically to Staff. Additional copies are available upon request.

Attachment DR-45
Correspondence with BAAQMD
Re: AERMET Data Files

From: James Cordova
To: Dickison, Melanie/SDO
Subject: [EXTERNAL] RE: Your request for AREMOD-ready met data in/near Santa Clara
Date: Wednesday, March 13, 2019 11:40:19 AM
Attachments: image001.png
image003.png

Hi Melanie,

Your files are ready to be downloaded at the link https://www.dropbox.com/sh/fi13a8f8c9desgs/AADJoibmAo7RyoZ2YUz8yvbca?dl=0. Please let me know if you encounter any problems accessing the files. Please not that the met data were processed with the U* option enabled since no local turbulence data were reported with the NCDC data files.

Regards,

Jim

James Cordova
Assessment, Inventory and Modeling Division
Modeling and Assessment Section
The Bay Area Air Quality Management District
375 Beale Street, Suite 600
San Francisco, CA 94105
Office: 415.749.5104 | Fax: 415.749.4741
jcordova@baaqmd.gov | www.baaqmd.gov

From: Dickison, Melanie/SDO <Melanie.Dickison@jacobs.com>
Sent: Thursday, February 28, 2019 10:02 AM
To: James Cordova <JCordova@baaqmd.gov>
Subject: RE: Your request for AREMOD-ready met data in/near Santa Clara

Hello James,

My apologies for the late reply. Can you please send me data from both sites? Thank you for the additional information. I will keep that in mind.

Thank you so much,

Melanie Dickison, EIT
Jacobs
Environmental Engineer | GES
(619) 272-7290
(303) 929-1887 mobile
melanie.dickison@jacobs.com

www.jacobs.com

From: James Cordova <JCordova@baaqmd.gov>
Sent: Thursday, February 21, 2019 9:36 AM
To: Dickison, Melanie/SDO <Melanie.Dickison@jacobs.com>
Subject: [EXTERNAL] Your request for AREMOD-ready met data in/near Santa Clara

Dear Ms. Dickison,

The nearest AERMOD-ready met data to Santa Clara I have are Moffet Field (37.405925, -122.049028) and San Jose International Airport (37.359403, -121.924423). Please let me know if you want data from one or both sites. Please also be aware that transmitting the data to you does not constitute approval to use the data in your analysis. You will need to provide justification on which data you use to the agency reviewing your analysis.

Regards,

James Cordova

James Cordova
Assessment, Inventory and Modeling Division
Modeling and Assessment Section
The Bay Area Air Quality Management District
375 Beale Street, Suite 600
San Francisco, CA 94105
Office: 415.749.5104 | Fax: 415.749.4741
jcordova@baaqmd.gov | www.baaqmd.gov

Attachment DR-50
Revised Section 3.5 Cultural Resources

3.5 Cultural Resources (Revised 4/5/19)

Would the project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?	☐	☐	☒	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to 15064.5?	☐	☐	☐	☒
c) Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☐	☒	☐

Environmental checklist established by CEQA Guidelines, Appendix G.

3.5.1 Setting

The city of Santa Clara (City) is situated within the valley created by the Santa Cruz and Gavilan Mountains on the west and the Diablo Range on the east. The Santa Clara Valley is a structural valley (it was created by the uplifting mountains, as opposed to erosional forces [NPS, 2018~~07~~; SFEI, 2010]).

An analysis of historic maps and field notes identifies the area of the project as having been agricultural zone prior to its development in the 1960s and 1970s (USGS, 1953, 1961, 1968, and 1973). The elevation of the project ranges between 27 and 30 feet above mean sea level.

The geologic map of Santa Clara County shows the area of the project as Quaternary (Holocene) alluvium (Qha) (USGS, 2006). The age and depositional nature of these deposits are such that the project area retains the potential for unknown, buried cultural resources despite minor previous ground-disturbing activities at the site.

The project site is located north of downtown Santa Clara, at the intersection of US-101 and Montague Expressway in the city. Land use in the area is primarily industrial and commercial. A channelized portion of the San Tomas Aquino Creek is located approximately 500 feet to the west.

The project site has been developed since the late 1960s and the existing facilities are being demolished by the previous owner. The demolition is not included as part of the project, which is anticipated to begin construction in the Fourth Quarter of 2019, with operations beginning in Fourth Quarter of 2020.

A complete discussion of the prehistoric, ethnographic, and historical setting may be found in Appendix 3.5-A, *Cultural Resource Investigation in Support of the 2201 Laurelwood Road Project*.

3.5.2 Regulatory Setting

3.5.2.1 California Environmental Quality Act

Various laws apply to the evaluation and treatment of cultural resources. The California Environmental Quality Act (CEQA) requires the Lead Agency to evaluate cultural resources by determining whether they meet several sets of specified criteria that make such resources eligible to the California Register of Historical Resources (CRHR). The evaluation then influences the analysis of potential impacts to such historical resources and the mitigation(s) that may be required to ameliorate any such impacts.

CEQA guidelines define significant cultural resources under two regulatory definitions: historical resources and unique archaeological resources. A historical resource is defined as meeting one or more of the following, per California Code of Regulations (CCR), Title 14, Section [§] 15064.5[a]:

- A resource listed in, or determined to be eligible by the State Historical Resources Commission for listing in, the CRHR
- A resource listed in a local register of historical resources or identified as significant in a historical resource survey meeting the requirements of §5024.1(g) of the Public Resources Code (PRC)
- Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the agency's determination is supported by substantial evidence in light of the whole record

Historical resources that are automatically listed in the CRHR include California historical resources listed in or formally determined eligible for the National Register of Historic Places (NRHP) and California Registered Historical Landmarks from No. 770 onward (PRC, §5024.1[d]).

Under CEQA, a resource is generally considered to be historically significant if it meets the criteria for listing in the CRHR. In addition to being at least 50 years old, a resource must meet one or more of the following four criteria (PRC, §5024.1):

- Associated with events that have made a significant contribution to the broad patterns of our history
- Associated with the lives of persons significant in our past
- Embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of an important creative individual, or possesses high artistic values
- Has yielded, or may be likely to yield, information important to history or prehistory

In addition, historical resources must also possess integrity of location, design, setting, materials, workmanship, feeling, and association (CCR, Title 14, §4852[c]).

Even if a resource is not listed or determined to be eligible for listing in the CRHR, CEQA requires the Lead Agency to decide as to whether the resource is a historical resource as defined in PRC, §§5020.1(j) or 5024.1.

In addition to historical resources, archaeological artifacts, objects, or sites can meet CEQA's definition of a unique archaeological resource, even if the resource does not qualify as a historical resource (CCR, Title 14, §15064.5[c][3]). Archaeological artifacts, objects, or sites are considered unique archaeological resources if it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that the resource meets any of the following criteria (PRC, §21083.2[g]):

- Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.
- Has a special and particular quality such as being the oldest of its type or the best available example of its type.
- Is directly associated with a scientifically recognized important prehistoric or historic event or person.

To determine whether a proposed project may have a significant effect on the environment (CEQA defines historical resources to be a part of the environment), the project's construction and operational impacts are analyzed to determine if a substantial adverse change in the significance of historical or unique archaeological resources will occur. The magnitude of an impact depends on:

- Historical resource(s) affected
- Specific historic significances of any potentially impacted historical resource(s)

- How the historical resource(s) significance is manifested physically and perceptually
- Appraisals of those aspects of any historical resource's integrity that figure importantly in the manifestation of the resource's historical significance
- How much the impact will change historical resource integrity appraisals

CCR, Title 14, §15064.5(b), the CEQA Guidelines, define a substantial adverse change as "physical demolition, destruction, relocation or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired."

3.5.2.2 Resource Types

Three broad classes of cultural resources are considered in this section: prehistoric, ethnographic, and historic. Those cultural resources determined eligible to the CRHR are called historical resources and are further defined under state law as buildings, sites, structures, objects, areas, places, records, manuscripts, and tribal cultural resources (CCR, Title 14, §§4852a, 5064.5(a)(3); PRC, §§5020.1(h,j), 5024.1[e][2, 4], 21074).

Prehistoric archaeological resources are those materials relating to prehistoric human occupation and use of a particular environment. These resources may include sites and deposits, structures, artifacts, rock art, trails, and other traces of Native American human activity. In California, the prehistoric period began over 12,000 years ago and extended through the 18th century until 1769, when the first Europeans settled in California.

Ethnographic resources are those materials important to the heritage of a particular ethnic or cultural group, such as Native Americans or African, European, or Asian immigrants. They may include traditional resource collecting areas, ceremonial sites, topographic features, value-imbued landscapes, cemeteries, shrines, or neighborhoods and structures. Ethnographic resources are variations of natural resources and standard cultural resource types. They are subsistence and ceremonial locales and sites, structures, objects, and rural and urban landscapes assigned cultural significance by traditional users. The decision to call resources ethnographic depends on whether associated peoples perceive them as traditionally meaningful to their identity as a group and the survival of their lifeways.

Historic-period resources are those materials, archaeological and architectural, usually but not necessarily associated with Euro-American exploration and settlement of an area and the beginning of a written historical record. They may include archaeological deposits, sites, structures, trail and road corridors, artifacts, or other evidence of historic human activity. Under federal and state requirements, historic period cultural resources must be greater than 50 years old to be considered of potential historic importance. A resource less than 50 years of age may be historically significant if the resource is of exceptional importance. The Office of Historic Preservation endorses recording and evaluating resources over 45 years of age to accommodate a 5-year lag in the planning process.

3.5.2.3 City of Santa Clara General Plan

Section 5.6.3 of the City's General Plan (2010) outlines the goals and policies related to archaeological and cultural resources. The applicable goals in this section of the General Plan encourage the protection and preservation of cultural resources, including archaeological sites, and encourage appropriate mitigation in the event of discovery during construction.

Relevant policies require protecting historic resources through avoidance or reduction of potential impacts, using the Secretary of the Interior's Standards for the Treatment of Historic Properties and using the City's established historic preservation program for ensuring resource evaluation, protection, and integrity (City of Santa Clara, 2010).

Appendix 8.9 of the City's General Plan, the Historic Preservation and Resource Inventory, established criteria for local significance and included a list of recorded historic properties (2010). In addition, the City has embedded in its Municipal Code a section on Historic Preservation (Title 18 Zoning, Chapter 18.106 Historic Preservation). The purpose of this chapter is "to promote the identification, protection, enhancement and perpetuation of buildings, structures and properties within the City that reflect special elements of the City's social, economic, historical, architectural, engineering, archaeological, cultural, natural, or aesthetic heritage" (City of Santa Clara, 2018b). The chapter requires maintenance of a Historic Resource Inventory.

The chapter also identifies significance criteria for local listings. The Criteria for Local Significance was adopted on April 20, 2004, by the City Council. Any building, site, or property in the city that is 50 years old or older and meets certain criteria of architectural, cultural, historical, geographical, or archaeological significance is potentially eligible.

The project would be required to obtain building permits, which would be issued by the City. The issuance of the building permits and oversight provided by the City would ensure that the project complies with the applicable building codes.

3.5.2.4 Criteria for Local Significance

Multiple criteria have been established for local significance.

3.5.2.4.1 Criteria for Historic or Cultural Significance

To be historically or culturally significant, a property must meet at least one of the following criteria:

1) The site, building, or property has character, interest, integrity, and reflects the heritage and cultural development of the city, region, state, or nation.
2) The property is associated with a historical event.
3) The property is associated with an important individual or group who contributed in a significant way to the political, social, and/or cultural life of the community.
4) The property is associated with a significant industrial, institutional, commercial, agricultural, or transportation activity.
5) A building's direct association with broad patterns of local area history, including development and settlement patterns, early or important transportation routes, or social, political, or economic trends and activities. Included is the recognition of urban street pattern and infrastructure.
6) A notable historical relationship between a site, building, or property's site and its immediate environment, including original native trees, topographical features, outbuildings, or agricultural setting.

3.5.2.4.2 Criteria for Architectural Significance

To be architecturally significant, a property must meet at least one of the following criteria:

1) The property characterizes an architectural style associated with a particular era and/or ethnic group.
2) The property is identified with a particular architect, master builder, or craftsman.
3) The property is architecturally unique or innovative.
4) The property has a strong or unique relationship to other areas potentially eligible for preservation because of architectural significance.
5) The property has a visual symbolic meaning or appeal for the community.

6) A building's unique or uncommon building materials or its historically early or innovative method of construction or assembly.

7) A building's notable or special attributes of an aesthetic or functional nature. These may include massing, proportion, materials, details, fenestration, ornamentation, artwork, or functional layout.

3.5.2.4.3 Criteria for Geographical Significance

To be geographically significant, a property must meet at least one of the following criteria:

1) A neighborhood, group, or unique area directly associated with broad patterns of local area history.

2) A building's continuity and compatibility with adjacent buildings and/or visual contribution to a group of similar buildings.

3) An intact, historical landscape or landscape features associated with an existing building.

4) A notable use of landscaping design in conjunction with an existing building.

3.5.2.4.4 Criteria for Archaeological Significance

For the purposes of CEQA, an important archaeological resource is one that meets at least one of the following criteria:

1) Associated with an event or person of recognized significance in California or American history, or recognized scientific importance in prehistory

2) Can provide information that is both of demonstrable public interest, and useful in addressing scientifically consequential and reasonable or archaeological research questions

3) Has a special or particular quality (for example, oldest, best example, largest, or last surviving example of its kind)

4) Is at least 100 years old and possesses substantial stratigraphic integrity

5) Involves important research questions that historical research has shown can be answered only with archaeological methods

3.5.3 Findings

3.5.3.1 Prehistoric and Ethnographic Resources

A pedestrian archaeological survey was conducted inclusive of the project site, linear facility routes, and extending out no less than 200 feet around project components and 50 feet to either side of the right-of-way of the project linear facility routes per California Energy Commission required survey methods. No prehistoric or ethnographic resources were identified. A record search was conducted by PaleoWest Archaeology at the Northwest Information Center at Sonoma State University in February 2019. The record search indicated that 135 cultural resources studies were conducted within 1 mile of the project area, and 54 of those studies include the project area. No studies that included subsurface archaeological testing were conducted within 0.25 mile of the project area. No previously identified cultural resources were found in the project area or the surrounding 1-mile buffer.

3.5.3.2 Built Environment Resources

A review of the City's Historic Properties listings (2018a, 2018b), the General Plan (2010~~a~~), *County of Santa Clara Historic Context Statement* (2012), County of Santa Clara *Heritage Resource Inventory* (2018), and other sources for historical information on built environment resources was conducted. In addition, the NRHP, CRHR, Historic American Building Survey, Historic American Engineering Record, Historic American Landscape Survey, and other repositories of documentation of historical resources were also reviewed. Three built environment resources were identified within approximately 1 mile of the

project, however, none of these resources were recommended as eligible for either the CRHR or the NRHP.

The records search at the Northwest Information Center at Sonoma State University performed in February 2019 identified three historical built environment resources within 1 mile of the project, including a structure at 4423 Cheeney Street, the PG&E Northern Receiving Station Scott #2, and the Santa Clara Public Works Building Maintenance Facility.

- The 4423 Cheeney Street property is located approximately 1 mile to the northeast of the project site. This property does not retain adequate integrity or embody the necessary distinction to be considered a historical resource under CEQA (Oosterhous, 2002).
- The PG&E Station is located approximately 1 mile to the north of the project area. The PG&E Northern Receiving Station did not appear to be individually eligible for the NRHP under Criteria A or C when recorded in 2002 (Supernowicz, 2013).
- The Santa Clara Public Works Building is located approximately 1 mile to the southeast. This building did not appear to be eligible for the NRHP under Criteria A or C (Supernowicz, 2015).

The architectural study area used for this project includes properties within a one-parcel boundary of the project site. The study area is established to analyze the project's potential for impacts to historical resources. One property with structures 45 years or older was identified within the project site, and no properties over 45 years were identified within the one-parcel buffer. At the project site is a two-story Spanish Revival-style commercial building with Modern-style elements. This building is identified in Table 3.5-1 and discussed further in Section 3.5.3.3.

Table 3.5-1. Built Environment Resources 45 Years or Older Within the Project Site

Address	APN	Year Built	Description
2201 Laurelwood Road	104-39-023	1968	Two-story commercial building

3.5.3.3 2201 Laurelwood Road

2201 Laurelwood Road comprises two, two-story Spanish Revival-style buildings (Building 1 and Building 2) with Modern-style elements. Both buildings have a square plan with a tiled mansard roof supported by regularly spaced pillars. Both buildings feature decorative gravel textured panels that extend from the first to the second floor and form a series of arches divided by pillars on all elevations with the exception of the north elevation of Building 1. Glass entrance doors and fixed windows are recessed on the southeast and southwest corners of Building 1. The first and second floors on the south and west elevations of Building 1 feature regularly spaced fixed windows. The north elevation of Building 1 has had an addition removed as evidenced by exposed construction debris. The north elevation of Building 1 also features a two-story concrete enclosed stairwell. The northwest corner of the west elevation of Building 1 features glass entrance doors and fixed windows on the first floor and exposed doors on the second floor. Building 1 adjoins Building 2 on the southeast corner of the east elevation. Building 2 features glass entrance doors and fixed windows recessed on the first floor of the south and east elevations and regularly spaced fixed windows on the second floor of all elevations. The north elevation of Building 2 features a large opening cut into the wall. Several non-historic period tanks, pumping equipment, and an electrical building are located on the property as well as hardscape and landscaped vegetation. The building is currently undergoing demolition by the previous owner as a condition of the sale.

2201 Laurelwood Road does not appear to be a historical resource eligible for listing under the CRHR or City's significance criteria and thus does not qualify as a historical resource under CEQA. Therefore, the resource will not be impacted by the project.

3.5.3.4 Native American Consultation and Ethnography

A summary of outreach and consultation to California Native American tribes and an ethnographic context is provided in Section 3.18, Tribal Cultural Resources.

3.5.4 Environmental Impacts and Mitigation Measures

a) Would the project cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?

Less Than Significant Impact. No prehistoric or ethnographic resources were identified. The record search indicated that no fewer than 135 cultural resources studies were conducted within 1 mile of the project site, of which 54 included portions or all of the project site. No studies that included subsurface archaeological testing were conducted within 0.25 mile of the project site.

A total of three built resources were documented within 1 mile of the project area, the closest of which is approximately 1 mile away. None of these buildings are eligible for the CRHR or the NRHP.

Background research suggests that the project area is located approximately 1.5 miles south of the ethnographic village of *Ulístac* and 2.3 miles north of Rancheria Santa Clara (Brown, 1994).

The geologic map of Santa Clara County shows the area of the project as Quaternary (Holocene) alluvium (Qha) (Graymer et al., 2006). The age and depositional nature of these deposits are such that the project area retains the potential for unknown, buried cultural resources despite previous minor ground-disturbing activities at the site. Boring logs conducted for the project indicate that these alluvial deposits are present to at least 7.5 feet below the ground surface (TRC, 2019).

As a result of the extent of ground-disturbing activities as part of the project, there is potential to impact as-yet unknown, buried archaeological resources in those parts of the project area that encounter native, undisturbed sediments. If these resources were to be exposed or destroyed, it would be considered a significant impact. Based on the potential of encountering a buried resource in the project area, the project design includes the development and implementation of a Worker Environmental Awareness Program (WEAP) prior to ground-disturbing activities. The WEAP includes establishment of protocols to be implemented if inadvertent discoveries of buried cultural resources/human remains are encountered during construction. Implementation of these mitigation measures would reduce the impacts to unknown cultural resources to less than significant.

b) Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

No Impact. Please see response to question (a).

c) Would the project disturb any human remains, including those interred outside of formal cemeteries?

Less Than Significant Impact. As discussed in question (a), as a result of the extent of ground-disturbing activities as part of the project, there is potential to impact buried cultural resources, including human remains. The protocols included in the WEAP will provides guidance should human remains be discovered during construction. Implementation of the WEAP will reduce impacts to unknown human remains to less than significant.

Previously Identified Mitigation Measures: None.

New Proposed Mitigation Measures: None.

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Attachment DR-55
Revised Cultural Resources Technical Report

Cultural Resource Investigation in Support of the 2201 Laurelwood Road Project, Santa Clara County, California

Submitted to:

Jacobs Engineering Group, Inc
2485 Natomas Park Drive, Suite 600
Sacramento, CA 95833

Technical Report 19-37

April 3, 2019

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Cultural Resource Investigation in Support of the 2201 Laurelwood Road Project, Santa Clara County, California

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Technical Report No. 19-37

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April 3, 2019

Keywords: CEQA; Santa Clara Valley; Santa Clara County; Edgecore Laurelwood Data Center

CONTENTS

TABLES

MANAGEMENT SUMMARY

Edgecore, a subsidiary or MECP1 Santa Clara 1, LLC (Edgecore), proposes development of a data center campus, the Laurelwood Data Center (LDL) Project (Project), in Santa Clara, California. PaleoWest Archaeology (PaleoWest) was contracted by Jacobs Engineering Group, Inc. (Jacobs) to conduct a Phase I cultural resource assessment of the Project area in compliance with the California Environmental Quality Act (CEQA). The California Energy Commission (CEC) is the Lead Agency for the purposes of the CEQA.

This report summarizes the methods and results of the cultural resource investigation of the Project area. This investigation included background research, communication with the Native American Heritage Commission (NAHC) and interested Native American tribal groups, and an intensive pedestrian survey of the Project area. The purpose of the investigation was to determine the potential for the Project to impact historical resources under CEQA.

A cultural resource records search and literature review was conducted on February 4, 2019, at the Northwest Information Center of the California Historical Resource Information System housed at Sonoma State University, in Rohnert Park. The records search indicated that no fewer than 135 previous studies have been conducted within one mile of the Project area. In addition, three cultural resources, all built resources, have been recorded within one mile of the Project area, but are not within the Project footprint. No prehistoric resources were recorded within the Project area or one-mile buffer.

As part of the cultural resource assessment of the Project area, PaleoWest also requested a search of the Sacred Lands File (SLF) from the NAHC. Results of the SLF search indicate that there are no known Native American cultural resources within the immediate Project area but suggested contacting six Native American tribal groups to find out if they have additional information about the Project area. All Six individuals were contacted. Four responses were received as a result of the outreach efforts. Recommendations included providing cultural resource training prior to ground disturbing activities and utilizing both a Native American and archaeological monitor if cultural resources are found during Project activities.

PaleoWest conducted an intensive pedestrian survey of the proposed Project area on February 11, 2019. Field survey methods for both the pedestrian archaeological survey and the architectural history survey were completed in accordance with the California Energy Commission (CEC) required survey methods. No prehistoric or historic archaeological resources were identified during the survey. However, ground visibility was very poor throughout the Project area as a majority of the area was paved. PaleoWest recommends that in the event that potentially significant archaeological materials are encountered during Project-related ground-disturbing activities, all work should be halted in the vicinity of the archaeological discovery until a qualified archaeologist can visit the site of discovery and assess the significance of the archaeological resource. In addition, Health and Safety Code 7050.5, CEQA 15064.5(e), and Public Resources Code 5097.98 mandate the process to be followed in the unlikely event of an accidental discovery of any human remains in a location other than a dedicated cemetery.

1.0 INTRODUCTION

Edgecore, a subsidiary or MECP1 Santa Clara 1, LLC (Edgecore), proposes development of a data center campus, the Laurelwood Data Center (LDL) Project (Project), in Santa Clara, California. PaleoWest Archaeology (PaleoWest) was contracted by Jacobs Engineering, Inc (Jacobs) to conduct a Phase I cultural resource assessment of the Project area in compliance with the California Environmental Quality Act (CEQA). The California Energy Commission (CEC) is the Lead Agency for the purposes of the CEQA.

1.1 PROJECT LOCATION AND DESCRIPTION

The Laurelwood Data Center is a proposed data center campus on an approximate 12-acre site located at the intersection of Highway 101 and Montague Expressway in the City of Santa Clara, Santa Clara County, California. The Project area is located at 2201 Laurelwood Road approximately 80 feet north of Highway 101 and 400 feet west of the Montague Expressway (Figure 1-1). A channelized portion of the San Tomas Aquino Creek runs approximately 0.2 miles to the west of the Project area. The Project area is situated within an unsectioned portion of Township 6 South, Range 1 West, Mount Diablo Base Meridian (MDBM), as depicted on the Milpitas, CA 7.5' U.S. Geological Survey (USGS) topographic quadrangle (Figure 1-2). The elevation of the Project area ranges between 27 and 30 feet above mean sea level (amsl).

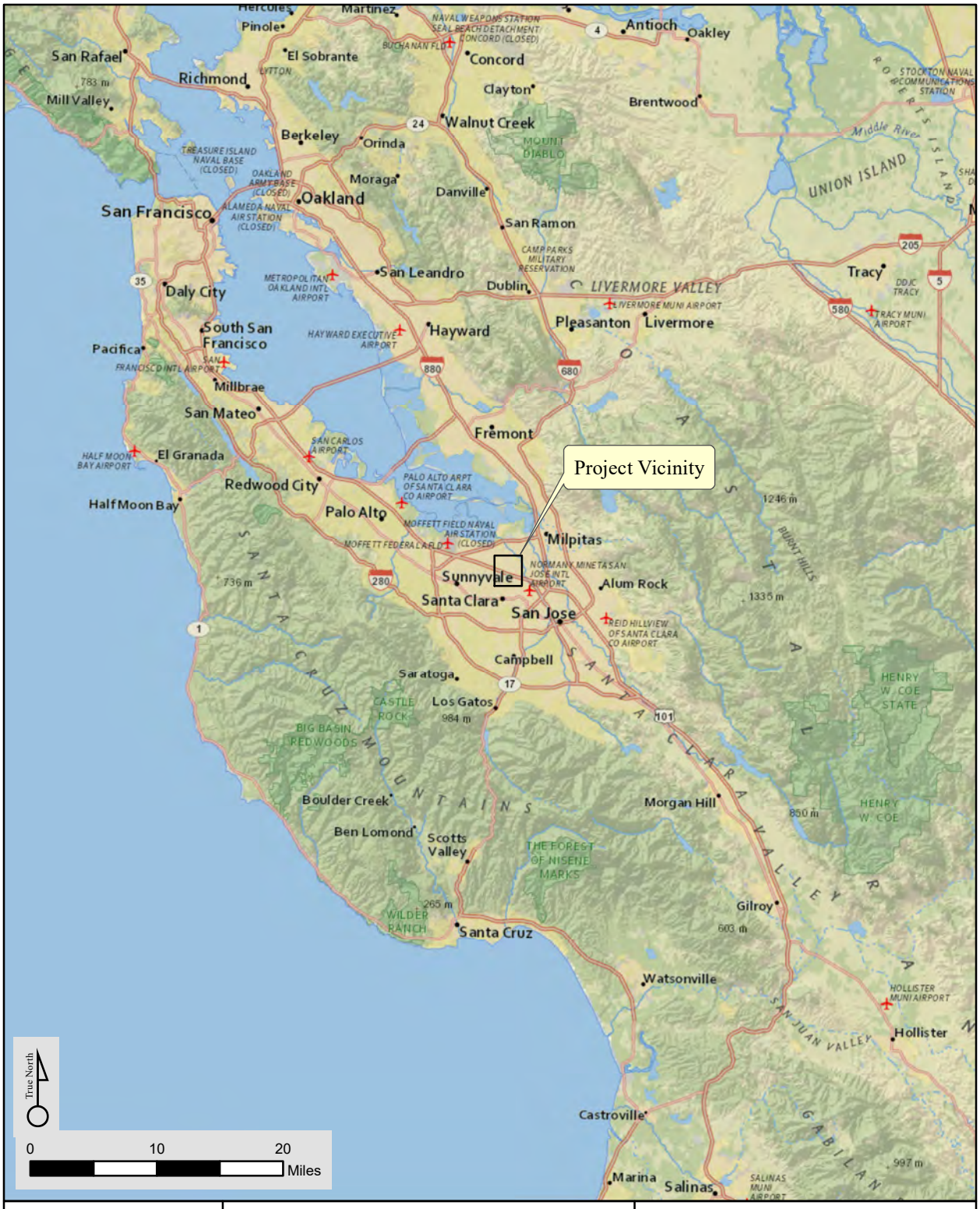
The proposed LDC Project will use existing natural gas, water, and sewer interconnections located either onsite or within Laurelwood Road and one short offsite transmission line. An onsite substation will be located in the southwestern corner of the project site and will be constructed by the project owner and deeded to SVP. Ground disturbing activities include excavation for the natural gas line, water supply, and santitary wastewater pipeline. The maximum depth of disturbance for these lines is listed in Table 1-1 below.

Table 1-1: Proposed Excavation Depths

Type of Conveyance	Length	Depth	Width
Natural Gas Pipeline	0	-	-
Water Supply Pipeline	80 ft.	4 ft.	4 ft.
Sanitary Wastewater Pipeline	60 ft.	8 ft.	8 ft.

1.2 REPORT ORGANIZATION

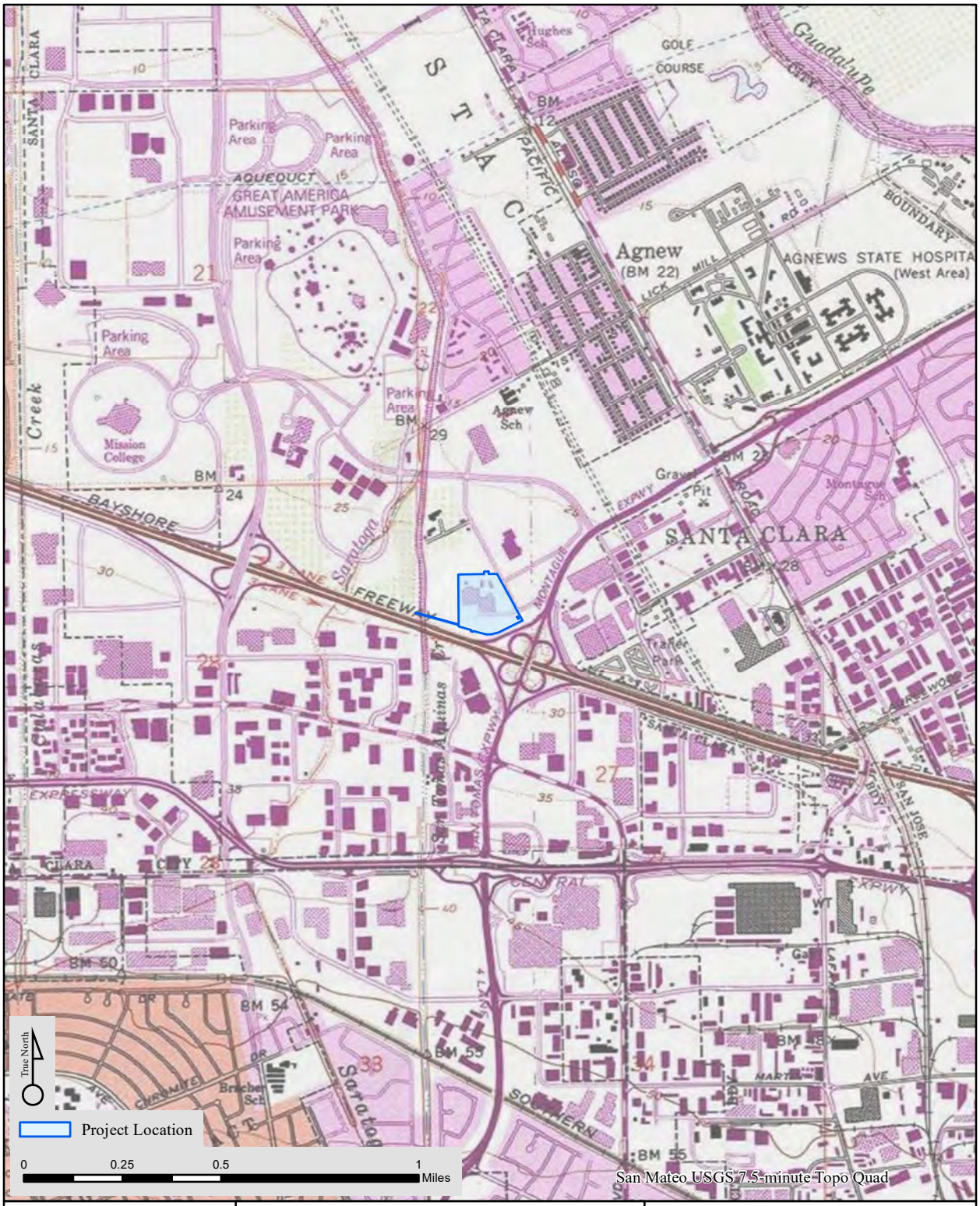
This report documents the results of a cultural resource investigation conducted for the proposed Project. Chapter 1 has introduced the project location and description. Chapter 2 states the regulatory context that should be considered for the Project. Chapter 3 synthesizes the natural and cultural setting of the Project area and surrounding region. The results of the cultural resource literature and records search conducted at the Northwest Information Center (NWIC) and the Sacred Lands File (SLF) search, and a summary of the Native American communications is presented in Chapter 4. The field methods employed during this investigation and findings are outlined in Chapter 5 with management recommendation provided in Chapter 6. This is followed by bibliographic references and appendices.



PALEO WEST archaeology

Project Vicinity Map

Figure 1-1
Edgecore Laurelwood
Small Power Plant Survey
Santa Clara County, CA



PALEO WEST archaeology

Project Location Map

Figure 1-2
Edgecore Laurelwood
Small Power Plant Survey
Santa Clara County, CA

2.0 REGULATORY CONTEXT

2.1 CALIFORNIA ENVIRONMENTAL QUALITY ACT

The proposed Project is subject to compliance with CEQA, as amended. Compliance with CEQA statutes and guidelines requires both public and private projects with financing or approval from a public agency to assess the project's impact on cultural resources (Public Resources Code Section 21082, 21083.2 and 21084 and California Code of Regulations 10564.5). The first step in the process is to identify cultural resources that may be impacted by the project and then determine whether the resources are "historically significant" resources.

CEQA defines historically significant resources as "resources listed or eligible for listing in the California Register of Historical Resources (CRHR)" (Public Resources Code Section 5024.1). A cultural resource may be considered historically significant if the resource is 45 years old or older, possesses integrity of location, design, setting, materials, workmanship, feeling, and association, and meets any of the following criteria for listing on the CRHR:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. Is associated with the lives of persons important in our past;
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or,
4. Has yielded, or may be likely to yield, information important in prehistory or history (Public Resources Code Section 5024.1).

Cultural resources are buildings, sites, humanly modified landscapes, traditional cultural properties, structures, or objects that may have historical, architectural, cultural, or scientific importance. CEQA states that if a project will have a significant impact on important cultural resources, deemed "historically significant," then project alternatives and mitigation measures must be considered. Additionally, any proposed project that may affect historically significant cultural resources must be submitted to the State Historic Preservation Officer (SHPO) for review and comment prior to project approval by the responsible agency and prior to construction.

3.0 SETTING

This section of the report summarizes information regarding the physical and cultural setting of the Project area, including the prehistoric, ethnographic, and historic contexts of the general area. Several factors, including topography, available water sources, and biological resources, affect the nature and distribution of prehistoric, ethnographic, and historic-period human activities in an area. This background provides a context for understanding the nature of the cultural resources that may be identified within the region.

3.1 ENVIRONMENTAL SETTING

The project area is located south of the San Francisco Bay. The project area ecology, though heavily impacted by dense urban development, is coastal littoral, which consists of land strips along the coast that are characterized by a series of microenvironments including estuaries, bays, marshes, and grassy terraces (Chartkoff and Chartkoff 1984). The project area is located approximately 6.5 miles southeast of the Bay waters and 3 miles from the salt flats leading to the Bay. Agricultural activities are known to have taken place in the immediate project vicinity since the mid-1870s, and within the project area itself from at least the mid-1940s and probably earlier. Development on the property has impacted the entire project area.

The climate of the project area is Mediterranean: mild, rainy winters, and hot, dry summers. Annual precipitation in the area is approximately 14.5 inches, with rainfall concentrated in the fall, winter, and spring. The San Francisco Peninsula's proximity to the Pacific Ocean provides for mild temperatures throughout the year. Winter temperatures vary from an average high of approximately 60°F to an average low of approximately 39°F; summer temperatures vary from an average high of approximately 81°F to an average low of approximately 52°F (Western Regional Climate Center 2010)

Common vegetation throughout the area includes Valley Oak (*Quercus lobata*), Live Oak (*Quercus agrifolia*), California buckeye (*Aesculus californica*), California bay laurel (*Umbellularia californica*), star thistle (*Centaurea solstitialis*), wild oats (*Avena fatua*), morning glories (*Convolvulus*), lupine (*Lupinus*), poppies (*Papaver*), wild artichokes (*Cynara scolymus*), and various other native and imported grasses (Brown 1985).

Animal life within the region is diverse. Unlike prehistoric times when animals such as pronghorn, antelope, tule elk, mule deer, black-tail deer, and grizzly bear occupied the area, the region today favors small, herbivorous mammals, especially voles, pocket gophers, ground squirrels, and pocket mice (Brown 1985). The few larger, open areas in the region attract some larger animals including deer, rabbit, skunk, opossum, raccoon, and a number of birds including red-tailed hawks and turkey vultures.

3.2 PREHISTORIC SETTING

Research into local prehistoric cultures began with the work of N. C. Nelson of the University of California, who conducted the first intensive archaeological surveys of the San Francisco Bay region from 1906 to 1908. Nelson documented 425 shellmounds along the Bay shoreline and adjacent coast when the Bay was still ringed by salt marshes up to 5 miles wide (Nelson 1909). He maintained that the intensive use of shellfish, a subsistence strategy reflected in both coastal and bay shoreline middens, indicated a general economic unity in the region during prehistoric times, and he introduced the idea of a distinct San Francisco Bay archaeological region (Moratto 1984:227).

In 1911, Nelson supervised excavations at CA-SFR-7 (the Crocker Mound) near Hunter's Point in San Francisco County, a site that was later dated from 1050 B.C. to A.D. 450. L. L. Loud identified archaeological components from this same period in Santa Clara County in 1911 while excavating at CA-SCL-1 (the Ponce, Mayfield, or Castro Mound site) (Loud 1912). R. J. Drake recognized comparably dated archaeological components in San Mateo County in 1941–1942 at CA-SMA-23 (Mills Estate) in San Bruno (Moratto 1984:233).

Conducted more or less independently from the work of Nelson and Loud, investigations into the prehistory of the Central Valley of California, presaged by early amateur excavations in the 1890s, began in earnest in the 1920s. In the early 20th century, Stockton-area amateur archaeologists J. A. Barr and E. J. Dawson separately excavated a few sites in the Central Valley and made substantial collections. Based on artifact comparisons, Barr identified what he believed were two distinct cultural traditions, an early and a late. Dawson later refined his work and classified the Central Valley sites into three "age-groups" (Schenck and Dawson 1929:402).

Professional or academic-sponsored archaeological investigations in central California began in the 1930s, when J. Lillard and W. Purves of Sacramento Junior College formed a field school and conducted excavations throughout the Sacramento Delta area. By seriating artifacts and mortuary traditions, they identified a three-phase sequence similar to Dawson's, including Early, Intermediate, and Recent cultures (Lillard and Purves 1936). This scheme went through several permutations, including Early, Transitional, and Late Periods (Lillard et al. 1939) and Early, Middle, and Late Horizons (Heizer and Fenenga 1939). In 1948 and again in 1954, Richard Beardsley refined this system and extended it to include the region of San Francisco Bay (Beardsley 1948, 1954). The resulting scheme came to be known as the Central California Taxonomic System (CCTS) (Fredrickson 1973; Hughes 1994:1). Subsequently, the CCTS system of Early, Middle, and Late Horizons was applied widely to site dating and taxonomy throughout central California. This system focused on the archaeology of the Delta region, with its more established tradition of archaeological investigations of rich archaeological sites, to set the standard by which other regions were assessed. Resulting explanations of regional prehistory and culture change tended to place the Delta as the earlier center for interaction, change, and development, with the Bay Area following on a separate, somewhat different path.

As more data were acquired through continued fieldwork, local exceptions to the CCTS were discovered. The accumulation of these exceptions, coupled with the development of radiocarbon dating in the 1950s and obsidian hydration analysis in the 1970s, opened up the possibility of dating deposits more accurately. Much of the subsequent archaeological investigation in central California focused on the creation and refinement of local versions of the CCTS.

Citing limitations with the existing classificatory schemes, Ragir (1972) adopted a new set of terms for describing archaeological cultures based on their localities. Around this same time, a series of workshops was convened to discuss concerns in California archaeology, including revisions to the CCTS (Fredrickson 1973:88-91). In his doctoral dissertation, Fredrickson (1973) reviewed the state of archaeology in California. Adopting some of the revisions agreed upon at the workshops as well as incorporating modifications employed by Ragir and Bennyhoff, Fredrickson (1973) suggested an alternative way of classifying the prehistory of California. Fredrickson (1973:113-114) proposed four "major chronological periods" in prehistoric California: the Early Lithic Period (described as hypothetical), a Paleoindian Period, an Archaic Period, and an Emergent Period. The Archaic and Emergent Periods were further divided into Upper and Lower periods. Subsequently, Fredrickson (1974, 1994) revised the findings and concepts discussed in his doctoral dissertation, further subdividing the Archaic into Lower, Middle, and Upper.

A series of "patterns," emphasizing culture rather than temporal periods, can be identified throughout California prehistory. Fredrickson (1973:7-8) defines a pattern as:

> [An] adaptive mode(s) extending across one or more regions, characterized by particular technological skills and devices, particular economic modes, including participation in trade networks and practices surrounding wealth, and by particular mortuary and ceremonial practices.

In addition, following Ragir, Fredrickson (1973:123) proposed that the nomenclature for each pattern relate to the location at which it was first identified, such as the Windmiller, Berkeley, and Augustine Patterns (see below for descriptions).

Various modifications of the CCTS (e.g., Bennyhoff and Hughes 1987; Fredrickson 1973, 1974; Milliken and Bennyhoff 1993) sustain and extend the system's usefulness for organizing our understanding of local and regional prehistory in terms of time and space. The cultural patterns identified in the Bay Area that, in a general way, correspond to the CCTS scheme are the Berkeley and Augustine patterns. Dating techniques such as obsidian hydration analysis or radiometric measurements can further increase the accuracy of these assignments.

It was initially thought that a well-developed Early Period prehistoric component was not represented within the San Francisco Bay area. It had been assumed that San Francisco Bay was a "local marginal and impoverished manifestation of cultural succession or development in the Sacramento-San Joaquin Delta region," where a thriving Windmiller culture had been identified, which was "explainable in terms of local ecological adjustments over a period of three to four thousand years" (Gerow with Force 1968:10 summarizing Heizer 1964).

However, Bert Gerow of Stanford University, in his work at the University Village site in the 1950s, established the idea that the Bay Area represented a separate center of cultural interaction, change, and development (Gerow with Force 1968). The work undertaken by Gerow at the University Village site (CA-SMA-77) in San Mateo County indicated that a distinct Early Bay period preceded the arrival of the Middle Horizon, Berkeley Pattern. These conclusions were supported by radiocarbon dates derived from charcoal found in association with burials at the site. The burials were dated from 1500 to 1000 B.C. and were markedly older than any other published site in the Bay Area at that time. Results of obsidian hydration analysis were in accord with this date range (Gerow with Force 1968:7-8).

Comparing characteristics of the Early Bay period to those of the Windmiller pattern and Beardsley's Sacramento Valley Middle Horizon, Gerow (Gerow with Force 1968:109-110) noted the following trends. In the Early Bay period, burials tend to be flexed and lack patterned orientation or position, in contrast to Windmiller burials that tend to be in extended positions with patterned orientation. There is a high occurrence of red ochre in relation to ornamental artifacts manufactured of bone, marine shell, and stone. Whole *Olivella* shell is more common than drilled shell fractions. Quartz crystals, plummet-shaped charmstones and artifacts manufactured from mica or slate are either rare or absent. Flaked and core tools are more common than projectile points, which are relatively rare. Stone net-sinkers are found in this period, and composite fishhooks or fish spears are rare or absent. There is a relative abundance of bone awls, antler wedges or end-scrapers, scapula and rib side-scrapers, flat-ended pestles and unshaped cobblestone mortars.

Gerow (Gerow with Force 1968) noted that there were similarities between the Early Bay period components and those of later periods, but observed that changing trends included more intensive exploitation of food resources, a decrease in the amount of powdered red ochre included in graves, more

elaborate shell, stone and bone artifacts, an increase in the number of obsidian and projectile points and a concomitant decrease in the number of flake and core tools, an increase in the amount of cylindrically shaped mortars and longer pestles, a decrease in the number of edge-notched stone sinkers, and an increase in stature and variations in cranial indices (Gerow with Force 1968:124).

According to Breschini (1983), Gerow's hypotheses were largely ignored by the archaeological community throughout the next two decades. Alternative explanations have subsequently been suggested such as Moratto's (1984:279) hypothesis that the "University Village complex is an expression of the Sur Pattern strongly influenced by the Berkeley Pattern."

The Early Berkeley Pattern has been dated from at least 3000 B.C. in the east San Francisco Bay (e.g., Alameda County, where the earliest Early Berkeley sites appear) (Hughes 1994), with the number of sites increasing through A.D. 1 (Moratto 1984:282). Late Berkeley Pattern (500 B.C. - A.D. 1000) sites are much more common and well documented, and, therefore, better understood than the Early Berkeley Pattern sites. Berkeley Pattern sites are scattered in more diverse environmental settings, but riverine settings are prevalent.

It is during this period that the Bay Area shellmounds were inhabited (Lightfoot and Luby 2002), and deeply stratified shellmound deposits that developed over generations of occupation are common to Berkeley Pattern sites. The typical body position for burials is tightly flexed, with no consistent orientation. Associated grave goods are much less frequent than is encountered in sites of other periods. The sites contain numerous mortars and pestles. Projectile points in this pattern become progressively smaller and lighter over time, culminating in the introduction of the bow and arrow during the Late Period. Wiberg (1997:10) claims that large obsidian lanceolate projectile points or blades are unique to the Berkeley Pattern. *Olivella* shell beads include saddle and saucer types. *Haliotis* pendants and ornaments are occasionally found. Slate pendants, steatite beads, stone tubes, and ear ornaments are unique to Berkeley Pattern sites (Fredrickson 1973:125–126; Moratto 1984:278–279). Evidence of warfare or interpersonal violence is present, including cranial trauma, parry fractures, and embedded projectile points (Milliken et al. 2007:113-114).

The Augustine Pattern coincides with the Late Period, ranging from as early as A.D. 700 to about A.D. 1800. Intensive fishing, hunting, and gathering (especially of acorns) typify this period, as well as a large population increase, expanded trade and exchange networks, increased ceremonialism, and the practice of cremation, in addition to flexed burials. Certain artifacts are also distinctive in this pattern: bone awls used in basketry, small notched and serrated projectile points that are indicative of bow-and-arrow usage, clay effigies, bone whistles, stone pipes, and occasional pottery. *Olivella* beads and *Haliotis* ornaments increase in number of types and frequency of occurrence, sometimes numbering in the hundreds in single burials. Beginning in the last quarter of the 18th century, the Augustine Pattern was disrupted by the Spanish explorers and the mission system (Moratto 1984:283).

Most recently, Milliken et al. (2007:99-123) developed what they term a "hybrid system" for the San Francisco Bay Area, combining the Early-Middle-Late Period temporal sequence with the pattern-aspect-phase cultural sequence. Following Fredrickson, Milliken et al. (2007:103) define *patterns* as "units of culture marked by distinct underlying economic modes, technological adaptations, and ceremonial practices." The a*spect* is defined as a local variation in a major economic pattern, with a sequence of phases within a particular district representing an aspect. Following Willey and Phillips (1958), phases represent the smallest units of related site components "spatially limited to the order of magnitude of a locality or region and chronologically limited to a relatively brief interval of time" (Milliken et al. 2007:103).

Dating of the cultural patterns, aspects, and phases was based on Dating Scheme D of the CCTS, developed by Groza (2002). Groza directly dated over 100 *Olivella* shell beads, obtaining a series of AMS radiocarbon dates representing shell bead horizons. The new chronology she developed has moved several shell bead horizons as much as 200 years forward in time. Milliken et al. (2007:105) use the term *bead horizon* to represent "the short time periods marked by trade of particular bead types across wide areas of central California, in order to clearly separate units of time and units of culture."

Milliken et al.'s (2007) San Francisco Bay Area Cultural Sequence includes:

- Early Holocene (Lower Archaic1) from 8000 to 3500 B.C.
- Early Period (Middle Archaic) from 3500 to 500 B.C
- Lower Middle Period (Initial Upper Archaic) from 500 B.C. to A.D. 430
- Upper Middle Period (Late Upper Archaic) from A.D. 430 to 1050
- Initial Late Period (Lower Emergent) from A.D. 1050 to 1550
- Terminal Late Period, post-A.D. 1550

There is no discussion of pre-8000 B.C., as no archaeological evidence dating to this early time period has been located in the Bay Area. Milliken et al. (2007) posit that this dearth of archaeological material may be related to subsequent environmental changes that submerged sites, buried sites beneath alluvial deposits, or destroyed sites through stream erosion. A summary of the approach presented by Milliken et al. (2007) follows.

A "generalized mobile forager" pattern marked by the use of milling slabs and handstones and the manufacture of large, wide-stemmed and leaf-shaped projectile points emerged around the periphery of the Bay Area during the Early Holocene Period (8000 to 3500 B.C.). No occupation sites dating to this early period have been found near the project area in the South Bay.

Beginning around 3500 B.C., evidence of sedentism, interpreted to signify a regional symbolic integration of peoples, and increased regional trade, emerges in the form of new ground stone technology and the introduction of cut-shell beads into burial contexts (Milliken et al. 2007:114). This Early Period lasted until ca. 500 B.C. The earliest mortar and pestles found so far date to post-4000 B.C., with wood mortars dating to 3800 B.C. found in the vicinity of the Los Vaqueros reservoir. By 1500 B.C., mortars and pestles replaced milling slabs and handstones at some East Bay sites. Sedentism or semi-sedentism is in evidence in the East Bay during this period in the form of burial complexes with associated ornamental grave goods, such as were found at West Berkeley, Ellis Landing, and Pacheco shellmounds, and house floors with postholes, as have been found at the Rossmoor site near Walnut Creek (Milliken et al. 2007:115; Price et al. 2006).

Milliken et al. (2007:115) identify "a major disruption in symbolic integration systems" circa 500 B.C., marking the beginning of the Lower Middle Period (500 B.C. to A.D. 430). Changes included the disappearance of rectangular shell beads and introduction of split-beveled and small saucer *Olivella* beads (inferred to represent some of the earliest religious artifacts), which appear around the Early/Middle Transition bead horizon. However, spire-lopped *Olivella* beads continued to be the most common bead type in mortuary contexts. Bead Horizon M1, dating from 200 B.C. to A.D. 430, is described by Milliken et al. (2007:115) as marking a 'cultural climax' within the San Francisco Bay Area. New developments included the introduction of circular *Haliotis* ornaments and the proliferation of *Olivella* saucer beads.

1 The corresponding periods based on Fredrickson's Paleoindian, Archaic and Emergent classification system are provided in parentheses.

New bone tools and ornaments are also manufactured in this period, such as tubes and whistles, barbless fish spears, and elk femur spatulae. In the Central and North Bay areas, awls of bone with shouldered tips indicate basketry manufacture. Within the Central Bay, mortars and pestles continued to be used exclusively, while both milling slabs and mortars were used around the margins. Net sinkers ceased to be used at most sites around the Bay but continued to be used at CA-SFR-112, which is located within the South of Market area in San Francisco (Milliken et al. 2007:115).

The Upper Middle Period (A.D. 430 to 1050) is marked by the collapse of the *Olivella* saucer bead trade in central California, abandonment of many Bead Horizon M1 sites, an increase in the occurrence of sea otter bones in those sites that were not abandoned, and the spread of the extended burial mortuary pattern characteristic of the Meganos complex into the interior East Bay. Bead Horizons M2, M3, and M4 were identified within this period (Milliken et al. 2007:116). Bead Horizon M2a is marked by the replacement of *Olivella* saucer beads in burial contexts with "rough-edged full saddle *Olivella* beads with remarkably small perforations" (Milliken et al. 2007:116). Bead Horizon M2b is characterized by mixed *Olivella* saddle beads dating from A.D. 430 to 600. The Meganos burial pattern continued to spread westward, although it did not extend as far as the West or North Bay, and therefore not into the northern San Francisco Peninsula. Within the Central Bay, artifacts such as extremely well-crafted "show" blades, mica ornaments, fishtail charmstones and a variety of *Haliotis* ornament forms appear during Bead Horizons M2a and M2b.

The Initial Late Period, dating from A.D. 1050 to 1550, is characterized by increased manufacture of status objects. In lowland, central California during this period, Fredrickson (1973 and 1994, quoted in Milliken et al. 2007:116) noted evidence for increased sedentism, the development of ceremonial integration, and status ascription. The beginning of the Late Period (ca. A.D. 1000) is marked by the Middle/Late Transition bead horizon. Well-fashioned "show" mortars, new *Olivella* bead forms, and a variety of *Haliotis* ornaments with multiperforated and bar-scored forms appear during this period. These new artifact forms are reflective of the beginning of the Augustine Pattern, while those features of the classic Augustine Pattern, such as the arrow, banjo effigy ornaments, the flanged pipe, and *Olivella* callus cup beads, appear during Bead Horizon L1 (post-A.D. 1250). Coincident with the introduction of the bow and arrow, Napa Valley obsidian manufacturing debitage increased markedly in the interior East Bay, while there was a striking decrease in biface manufacture and debitage at Napa Valley Glass Mountain quarries. In the South Bay, however, local Franciscan chert continued to be used and completed obsidian projectile points were traded in from the north. Social stratification is evident in the introduction or, in some areas, reintroduction of partial cremations with high-status grave goods. In addition, the variety of status goods included in interments and in association with cremations of high-status individuals increased (Milliken et al. 2007:117).

Olivella sequin and cup beads, characteristic of the L1 Bead Horizon, disappear circa A.D. 1500 to 1550, marking the beginning of the Terminal Late Period. Clamshell disk beads, indicative of the L2 Bead Horizon, were traded across the North Bay during this period, although there is no evidence that they spread south of the Carquinez Strait at this time. The earliest clamshell disks south of the Carquinez Strait date to A.D. 1670 in Contra Costa County. Sometime between A.D. 1500 and 1650, fewer beads appear as grave goods, and only *Olivella* lipped and spire-lopped beads appear in South Bay and Central Bay interments. Milliken et al. (2007:117) note that material of the L2 Bead Horizon tends to occur as a thin lens atop rich midden material of the L1 Bead Horizon. Other changes occurred around the San Francisco Bay Area during this period. Clamshell disk beads, magnetite tube beads, the toggle harpoon, hopper mortars, plain, corner-notched, arrow-sized, projectile points, and secondary cremation initially appear in the North Bay during the Terminal Late Period. The hopper mortar did not extend into the Central or

South Bay, although plain, corner-notched, projectile points did begin appearing in the Central Bay. Desert side-notched points spread from the Central Coast into the South Bay (Milliken et al. 2007:117).

3.3 ETHNOGRAHIC SETTING

There is a considerable body of ethnographic literature about the Native American inhabitants of the region in which the project is located. This section provides a brief summary of that ethnography and is intended to provide a general background only. For a more extensive review of Ohlone ethnography, see Bocek (1986); Cambra et al. (1996); Kroeber (1925); Levy (1978); Milliken (1983); and Shoup et al. (1995).

The project area lies within the region occupied by the Ohlone or Costanoan group of Native Americans at the time of historic contact with Europeans (Kroeber 1925:462-473). Although the term Costanoan is derived from the Spanish word *Costaños*, or "coast people," its application as a means of identifying this population is based in linguistics. The Costanoans spoke a language now considered one of the major subdivisions of the Miwok-Costanoan, which belonged to the Utian family within the Penutian language stock (Shipley 1978:82-84). Costanoan actually designates a family of eight languages, which were spoken by tribal groups occupying the area from the Pacific Coast to the Diablo Range, and from San Francisco to Point Sur. Modern descendants of the Costanoan prefer to be known as Ohlone. The name Ohlone is derived from the Oljon group, which occupied the San Gregorio watershed in San Mateo County (Bocek 1986:8). The two terms (Costanoan and Ohlone) are used interchangeably in much of the ethnographic literature.

Based on linguistic evidence, it has been suggested that the ancestors of the Ohlone arrived in the San Francisco Bay area about 1,500 years ago, having moved south and west from the Sacramento-San Joaquin Delta region. The ancestral Ohlone displaced speakers of a Hokan language and were probably the producers of the artifact assemblages that constitute the Augustine pattern described above (Levy 1978:486).

Although linguistically related as a family, the eight Costanoan languages composed a continuum in which neighboring groups could probably understand each other. Beyond neighborhood boundaries, however, each group's language was unrecognizable to the other. Each of the eight language groups was subdivided into smaller village complexes or tribal groups. The groups were independent political entities, each occupying specific territories. Access to the natural resources of the territories was controlled by each group. Although each group had one or more permanent villages, their territory contained numerous smaller camp sites used as needed during a seasonal round of resource exploitation.

Leadership was provided by a chief. The chief, who could be either a man or a woman, inherited the position patrilineally. Together, the chief and a council of elders served the community as advisers. However, the chief had special responsibility to feed visitors, to provide for the impoverished, and to direct ceremonies and hunting, fishing, and gathering activities. Only in times of warfare was the chief's role as absolute leader recognized by group members (Levy 1978:487).

Extended families lived in domed structures thatched with tule, grass, wild alfalfa, or ferns (Levy 1978:492). Semisubterranean sweat houses were built into pits excavated next to stream banks and covered with a structure. The tule raft, propelled by double-bladed paddles similar to those that were used in the Santa Barbara Channel Island region, was used to navigate across San Francisco Bay (Kroeber 1925:468).

Mussels were an important staple in the Ohlone diet as were acorns of the coast live oak, valley oak, tanbark oak, and California black oak. Seeds and berries, roots and grasses, as well as the meat of deer, elk, grizzly, rabbit, and squirrel formed the Ohlone diet. Careful management of the land through controlled burning served to insure a plentiful and reliable source of all these foods (Levy 1978:491).

The Ohlone usually cremated a corpse immediately upon death, but the body was interred if there were no relatives to gather wood for the funeral pyre. Mortuary goods comprised most of the personal belongings of the deceased (Levy 1978:490).

The arrival of the Spanish in the San Francisco Bay Area led to a rapid and major reduction in native California populations. Diseases, declining birth rates, and the effects of the mission system served to largely eradicate their traditional lifeways (which are currently experiencing resurgence among Ohlone descendants). Brought into the missions, the surviving Ohlone, along with former neighboring groups of Esselen, Yokuts, and Miwok, were transformed from hunters and gatherers into agricultural laborers (Levy 1978; Shoup et al. 1995). With the secularization of the mission system by an independent Mexico in the 1830s, numerous ranchos were established. Generally, the few Indians who remained were then forced, by necessity, to work on the ranchos.

Today, descendants of the Ohlone live throughout the Bay Area. Several Ohlone groups (e.g., Muwekma, Amah) have banded together to seek federal recognition. Many Ohlone, both as individuals and as groups, are active in preserving and reviving elements of their traditional culture, such as dance, basketry, and song, and are active participants in the monitoring and excavation of archaeological sites.

3.4 HISTORICAL SETTING

This section of the report summarizes information regarding the historic context of the Project area. Overarching historic themes were identified to establish a historic context within which to evaluate historic-period period properties within the Project area. These themes include the history of Santa Clara, the history of Silicon Valley, and the history of 2201 Laurelwood Road.

3.4.1 History of Santa Clara

The 1769 expedition led by Captain Gaspar de Portola initiated the period of contact between Spanish colonists and the native people of the Santa Clara Valley. The Portola party reached the Santa Clara Valley in the fall of that year, camping on San Francisquito Creek. A year later, Pedro Fages led an expedition that explored the eastern shore of San Francisco Bay, eventually reaching the location of modern-day Fremont, where they traded with the local native people. In 1772, a second Fages expedition traveled from Monterey passing through the Santa Clara Valley (Fages 1972, Levy 1978).

In 1774, Captain Fernando Rivera y Moncada, scouting locations for a mission and military installment, encountered local Indian people in the Santa Clara Valley. In 1776, a mission scouting expedition under the leadership of Juan Bautista de Anza and Friar Pedro Font traveled through the same area and traded with residents of native villages encountered along the way. Font recorded that the party had observed 100 native people while traveling through the Santa Clara Valley (Font 1930, Shoup et al. 1995).

The first mission in the San Francisco Bay Area was established in San Francisco with the completion of Mission San Francisco de Asis (Mission Dolores) in 1776. Mission Santa Clara de Asis followed in 1777, and Mission San Jose in 1797. The missions relied on the Native American population both as their source of Christian converts and their primary source of labor. Diseases introduced by the early

expeditions and missionaries, and the contagions associated with the forced communal life at the missions, resulted in the death of many local peoples. Cook (1943) estimates that by 1832, the Ohlone population had been reduced from a high of over 10,000 in 1770 to less than 2,000.

Mission Santa Clara, founded in 1777, controlled much of the land of the Santa Clara Valley (approximately 80,000 acres) until the 1830s. Mission lands were used primarily for the cultivation of wheat, corn, peas, beans, hemp, flax, and linseed, and for grazing cattle, horses, sheep, pigs, goats, and mules. In addition, mission lands were used for growing garden vegetables and orchard trees such as peaches, apricots, apples, pears, and figs.

Within a period of 25 years after the founding of Mission Santa Clara, most local native peoples had been affected by the presence of the missionaries. Though some Indians gave up their traditional way of life by choice, many were coerced, manipulated, and forced to the mission. By the mid-1790s, the traditional Ohlone economy had been significantly disrupted. Native populations outside the Mission had suffered losses to Spanish disease, a decline in food resources, a disrupted trade system, and a significant drought in 1794 (Shoup et al. 1995). Mission records of 1794 and 1795 show that 586 Native Indians were baptized. While earlier baptisms were composed primarily of children, 80 percent of the converts during this period were adults. The independent tribal elders had finally been brought into the mission system.

The next several decades represent a time of relative stability throughout the Santa Clara Valley. During this period, the Spanish and Mexican population outside of the Mission grew in numbers, power, and prosperity, and Mexico, having gained its independence from Spain, began administering the 21 California missions. By the 1820s, when American trappers began exploring the region, Indians of the San Jose and Santa Clara missions began to rebel (Shoup et al 1995). The rebellion was led by Indian chieftain Estanislao and his companion Cipriano, and the confrontations that took place in the summer of 1829 resulted in casualties for both the Indian rebels and the soldiers serving the mission (Shoup et al. 1995). The fact that Indian people who had maintained long-term relationships with local missions were motivated to rebel against them reflected poorly on the institution's success and signaled the beginning of the final chapter in Mission Santa Clara's long existence (Shoup et al. 1995).

The Mexican government began the process of secularizing mission lands in the 1830s. The secularization of the mission lands was decreed in 1834, but the process did not get underway at Santa Clara until 1837. Within a few years, the lands of all 21 missions were expropriated in the form of land grants. Despite regulations that stipulated that the land grants were to be distributed fairly, recipients of the land grants were primarily *Californios* who had allied themselves with Jose Ramon Estrada, Governor Juan Bautista Alvarado's brother-in-law, who oversaw the process (Shoup et al. 1995). By 1845, eight land grants of the former Mission Santa Clara lands were formally awarded to *Californios* and their Anglo allies (54,284 acres); four were awarded to Mission Indians (11,917 acres) (Shoup et al. 1995).

With their victory in the Mexican-American War (1846-1848), the United States took possession of California and Anglo-European settlers began to arrive in the Santa Clara Valley. The 1849 Gold Rush brought an unprecedented wave of settlers, many of whom acquired land and turned their attention to agriculture. In November of 1849, San Jose became the first capital of the State of California. The following decades were marked by a transition from the ranching economy favored by Spanish and Mexican landholders to an economy based at first on grain agriculture, such as wheat, then increasingly on orchard and specialty vegetable agriculture.

In the 1850's the hamlet of Santa Clara began to take shape as a recognizable small town. William Campbell surveyed the town site into lots one hundred yards square, and one lot was given to each citizen with the understanding that he was to build a house on it within three months or lose the property. A schoolhouse and a church were built, several hotels erected, mercantile businesses established, and 23 houses were imported from Boston to be set up in the town. In 1851, Santa Clara University, was founded on the site of the Santa Clara de Asiss Mission (City of Santa Clara 2010:2).

In 1851, Santa Clara College was established on the old mission site and became a prominent feature of the developing town. Santa Clara incorporated as a town on July 5, 1852 and became a state-chartered city in 1862. By this time the city encompassed an area two miles long and one and a half miles wide. Outside city limits, small family farms and orchards developed and thrived in testimony to the area's fertile soil and mild climate. As the town grew, it was supported by a variety of manufacturing, seed, and fruit industries. The immediate vicinity around Santa Clara became famous for its acre-upon-acre of flower and vegetable seed farms. In 1869, the Western Pacific Railroad completed a rail line from San Jose to Niles connecting San Jose with the Transcontinental Railroad. This new line opened additional markets for the agricultural and manufactured products throughout the Santa Clara Valley. In 1982, the Western Pacific Railroad was merged with Union Pacific Railroad (Santa Clara 2012: 44).

As the 19th century ended, more and more people arrived seeking the mild climate and job opportunities of the Santa Clara area. By 1906, the population of the city had grown to nearly 5,000 (City of Santa Clara 2019). The population remained stable and did not increase greatly until after World War II when the city outgrew its 19th century boundaries and expanded to open lands north and west of the original city limits, replacing farms and orchards with suburban and high-tech development (City of Santa Clara 2019).

3.4.2 History of Silicon Valley

The root of the transformation of the Santa Clara Valley from a center of agriculture to a center of technology can be traced to Frederick E. Terman. After receiving his Ph.D from the Massachusetts Institute of Technology in 1924, Frederick E. Terman accepted a faculty position at Stanford's electrical engineering department. Terman set out to build Stanford into a major center of radio and communications research. He also encouraged students such as William Hewlett and David Packard (of the Hewlett-Packard Company) and Eugene Litton (of Litton Industries, Inc.) to establish local companies, many of which he personally invested in. After the World War II Terman was intent on transforming Stanford into a West Coast MIT. To accomplish this goal, he selected technologies for research emphasis, beginning with microwave electronics. Second, he solicited military contracts to fund academic research by faculty members who had worked in microwave technology during the war. By 1949 Stanford had become one of the top three recipients of government research contracts, overshadowing all other electronics departments west of the Mississippi River (Dennis 1999).

In 1951 Terman spearheaded the creation of the Stanford Industrial (now Research) Park, which granted long-term leases on university land exclusively to high-technology firms. Soon Varian Associates, Inc. (now Varian Medical Systems, Inc.), Eastman Kodak Company, General Electric Company, Admiral Corporation, Lockheed Corporation (now Lockheed Martin Corporation), Hewlett-Packard Company, and others turned Stanford Research Park into America's premier high-technology manufacturing region. As more firms moved to the region, fueling demand for basic electronic components, technical skills, and business supplies, many former high-technology employees started their own companies (Dennis 1999).

In 1956 William Shockley, Nobel Prize-winning coinventor of the transistor, established the Shockley Semiconductor Laboratory at Stanford Industrial Park. Within a year. a group of engineers resigned to establish Fairchild Semiconductor Corporation in Santa Clara, expanding Silicon Valley beyond the Stanford area (Dennis 1999). At the time, Santa Clara was largely comprised of orchards. With the development of the semiconductor chip a technology boom occurred in the valley, displacing the agricultural economy of Santa Clara. By 1990, the city covered 19.3 square miles and had a population of more than 93,000. (City of Santa Clara 2019).

The late 1960s and early 1970s saw a fundamental change in the semiconductor market. By 1972 the U.S. military accounted for only 12 percent of semiconductor sales, compared with more than 50 percent during the early 1960s. With the growth in consumer applications, by the mid-1970s venture capitalists had replaced the U.S. government as the primary source of financing for start-ups (Dennis 1999).

3.4.3 Site Specific History

The buildings located at 2201 Laurelwood Road were initially developed in 1968, prior to which the land was used for agricultural purposes (NETR 2019). By 1969 the buildings were occupied by Siliconix. Siliconix was founded in 1962 in Sunnyvale, California by Frances and Bill Hugle. The Hugles were previously research scientists at a Westinghouse semiconductor facility. Siliconix's first product was a junction field-effect transistor used to switch and sense analog signals. In 1967, Siliconix became the first company to produce and market analog switches and in 1968 they were the first company to produce and market analog multiplexers. Both technologies have a variety of applications and are still in use today. In 1969, the company moved from Sunnyvale to 2201 Laurelwood Road, Santa Clara. Siliconix continued to innovate with the development of the first commercially viable metal-oxide-semiconductor field-effect transistors in 1975, power integrated circuits in 1982, and the first power metal-oxide-semiconductor field-effect transistors based on trench technology increasing the current efficiency of silicon in 1993. In 1998 Siliconix was partially acquired by Vishay and was fully acquired in 2005 (Vishay 2019).

4.0 CULTURAL RESOURCES INVENTORY

A literature review and records search was conducted at the NWIC, housed at Sonoma State University, in Rohnert Park, on February 4, 2019. This inventory effort included the Project area and a one-mile radius around the Project area, collectively termed the Project study area. The objective of this records search was to identify prehistoric or historical cultural resources that have been previously recorded within the study area during prior cultural resource investigations.

4.1 PREVIOUS CULTURAL RESOURCE INVESTIGATIONS

The records search results indicate that no less than 135 previous investigations have been conducted and documented within the Project study area since 1973 (Appendix A: Table 1 and 2). At least fifty-four of the previous studies encompass portions or all of the Project area. As a result, 100 percent of the Project area has been previously investigated by these studies.

4.2 CULTURAL RESOURCES REPORTED WITHIN THE STUDY AREA

The records search results also indicated that three built resources have been previously recorded within the Project study area (Table 4-1). No cultural or built resources were recorded within the Project location. Each resource is briefly described in the table below.

Table 4-1 Cultural Resources Recorded within the Study Area

Primary No.	Resource Name	Type	Age
P-43-001475	4423 Cheeney Street	Building	Historic
P-43-002978	PG&E Northern Rec Station Scott #2	Building	Historic
P-43-003529	Santa Clara Public Works Building Maintenance Facility	Building	Historic

4.3 ADDITIONAL SOURCES

Additional sources consulted during the cultural resource literature review and records search include the National Register of Historic Places, the Office of Historic Preservation Archaeological Determinations of Eligibility, and the Office of Historic Preservation Directory of Properties in the Historic Property Data File. There are no listed historic properties, historical resources, or historic landmarks recorded within the Project study area.

Historical maps consulted include Milpitas, CA (1953) 7.5-minute, Milpitas, CA (1961) 7.5-minute, and Milpitas, CA (1968) 7.5-minute USGS quadrangles. None of these hisotrical topographic quadrangles show any historical structures or buildings within the Project area. The 1973 Milpitas, CA 7.5-minute topographic quad shows two buildings within the Project area, a large building in the southern portion, and a smaller building to the north.

4.4 NATIVE AMERICAN COORDINATION

PaleoWest contacted the NAHC, as part of the cultural resource assessment, on February 1, 2019, for a review of the SLF. The objective of the SLF search was to determine if the NAHC had any knowledge of Native American cultural resources (e.g., traditional use or gathering area, place of religious or sacred activity, etc.) within the immediate vicinity of the Project area. The NAHC responded with a letter dated February 5, 2019 stating that the SLF search resulted in a negative finding; however, the NAHC requested that six Native American tribal groups be contacted to elicit information regarding cultural resource issues related to the proposed Project (Appendix B). Six tribal groups were contacted by email on February 6, 2019.

As of February 11th, four responses were been received. Mr. Andy Galvan, of the Ohlone Indian Tribe, requested that a copy of the Phase I archaeological study provided to him. Mr. Valentin Lopez noted that this was outside of his traditional tribal territory and declines to comment. Ms. Irene Zwierlein requested that construction crews receive cultural resource training and that if anything is found that a Native American and an archaeological monitor be present for any additional ground disturbing activities. Ms. Ann Marie Sayers requested a copy of the records search so that she could review the literature before she provided any comments. A copy of the final report was sent to Ms. Sayers on 2/26/19. PaleoWest conducted follow up phone calls on February 11, 2019 to the remaining individuals that had not yet responded to the scoping letter. An example of the SLF search request letter, the list of contacts, a sample scoping letter, and a contact/response matrix are included in Appendix A.

5.0 FIELD INVESTIGATION

5.1 SURVEY FIELD METHODS

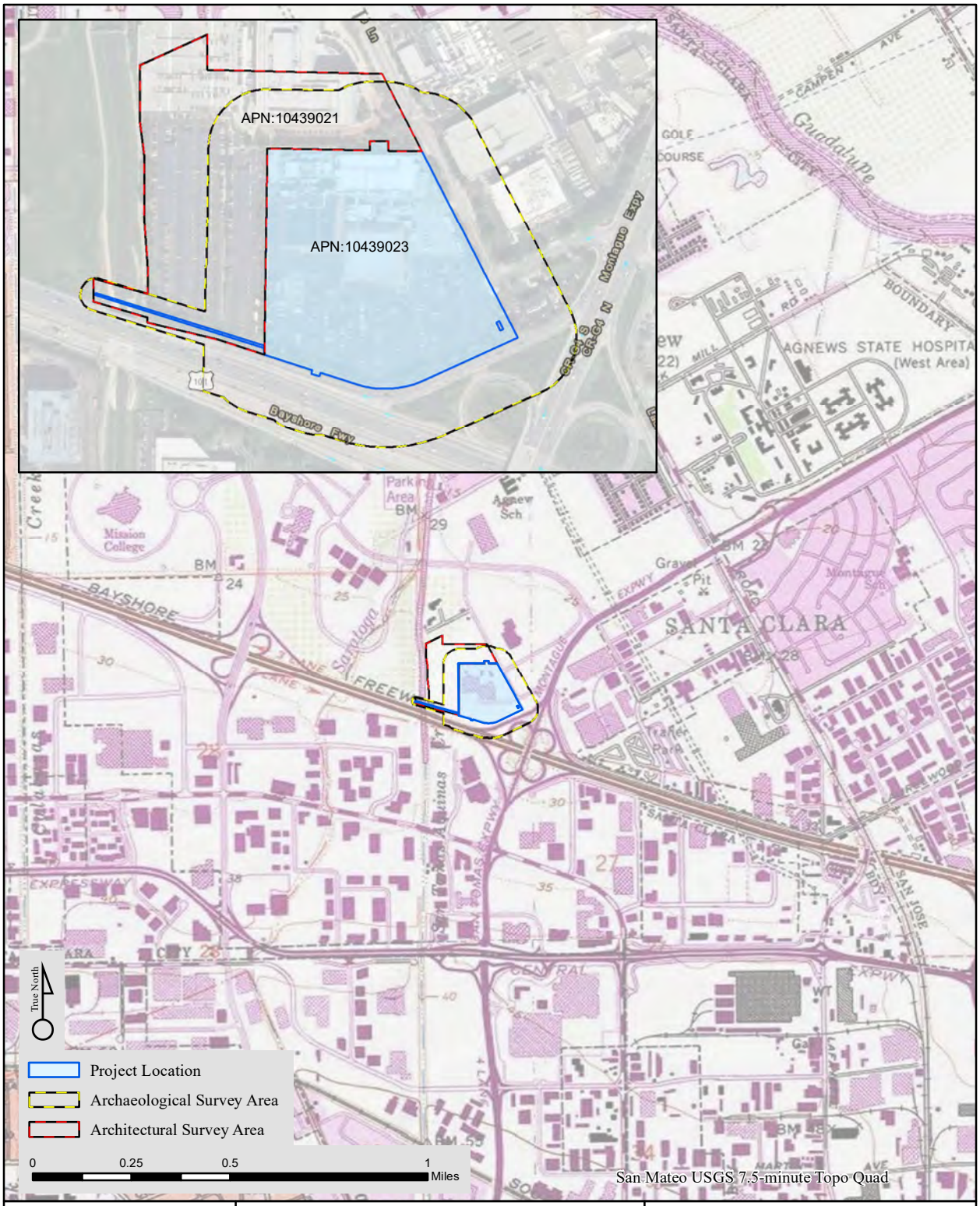
A Phase I intensive pedestrian survey of the Project area was conducted by PaleoWest archaeologist, Patrick Zingerella, on February 11, 2019. The pedestrian archaeological survey was conducted inclusive of the Project site, linear facility routes, and extending out no less than 200 feet around project components and 50 feet to either side of the right-of-way of the Project linear facility routes per CEC required survey methods (Figure 1-3). The architectural history survey was conducted inclusive of the Project site and a one-parcel deep buffer from the proposed plant site boundaries and along the routes of all linear facilities in order to identify, inventory, and characterize structures and districts over 45 years of age or that are considered to be significant per CEC required survey methods. The survey was conducted by walking parallel transects across the entirety of the Project area spaced at 10- to 15-meter (33- to 50-feet) intervals, when possible. The Project area was recorded with digital photographs for use in the report. Photographs included general views of the topography and vegetation density, and other relevant images. A photo log was maintained to include, at a minimum, photo number, date, orientation, photo description, and comments. The surveyor carefully inspected all areas likely to contain or exhibit sensitive cultural resources to ensure discovery and documentation of and visible, potentially significant cultural resources located within the Project area. In addition, the exteriors of the buildings within the Project area were analyzed, photographed, and recorded. Any building or structure determined to have been built prior to 1974 or to be potentially eligible for the CRHR or the Local Register were formally evaluated on DPR 523 series forms. The resulting forms are included as Appendix A.

Historical and prehistoric site indicators were noted where present. Historical site indicators include fence lines, ditches, standing buildings, objects or structures such as sheds, or concentrations of materials at least 45 years in age, such as domestic refuse (e.g., glass bottles, ceramics, toys, buttons or leather shoes), refuse from other pursuits such as agriculture (e.g., metal tanks, farm machinery parts, horse shoes) or structural materials (e.g., nails, glass window panes, corrugated metal, wood posts or planks, metal pipes and fittings, railroad spurs, etc.). Prehistoric site indicators include areas of darker soil with concentrations of ash, charcoal, animal bone (burned or unburned), shell, flaked stone, ground stone, pottery, or even human bone.

5.2 ARCHAEOLOGICAL SURVEY RESULTS

On February 11, 2019 PaleoWest archaeologist Patrick Zingerella conducted a pedestrian survey of the proposed Edgecore Laurelwood Small Power Plant, linear facility routes/transmission line, and a 200 foot project buffer around main components and a 50 foot buffer to either side of the linear facility routes. Due to the narrow sections of exposed ground surface found throughout the survey area, it was only necessary to complete one thorough transect along the southern edge, western edge, and transmission line route within project area. The results of this survey are discussed below.

The survey area was located within the city limits of Santa Clara, CA in Santa Clara County, and was accessible from the gate entrance located at 2201 Laurelwood Road. Survey was to include the entire project area including the transmission line, which was approximately 350 meters N/S by 240 meters E/W. Less than 1% of the survey area had visible ground surface due to paving and standing structures. As such, approximately 390m of visible soil along the southern edge of the site, and a 190 meters of soil along the western edge of the project area was able to be surveyed visually.



PALEO WEST archaeology

Survey Coverage Map

Figure 1-3
Edgecore Laurelwood
Small Power Plant Survey
Santa Clara County, CA

The terrain is characterized by a mechanically altered and landscaped topography located in an industrial and commercial portion of Santa Clara immediately north of US 101 and immediately west of Montague Expressway. The channelized San Tomas Aquino Creek parallels the western edge of the project area at approximately 145 meters. Vegetation consists mostly of grasses and ornamental bushes and trees; predominately oleander, black locust and madrone with few eucalyptus trees.

Due to its location along a bermed highway in a commercial zone, the land within the project area has been greatly disturbed by construction. Natural soils have been displaced and/ or covered in concrete throughout a vast portion of the project area.

Southern edge of project area

Surveying from the southeastern corner of project area near a cell phone tower toward the south and west, the surveyed area included an 8-meter-wide strip of visible soil that was surveyed with one transect. The topography starts as a mechanically-constructed mound with its ground surface being between 20 centimeters to 1 meter higher than the surface of the parking lot to the north. This area contained soil that was 10YR 3/2 very dark grayish brown silty loam that was organic soil lying upon environmental fabric. This area had 50% surface visibility, with no cultural material visible.

Approximately 115-meters southeast of the cell phone tower, a modern designated smoking area was observed. This area was defined as a 2x4 wood-lined square that was 10' N/S by 8' E/W with sandy gravel padding throughout. Continuing beyond this first designated smoking area, the survey area changed to a northwest direction. A second, modern designated smoking area was observed 60m northwest of the first. This designated smoking area was lined with recycled fiberglass and was also 10' N/S by 8' E/W. This smoking area contained two decaying park benches marked with small brass tags etched with "(in script) Parkland Heritage™". This designated smoking area also had a sandy gravel pad.

The remaining 50 meter of surveyed area in the southern portion of the site contained predominately madrone trees with 80% surface visibility. No cultural material was observed throughout this area. This area also had landscaped mounds measuring from 20 centimeters to 1 meter above the parking lot to the north. Soil in this area was organic 10YR 3/2 dark grayish brown soil with a lighter 10 YR 5/3 light grayish brown loam also visible upon gentle scraping of topsoil. None of the areas observed along the southern edge of the survey area was native soil. No soil was in its original context and the entire area was disturbed by mechanized grading and landscaping.

Western edge of the project area and transmission line.

Surveying from the southwestern corner of the project area toward the northwestern corner, there was a very thin 1 meter wide strip of visible soil that continued for approximately 190 meters to the north. This area was surveyed in one transect and contained soil with 50% visibility. Soil was a 10YR 4/4 brown soil that did not contain any cultural material, except for a few instances of modern concrete pieces related to the demolition of nearby structures.

The transmission line was surveyed in one transect. There was a very thin strip of visible soil for a majority of the linear route, the linear route follows the existing paved parking area. This section contained soil with 50% visibility. Soil was a 10YR 4/4 brown soil that did not contain any cultural material. The transmission line crossed a section of the channelized San Tomas Aquino Creek and extended past the San Tomas Aquino Creek Trail. The area on either side of the creek was concrete. A

small portion of burmed soils was present to the west of the Creek Trail. No cultural material was seen in this section of the Project area.

No other locations within the project area could be visually inspected due to the existence of standing structures or paving from parking lots. No prehistoric or historic-period archaeological resources were identified during the survey effort.

5.3 2201 LAURELWOOD ROAD

2201 Laurelwood Road is comprised of two two-story Spanish Revival-style buildings with Modern-style elements. Both buildings have a square plan with a tiled mansard roof supported by regularly spaced pillars. Both Buildings feature decorative gravel textured panels that extend form the first to the second floor and form a series of arches divided by pillars on all elevations with the exception of the north elevation of Building 1. Glass entrance doors and fixed windows are recessed on the southeast and southwest corners of Building 1. The first and second floors on the south and west elevations of Building 1 feature regularly spaced fixed windows. The north elevation of Building 1 has had an addition removed as evidenced by exposed construction debris. The north elevation of Building 1 also features a 2-story concrete enclosed stairwell. The northwest corner of the west elevation of Building 1 features glass entrance doors and fixed windows on the first floor and exposed doors on the second floor. Building 1 adjoins Building 2 on the southeast corner of the east elevation. Building 2 features glass entrance doors and fixed windows recessed on the first floor of the south and east elevations and regularly spaced fixed windows on the second floor of all elevations. The north elevation of Building 2 features a large opening cut into the wall. Several non-historic period tanks, pumping equipment, and an electrical building are located on the property as well as hardscape and landscaped vegetation.

5.4 ARCHITECTURAL HISTORY EVALUATION

5.4.1 CRHR Evaluation

The following presents an assessment of the historical significance of 628-638 San Julian Street by applying the procedure and criteria for the CRHR. The purpose of this assessment is to evaluate the eligibility of the resource for listing on the CRHR.

CRHR Criterion 1: The buildings located at 2201 Laurelwood Road do not meet CRHR Criterion 1 for association with events that have made a significant contribution to the broad patterns of California's history and cultural heritage. The property was constructed in 1968 which coincided with a period of rapid growth in Santa Clara as a result of the Silicon Valley technology boom. The property was one of many constructed in the area during that period to accommodate the growing technology industry. The long-term tenant of the property has been Siliconix who developed several technologies, many of which are currently in use. While Siliconix has a history of innovation, research has yielded no information to suggest that they have made historically significant contributions to the development of technology during the mid-twentieth century. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the CRHR under Criterion 1.

CRHR Criterion 2: The buildings located at 2201 Laurelwood Road do not meet CRHR Criterion 2 for any direct associations with the productive lives of persons important in local, state, or national history. The long-term tenants of the property, Siliconix, which was founded by Francis and Bill Hugle. Research has yielded no information to suggest that either are persons of historical significance. Many technicians and employees have worked at the property but there is no indication that any are persons of historical

significance. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the CRHR under Criterion 2.

CRHR Criterion 3: The buildings located at 2201 Laurelwood Road do not to meet CRHR Criterion 3 for embodying the distinctive characteristics of a type, period, and method of construction, or as the work of an important creative individual, or as having high artistic value. The buildings on the property were designed in the Spanish-Revival style. The Spanish-Revival style was popular in California beginning in the early twentieth century and continues into the present. These buildings represent a relatively late and unremarkable example of this style. The buildings are essentially similar to many others constructed within the region and state during this time period. The architect and builder of the buildings was not identified, but it is unlikely that this property is the work of a master. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the CRHR under Criterion 3.

CRHR Criterion 4: The buildings located at 2201 Laurelwood Road do not meet CRHR Criterion 4 since it is unlikely to yield information important to prehistory or history. It is unlikely that this property has the potential to broaden our understanding of Silicon Valley in the mid-twentieth century. Therefore, the buildings located at 2201 Laurelwood Road is not eligible for the CRHR under Criterion 4.

The buildings located at 2201 Laurelwood Road does not meet any of the eligibility criteria for inclusion on the CRHR and is, therefore, not a historic resource for the purposes of CEQA.

5.4.2 City of Santa Clara Historic Resource Inventory

Criteria for Historical or Cultural Significance

Criterion 1: The buildings located at 2201 Laurelwood Road do not to meet Criterion 1 for having character, interest, integrity and reflects the heritage and cultural development of the city, region, state, or nation. The buildings on the property were designed in the Spanish-Revival style. The Spanish-Revival style was popular in California beginning in the early twentieth century and continues into the present. These buildings represent a relatively late and unremarkable example of this style. The property was constructed in 1968 which coincided with a period of rapid growth in Santa Clara because of the Silicon Valley technology boom. The property was one of many constructed in the area during that period to accommodate the growing technology industry. The long-term tenant of the property has been Siliconix who developed several technologies, many of which are currently in use. While Siliconix has a history of innovation, research has yielded no information to suggest that they have made historically significant contributions to the development of technology during the mid-twentieth century. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 2.

Criterion 2: The buildings located at 2201 Laurelwood Road do not to meet Criterion 2 for association with a historical event. The property was constructed in 1968 which coincided with a period of rapid growth in Santa Clara because of the Silicon Valley technology boom. The property was one of many constructed in the area during that period to accommodate the growing technology industry. The long-term tenant of the property has been Siliconix who developed several technologies, many of which are currently in use. While Siliconix has a history of innovation, research has yielded no information to suggest that they have made historically significant contributions to the development of technology during the mid-twentieth century. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 2.

Criterion 3: The buildings located at 2201 Laurelwood Road do not to meet Criterion 3 for association with an important individual or group who contributed in a significant way to the political, social and/or cultural life of the community. The long-term tenants of the property, Siliconix, which was founded by

Francis and Bill Hugle. Research has yielded no information to suggest that either are persons of historical significance. Many technicians and employees have worked at the property but there is no indication that any are persons of historical significance. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 3.

Criterion 4: The buildings located at 2201 Laurelwood Road do not to meet Criterion 4 for association with a significant industrial, institutional, commercial, agricultural, or transportation activity. The long-term tenant of the property has been Siliconix who developed several technologies, many of which are currently in use. While Siliconix has a history of innovation, research has yielded no information to suggest that they have made historically significant contributions to the development of technology during the mid-twentieth century. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 4.

Criterion 5: The buildings located at 2201 Laurelwood Road do not to meet Criterion 5 for association with broad patterns of local area history, including development and settlement patterns, early or important transportation routes or social, political, or economic trends and activities. Included is the recognition of urban street pattern and infrastructure. The property was constructed in 1968 which coincided with a period of rapid growth in Santa Clara as a result of the Silicon Valley technology boom. The property was one of many constructed in the area during that period to accommodate the growing technology industry. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 5.

Criterion 6: The buildings located at 2201 Laurelwood Road do not to meet Criterion 6 for a notable historical relationship between a site, building, or property's site and its immediate environment, including original native trees, topographical features, outbuildings or agricultural setting. While the property is surrounded by other technology industry related properties, there is no indication that the buildings on this property have a notable historical relationship with other buildings or landscape features in the area. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 6.

Criteria for Architectural Significance

Criterion 7: The buildings located at 2201 Laurelwood Road do not to meet Criterion 7 for characterizing an architectural style associated with a particular era and/or ethnic group. The buildings on the property were designed in the Spanish-Revival style. The Spanish-Revival style was popular in California beginning in the early twentieth century and continues into the present. These buildings represent a relatively late and unremarkable example of this style. The buildings are essentially similar to many others constructed within the region and state during this time period. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 7.

Criterion 8: The buildings located at 2201 Laurelwood Road do not to meet Criterion 8 for identification with a particular architect, master builder or craftsman. The architect and builder of the buildings was not identified, but it is unlikely that this property is the work of a master. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 7.

Criterion 9: The buildings located at 2201 Laurelwood Road do not to meet Criterion 9 as architecturally unique or innovative. The buildings on the property were designed in the Spanish-Revival style. The Spanish-Revival style was popular in California beginning in the early twentieth century and continues into the present. These buildings represent a relatively late and unremarkable example of this style. The buildings are essentially similar to many others constructed within the region and state during this time

period. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 9.

Criterion 10: The buildings located at 2201 Laurelwood Road do not to meet Criterion 10 for having a strong or unique relationship to other areas potentially eligible for preservation because of architectural significance. There is no indication that the buildings on this property have a strong or unique relationship to other areas potentially eligible for preservation because of architectural significance. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 10.

Criterion 11: The buildings located at 2201 Laurelwood Road do not to meet Criterion 11 for having a visual symbolic meaning or appeal for the community. There is no indication that the buildings on this property have a visual symbolic meaning or appeal for the community. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 11.

Criterion 12: The buildings located at 2201 Laurelwood Road do not to meet Criterion 12 for having unique or uncommon building materials or its historically early or innovative method of construction or assembly. There is no indication that the buildings on this property have used unique or uncommon building materials or are historically early or innovative method of construction or assembly. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 12.

Criterion 13: The buildings located at 2201 Laurelwood Road do not to meet Criterion 13 for notable or special attributes of an aesthetic or functional nature. These may include massing, proportion, materials, details, fenestration, ornamentation, artwork, or functional layout. These buildings do not display any notable of special attributes. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 13.

Criteria for Geographical Significance

Criterion 14: The buildings located at 2201 Laurelwood Road do not to meet Criterion 14 since they are not a neighborhood, group, or unique area directly associated with broad patterns of local area history. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 14.

Criterion 15: The buildings located at 2201 Laurelwood Road do not to meet Criterion 15 for exhibiting continuity and compatibility with adjacent buildings and/or visual contribution to a group of similar buildings. The buildings on this property do not contribute to a larger group of similar buildings. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 15.

Criterion 16: The buildings located at 2201 Laurelwood Road do not to meet Criterion 16 as an intact, historical landscape or landscape features associated with an existing building. The buildings on this property are not a part of or are themselves a historical landscape. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 16.

Criterion 17: The buildings located at 2201 Laurelwood Road do not to meet Criterion 17 as a notable use of landscaping design in conjunction with an existing building. There is no notable use of landscaping on this property. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 17.

The buildings located at 2201 Laurelwood Road does not meet any of the eligibility criteria for inclusion on the Local Register.

6.0 MANAGEMENT RECOMMENDATIONS

The cultural resource records search and field visit indicated no evidence of any archaeological resources within the Project area. However, the ground visibility within the Project area was very poor as much of the project area was paved. Project area has no know prehistoric sites within the Project footprint or the surrounding mile. While the Project area is close to the channelized section of San Tomas Aquino Creek, this channelization does not follow the original path of the creek. As such, the archaeological sensitivity of the Project area is considered low.

The building at 2201 Laurelwood Road was evaluated for historical significance by applying the criteria of the CRHR and the Local Register using data gathered during the pedestrian survey and information acquired through historical research. PaleoWest does not recommend 2201 Laurelwood Road as eligible for listing on the CRHR and; therefore, it is not considered a historical resource for the purposes of CEQA. As this building is not recommended as eligible for the CRHR or the Local Register, there is no future resource management needed.

In the event that potentially significant archaeological materials are encountered during Project-related ground-disturbing activities, all work should be halted in the vicinity of the archaeological discovery until a qualified archaeologist can visit the site of discovery and assess the significance of the archaeological resource. In addition, Health and Safety Code 7050.5, CEQA 15064.5(e), and Public Resources Code 5097.98 mandate the process to be followed in the unlikely event of an accidental discovery of any human remains in a location other than a dedicated cemetery. Finally, should additional actions be proposed outside the currently defined Project area that have the potential for additional subsurface disturbance, further cultural resource management may be required.

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Appendix A.
Previous Cultural Resource Studies

Table A-1: Cultural Resource Studies within the Project area

Report Number	Year	Authors	Title	Pubisher
S-000848	1977	David A. Fredrickson	A Summary of Knowledge of the Central and Northern California Coastal Zone and Offshore Areas, Vol. III, Socioeconomic Conditions, Chapter 7: Historical & Archaeological Resources	The Anthropology Laboratory, Sonoma State College; Winzler & Kelly Consulting Engineers
S-001784	1979	David Chavez	Preliminary Cultural Resources Identification: San Francisco Bay Study for Corps of Engineers Projects	
S-004382	1975	Richard B. Hastings	An Archaeological Survey of the San Tomas Expressway Interchange	
S-004486	1978	Marianne Fazio	Field reconnaissance of parcels along Mission College Boulevard in Santa Clara (letter report)	Archaeological Resource Service
S-004699	1979	Austin D. Warburton	Archaeological survey, proposed hotel and office complex near the San Tomas Expressway Interchange	David J. Powers and Associates
S-005259	1979	Ann Hines, Pauline Pace, and Gail Woolley	Santa Clara County Heritage Resource Inventory	Santa Clara County Historical Heritage Commission
S-005260	1978	Joseph C. Winter	Tamien - 6000 Years in an American City	
S-005272	1932	Jan Otto Marius Broek	The Santa Clara Valley, California: A Study in Landscape Changes	
S-007483	1985	Albert B. Elsasser, R. L. Anastasio, J. C. Bard, C. I. Busby, D. M. Garaventa, S. A. Guedon, E. L. Moore, K. M. Nissen, and M. E. Tannam	Revised Data Recovery Plan, Part I: Review of the Prehistory of the Santa Clara Valley Region as Part of the Guadalupe Transportation Corridor Compliance with 36 CFR Part 800	Basin Research Associates, Inc.
S-008585	1974	Thomas King, Gary Berg, Patricia Hickman, Richard Hastings, Chester D. King, Katherine Flynn, and William Roop	Archaeological Element, Environmental Impact Report on the San Felipe Water Distribution System	Archaeological Resource Service
S-009462	1977	Teresa Ann Miller	Identification and Recording of Prehistoric Petroglyphs in Marin and Related Bay Area Counties	San Francisco State University
S-009583	1978	David W. Mayfield	Ecology of the Pre-Spanish San Francisco Bay Area	San Francisco State University
S-011756	1989	Miley Paul Holman	Archaeological Field Inspection of the Intel Expansion Project, Santa Clara, Santa Clara County, California (letter report)	Holman & Associates
S-013200	1991	Donna M. Garaventa, Colin I. Busby, Sondra A. Jarvis, and David G. Brittin	Cultural Resources Assessment for the Santa Clara County Transportation Plan - T2010 EIR	Basin Research Associates, Inc.
S-014230	1992	Robert Cartier, Allika Ruby, Jason Bass, and Mike Kelley	Evaluation of Archaeological Resources for the San Jose/Santa Clara Nonpotable Water Reclamation Project	Archaeological Resource Management
S-015529	1993	Robert L. Gearhart II, Clell L. Bond, Steven D. Hoyt, James H. Cleland, James Anderson, Pandora Snethcamp, Gary Wesson, Jack Neville, Kim Marcus, Andrew York, and Jerry Wilson	California, Oregon, and Washington: Archaeological Resource Study	Espey, Huston & Associates, Inc.; Dames & Moore
S-015989	1989	Katherine Flynn	Archaeological Survey Report of the San Tomas/Montague Expressway Improvement Project, Santa Clara County, California (T.A. Project C2997/ARS 88-112)	Archaeological Resource Service
S-016394	1994	Colin I. Busby, Donna M. Garaventa, Stuart A. Guedon, and Melody E. Tannam	Recorded Archaeological Resources in Santa Clara County, California (Plotted on the BARCLAY 1993 LoCaide Atlas)	Basin Research Associates, Inc.
S-016394a	1995	Colin I. Busby, Donna M. Garaventa, Stuart A	First Supplement, Recorded Archaeological Resources in Santa Clara County, California	Basin Research Associates, Inc.

		Guedon, and Melody E. Tannam		
S-016394b	1996	Colin I. Busby, Donna M. Garaventa, Stuart A. Guedon, and Melody E. Tannam	Second Supplement, Recorded Archaeological Resources in Santa Clara County, California	Basin Research Associates, Inc.
S-016394c	1997	Colin I. Busby, Donna M. Garaventa, Stuart A. Guedon, and Melody E. Tannam	Third Supplement, Recorded Archaeological Resources in Santa Clara County, California	Basin Research Associates, Inc.
S-016820	1994	Colin I. Busby	Cultural Resources Assessment, Regency Site Project - Intel, City of Santa Clara, Santa Clara County, California (letter report)	Basin Research Associates, Inc.
S-017852	1995	Jacquelin Jensen Kehl and Linda Yamane	Ethnohistoric Genealogy Study, Tasman Corridor Light Rail Project, Santa Clara County, California	Woodward-Clyde Consultants
S-018217	1996	Glenn Gmoser	Cultural Resource Evaluations for the Caltrans District 04 Phase 2 Seismic Retrofit Program, Status Report	California Department of Transportation
S-018367	1995	Mark Hylkema	Historic Property Survey Report and Finding of No Effect for the Proposed Ramp Metering and HOV Ramp Project, 4-SCL-101 PM 40.0/52.5, EA 132451	Caltrans District 4
S-018367	1995	Mark Hylkema	Archaeological Survey Report Addendum #1, for the Proposed Ramp Metering and HOV Ramp Project, 4-SCL-101 PM 40.0/52.5, EA 132451	Caltrans
S-018377	1996	Robert Cartier, Lynne Eckert, Jeanne Goetz, and Jon Reddington	Cultural Resource Evaluation of the Santa Clara Pipe Alignment for the South Bay Water Recycling Project	Archaeological Resource Management
S-019072	1996	Colin I. Busby, Donna M. Garaventa, Melody E. Tannam, and Stuart A. Guedon	Historic Properties Treatment Plan, South Bay Water Recycling Program.	Basin Research Associates, Inc.
S-019072a	1996	Colin I. Busby, Donna M. Garaventa, Melody E. Tannam, and Stuart A. Guedon	Supplemental Report: Historic Properties Affected or Potentially Affected by the South Bay Water Recycling Program	Basin Research Associates, Inc.
S-019072b	1999	Colin I. Busby	South Bay Water Recycling Program - Cultural Resources Program, Subcontract No. 728106.3024, Monitoring Closure Report - Phase 1 (letter report)	Basin Research Associates, Inc.
S-020395	1998	Donna L. Gillette	PCNs of the Coast Ranges of California: Religious Expression or the Result of Quarrying?	California State University, Hayward
S-022570	1998	Suzanne Baker	Archaeological Survey, San Tomas Aquino/Saratoga Creek Trail Project, Santa Clara County, California	Archaeological/Historical Consultants
S-023356	1999	Ward Hill	Historic Property Survey Report, Montague Expressway Project, Cities of Santa Clara, San Jose and Milpitas, Santa Clara County, California	Basin Research Associates, Inc.
S-023357	1999		Archaeological Survey Report (Positive), Montague Expressway Improvements Project, Cities of Santa Clara, San Jose and Milpitas, Santa Clara County, California	Basin Research Associates, Inc.
S-023358	1999	Ward Hill	Historic Architectural Survey Report (Abbreviated), Montague Expressway Improvement Project, Cities of Santa Clara, San Jose and Milpitas, Santa Clara County, California Department of Transportation District 4	
S-023364	1999	Colin I. Busby	Historic Properties Affected or Potentially Affected by the South Bay Water Recycling Program (SBWRP), Phase 2 Master Plan, Tasman Drive Interconnection, SC-2 and SC-4 Segments, Cities of Milpitas and Santa Clara, Santa Clara County (letter report)	Basin Research Associates
S-024967	2000		Cultural Resources Review (Positive), Proposed RCN Fiber Optic Cable Program, City of Santa Clara, Santa Clara County	Basin Research Associates, Inc.
S-025173	2002	John Holson, Cordelia Sutch, and Stephanie Pau	Cultural Resources Report for San Jose Local Loops, Level 3 Fiber Optics Project in Santa Clara and Alameda Counties, California	Pacific Legacy, Inc.; William Self Associates, Inc.
S-030204	2003	Donna L. Gillette	The Distribution and Antiquity of the California Pecked Curvilinear Nucleated (PCN) Rock Art Tradition.	University of California, Berkeley

S-031026	2005	Carolyn Losee	Records Search Results for T-Mobile Project SF15058: 2151 Laurelwood Road, Santa Clara, CA 95054 (letter report)	Archaeological Resources Technology
S-032596	2006	Randall Milliken, Jerome King, and Patricia Mikkelsen	The Central California Ethnographic Community Distribution Model, Version 2.0, with Special Attention to the San Francisco Bay Area, Cultural Resources Inventory of Caltrans District 4 Rural Conventional Highways	Consulting in the Past; Far Western Anthropological Research Group, Inc.
S-033600	2007	Jack Meyer and Jeff Rosenthal	Geoarchaeological Overview of the Nine Bay Area Counties in Caltrans District 4	Far Western Anthropological Research Group, Inc.
S-038128	2010	Basin Research Associates, Inc.	Historic Property Survey Report/Finding of Effect, South Bay Water Recycling (SBWR), Santa Clara Industrial 3B, City of Santa Clara, Santa Clara County	Basin Research Associates, Inc.
S-039091	2010		Historic Property Survey Report/Finding of Effect, South Bay Water Recycling (SBWR), Santa Clara Industrial 3B, City of Santa Clara, Santa Clara County	Basin Research Associates
S-045670	2014	Kathleen Kubal	Historic Property Survey Report, US 101 Express Lanes Project, Santa Clara County, California, Project No. 0412000459/EA 2G7100, 04-SCL-101 PM 16.00/52.55, 04-SCL-85 PM 23.0/24.1	URS Corporation
S-045670a	2014	Kathleen Kubal	Supplemental Historic Property Survey Report, US 101 Express Lanes Project, Project No. 0412000459/EA 2G7100, 04-SCL-101 PM 16.00/52.55 - 04-SCL-85 PM 23.0/24.1, Santa Clara County, California	URS Corporation
S-045670b	2014	Nancy E. Sikes, Molly Valasik, Amy Glover, Jay Rehor, and Kathleen Kubal	Archaeological Survey Report, US 101 Express Lanes Project, Project No. 0412000459/EA 2G7100, US 101 PM 16.00/52.55 - SR 85 PM 23.0/R24.1, Santa Clara County, California	Cogstone Resource Management, Inc.; URS Corporation
S-045670c	2014	Jay Rehor	Extended Phase I Study, US 101 Express Lanes Project, Project No. 0412000459/EA 2G7100, US 101 PM 16.00/52.55 - SR 85 PM 23.0/R24.1, Santa Clara County, California	URS Corporation
S-045670d	2014	Karin G. Beck	Historical Resources Evaluation Report, US 101 Express Lanes Project, Project No. 0412000459/EA 2G7100, US 101 PM 16.00-52.55, SR 85 PM 23.0-24.1, Santa Clara County, California	URS Corporation
S-045670e	2014	Carol Roland-Nawi	FHWA 2014 0527 001Determinations of Eligibility for the Proposed US 101 Express Lanes Project, Santa Clara County, California	California Office of Historic Preservation
S-046375	2012		County of Santa Clara Historic Context Statement	Archives and Architecture, LLC.
S-048927	1997	Donald Scott Crull	The Economy and Archaeology of European-made Glass Beads and Manufactured Goods Used in First Contact Situations in Oregon, California and Washington	University of Sheffield, England
S-049780	2017	Brian F. Byrd, Adrian R. Whitaker, Patricia J. Mikkelsen, and Jeffrey S. Rosenthal	San Francisco Bay-Delta Regional Context and Research Design for Native American Archaeological Resources, Caltrans District 4	California Department of Transportation, District 4
S-049780a	2016	Julianne Polanco	FHWA_2016_0615_001, Caltrans District 4 Archaeological Context	Office of Historic Preservation

Table A-2: Cultural Resource Studies within the 1-mile Buffer

Report Number	Date	Authors	Title	Publisher
S-004428	1975		HUD Community Development Block Grant: Cultural Resources	Archaeological Consulting & Research Services, Inc.
S-004754	1973	Thomas M. King and Linda King	Visual Inventory of Historic and Archaeological Sites, San Jose, California	Santa Clara County Archaeological Society
S-006066	1983		Data Recovery Plan for the Guadalupe Corridor Transportation Project, Santa Clara County, California	Parsons Brinckerhoff Quade & Douglas, Inc.; Kobori Environmental Management Corp.
S-006066	1983	Colin I. Busby, Donna M. Garaventa, and Larry S. Kobori	Historic Property Survey Report, Guadalupe Transportation Corridor Project: Civic Center Area, Prehistoric Properties	Kobori Environmental Management Corp.
S-006066	1983	Colin I. Busby, Donna M. Garaventa, and Michael Corbett	Historic Property Survey Report, Guadalupe Transportation Corridor Project: Civic Center Area, Historic Properties	Kobori Environmental Management Corp.
S-006066	1982	Thomas Rountree and Knox Mellon	UMTA-Guadalupe Corridor Project: Determiniation of National Register of Historic Places Eligibility for Archaeological Properties	Transportation Agency, County of Santa Clara; State Historic Preservation Officer
S-006066	1983	Colin I. Busby, Donna M. Garaventa, and Larry S. Kobori	National Register of Historic Places, Prehistoric Properties Photographic Record, Guadalupe Transportation Corridor Project: Civic Center Area	Kobori Environmental Management Corp.
S-006066	1983		Request for Determination of Eligibility for Inclusion in the National Register of Historic Places, Guadalupe Corridor Transportation Project, Santa Clara County Transportation Agency	Basin Research Associates
S-007560	1985		Cultural Resource Evaluation of the Esperanca Development on Fuller Street in the County of Santa Clara	Archeological Resource Management
S-007642	1985	Stephen A. Dietz	Santa Clara Post Office Carrier Annex (letter report)	Archaeological Consulting & Research Services, Inc.
S-008387	1980	David Chavez	Archaeological Resources Assessment for the Guadalupe Corridor Alternatives Analysis Draft Environmental Impact Statement, Santa Clara County, California	
S-008387	1981	William Roop	An Evaluation of the Applicability of section 4 (f) of the Department of Transportation Act to the Guadalupe Corridor Transportation Plan Alternatives (letter report)	Archaeological Resource Service
S-008387	1982	William Roop, Christian Gerike, and Margaret Duddy	Prehistoric Archaeological Survey Report, Guadalupe Transportation Corridor, Santa Clara County, California.	Archaeological Resource Service
S-008521	1979	Katherine Flynn	Archaeological reconnaissance of approximately 9 miles of Central Expressway from De La Cruz Boulevard to San Antonio Road (WO #872824) (letter report)	Archaeological Resource Service
S-010154	1988	Rebecca Loveland Anastasio, Donna M. Garaventa, Stuart A. Guedon, Robert M. Harmon, and Mella J. Rothwell	Historic Property Survey of the Proposed Central Expressway Commuter Lane Project Located in the Cities of Santa Clara, Sunnyvale, and Mountain View in Santa Clara County, California	Basin Research Associates, Inc.
S-010154	1987	Rebecca Loveland Anastasio, Donna M.	Historic Property Survey of the Proposed Central Expressway Commuter Lane Project Located in the Cities of Santa Clara, Sunnyvale, and Mountain View in Santa Clara County, California	Basin Research Associates, Inc.

		Garaventa, Stuart A. Guedon, Robert M. Harmon, and Mella J. Rothwell		
S-010154	1987	Rebecca Loveland Anastasio, Donna M. Garaventa, Stuart A. Guedon, Robert M. Harmon, and Mella J. Rothwell	Historic Property Survey of the Proposed Central Expressway Commuter Lane Project Located in the Cities of Santa Clara, Sunnyvale, and Mountain View in Santa Clara County, California	Basin Research Associates, Inc.
S-010210	1988	Archaeological Resource Management	Cultural Resource Evaluation of a Parcel at Central Expressway and Scott Blvd. in the City of Santa Clara, County of Santa Clara	Archaeological Resource Management
S-011396	1989		Technical Report of Cultural Resources Studies for the Proposed WTG-WEST, Inc., Los Angeles to San Francisco and Sacramento, California: Fiber Optic Cable Project	BioSystems Analysis, Inc.
S-015228	1993	Donna M. Garaventa, Stuart A. Guedon, and Colin I. Busby	Cultural Resources Review for the City of San Jose 2020 General Plan Update, Santa Clara County, California	Basin Research Associates, Inc.
S-019424	1997	John Holson	Cultural Resources Survey for the Los Esteros Project, Santa Clara County (letter report)	Pacific Legacy, Inc.
S-020327	1998	Mark G. Hylkema	Extended Phase I Archaeological Survey Report, Subsurface Presence/Absence Testing at the Woolen Mills Chinatown Site (CA-SCL-807H) and Three Storm Water Detention Basins, for the Route 87 Guadalupe Corridor Freeway Project, City of San Jose, Santa Clara County, California: 04-SCL-87 PM 6.3/9.4, 04-SCL-101 PM 40.2/41.2	California Department of Transportation, District 4
S-021137	1996	Michael R. Corbett and Stuart A. Guedon	Archaeological Resources Review, Agnews West Campus, City of Santa Clara, Santa Clara County, California	Basin Research Associates, Inc.
S-021162	1997	Colin I. Busby	Revised Historic Property Survey Report, Route 87 Freeway Project, City of San Jose, Santa Clara County, California, 04-SCL-87 P.M. 6.3/9.4, and 04-SCL-101 PM 40.2/41.2	Basin Research Associates, Inc.
S-021162	1997	Colin I. Busby	Positive Archaeological Survey Report Addendum No. 1, Route 87 Freeway Project, City of San Jose, Santa Clara County, California, 04-SCL-87 P.M. 6.3/9.4 and 04-SCL-101 P.M. 40.2/41.2	Basin Research Associates, Inc.
S-021182	1997	Colin I. Busby	Cultural Resources Assessment - Subareas A-F, Bayshore North Redevelopment Area, City of Santa Clara, Santa Clara County, California	Basin Research Associates, Inc.
S-021546	1998	Colin I. Busby	Cultural Resources Assessment - Subareas A-H, Bayshore North Redevelopment Area, City of Santa Clara, Santa Clara County, California (letter report)	Basin Research Associates, Inc.
S-021575	1998	Colin I. Busby	Cultural Resources Assessment, Great America Corporate Center EIR, 4351 Great America Parkway, City of Santa Clara, Santa Clara County, California	Basin Research Associates, Inc.
S-022660	2000	George McKale	Archaeological Study for Esperanca Property, City of Santa Clara, Santa Clara County (letter report)	LSA Associates, Inc.
S-022705	2000	Hannah Ballard, John Holson, and Stephanie Pau	Archaeological Survey and Record Search Results for the MCI WorldCom: Fremont, San Jose 12, San Mateo, and Santa Clara Fiber Optic Segments in Alameda, San Mateo and Santa Clara Counties, California	Pacific Legacy, Inc.
S-022725	2000	Hannah Ballard, John	Archaeological Survey and Record Search Results for the Fourteen Broadwing Bay Area Fiber Optic Segments, California: Final Report	Pacific Legacy, Inc.

		Holson, and Stephanie Pau		
S-022819	2000	Wendy J. Nelson, Maureen Carpenter, and Julia G. Costello	Cultural Resources Survey for the Level (3) Communications Long Haul Fiber Optics Project, Segment WS05: San Jose to San Luis Obispo	Far Western Anthropological Research Group, Inc.; Foothill Resources, Ltd.
S-023048	1998	Colin I. Busby, Woodruff C. Minor, and Michael R. Corbett	Preliminary Historic Architectural Survey, Portions of Phases 1-4, 5-6 Areas, San Jose International Airport Acoustical Treatment Program, City of Santa Clara, California	Basin Research Associates, Inc.; Corbett & Minor
S-023051	1998	Michael R. Corbett and Woodruff C. Minor	Summary Descriptions of Significant and Potentially Significant Buildings, Historic Architectural Surveys, Coleman Area, Julian-Stockton Redevelopment Area and Agnews Area, San Jose International Airport Acoustical Treatment Program, Cities of San Jose and Santa Clara, Santa Clara County, California	Basin Research Associates, Inc.; Corbett & Minor
S-023105	1999	Colin I. Busby	Historic Properties Affected or Potentially Affected by the South Bay Water Recycling Program "Package 1" Segments SC 1, SC 3, SC 5, M 2, M 3, M 4, M 5 & SJ/C 1, Cities of Milpitas, San Jose, Santa Clara, and Sunnyvale, Santa Clara County (letter report)	Basin Research Associates, Inc.
S-023110	1999	Colin I. Busby	EHC Residential Facility at 1501 Agnew Road (Agnews West Campus), City of Santa Clara, Santa Clara County, California: Archaeological Monitoring Closure Report (letter report)	Basin Research Associates, Inc.
S-023362	1999	Colin I. Busby	Estancia Apartments Project on Hope Drive (Agnews West Campus) City of Santa Clara, Santa Clara County, Archaeological Monitoring Closure Report (letter report)	Basin Research Associates, Inc.
S-023934	2001		Cultural Resources Investigations for XO California, Inc. Fiber Optic Installations in San Francisco and Santa Clara Counties	Jones & Stokes
S-024980	2000	Colin I. Busby	Sun Microsystems Santa Clara Campus Project, Agnews West Campus, Archaeological Monitoring Closure Report, Phase 1 (July 1998 to December 1999) (letter report)	Basin Research Associates, Inc.
S-026045	2000	Richard Carrico, Theodore Cooley, and William Eckhardt	Cultural Resources Reconnaissance Survey and Inventory Report for the Metromedia Fiberoptic Cable Project, San Francisco Bay Area and Los Angeles Basin Networks	Mooney & Associates
S-026095	2002	Kara Oosterhous, Franklin Maggi, and Leslie Dill	Historical and Architectural Evaluation, 4423 Cheeney Street, Santa Clara, County of Santa Clara, California	Dill Design Group
S-028015	2002	Colin I. Busby	Agnews (West) Family Housing, Rivermark Master Plan Parcel 22, Sobrato Family Living Center Phase 2, 1451-1491 Agnew Road, City of Santa Clara, Santa Clara County, Archaeological Monitoring Closure Report (letter report)	Basin Research Associates, Inc.
S-028016	2002	Colin I. Busby	Agnews (West) Family Housing, Rivermark Master Plan Parcel 26, Currently Vacant Parcel, City of Santa Clara, Santa Clara County, Archaeological Monitoring Closure Report (letter report)	Basin Research Associates, Inc.
S-029226	2000	Lorna Billat	Nextel Communications Wireless Telecommunications Service Facility - Santa Clara County, Nextel Site No. (CA-0251H)/Great America (letter report)	Earth Touch, Inc
S-031030	2005	Carolyn Losee	Collocation ("CO") Submission Packet, PG&E Lafayette, T-Mobile SF-14166; 2337 Silveria Court	Archaeological Resources Technology
S-033061	2006	Nancy Sikes, Cindy Arrington, Bryon Bass, Chris Corey, Kevin Hunt,	Cultural Resources Final Report of Monitoring and Findings for the Qwest Network Construction Project, State of California	SWCA Environmental Consultants

		Steve O'Neil, Catherine Pruett, Tony Sawyer, Michael Tuma, Leslie Wagner, and Alex Wesson		
S-033061	2006		Cultural Resources Final Report of Monitoring and Findings for the Qwest Network Construction Project, State of California	SWCA Environmental Consultants
S-033061	2007	Nancy E. Sikes	Final Report of Monitoring and Findings for the Qwest Network Construction Project (letter report)	SWCA Environmental Consultants
S-034214	1995		Final Report: Archaeological Collections Project for the Redevelopment Agency of the City of San Jose	Basin Research Associates, Inc.
S-036715	2009		Historic Property Survey Report/Finding of Effect, South Bay Water Recycling (SBWR) Stimulus Projects, Santa Clara Industrial 1, City of Santa Clara, Santa Clara County	Basin Research Associates, Inc.
S-036717	2009		Historic Property Survey Report/Finding of Effect, South Bay Water Recycling (SBWR) Stimulus Projects, Santa Clara Industrial 2, City of Santa Clara, Santa Clara County	Basin Research Associates
S-037218	2009		Historic Property Survey Report/Finding of Effect, South Bay Water Recycling (SBWR) Stimulus Projects, Santa Clara Industrial 3A, City of Santa Clara, Santa Clara County	Basin Research Associates
S-037218	2010	Milford Wayne Donaldson and Michael A. Chotkowski	BUR100114A; South Bay Water Recycling Prgram (SBWRP) Phase 1C Projects (Industrial-3A) Santa Clara County, California (Project No. 09-SCAO-092.5)	Office of Historic Preservation; Bureau of Reclamation
S-039101	2011		Cultural Resources Review, South Bay Water Recycling Program (SBWRP) Stimulus Projects, Six Landscape Irrigation Extensions, Cities of San Jose and Santa Clara, Santa Clara County	Basin Research Associates
S-040756	2012	Philip Kaijankoski, Jack Meyer, and Julia Costello	Extended Phase 1 Subsurface Archaeological Explorations for the US 101/ De La Cruz Boulevard/Trimble Road Interchange Improvement Project, San Jose, Santa Clara County, California; 04-SCL-101 PM 40.5/41.5, EA 04-234-26470K	Far Western Anthropological Research Group; Foothill Resources, Ltd.
S-040756	2012	Philip Kaijankoski	Historical Resources Compliance Report for the US 101/De La Cruz Boulevard/Trimble Road Interchange Improvement Project, San Jose, Santa Clara County, California, 04-SCL-101 PM 40.5/41.5, EA 04-234-26470K	Far Western Anthropological Research Group, Inc.
S-042886	2012	Amy E. Foutch	PG&E External Corrosion Direct Assessment (ECDA) on Line 132, Station 135+55, Santa Clara, California (letter report)	Far Western Anthropological Research Group, Inc.
S-043144	2013	Lorna Billat	Collocation ("CO") Submission Packet, FCC Form 621, North Lafayette, CNU0188	EarthTouch, Inc
S-043144	2013		Architectural Evaluation Study of the North Lafayette Project, AT&T Site No, CNU0188, 2302 Sawyer Court, Santa Clara, Santa Clara County, California 95054	Historic Resource Associates
S-044023	2012		Cultural Resources Review South Bay Water Recycling Program (SBWRP) Stimulus Projects, Five Landscape Irrigation Extensions, Cities of Santa Clara and San Jose, Santa Clara County	Basin Research Associates
S-044023	2012	Milford Wayne Donaldson and Anastasia T. Leigh	BUR 120130A; Section 106 Consultation for the Proposed South Bay Water Recycling Program (SBWRP) Phase 1C Project (Five landscape Irrigation and Cooling Tower Pipeline Extensions), Cities of San Jose and Santa Clara, Santa Clara County, California (Project #09-SCA)-092. 18b)	Office of Historic Preservation Department of Parks and Recreation
S-046038	2015	Tara Cubie	FCC Form 620, New Tower ("NT") Submission Packet, Central and Corvin/23025, 3080 Oakmead Village Drive, Santa Clara, Santa Clara County, CA 95051	EBI Consulting

S-046038	2015	Andrea K. Fink	Cultural Resources Survey, Central and Corvin/Ensite #23025 (283966), 3080 Oakmead Village Drive, Santa Clara, Santa Clara County, California 95051, EBI Project No. 61149285	EBI Consulting
S-046038	2015	Carol Roland Nawi and Tara Cubie	Central and Corvin (Ensite #23025 (283966))	California Office of Historic Preservation; EBI Consulting
S-046600	2015	Lorna Billat	New Tower (NT) Submission Packet, FCC Form 620, Silicon Valley Power, CA-DGP048A	EarthTouch Inc.
S-046600	2015	Dana Supernowicz	Architectural Evaluation Study of the Silicon Valley Power Project, DGP Development Site No. DGP048A, 815 Comstock Street, Santa Clara County, California	Historic Resource Associates
S-046801	2015	Ryan Brady	Cultural Resources Monitoring at 3303 Scott Boulevard, Santa Clara County, California (letter report)	Albion Environmental, Inc.
S-046868	2008	Miley Paul Holman	Cultural Resources Study of the Mission College Master Plan Project, Santa Clara County, California (letter report)	Holman & Associates
S-046877	2011	Miley Paul Holman	Mission Substation Cultural Resource Study (letter report)	Holman & Associates
S-047374	2016	Holly D. Moore	FCC Form 621, Collocation Submission Packet, AT&T CNU0188 "North Lafayette" 2308 Sawyer Court, Santa Clara City & County, California 94054	Diablo Green Consulting
S-047374	2016	Carolyn Losee	Cultural Resources Investigation for AT&T CNU0188 "North Lafayette" 2308 Sawyer Court, Santa Clara City & County, California 94045 (letter report)	Archaeological Resources Technology
S-047374	2016	Julianne Polanco	FCC_2016_0222_002; CNU0188 "North Lafayette" 2308 Sawyer Court, Santa Clara, Collocation (Concurrence Letter)	Office of Historic Preservation
S-047529	2015	Esme Hammerle	Cultural Resources Constraints Report Gas Main Bowers & Kifer, Santa Clara City and County, PM Number 31099142	Garcia and Associates
S-047529	2015	Esme A. Hammerle	Archaeological Monitoring Summary Report for 31099142 Gas Main Bowers & Kifer, Santa Clara City and County	Garcia and Associates
S-048253	2016	Carolyn Losee	Cultural Resources Investigation for AT&T CCL03557 "Tannery - Garrett" 2885 Lakeside Drive, Santa Clara City and County, California 95054 (letter report)	Archaeological Resources Technology
S-048253	2016	Carolyn Losee	Section 106 Review, AT&T Site Number CNU3557-CCL03557, "Tannery Garrett", 2885 Lakeside Drive, Santa Clara, California, Santa Clara County	Archaeological Resources Technology; Diablo Green Consulting, Inc.
S-048704	2017	Sunshine Psota	Results of Cultural Resources Literature Search for the Aligned Data Center Project at 2305 Mission College Boulevard, City & County of Santa Clara (letter report)	Holman & Associates
S-048931	2016	Adrian R. Whitaker	Cultural Resources Sensitivity Assessment for the 2016 Caltrain and Dumbarton Rail Fence Installation and Replacement Project	Far Western Anthropological Research Group, INC.
S-049685	2017	Stella D'Oro	Archaeological Monitoring at the Mission Park MarketPlace Project, Santa Clara, California (letter report)	Albion Environmental, Inc.
S-049780	2016	Julianne Polanco	FHWA_2016_0615_001, Caltrans District 4 Archaeological Context	Office of Historic Preservation
S-050562	2017	Suzanne B. Derrick	FCC Section VII.C Submission-Mobilities Small Cells Site, One (1) Node Located in or within 250 feet of Historic District, 1451 Agnew Road, Santa Clara, California (Santa Clara County), EBI #6117003529 (letter report)	EBI Consulting
S-050562	2016	Suzanne Derrick and Julianne Polanco	FCC_2017_0906_001, Mobilities Small Cell Project, One (1) Node, within 250 feet of a Historic District, 1451 Agnew Rd., Santa Clara, Santa Clara County, Collocation, EBI Project #6117003529	EBI Consulting, Inc.; Office of Historic Preservation

Appendix B. Native American Coordination

Additional Information

California Native Americans
Cultural Resources
Strategic Plan
Commissioners
Federal Laws and Codes
State Laws and Codes
Local Ordinances and Codes
Additional Information
Return to CNAHC Home Page

Sacred Lands File & Native American Contacts List Request

NATIVE AMERICAN HERITAGE COMMISSION
915 Capitol Mall, RM 364
Sacramento, CA 95814
(916) 653-4082
(916) 657-5390 – Fax
nahc@pacbell.net

Information Below is Required for a Sacred Lands File Search

Project: Edgecore Laurelwood Small Power Plant

County Santa Clara

USGS Quadrangle

Name 7.5' Milpitas 1983

Township 6S Range 1W Section(s) N/A

Company/Firm/Agency:
PaleoWest

Contact Person: Christina Alonso

Street Address: 1870 Olympic Blvd St. 100

City: Walnut Creek, CA Zip: 94596

Phone: (925) 253-9070

Fax: (925) 254-3553

Email: calonso@paleowest.com

Project Description:

STATE OF CALIFORNIA **Gavin Newsom, Governor**

NATIVE AMERICAN HERITAGE COMMISSION
Cultural and Environmental Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
Phone: (916) 373-3710
Email: nahc@nahc.ca.gov
Website: http://www.nahc.ca.gov

February 5, 2019

Christina Alonso
PaleoWest

VIA Email to: calonso@paleowest.com

RE: Edgecore Laurelwood Small Power Plant Project, City of Santa Clara; Milpitas USGS Quadrangle, Santa Clara County

Dear Ms. Alonso:

A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information you have submitted for the above referenced project. The results were negative. However, the absence of specific site information in the SLF does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Attached is a list of Native American tribes who may also have knowledge of cultural resources in the project area. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated; if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call or email to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from tribes, please notify the NAHC. With your assistance, we can assure that our lists contain current information. If you have any questions or need additional information, please contact me at my email address: gayle.totton@nahc.ca.gov.

Sincerely,

Gayle Totton

Gayle Totton, B.S., M.A., Ph.D.
Associate Governmental Program Analyst

Attachment

Native American Heritage Commission
Native American Contact List
Santa Clara County
2/5/2019

Amah MutsunTribal Band
Valentin Lopez, Chairperson
P.O. Box 5272
Galt, CA, 95632
Phone: (916) 743 - 5833
vlopez@amahmutsun.org

Costanoan
Northern Valley
Yokut

Amah MutsunTribal Band of Mission San Juan Bautista
Irenne Zwierlein, Chairperson
789 Canada Road
Woodside, CA, 94062
Phone: (650) 851 - 7489
Fax: (650) 332-1526
amahmutsuntribal@gmail.com

Costanoan

Indian Canyon Mutsun Band of Costanoan
Ann Marie Sayers, Chairperson
P.O. Box 28
Hollister, CA, 95024
Phone: (831) 637 - 4238
ams@indiancanyon.org

Costanoan

Muwekma Ohlone Indian Tribe of the SF Bay Area
Charlene Nijmeh, Chairperson
20885 Redwood Road, Suite 232
Castro Valley, CA, 94546
Phone: (408) 464 - 2892
cnijmeh@muwekma.org

Costanoan

North Valley Yokuts Tribe
Katherine Erolinda Perez, Chairperson
P.O. Box 717
Linden, CA, 95236
Phone: (209) 887 - 3415
canutes@verizon.net

Costanoan
Northern Valley
Yokut

The Ohlone Indian Tribe
Andrew Galvan,
P.O. Box 3388
Fremont, CA, 94539
Phone: (510) 882 - 0527
Fax: (510) 687-9393
chochenyo@AOL.com

Bay Miwok
Ohlone
Patwin
Plains Miwok

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resource Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources assessment for the proposed Edgecore Laurelwood Small Power Plant Project, Santa Clara County.

February 6, 2019

Irenne Zwierlein
Amah Mutsun Tribal Band of Mission San Juan Bautista
789 Canada Road
Woodside, CA 94062

VIA Email to: amahmutsuntribal@gmail.com

RE: Edgecore Laurelwood Small Power Plant Project, City of Santa Clara; Milpitas USGS Quadrangle, Santa Clara County

Dear Ms. Zwierlein:

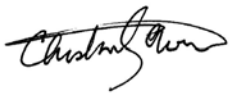
PaleoWest has been contracted by Edgecore to prepare a Cultural Resources Assessment Report for the Laurelwood Data Center Small Power Plant Exemption Project, located in the City of Santa Clara, Santa Clara County. PaleoWest has agreed to conduct a Records Search with the Northwest Information Center (NWIC) of the proposed project area and a 1/4-mile radius to identify known cultural resource sites and previous surveys in or near the project area. The project is located in in Township 6 South, Range 1 West, in an unnamed Section of the Milpitas 7.5' Topographic Map (1983).

PaleoWest contacted the NAHC on February 2, 2019 with a request that they search their Sacred Lands File for the project vicinity. The February 5, 2019 response from Gayle Totton of the NAHC states, "A record search of the Native American Heritage Commission (NAHC) Sacred Lands File (SLF) was completed for the information you have submitted for the above referenced project. The results were negative."

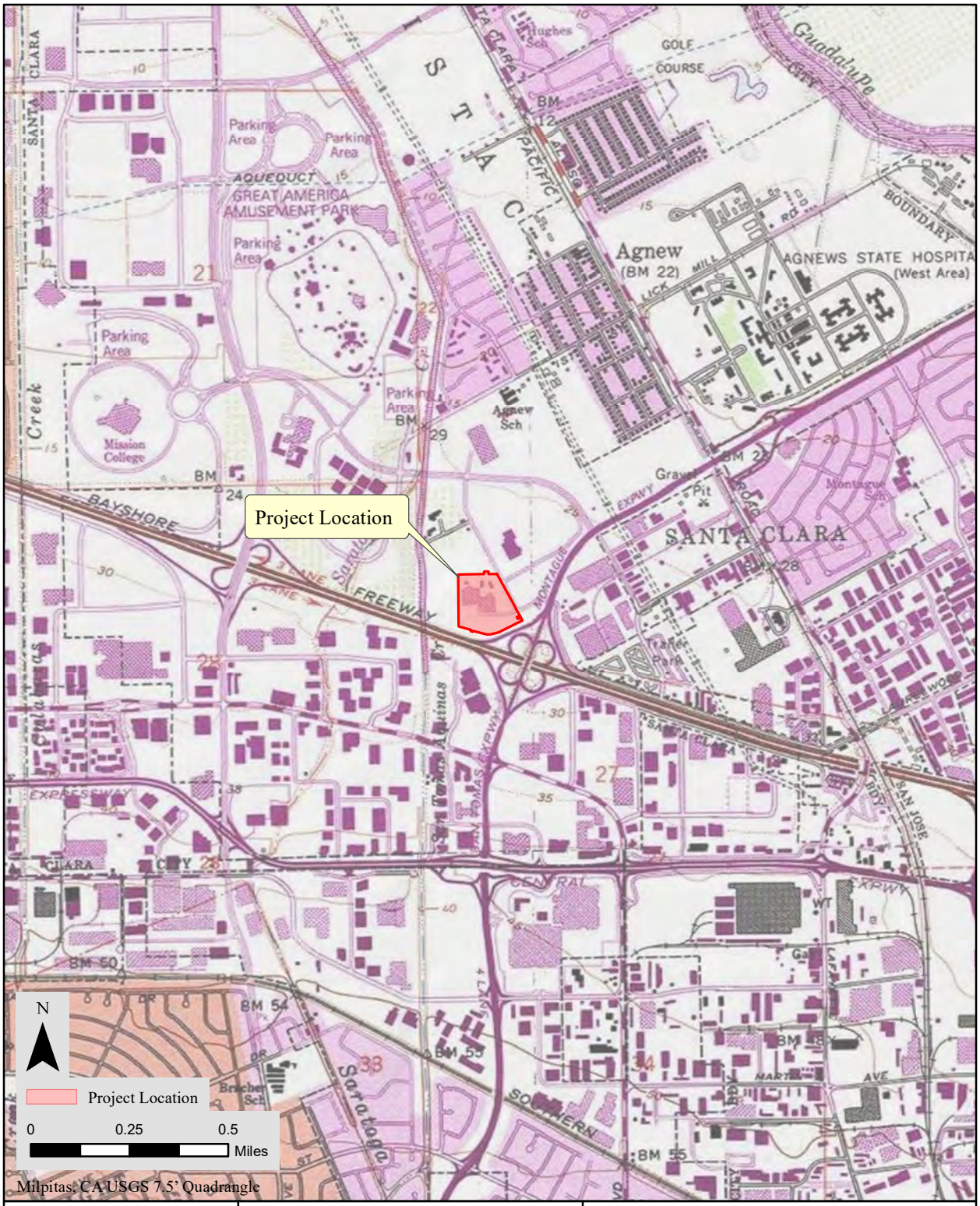
We would appreciate receiving any comments, concerns, or information you wish to share regarding cultural resources or sacred sites within the immediate project area. If you could provide your response in writing, at your earliest convenience, to the address below, we will make sure the relevant information is considered in preparing our report. Should you have any questions, I can be reached by e-mail at calonso@paleowest.com or by telephone at (925) 253-9070, Ext. 321.

Thank you again for your assistance.

Sincerely,



Christina Alonso, M.A., RPA
Senior Archaeologist/Project Manager
Attachment: Map



PALEO WEST archaeology

Project Location Map

Edgecore Laurelwood
Small Power Plant
Survey Project
Santa Clara County, CA

Project #19-037: Edgecore Laurelwood Small Power Plant Survey

Table #. Record of Native American Contacts and Comments

Native American Contact	Date of Notification Email	Date of Phone Contact	Comments
Katherine Erolinda Perez, Chairperson North Valley Yokuts Tribe P.O. Box 717 Linden, CA 95236 209-887-3415 canutes@verizon.net	2/6/2019 MMW	2/11/2019 MMW	Called, no answer, left a voicemail message. MMW
Valentin Lopez, Chairperson Amah Mutsun Tribal Band P.O. Box 5272 Galt, CA 95632 Phone: (916) 743 - 5833 vlopez@amahmutsun.org	2/6/2019 MMW	2/11/2019 MMW	Spoke on the telephone with Mr. Lopez. He stated that the city of Santa Clara was outside of his tribal territory and he declined to comment on the project.
Irenne Zwierlein, Chairperson Amah Mutsun Tribal Band of Mission San Juan Bautista 789 Canada Road Woodside, CA 94062 650-851-7489 (cell) 650-851-7747 (office) 650-332-1526 (fax) amahmutsuntribal@gmail.com	2/6/2019 MMW	2/11/2019 MMW	Spoke with Ms. Zwierlein on the telephone. She requested that the construction crews receive cultural resources awareness training, and if anything is found to have an archaeological monitor and a Native American monitor.

Native American Contact	Date of Notification Email	Date of Phone Contact	Comments
Ann Marie Sayers, Chairperson Indian Canyon Mutsun Band of Costanoan P.O. Box 28 Hollister, CA 95024 831-637-4238 ams@indiancanyon.org	2/6/2019 MMW	2/11/2019 MMW	Spoke on the telephone with Ms. Sayers. She requested that we send her the results of the records search and the pedestrian survey via USPS. She stated that after she reviewed these documents, she would contact us if she had any concerns. PaleoWest mailed Sayers a copy of the letter on 2/11/2019. Per Ms. Sayers request, mailed her a copy of the final report with the survey results and record search results on 2/26/19.
Charlene Nijmeh, Chairperson Muwekma Ohlone Indian Tribe of the SF Bay Area 20885 Redwood Road, Suite 232 Castro Valley, CA, 94546 Phone: (408) 464 - 2892 cnijmeh@muwekma.org	2/6/2019 MMW	2/11/2019 MMW	Called, no answer, left a voicemail message.

Native American Contact	Date of Notification Email	Date of Phone Contact	Comments
Andrew Galvan The Ohlone Indian Tribe P.O. Box 3152 Fremont, CA 94539 510-882-0527 cell 510-687-9393 fax chochenyo@aol.com	2/6/2019 MMW	N/A	Mr. Galvan emailed on 2/6/19 asking about the records search and pedestrian survey. He also requested a copy of the Phase 1 report. PW replied via email to let him know that the survey has yet to be completed and the Phase 1 report is in progress. We told Mr. Galvan we would send him a copy of the Phase 1 report when it is complete. Emailed copy of Phase 1 report to Mr. Galvan.

Appendix C. Photographs

Photo 1. Survey area in south portion of project area with obvious landscaping surface disturbances.

Photo 2. Survey area from SW corner of project area. View of 80% visibility with ornamental madrone trees.

Photo 3. Project area overview from SW corner.

Photo 4. Site overview from NW corner

Photo 13. East and South Elevagions of Building A, view northwest.

Photo 14. West Elevation of Building B, view southeast.

Appendix D. California Department of Recreation 523 Forms

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

PRIMARY RECORD

Primary #
HRI #
Trinomial
NRHP Status Code
Other Listings
Review Code Reviewer Date

Page 1 **of 13** ***Resource Name or #:** 2201 Laurelwood Road

P1. Other Identifier: N/A

***P2. Location:** ☐ **Not for Publication** ■ **Unrestricted** ***a. County:** Santa Clara

and (P2b and P2c or P2d. Attach a Location Map as necessary.)

***b. USGS 7.5' Quad:** Milpitas **Date:** 1979 **T** ; **R** ; **¼ of ¼ of Sec** ; SB **B.M.**

c. Address: 2201 Laurelwood Road City: Santa Clara Zip: 95054

d. UTM: Zone: 10; 591534 mE/ 4138015 mN

e. Other Locational Data: (e.g., parcel #, directions to resource, elevation, etc., as appropriate): APN 104-39-023

***P3a. Description:** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)

2201 Laurelwood Road is comprised of two two-story Spanish Revival-style buildings with Modern-style elements. Both buildings have a square plan with a tiled mansard roof supported by regularly spaced pillars. Both Buildings feature decorative gravel textured panels that extend form the first to the second floor and form a series of arches divided by pillars on all elevations with the exception of the north elevation of Building 1. Glass entrance doors and fixed windows are recessed on the southeast and southwest corners of Building 1. The first and second floors on the south and west elevations of Building 1 feature regularly spaced fixed windows. The north elevation of Building 1 has had an addition removed as evidenced by exposed construction debris. The north elevation of Building 1 also features a 2-story concrete enclosed stairwell. The northwest corner of the west elevation of Building 1 features glass entrance doors and fixed windows on the first floor and exposed doors on the second floor. Building 1 adjoins Building 2 on the southeast corner of the east elevation. Building 2 features glass entrance doors and fixed windows recessed on the first floor of the south and east elevations and regularly spaced fixed windows on the second floor of all elevations. The north elevation of Building 2 features a large opening cut into the wall. Several non-historic period tanks, pumping equipment, and an electrical building are located on the property as well as hardscape and landscaped vegetation.

***P3b. Resource Attributes:** (List attributes and codes) HP6. 1-3 story commercial building

***P4. Resources Present:** ■Building ☐Structure ☐Object ☐Site ☐District ☐Element of District ☐Other (Isolates, etc.)

P5a. Photo or Drawing **(**Photo required for buildings, structures, and objects.)

P5b. Description of Photo: (View, date, accession #)
Building 2, view facing northwest February 11, 2019

***P6. Date Constructed/Age and Sources:**
■Historic
☐Prehistoric ☐Both
1968 (Santa Clara County)

***P7. Owner and Address:**
2201 Laurelwood Road
Santa Clara, CA 95054

***P8. Recorded by: (**Name, affiliation, and address)
J. Castells, M.A.
PaleoWest
3990 Old Town Ave., Suite C101
San Diego, CA 92110

***P9. Date Recorded:** February 2019

***P10. Survey Type:** (Describe) Intensive

***P11. Report Citation:** (Cite survey report and other sources or enter "none.")

Cultural Resource Investigation in Support of the 2201 Laurelwood Road Project, Santa Clara County, CA. PaleoWest Archaeology, 2019

***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):

B1. Historic Name: 2201 Laurelwood Road
B2. Common Name: 2201 Laurelwood Road
B3. Original Use: commercial building B4. Present Use: commercial building
***B5. Architectural Style:** Spanish Revival
***B6. Construction History:** (Construction date, alterations, and date of alterations) Constructed in 1968, removal of additona and various other modifications (dates unknown, based on field observations)

***B7. Moved?** ■**No** ☐**Yes** ☐**Unknown** **Date:** N/A **Original Location:** N/A
***B8. Related Features:** Several non-historic period tanks, pumping equipment, and an electrical building are located on the property as well as hardscape and landscaped vegetation.

B9a. Architect: Unknown b. Builder: Unknown
***B10. Significance: Theme:** Commercial/technology insudtry development in Silicon Valley **Area:** Santa Clara
Period of Significance: 1968 **Property Type:** Commercial building **Applicable Criteria:** N/A
(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)

The 1769 expedition led by Captain Gaspar de Portola initiated the period of contact between Spanish colonists and the native people of the Santa Clara Valley. The Portola party reached the Santa Clara Valley in the fall of that year, camping on San Francisquito Creek. A year later, Pedro Fages led an expedition that explored the eastern shore of San Francisco Bay, eventually reaching the location of modern-day Fremont, where they traded with the local native people. In 1772, a second Fages expedition traveled from Monterey passing through the Santa Clara Valley (Levy 1978).

In 1774, Captain Fernando Rivera y Moncada, scouting locations for a mission and military installment, encountered local Indian people in the Santa Clara Valley. In 1776, a mission scouting expedition under the leadership of Juan Bautista de Anza and Friar Pedro Font traveled through the same area and also traded with residents of native villages encountered along the way. Font recorded that the party had observed 100 native people while traveling through the Santa Clara Valley (Shoup et al. 1995).

(See continuation Sheet)

B11. Additional Resource Attributes: (List attributes and codes)
N/A

***B12. References:**
Refer to Continuation Sheet

B13. Remarks:
NA

***B14. Evaluator:** J. Castells, M.A.

***Date of Evaluation:** February 2019

(Sketch Map with north arrow required.)

***B10. Significance (Continued):**

The first mission in the San Francisco Bay Area was established in San Francisco with the completion of Mission San Francisco de Asis (Mission Dolores) in 1776. Mission Santa Clara de Asis followed in 1777, and Mission San Jose in 1797. The missions relied on the Native American population both as their source of Christian converts and their primary source of labor. Diseases introduced by the early expeditions and missionaries, and the contagions associated with the forced communal life at the missions, resulted in the death of a large number of local peoples. Cook (1943) estimates that by 1832, the Ohlone population had been reduced from a high of over 10,000 in 1770 to less than 2,000.

Mission Santa Clara, founded in 1777, controlled much of the land of the Santa Clara Valley (approximately 80,000 acres) until the 1830s. Mission lands were used primarily for the cultivation of wheat, corn, peas, beans, hemp, flax, and linseed, and for grazing cattle, horses, sheep, pigs, goats, and mules. In addition, mission lands were used for growing garden vegetables and orchard trees such as peaches, apricots, apples, pears, and figs.

Within a period of 25 years after the founding of Mission Santa Clara, most local native peoples had been affected by the presence of the missionaries. Though some Indians gave up their traditional way of life by choice, many were coerced, manipulated, and forced to the mission. By the mid-1790s, the traditional Ohlone economy had been significantly disrupted. Native populations outside the Mission had suffered losses to Spanish disease, a decline in food resources, a disrupted trade system, and a significant drought in 1794 (Shoup et al. 1995). Mission records of 1794 and 1795 show that 586 Native Indians were baptized. While earlier baptisms were composed primarily of children, 80 percent of the converts during this period were adults. The independent tribal elders had finally been brought into the mission system.

The next several decades represent a time of relative stability throughout the Santa Clara Valley. During this period, the Spanish and Mexican population outside of the Mission grew in numbers, power, and prosperity, and Mexico, having gained its independence from Spain, began administering the 21 California missions. By the 1820s, when American trappers began exploring the region, Indians of the San Jose and Santa Clara missions began to rebel (Shoup et al 1995). The rebellion was led by Indian chieftain Estanislao and his companion Cipriano, and the confrontations that took place in the summer of 1829 resulted in casualties for both the Indian rebels and the soldiers serving the mission (Shoup et al. 1995). The fact that Indian people who had maintained long-term relationships with local missions were motivated to rebel against them reflected poorly on the institution's success, and signaled the beginning of the final chapter in Mission Santa Clara's long existence (Shoup et al. 1995).

The Mexican government began the process of secularizing mission lands in the 1830s. The secularization of the mission lands was decreed in 1834, but the process did not get underway at Santa Clara until 1837. Within a few years, the lands of all 21 missions were expropriated in the form of land grants. Despite regulations that stipulated that the land grants were to be distributed fairly, recipients of the land grants were primarily Californios who had allied themselves with Jose Ramon Estrada, Governor Juan Bautista Alvarado's brother-in-law, who oversaw the process (Shoup et al. 1995). By 1845, eight land grants of the former Mission Santa Clara lands were formally awarded to Californios and their Anglo allies (54,284 acres); four were awarded to Mission Indians (11,917 acres) (Shoup et al. 1995).

With their victory in the Mexican-American War (1846-1848), the United States took possession of California and Anglo-European settlers began to arrive in the Santa Clara Valley. The 1849 Gold Rush brought an unprecedented wave of settlers, many of whom acquired land and turned their attention to agriculture. In November of 1849, San Jose became the first capital of the State of California. The following decades were marked by a transition from the ranching economy favored by Spanish and Mexican landholders to an economy based at first on grain agriculture, such as wheat, then increasingly on orchard and specialty vegetable agriculture.

***B10. Significance (Continued):**

In the 1850's the hamlet of Santa Clara began to take shape as a recognizable small town. William Campbell surveyed the town site into lots one hundred yards square, and one lot was given to each citizen with the understanding that he was to build a house on it within three months or lose the property. A schoolhouse and a church were built, several hotels erected, mercantile businesses established, and 23 houses were imported from Boston to be set up in the town.

In 1851, Santa Clara College was established on the old mission site and became a prominent feature of the developing town. Santa Clara incorporated as a town on July 5, 1852, and became a state-chartered city in 1862. By this time the city encompassed an area two miles long and one and a half miles wide. Outside city limits, small family farms and orchards developed and thrived in testimony to the area's fertile soil and mild climate. As the town grew, it was supported by a variety of manufacturing, seed, and fruit industries. The immediate vicinity around Santa Clara became famous for its acre-upon-acre of flower and vegetable seed farms. As the 19th century came to a close, more and more people arrived seeking the mild climate and job opportunities of the Santa Clara area. By 1906, the population of the city had grown to nearly 5,000 (City of Santa Clara 2019). The population remained fairly stable and did not increase greatly until after World War II when the city outgrew its 19th century boundaries and expanded to open lands north and west of the original city limits, replacing farms and orchards with suburban and high-tech development (City of Santa Clara 2019).

The root of the transformation of the Santa Clara Valley from a center of agriculture to a center of technology can be traced to Frederick E. Terman. After receiving his Ph.D from the Massachusetts Institute of Technology in 1924, Frederick E. Terman accepted a faculty position at Stanford's electrical engineering department. Terman set out to build Stanford into a major center of radio and communications research. He also encouraged students such as William Hewlett and David Packard (of the Hewlett-Packard Company) and Eugene Litton (of Litton Industries, Inc.) to establish local companies, many of which he personally invested in. After the World War II Terman was intent on transforming Stanford into a West Coast MIT. To accomplish this goal he selected technologies for research emphasis, beginning with microwave electronics. Second, he solicited military contracts to fund academic research by faculty members who had worked in microwave technology during the war. By 1949 Stanford had become one of the top three recipients of government research contracts, overshadowing all other electronics departments west of the Mississippi River (Dennis 1999).

In 1951 Terman spearheaded the creation of the Stanford Industrial (now Research) Park, which granted long-term leases on university land exclusively to high-technology firms. Soon Varian Associates, Inc. (now Varian Medical Systems, Inc.), Eastman Kodak Company, General Electric Company, Admiral Corporation, Lockheed Corporation (now Lockheed Martin Corporation), Hewlett-Packard Company, and others turned Stanford Research Park into America's premier high-technology manufacturing region. As more firms moved to the region, fueling demand for basic electronic components, technical skills, and business supplies, many former high-technology employees started their own companies (Dennis 1999).

In 1956 William Shockley, Nobel Prize-winning coinventor of the transistor, established the Shockley Semiconductor Laboratory at Stanford Industrial Park. Within a year. a group of engineers resigned to establish Fairchild Semiconductor Corporation in Santa Clara, expanding Silicon Valley beyond the Stanford area (Dennis 1999). At the time, Santa Clara was largely comprised of orchards. With the development of the semiconductor chip a technology boom occurred in the valley, displacing the agricultural economy of Santa Clara. By 1990, the city covered 19.3 square miles and had a population of more than 93,000. (City of Santa Clara 2019).

The late 1960s and early 1970s saw a fundamental change in the semiconductor market. By 1972 the U.S. military accounted for only 12 percent of semiconductor sales, compared with more than 50 percent during the early 1960s. With the growth in consumer applications, by the mid-1970s venture capitalists had replaced the U.S. government as the primary source of financing for start-ups (Dennis 1999).

***B10. Significance (Continued):**

The buildings located at 2201 Laurelwood Road were initially developed in 1968, prior to which the land was used for agricultural purposes (NETR 2019). By 1969 the buildings were occupied by Siliconix. Siliconix was founded in 1962 in Sunnyvale, California by Frances and Bill Hugle. The Hugles were previously research scientists at a Westinghouse semiconductor facility. Siliconix's first product was a junction field-effect transistor used to switch and sense analog signals. In 1967, Siliconix became the first company to produce and market analog switches and in 1968 they were the first company to produce and market analog multiplexers. Both technologies have a variety of applications and are still in use today. In 1969, the company moved from Sunnyvale to 2201 Laurelwood Road, Santa Clara. Siliconix continued to innovate with the development of the first commercially viable metal-oxide-semiconductor field-effect transistors in 1975, power integrated circuits in 1982, and the first power metal-oxide-semiconductor field-effect transistors based on trench technology increasing the current efficiency of silicon in 1993. In 1998 Siliconix was partially acquired by Vishay and was fully acquired in 2005 (Vishay 2019).

CRHR and Local Register Evaluation

The historical significance of the subject property was determined by applying the procedure and criteria for the California Register of Historical Resources (CRHR) and the City of Santa Clara Historic Resource Inventory (Local Register).

CRHR Criterion 1: The buildings located at 2201 Laurelwood Road do not meet CRHR Criterion 1 for association with events that have made a significant contribution to the broad patterns of California's history and cultural heritage. The property was constructed in 1968 which coincided with a period of rapid growth in Santa Clara as a result of the Silicon Valley technology boom. The property was one of many constructed in the area during that period to accommodate the growing technology industry. The long-term tenant of the property has been Siliconix who developed several technologies, many of which are currently in use. While Siliconix has a history of innovation, research has yielded no information to suggest that they have made historically significant contributions to the development of technology during the mid-twentieth century. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the CRHR under Criterion 1.

CRHR Criterion 2: The buildings located at 2201 Laurelwood Road do not meet CRHR Criterion 2 for any direct associations with the productive lives of persons important in local, state, or national history. The long-term tenants of the property, Siliconix, which was founded by Francis and Bill Hugle. Research has yielded no information to suggest that either are persons of historical significance. Many technicians and employees have worked at the property but there is no indication that any are persons of historical significance. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the CRHR under Criterion 2.

CRHR Criterion 3: The buildings located at 2201 Laurelwood Road do not to meet CRHR Criterion 3 for embodying the distinctive characteristics of a type, period, and method of construction, or as the work of an important creative individual, or as having high artistic value. The buildings on the property were designed in the Spanish-Revival style. The Spanish-Revival style was popular in California beginning in the early twentieth century and continues into the present. These buildings represent a relatively late and unremarkable example of this style. The buildings are essentially similar to many others constructed within the region and state during this time period. The architect and builder of the buildings was not identified, but it is unlikely that this property is the work of a master. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the CRHR under Criterion 3.

CRHR Criterion 4: The buildings located at 2201 Laurelwood Road do not meet CRHR Criterion 4 since it is unlikely to yield information important to prehistory or history. It is unlikely that this property has the potential to broaden our understanding of Silicon Valley in the mid-twentieth century. Therefore, the buildings located at 2201 Laurelwood Road is not eligible for the CRHR under Criterion 4.

***B10. Significance (Continued):**

Local Register

Criteria for Historical or Cultural Significance

Local Register Criterion 1: The buildings located at 2201 Laurelwood Road do not to meet Criterion 1 for having character, interest, integrity and reflects the heritage and cultural development of the city, region, state, or nation. The buildings on the property were designed in the Spanish-Revival style. The Spanish-Revival style was popular in California beginning in the early twentieth century and continues into the present. These buildings represent a relatively late and unremarkable example of this style. The property was constructed in 1968 which coincided with a period of rapid growth in Santa Clara as a result of the Silicon Valley technology boom. The property was one of many constructed in the area during that period to accommodate the growing technology industry. The long-term tenant of the property has been Siliconix who developed several technologies, many of which are currently in use. While Siliconix has a history of innovation, research has yielded no information to suggest that they have made historically significant contributions to the development of technology during the mid-twentieth century. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 2.

Local Register Criterion 2: The buildings located at 2201 Laurelwood Road do not to meet Criterion 2 for association with a historical event. The property was constructed in 1968 which coincided with a period of rapid growth in Santa Clara as a result of the Silicon Valley technology boom. The property was one of many constructed in the area during that period to accommodate the growing technology industry. The long-term tenant of the property has been Siliconix who developed several technologies, many of which are currently in use. While Siliconix has a history of innovation, research has yielded no information to suggest that they have made historically significant contributions to the development of technology during the mid-twentieth century. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 2.

Local Register Criterion 3: The buildings located at 2201 Laurelwood Road do not to meet Criterion 3 for association with an important individual or group who contributed in a significant way to the political, social and/or cultural life of the community. The long-term tenants of the property, Siliconix, which was founded by Francis and Bill Hugle. Research has yielded no information to suggest that either are persons of historical significance. Many technicians and employees have worked at the property but there is no indication that any are persons of historical significance. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 3.

Local Register Criterion 4: The buildings located at 2201 Laurelwood Road do not to meet Criterion 4 for association with a significant industrial, institutional, commercial, agricultural, or transportation activity. The long-term tenant of the property has been Siliconix who developed several technologies, many of which are currently in use. While Siliconix has a history of innovation, research has yielded no information to suggest that they have made historically significant contributions to the development of technology during the mid-twentieth century. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 4.

Local Register Criterion 5: The buildings located at 2201 Laurelwood Road do not to meet Criterion 5 for association with broad patterns of local area history, including development and settlement patterns, early or important transportation routes or social, political, or economic trends and activities. Included is the recognition of urban street pattern and infrastructure. The property was constructed in 1968 which coincided with a period of rapid growth in Santa Clara as a result of the Silicon Valley technology boom. The property was one of many constructed in the area during that period to accommodate the growing technology industry. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 5.

***B10. Significance (Continued):**

Local Register Criterion 6: The buildings located at 2201 Laurelwood Road do not to meet Criterion 6 for a notable historical relationship between a site, building, or property's site and its immediate environment, including original native trees, topographical features, outbuildings or agricultural setting. While the property is surrounded by other technology industry related properties, there is no indication that the buildings on this property have a notable historical relationship with other buildings or landscape features in the area. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 6.

Criteria for Architectural Significance

Local Register Criterion 7: The buildings located at 2201 Laurelwood Road do not to meet Criterion 7 for characterizing an architectural style associated with a particular era and/or ethnic group. The buildings on the property were designed in the Spanish-Revival style. The Spanish-Revival style was popular in California beginning in the early twentieth century and continues into the present. These buildings represent a relatively late and unremarkable example of this style. The buildings are essentially similar to many others constructed within the region and state during this time period. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 7.

Local Register Criterion 8: The buildings located at 2201 Laurelwood Road do not to meet Criterion 8 for identification with a particular architect, master builder or craftsman. The architect and builder of the buildings was not identified, but it is unlikely that this property is the work of a master. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 7.

Local Register Criterion 9: The buildings located at 2201 Laurelwood Road do not to meet Criterion 9 as architecturally unique or innovative. The buildings on the property were designed in the Spanish-Revival style. The Spanish-Revival style was popular in California beginning in the early twentieth century and continues into the present. These buildings represent a relatively late and unremarkable example of this style. The buildings are essentially similar to many others constructed within the region and state during this time period. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 9.

Local Register Criterion 10: The buildings located at 2201 Laurelwood Road do not to meet Criterion 10 for having a strong or unique relationship to other areas potentially eligible for preservation because of architectural significance. There is no indication that the buildings on this property have a strong or unique relationship to other areas potentially eligible for preservation because of architectural significance. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 10.

Local Register Criterion 11: The buildings located at 2201 Laurelwood Road do not to meet Criterion 11 for having a visual symbolic meaning or appeal for the community. There is no indication that the buildings on this property have a visual symbolic meaning or appeal for the community. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 11.

Local Register Criterion 12: The buildings located at 2201 Laurelwood Road do not to meet Criterion 12 for having unique or uncommon building materials or its historically early or innovative method of construction or assembly. There is no indication that the buildings on this property have used unique or uncommon building materials or are historically early or innovative method of construction or assembly. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 12.

***B10. Significance (Continued):**

Local Register Criterion 13: The buildings located at 2201 Laurelwood Road do not to meet Criterion 13 for notable or special attributes of an aesthetic or functional nature. These may include massing, proportion, materials, details, fenestration, ornamentation, artwork, or functional layout. These buildings do not display any notable of special attributes. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 13.

Criteria for Geographical Significance

Local Register Criterion 14: The buildings located at 2201 Laurelwood Road do not to meet Criterion 14 since they are not a neighborhood, group, or unique area directly associated with broad patterns of local area history. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 14.

Local Register Criterion 15: The buildings located at 2201 Laurelwood Road do not to meet Criterion 15 for exhibiting continuity and compatibility with adjacent buildings and/or visual contribution to a group of similar buildings. The buildings on this property do not contribute to a larger group of similar buildings. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 15.

Local Register Criterion 16: The buildings located at 2201 Laurelwood Road do not to meet Criterion 16 as an intact, historical landscape or landscape features associated with an existing building. The buildings on this property are not a part of or are themselves a historical landscape. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 16.

Local Register Criterion 17: The buildings located at 2201 Laurelwood Road do not to meet Criterion 17 as a notable use of landscaping design in conjunction with an existing building. There is no notable use of landscaping on this property. Therefore, the buildings located at 2201 Laurelwood Road are not eligible for the Local Register under Criterion 17.

***B12. References (Continued):**

City of Santa Clara
2019 "A Brief History of Santa Clara." http://santaclaraca.gov/government/about-santa-clara/city-history

Cook, Sherburne F.
1943 The Conflict Between the California Mission Indians and White Civilization. Ibero-Americana 22. Berkeley, CA.

Dennis, Michael Aaron
1999 "Silicon Valley." https://www.britannica.com/place/Silicon-Valley-region-California

Levy, Richard S.
1978 Costanoan. In Handbook of North American Indians, Vol. 8: California. Robert F. Heizer, editor, pp. 485-495. Smithsonian Institution, Washington, D.C.

National Environmental Title Research (NETR)
2019 Historic Aerials from 1948-2014. Accessed at: https://www.historicaerials.com/

Shoup, Lawrence H., Randall T. Milliken and Alan K. Brown
1995 Inigo of Rancho Posolmi: The Life and Times of a Mission Indian and His Land. Prepared by Archaeological/Historical Consultants, Oakland, CA for Woodward-Clyde Consultants, Oakland, CA.

Vishay
2019 "Siliconix 50-year Timeline." https://www.vishay.com/landingpage/50year/siliconix.html

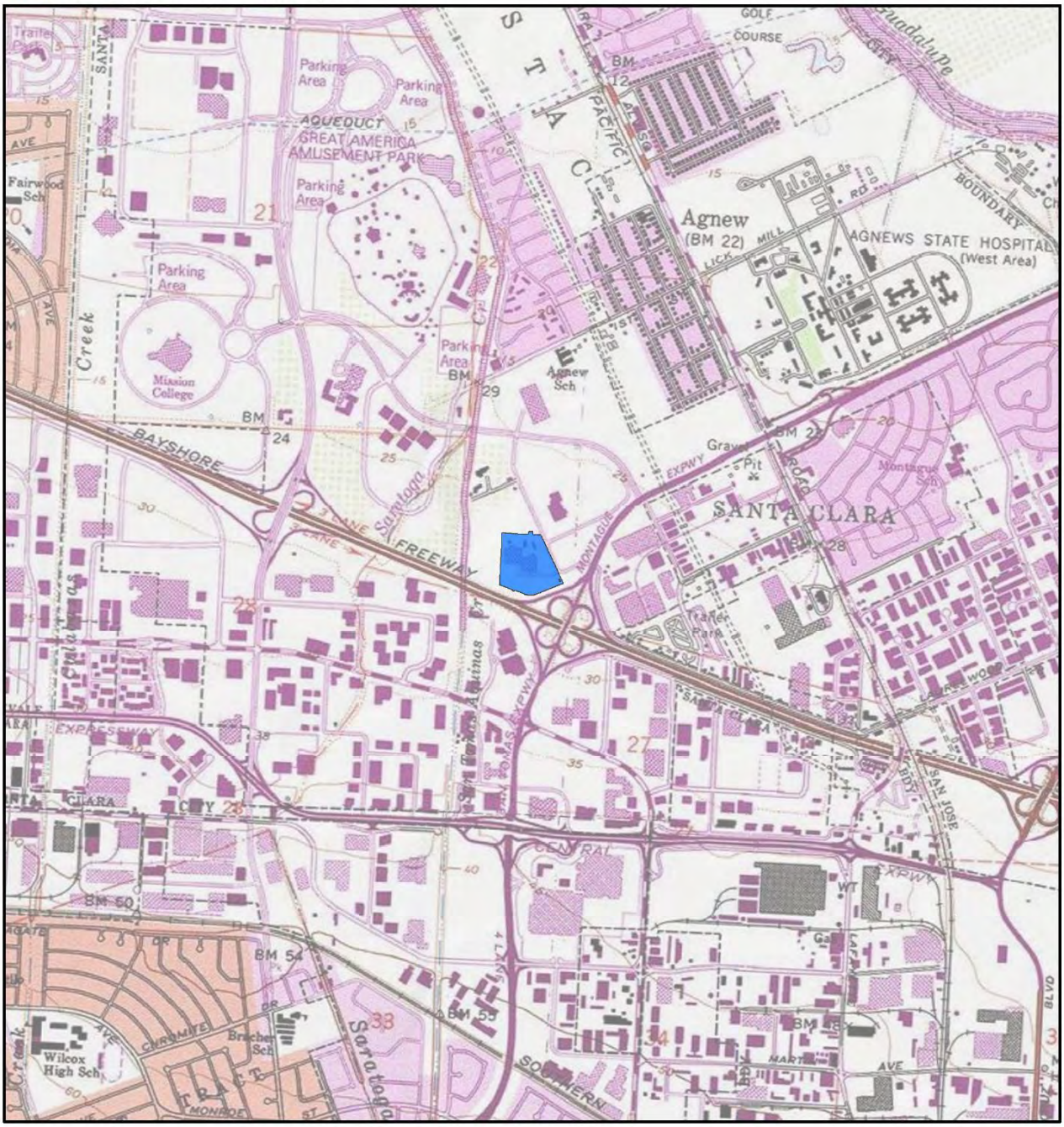
Building 2, southwest corner, facing northeast

Building 1, south elevation, facing north

Building 1, west elevation, facing southeast

Building 1, north elevation, facing southeast

Map Name: Milpitas, CA 7.5' USGS Quad. **Date:** 1979



Attachment DR-60
Transmittal Letters Provided to Native American Tribes

Madams, Sarah

From: Christina Alonso <calonso@paleowest.com>
Sent: Thursday, April 4, 2019 3:52 PM
To: Madams, Sarah
Subject: [EXTERNAL] Andy Galvan Report Submission SPPE Project
Attachments: SPPE Laurelwood CRTR Final 4_3_19.pdf

Christina Alonso, M.A., RPA
Senior Archaeologist, Project Manager

PALEOWEST archaeology

1870 Olympic Boulevard, Suite 100, Walnut Creek, CA 94596
925.253.9070 | 925.399.9220 cell | www.paleowest.com

From: Megan Watson
Sent: Thursday, April 4, 2019 3:45 PM
To: Christina Alonso
Subject: Fw: Sacred Lands Inquiry

From: Megan Watson
Sent: Wednesday, April 3, 2019 4:13 PM
To: Andrew Galvan
Subject: Re: Sacred Lands Inquiry

Hello Andrew,

Per your request I am sending you a copy of the Phase I report for the Laurelwood Road Project in Santa Clara County (attached). You mentioned that you were most interested in our recommendations for the project and I would like to direct you to page 25 of the attached report. Please let me know if you have any comments.

Best,
Megan

From: Andrew Galvan <chochenyo@aol.com>
Sent: Thursday, February 7, 2019 2:05:20 PM

To: Megan Watson
Subject: Re: Sacred Lands Inquiry

Thank you, I look forward to reading the report

What I am most interested in learning is "what are the professional archaeological recommendations for this project

Andy

Sent from my iPhone

On Feb 7, 2019, at 10:21 AM, Megan Watson <mwatson@paleowest.com> wrote:

> Hello Andrew,
>
> Thank you for your quick response. We have done the records search and we are in the process of preparing the Phase 1 report but we have not yet completed the foot survey. We can definitely make a note that you would like a copy of the report when it is finalized. Please let me know if there is anything else you need. We look forward to receiving your comments.
>
> Best,
> Megan
>
> ---
>
> **From:** Andrew Galvan <chochenyo@aol.com>
> **Sent:** Wednesday, February 6, 2019 7:45:23 PM
> **To:** Megan Watson
> **Subject:** Re: Sacred Lands Inquiry
>
> **Hi there,**
>
> **can you tell me if a Phase I Literature Search and/or a Foot Survey have been under taken for this project? And if so, may I have a copy of that report?**
>
> **Thank you,**
>
> **Andrew Galvan**
> **An Ohlone Man**
>
> -----Original Message-----
> From: Megan Watson <mwatson@paleowest.com>
> To: chochenyo@AOL.com <chochenyo@AOL.com>
> Sent: Wed, Feb 6, 2019 4:26 pm
> Subject: Sacred Lands Inquiry
>
> Dear Mr. Galvan,
>
> I am writing to inform you that PaleoWest recently received your contact information from the NAHC Sacred Lands List regarding a project in Santa Clara County. I have attached to this email a formal letter describing this project which includes a map of the project location. Please

review the attached letter and respond at your earliest convenience. If we do not hear from you we will follow up again in five days. If you have any trouble viewing the attachment please let me know.

Kind Regards,

Megan

Megan Watson

Associate Archaeologist

<Outlook-lmfpqxp0.png>
1870 Olympic Boulevard, Suite 100, Walnut Creek, CA 94596
925.253.9070 | 925.783-6738 cell | www.paleowest.com

PaleoWest Archaeology

www.paleowest.com

Solution-driven Archaeological Consulting

Madams, Sarah

From: Christina Alonso <calonso@paleowest.com>
Sent: Thursday, April 4, 2019 5:37 PM
To: Madams, Sarah
Subject: [EXTERNAL] Fw: Sacred Lands Inquiry
Attachments: SPPE Laurelwood CRTR Final 4_3_19.pdf

Forwarding email chain regarding Ms. Sayers copy of report. We spoke with her on the phone today and she has not checked her mailbox in quite some time so she asked that we email her another copy.

Best,

Christina Alonso, M.A., RPA
Senior Archaeologist, Project Manager

PALEOWEST archaeology

1870 Olympic Boulevard, Suite 100, Walnut Creek, CA 94596
925.253.9070 | 925.399.9220 cell | www.paleowest.com

From: Megan Watson
Sent: Thursday, April 4, 2019 5:22 PM
To: ams@indiancanyon.org
Cc: Christina Alonso
Subject: Re: Sacred Lands Inquiry

Hello Again,

As you requested during our phone call earlier today, I have attached a copy of the technical report for the Edgecore Laurelwood Road project to this email. Please let me know that you have received it.

Thank you,
Megan

From: Megan Watson
Sent: Thursday, April 4, 2019 5:08:00 PM
To: ams@indiancanyon.org
Cc: Christina Alonso
Subject: Re: Sacred Lands Inquiry

Hello Ms. Sayers,

I wanted to follow up regarding the Edgecore Laurelwood Road project in Santa Clara County. Per your request we mailed you a copy of the completed technical report on February 25th, 2019. Can you please confirm that you received the technical report?

Thank you for your time.

Best,
Megan

From: Megan Watson
Sent: Wednesday, February 6, 2019 4:23:24 PM
To: ams@indiancanyon.org
Subject: Sacred Lands Inquiry

Dear Ms. Sayers,

I am writing to inform you that PaleoWest recently received your contact information from the NAHC Sacred Lands List regarding a project in Santa Clara County. I have attached to this email a formal letter describing this project which includes a map of the project location. Please review the attached letter and respond at your earliest convenience. If we do not hear from you we will follow up again in five days. If you have any trouble viewing the attachment please let me know.

Kind Regards,

Megan

Megan Watson

Associate Archaeologist

PALEOWEST archaeology

1870 Olympic Boulevard, Suite 100, Walnut Creek, CA 94596
925.253.9070 | 925.783-6738 cell | www.paleowest.com

Attachment DR-61
LDC Water Supply Assessment Request
Submittal Documentation

From:	Johnson, Miles
To:	Roger Palacpac; Ryan Harrison
Cc:	Nelson, Kari; Tiemo Mehner (Mehner@DCM-Designs.com); Brian Probst; NAgrawal@SantaClaraCA.gov
Subject:	2201 Laurelwood Road - WSA
Attachments:	WSA Form.pdf

Hi Roger and Ryan,
I am not sure which of the two of you helps to coordinate the Water Supply Assessment form, so I wanted to copy both of you. Can you please confirm which of you will be handling the processing of the Water Supply Assessment form? This is for the proposed data center project located at 2201 Laurelwood Road; we have submitted our entitlement package to the city and gone through one PCC meeting to date.

Please confirm receipt and let me know if there is any additional information that you need to process. We can send in hard copies if needed, just let us know.

Thanks,

Miles Johnson, P.E.
Kimley-Horn | Northern California
Direct: 669.800.4140 **| Mobile**: 925.876.5812

City of Santa Clara

Water Supply Assessment (WSA) Form

Site Name:	Laurelwood (Edgecore)
Address:	2201 Laurelwood Rd
	Santa Clara, CA 95054
Date:	03/20/2019

Person Completing WSA Form

Name:	Miles Johnson, P.E.
Affiliation:	Kimley-Horn
Phone Number:	669-800-4140
Email:	miles.johnson@kimley-horn.com

1) Describe Summary of Work:

Existing site to be redeveloped with two (2) 4-story data centers with parking and vegetated areas, as well as an SVP substation.

2) Fill out the following table for Existing Site:

If no existing development, write "N/A"

Existing Development				
Use	**sq ft.**	**Water Type (Potable, Recycled)**	**Demolition or Remaining**	**Notes**
Residential				
Irrigation	42,412	Potable	Demolition	
Office Space				
Retail Space				
Industrial	521,798	Potable	Demolition	
All Other[1]				
Total Demolition	564,210			
Total Remaining				

[1]Other uses include (but not limited to): fountains, pools, water features, athletic fields, parking lot, etc.

3) Fill out the following table for Proposed Development:

Proposed Development				
Use	**sq ft.**	**Water Type**	**Earliest Completion Date**	**Notes** (i.e. Different addresses to be used at project site)
e.g. Office Space	***300,000***	***Potable***	***June 2014***	***2 - 150,000 sq. ft. buildings***
e.g. Irrigation	***95,300***	***Recycled***		
Residential				
Irrigation	122,704	Recycled (If available)		
Office Space				
Retail Space				
Industrial	737,093	Potable		Two data center buildings
All Other[1]				
Total Proposed	859,797			

4) Totals

Total Development After Project Completion: (Total Remaining + Proposed)	859,797 SF

5) If any additional notes, please indicate below:
(i.e. Projected Water Demand)

Attachment SQ-8
Geotechnical Investigation Report

CORNERSTONE EARTH GROUP

TYPE OF SERVICES	Geotechnical Investigation
PROJECT NAME	2201 Laurelwood Road
LOCATION	2201 Laurelwood Road Santa Clara, California
CLIENT	EdgeCore Internet Real Estate
PROJECT NUMBER	1075-1-2
DATE	March 18, 2019

CORNERSTONE EARTH GROUP

Type of Services	**Geotechnical Investigation**
Project Name	**2201 Laurelwood Road**
Location	**2201 Laurelwood Road** **Santa Clara, California**
Client	**EdgeCore Internet Real Estate**
Client Address	**1415 Larimer Street, Suite 200** **Denver, Colorado**
Project Number	**1075-1-2**
Date	**March 18, 2019**

Prepared by

Maura Ruffatto

Maura F. Ruffatto, P.E.
Project Engineer
Geotechnical Project Manager

Danh T. Tran, P.E.
Senior Principal Engineer
Quality Assurance Reviewer

1259 Oakmead Parkway | Sunnyvale, CA 94085
T 408 245 4600 | F 408 245 4620

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T 925 988 9500 | F 925 988 9501

www.cornerstoneearth.com

CORNERSTONE EARTH GROUP

TABLE OF CONTENTS

Type of Services	**Geotechnical Investigation**
Project Name	**2201 Laurelwood Road**
Location	**2201 Laurelwood Road** **Santa Clara, California**

SECTION 1: INTRODUCTION

This geotechnical report was prepared for the sole use of EdgeCore Internet Real Estate for the 2201 Laurelwood Road project in Santa Clara, California. The location of the site is shown on the Vicinity Map, Figure 1. For our use, we were provided with the following documents:

- A previous geotechnical report titled "Preliminary Geotechnical Investigation, Prologis Santa Clara, 2201 Laurelwood Road, Santa Clara, California," prepared by TRC, dated June 6, 2018.
- Three previous boring logs and laboratory data performed by TRC on July 19, 2018.

1.1 PROJECT DESCRIPTION

We understand the project will include redeveloping the approximately 12-acre site for a new data center campus. The new campus will include two buildings with a connecting structure. The buildings will be four stories and at-grade. Building 1 will be about 75,500 square feet per floor with a building footprint of 395 feet by 191 feet. The connecting structure will total about 23,000 square feet per floor. Building 2 will be completed in two phases. Phase 1 will include about 62,800 square feet per floor with a dimension of 230 feet by 273 feet. The Phase 2 addition to Building 2 will be about 51,800 square feet per floor and dimensions of 190 feet by 273 feet. A substation will also be located in the southwest corner of the site and be 200 square feet. Stacked generators will be located along the south side of both buildings. At-grade asphalt concrete pavement areas will surround the buildings.

Structural loads were provided by Pangoli Structural, the project structural engineer. Typical cuts and fills on the order of 2 to 3 feet are expected for site development.

1.2 SCOPE OF SERVICES

Our scope of services was presented in our proposal dated November 15, 2018 and consisted of field and laboratory programs to evaluate physical and engineering properties of the

subsurface soils, engineering analysis to prepare recommendations for site work and grading, building foundations, flatwork, retaining walls, and pavements, and preparation of this report. Brief descriptions of our exploration and laboratory programs are presented below.

1.3 EXPLORATION PROGRAM

Field exploration consisted of eight borings drilled on January 8, 14, 15, and 16, 2019 with truck-mounted, hollow-stem auger drilling equipment and four Cone Penetration Tests (CPTs) advanced on December 21, 2018. The borings were drilled to depths of 29½ to 80 feet; the CPTs were advanced to depths of 50 to 110 feet. Seismic shear wave velocity measurements were collected from CPT-4. Four of the borings (Borings EB-7, EB-2, EB-6, and EB-3) were advanced adjacent to CPT-1, CPT-2, CPT-3, and CPT-4, respectively, for direct evaluation of physical samples to correlated soil behavior.

The borings and CPTs were backfilled with cement grout in accordance with local requirements; exploration permits were obtained as required by local jurisdictions.

The approximate locations of our exploratory borings are shown on the Site Plan, Figure 2. Details regarding our field program are included in Appendix A.

1.4 PREVIOUS EXPLORATION

TRC previously performed four Cone Penetration Tests (CPTs) and three hollow-stem auger borings in 2018. The CPTs were advanced to depths of 100 feet. The hollow-stem auger borings were drilled to depths of 44 to 45 feet. The approximate locations of the previous exploratory borings and CPTs are shown on the Site Plan, Figure 2. Previous boring and CPT logs and lab data are provided in Appendix C.

1.5 LABORATORY TESTING PROGRAM

In addition to visual classification of samples, the laboratory program focused on obtaining data for foundation design and seismic ground deformation estimates. Testing included moisture contents, dry densities, Plasticity Index tests, and consolidation tests. Details regarding our laboratory program are included in Appendix B.

1.6 CORROSION EVALUATION

Five samples from our borings from depths from 2 to 6 feet were tested for saturated resistivity, pH, and soluble sulfates and chlorides. In general, the on-site soils can be characterized as severely corrosive to buried metal, and not corrosive to buried concrete.

1.7 ENVIRONMENTAL SERVICES

Cornerstone Earth Group also provided environmental services for this project, including a Phase 1 assessment; environmental findings and conclusions are provided under separate covers.

SECTION 2: REGIONAL SETTING

2.1 GEOLOGICAL SETTING

The site is located within the Santa Clara Valley, which is a broad alluvial plane between the Santa Cruz Mountains to the southwest and west, and the Diablo Range to the northeast. The San Andreas Fault system, including the Monte Vista-Shannon Fault, exists within the Santa Cruz Mountains and the Hayward and Calaveras Fault systems exist within the Diablo Range. Alluvium in the area of the site is mapped to be greater than 500 feet thick (Rogers & Williams, 1974).

2.2 REGIONAL SEISMICITY

The San Francisco Bay area region is one of the most seismically active areas in the Country. While seismologists cannot predict earthquake events, geologists from the U.S. Geological Survey have recently updated earlier estimates from their 2014 Uniform California Earthquake Rupture Forecast (Version 3) publication. The estimated probability of one or more magnitude 6.7 earthquakes (the size of the destructive 1994 Northridge earthquake) expected to occur somewhere in the San Francisco Bay Area has been revised (increased) to 72 percent for the period 2014 to 2043 (Aagaard et al., 2016). The faults in the region with the highest estimated probability of generating damaging earthquakes between 2014 and 2043 are the Hayward (33%), Rodgers Creek (33%), Calaveras (26%), and San Andreas Faults (22%). In this 30-year period, the probability of an earthquake of magnitude 6.7 or larger occurring is 22 percent along the San Andreas Fault and 33 percent for the Hayward or Rodgers Creek Faults.

The faults considered capable of generating significant earthquakes are generally associated with the well-defined areas of crustal movement, which trend northwesterly. The table below presents the State-considered active faults within 25 kilometers of the site. Fault distances were determined using the program EZ Frisk (Risk Engineering, 2012). It is noted that fault distances presented in Table 1 were determined from EZ Frisk and represent the rupture distance and may not be the distance to the surface expression of the fault that is shown on published geological maps and on-line resources such as Google Earth, etc. The seismic characteristics of some faults vary along its length so different segments of the same fault could be listed separately in the table.

Table 1: Approximate Fault Distances

Fault Name	Distance	
	(miles)	(kilometers)
Monte Vista-Shannon	7.7	12.3
Hayward-Rodgers Creek	8.0	12.9
Calaveras	9.7	15.6
Northern San Andreas	11.1	17.9

A regional fault map is presented as Figure 3, illustrating the relative distances of the site to significant fault zones.

SECTION 3: SITE CONDITIONS

3.1 SURFACE DESCRIPTION

The project site is located at 2201 Laurelwood Road in Santa Clara, California. The site is bounded by industrial development to the north, Juliette Lane to the east, Highway 101 to the south, and an at-grade parking lot to the west. The site is currently occupied by three two- to three-level industrial/manufacturing buildings surrounded by at-grade asphalt pavements, landscaped areas, and generators. The site is relatively level, but graded toward on-site drainage facilities.

Surface pavements generally consisted of 3 to 5 inches of asphalt concrete over 0 to 15 inches of aggregate base. Based on visual observations, the existing pavements are in fair condition with minor cracking observed.

3.2 SUBSURFACE CONDITIONS

Below the surface pavements, our boring EB-7 encountered approximately 2½ feet of undocumented fill consisting of hard fat clay with gravel. Beneath the surface pavements and undocumented fill, where encountered, our borings generally encountered stiff to hard fat clay with varying amounts of sand to depths of 2½ to 7 feet. Beneath the fat clays, our boring generally encountered medium stiff to very stiff lean clays with varying amounts of sand and silt with interbedded layers of loose to very dense sands with varying amounts of clay and silt to the maximum boring depth of 80 feet.

3.2.1 Plasticity/Expansion Potential

We performed six Plasticity Index (PI) tests on representative samples. Test results were used to evaluate expansion potential of surficial soils, and the plasticity of the fines in potentially liquefiable layers. The results of the surficial PI test indicated a PI of 43, indicating high to very high expansion potential to wetting and drying cycles.

3.2.2 In-Situ Moisture Contents

Laboratory testing indicated that the in-situ moisture contents within the upper 10 feet range from optimum to about 15 percent over the estimated laboratory optimum moisture.

3.3 GROUNDWATER

Groundwater was encountered in our borings at depths ranging from 6½ to 13 feet below existing grades at the time of drilling. Groundwater was inferred at depths ranging from 5.7 to 8.8 feet below current grades in CPT-1, CPT-4 and CPT-6 based on pore pressure dissipation tests. All measurements were taken at the time of drilling and may not represent the stabilized levels that can be higher than the initial levels encountered.

Previous pore pressure dissipation tests by TRC in 2018 inferred groundwater at about 5½ to 9 feet. Groundwater was also encountered at a depth of 6½ feet in TRC's 2018 borings.

Historic high groundwater maps prepared by the California Geologic Survey (CGS, 2001) indicate the high groundwater to be at approximately 5 to 10 feet below the existing ground surface. We used a design groundwater depth of 5 feet below the existing ground surface for our analysis and also recommend this depth be used for project planning. Fluctuations in groundwater levels occur due to many factors including seasonal fluctuation, underground drainage patterns, regional fluctuations, and other factors.

3.4 CORROSION SCREENING

We tested five samples collected at depths from 2 to 6 feet for resistivity, pH, soluble sulfates, and chlorides. The laboratory test results are summarized in Table 2A.

Table 2A: Summary of Corrosion Test Results

Boring/Sample	Depth (feet)	Soil pH[1]	Resistivity[2] (ohm-cm)	Chloride[3,5] (mg/kg)	Sulfate[4,5] (mg/kg)
EB-1/2B	4	7.4	1,204	6	0.0139
EB-4/1B	2	7.5	1,323	5	0.0013
EB-6/3A	5½	7.8	1,307	6	0.0057
EB-7/3B	6	7.9	1,509	6	0.0092
EB-8/2A	3	7.9	1,234	15	0.0144

Notes: [1]ASTM G51
[2]ASTM G57 - 100% saturation
[3]ASTM D4327/Cal 422 Modified
[4]ASTM D4327/Cal 417 Modified
[5]1 mg/kg = 0.0001% by dry weight

Many factors can affect the corrosion potential of soil and bedrock including moisture content, resistivity, permeability, and pH, as well as chloride and sulfate concentration. Typically, soil resistivity, which is a measurement of how easily electrical current flows through a medium (soil and/or water), is the most influential factor. In addition to soil resistivity, chloride and sulfate ion concentrations, and pH also contribute in affecting corrosion potential. Based on the laboratory

test results summarized in Table 2A and published correlations between resistivity and corrosion potential, the near surface materials may be considered severely corrosive to buried metallic improvements (Chaker and Palmer, 1989).

In accordance with the 2016 CBC Section 1904A.1, alternative cementitious materials shall be determined in accordance with ACI 318-14 Table 19.3.1.1, Table R19.3.1, and Table 19.3.2.1. Based on the laboratory sulfate test results, no cement type restriction is required, although, in our opinion, it is generally a good idea to include some sulfate resistance and to maintain a relatively low water-cement ratio. We have summarized applicable design values and parameters from ACI 318-14, Chapter 19 below in Table 2B.

We recommend the structural engineer and a corrosion engineer be retained to confirm the information provided and for additional recommendations, as required.

Table 2B: ACI Sulfate Soil Corrosion Design Values and Parameters

Category	Water-Soluble Sulfate (SO4) in Soil (% by weight)	Sulfate (S) Class	Cementitious Materials (2)
S, Sulfate	< 0.10	S0	no type restriction

Notes: (1) above values and parameters are from on ACI 318-14, Table 19.3.1.1, Table R19.3.1, and Table 19.3.2.1
(2) cementitious materials are in accordance with ASTM C150, ASTM C595, and ASTM C1157

SECTION 4: GEOLOGIC HAZARDS

4.1 FAULT RUPTURE

As discussed above several significant faults are located within 25 kilometers of the site. The site is not located within a State-designated Alquist Priolo Earthquake Fault Zone, or a Santa Clara County Fault Hazard Zone. As shown in Figure 3, no known surface expression of fault traces is thought to cross the site; therefore, fault rupture hazard is not a significant geologic hazard at the site.

4.2 ESTIMATED GROUND SHAKING

Moderate to severe (design-level) earthquakes can cause strong ground shaking, which is the case for most sites within the Bay Area. A peak ground acceleration $(PGA)_M$ was estimated for analysis using a value equal to F_{PGA} x PGA, as allowed in the 2016 edition of the California Building Code. For our liquefaction analysis we used a PGA_M of 0.50g.

4.3 LIQUEFACTION POTENTIAL

The site is within a State-designated Liquefaction Hazard Zone (CGS, Milpitas Quadrangle, 2004) as well as a Santa Clara County Liquefaction Hazard Zone (Santa Clara County, 2003). Our field and laboratory programs addressed this issue by testing and sampling potentially

liquefiable layers to depths of at least 50 feet, performing visual classification on sampled materials, evaluating CPT data, and performing various tests to further classify soil properties.

4.3.1 Background

During strong seismic shaking, cyclically induced stresses can cause increased pore pressures within the soil matrix that can result in liquefaction triggering, soil softening due to shear stress loss, potentially significant ground deformation due to settlement within sandy liquefiable layers as pore pressures dissipate, and/or flow failures in sloping ground or where open faces are present (lateral spreading) (NCEER 1998). Limited field and laboratory data is available regarding ground deformation due to settlement; however, in clean sand layers settlement on the order of 2 to 4 percent of the liquefied layer thickness can occur. Soils most susceptible to liquefaction are loose, non-cohesive soils that are saturated and are bedded with poor drainage, such as sand and silt layers bedded with a cohesive cap.

4.3.2 Analysis

As discussed in the “Subsurface” section above, several sand layers were encountered below the design groundwater depth of 5 feet. Following the liquefaction analysis framework in the 2008 monograph, *Soil Liquefaction During Earthquakes* (Idriss and Boulanger, 2008), incorporating updates in *CPT and SPT Based Liquefaction Triggering Procedures* (Boulanger and Idriss, 2014), and in accordance with CDMG Special Publication 117A guidelines (CDMG, 2008) for quantitative analysis, these layers were analyzed for liquefaction triggering and potential post-liquefaction settlement. These methods compare the ratio of the estimated cyclic shaking (Cyclic Stress Ratio - CSR) to the soil’s estimated resistance to cyclic shaking (Cyclic Resistance Ratio - CRR), providing a factor of safety against liquefaction triggering. Factors of safety less than or equal to 1.3 are considered to be potentially liquefiable and capable of post-liquefaction re-consolidation (i.e. settlement).

The CSR for each layer quantifies the stresses anticipated to be generated due to a design-level seismic event, is based on the peak horizontal acceleration generated at the ground surface discussed in the “Estimated Ground Shaking” section above, and is corrected for overburden and stress reduction factors as discussed in the procedure developed by Seed and Idriss (1971) and updated in the 2008 Idriss and Boulanger monograph.

The soil’s CRR is estimated from the in-situ measurements from CPTs and laboratory testing on samples retrieved from our borings. SPT “N” values obtained from hollow-stem auger borings were not used in our analyses, as the “N” values obtained are less reliable in sands below ground water. The tip pressures are corrected for effective overburden stresses, taking into consideration both the ground water level at the time of exploration and the design ground water level, and stress reduction versus depth factors. The CPT method utilizes the soil behavior type index (I_C) to estimate the plasticity of the layers.

In estimating post-liquefaction settlement at the site, we have implemented a depth weighting factor proposed by Cetin (2009). Following evaluation of 49 high-quality, cyclically induced, ground settlement case histories from seven different earthquakes, Cetin proposed the use of a

weighting factor based on the depth of layers. The weighting procedure was used to tune the surface observations at liquefaction sites to produce a better model fit with measured data. Aside from the better model fit it produced, the rationale behind the use of a depth weighting factor is based on the following: 1) upward seepage, triggering void ratio redistribution, and resulting in unfavorably higher void ratios for the shallower sublayers of soil layers; 2) reduced induced shear stresses and number of shear stress cycles transmitted to deeper soil layers due to initial liquefaction of surficial layers; and 3) possible arching effects due to nonliquefied soil layers. All these may significantly reduce the contribution of volumetric settlement of deeper soil layers to the overall ground surface settlement (Cetin, 2009).

The results of our CPT analyses (CPT-1 through CPT-4) are presented on Figures 4A through 4D of this report.

4.3.3 Summary

Our analyses indicate that several layers could potentially experience liquefaction triggering that could result in post-liquefaction total settlement at the ground surface ranging from approximately ¼-inch to 1¾ inches in our CPT-1 through CPT-4 and ranging from less than ¼-inch to 2 inches in previous CPT-1 through CPT-4 based on the Yoshimine (2006) method. As discussed in SP 117A, differential movement for level ground sites over deep soil sites will be up to about two-thirds of the total settlement between independent foundation elements. In our opinion, differential settlements are anticipated to be on the order of up to 1⅓ inches between independent foundation elements.

4.3.4 Ground Rupture Potential

The methods used to estimate liquefaction settlements assume that there is a sufficient cap of non-liquefiable material to prevent ground rupture or sand boils. For ground rupture to occur, the pore water pressure within the liquefiable soil layer will need to be great enough to break through the overlying non-liquefiable layer, which could cause significant ground deformation and settlement. The work of Youd and Garris (1995) indicates that the minimum 8½-foot thick layer of non-liquefiable cap is sufficient to prevent ground rupture; therefore the above total settlement estimates are reasonable.

4.4 LATERAL SPREADING

Lateral spreading is horizontal/lateral ground movement of relatively flat-lying soil deposits towards a free face such as an excavation, channel, or open body of water; typically lateral spreading is associated with liquefaction of one or more subsurface layers near the bottom of the exposed slope. As failure tends to propagate as block failures, it is difficult to analyze and estimate where the first tension crack will form.

The top of the eastern bank of the San Tomas Aquino Creek ranges from approximately 400 to 450 feet to the western property line and western most edges of the proposed buildings. The creek has an estimated bank height of about 16 to 18 feet, based on Google Earth. In general, lateral spreading is considered when an open face (Height = D) is within about 40D of a site.

Since the project site is within this criteria, we analyzed the site for lateral spreading using analytical methods outlined in the 2008 monograph, *Soil Liquefaction During Earthquakes* (Idriss and Boulanger, 2008) and *CPT and SPT Based Liquefaction Triggering Procedures* (Boulanger and Idriss, 2014) by calculating Lateral Displacement Index (LDI) values at each CPT location. The LDI is calculated by integrating maximum shear strains versus depth, representing a measure of the potential maximum displacement (Zhang et al., 2004).

At exploration locations closest to San Tomas Aquino Creek [CPT-1 (TRC), CPT-1(CEG)] and on the southern portion of the site [CPT-3 (TRC), CPT-4 (CEG), CPT-6 (CEG)] our analyses indicates potential for lateral displacement with LDI values of 0.18, 0.48, 0.61, 0.22, and 0.53, respectively, and potential lateral displacements ranging from 0.4 to 1.2 feet. At the remaining CPTs [CPT-2 (CEG), CPT-2 (TRC), and CPT-4(TRC)], our analyses indicate LDI values of 0.02 to 0.07 corresponding to potential lateral displacements of 0.1 feet, or less. Therefore, the potential for lateral spreading appears possible to affect the proposed building. If the building is to remain in its currently planned locations, mitigation, such as ground improvement, would need to be performed to protect these buildings from the potential of lateral spreading. Additional recommendations are included in subsequent sections of this report.

4.5 SEISMIC SETTLEMENT/UNSATURATED SAND SHAKING

Loose unsaturated sandy soils can settle during strong seismic shaking. As the soils encountered below the design groundwater at the site were predominantly stiff to very stiff clays, in our opinion, the potential for significant differential seismic settlement affecting the proposed improvements is low.

4.6 TSUNAMI/SEICHE

The terms tsunami or seiche are described as ocean waves or similar waves usually created by undersea fault movement or by a coastal or submerged landslide. Tsunamis may be generated at great distance from shore (far field events) or nearby (near field events). Waves are formed, as the displaced water moves to regain equilibrium, and radiates across the open water, similar to ripples from a rock being thrown into a pond. When the waveform reaches the coastline, it quickly raises the water level, with water velocities as high as 15 to 20 knots. The water mass, as well as vessels, vehicles, or other objects in its path create tremendous forces as they impact coastal structures.

Tsunamis have affected the coastline along the Pacific Northwest during historic times. The Fort Point tide gauge in San Francisco recorded approximately 21 tsunamis between 1854 and 1964. The 1964 Alaska earthquake generated a recorded wave height of 7.4 feet and drowned eleven people in Crescent City, California. For the case of a far-field event, the Bay area would have hours of warning; for a near field event, there may be only a few minutes of warning, if any.

A tsunami or seiche originating in the Pacific Ocean would lose much of its energy passing through San Francisco Bay. Based on the study of tsunami inundation potential for the San Francisco Bay Area (Ritter and Dupre, 1972), areas most likely to be inundated are marshlands,

tidal flats, and former bay margin lands that are now artificially filled, but are still at or below sea level, and are generally within 1½ miles of the shoreline. The site is approximately 6 miles inland from the San Francisco Bay shoreline, and is approximately 26 to 31 feet above mean sea level. Therefore, the potential for inundation due to tsunami or seiche is considered low.

4.7 FLOODING

Based on our internet search of the Federal Emergency Management Agency (FEMA) flood map public database, the site is located within Zone X, described as "Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood." We recommend the project civil engineer be retained to confirm this information and verify the base flood elevation, if appropriate.

SECTION 5: CONCLUSIONS

5.1 SUMMARY

From a geotechnical viewpoint, the project is feasible provided the concerns listed below are addressed in the project design. Descriptions of each concern with brief outlines of our recommendations follow the listed concerns.

- Potential for liquefaction-induced settlements
- Potential for Lateral Spreading
- Potential for significant static settlements
- Shallow groundwater
- Presence of highly to very highly expansive soils
- Soil corrosion potential

5.1.1 Potential for Liquefaction-Induced Settlements

As discussed, our liquefaction analysis indicates that there is a potential for liquefaction of localized sand layers during a significant seismic event. Although the potential for liquefied sands to vent to the ground surface through cracks in the surficial soils is low, our analysis indicates that liquefaction-induced settlement on the order of up to 2 inches could occur in several areas of the site, resulting in differential settlement up to 1⅓ inches. Foundations should be designed to tolerate the anticipated total and differential settlements. Detailed foundation recommendations are presented in the "Foundations" section.

5.1.2 Potential for Lateral Spreading

As previously discussed, there is a potential for lateral displacement towards the adjacent San Tomas Aquino Creek. Lateral spreading appears possible for the propose data center building, particularly on the northern half of the site. The potential for lateral spreading is low at the proposed substation located in the southwest corner of the site. To protect the proposed

building from potential lateral displacement, we recommend that a shear key of improved soil be constructed between the building and the creek channel located along the west side of the site. The ground between the improved soil and the creek channel should be anticipated to slump and spread toward the creek channel during a large seismic event, however improvements to the east of the shear key would be protected from lateral displacement. Additional recommendations are provided later in this report.

5.1.3 Potential for Significant Static Settlements

We evaluated immediate and consolidation settlement due to static building loads based on a minimum column load of 250 kips and a maximum column load of 1,100 kips for shallow spread footings provided by Pangolin Structural. Based on the provided loads, total static settlement was estimated to be on the order of 1 to 2½ inches for spread footings. Foundations should be designed to tolerate the anticipated total and differential settlements. Detailed foundation recommendations are presented in the "Foundations" section.

5.1.4 Shallow Groundwater

Shallow groundwater was measured at depths ranging from approximately 6½ to 13 feet below the existing ground surface in our exploratory borings and inferred from pore pressure dissipation tests in our CPTs at depths ranging from approximately 5.7 to 8.8 feet below the existing ground surface. Historic high groundwater is also mapped at about 5 to 10 feet below current grades. We used a depth of groundwater of 5 feet for our analysis, which we recommend be used for planning purposes.

Our experience with similar sites in the vicinity indicates that shallow groundwater could significantly impact grading and underground construction. These impacts typically consist of potentially wet and unstable pavement subgrade, difficulty achieving compaction, and difficult underground utility installation. Dewatering and shoring of utility trenches may be required in some isolated areas of the site. Detailed recommendations addressing this concern are presented in the "Earthwork" section of this report.

5.1.5 Expansive Soils

Highly to very highly expansive surficial soils generally blanket the site. Expansive soils can undergo significant volume change with changes in moisture content. They shrink and harden when dried and expand and soften when wetted. To reduce the potential for damage to the planned structures, slabs-on-grade should have sufficient reinforcement and be supported on a layer of non-expansive fill; footings should extend below the zone of seasonal moisture fluctuation. In addition, it is important to limit moisture changes in the surficial soils by using positive drainage away from buildings as well as limiting landscaping watering. Evaluation of potential import sources for the site should consider the acceptable range of plasticity, especially in the upper 10 feet of fill. Detailed grading and foundation recommendations addressing this concern are presented in the following sections.

5.1.6 Soil Corrosion Potential

As discussed, we performed a preliminary soil corrosion screening based on the results of analytical tests on samples of the near-surface soil. In general, the corrosion potential for buried concrete does not warrant the use of sulfate resistant concrete; however, the corrosion potential for buried metallic structures, such as metal pipes, is considered severely corrosive. As the preliminary soil corrosion screening was based on the results of limited sampling, consideration may be given to collecting and testing additional samples from the upper 5 feet for sulfates and pH, as well as hiring a corrosion engineer, to confirm the classifications.

5.2 PLANS AND SPECIFICATIONS REVIEW

We recommend that we be retained to review the geotechnical aspects of the project structural, civil, and landscape plans and specifications, allowing sufficient time to provide the design team with any comments prior to issuing the plans for construction.

5.3 CONSTRUCTION OBSERVATION AND TESTING

As site conditions may vary significantly between the small-diameter borings performed during this investigation, we also recommend that a Cornerstone representative be present to provide geotechnical observation and testing during earthwork and foundation construction. This will allow us to form an opinion and prepare a letter at the end of construction regarding contractor compliance with project plans and specifications, and with the recommendations in our report. We will also be allowed to evaluate any conditions differing from those encountered during our investigation, and provide supplemental recommendations as necessary. For these reasons, the recommendations in this report are contingent of Cornerstone providing observation and testing during construction. Contractors should provide at least a 48-hour notice when scheduling our field personnel.

SECTION 6: EARTHWORK

6.1 SITE DEMOLITION

All existing improvements not to be reused for the current development, including all foundations, flatwork, pavements, utilities, and other improvements should be demolished and removed from the site. Recommendations in this section apply to the removal of these improvements, which are currently present on the site, prior to the start of mass grading or the construction of new improvements for the project.

Cornerstone should be notified prior to the start of demolition, and should be present on at least a part-time basis during all backfill and mass grading as a result of demolition. Occasionally, other types of buried structures (wells, cisterns, debris pits, etc.) can be found on sites with prior development. If encountered, Cornerstone should be contacted to address these types of structures on a case-by-case basis.

6.1.1 Demolition of Existing Slabs, Foundations and Pavements

All slabs, foundations, and pavements should be completely removed from within planned building areas.

As an owner value-engineered option, existing slabs, foundations, and pavements that extend into planned flatwork, pavement, or landscape areas may be left in place provided there is at least 3 feet of engineered fill overlying the remaining materials, they are shown not to conflict with new utilities, and that asphalt and concrete more than 10 feet square is broken up to allow subsurface drainage. Future distress and/or higher maintenance may result from leaving these prior improvements in place. A discussion of recycling existing improvements is provided later in this report.

Special care should be taken during the demolition and removal of existing floor slabs, foundations, utilities and pavements to minimize disturbance of the subgrade. Excessive disturbance of the subgrade, which includes either native or previously placed engineered fill, resulting from demolition activities can have serious detrimental effects on planned foundation and paving elements.

Existing foundations are typically mat-slabs, shallow footings, or piers/piles. If slab or shallow footings are encountered, they should be completely removed. If drilled piers are encountered, they should be cut off at an elevation at least 60-inches below proposed footings or the final subgrade elevation, whichever is deeper. The remainder of the drilled pier could remain in place. Foundation elements to remain in place should be surveyed and superimposed on the proposed development plans to determine the potential for conflicts or detrimental impacts to the planned construction. Following review, additional mitigation or planned foundation elements may need to be modified.

6.1.2 Abandonment of Existing Utilities

All utilities should be completely removed from within planned building areas. For any utility line to be considered acceptable to remain within building areas, the utility line must be completely backfilled with grout or sand-cement slurry (sand slurry is not acceptable), the ends outside the building area capped with concrete, and the trench fills either removed and replaced as engineered fill with the trench side slopes flattened to at least 1:1, or the trench fills are determined not to be a risk to the structure. The assessment of the level of risk posed by the particular utility line will determine whether the utility may be abandoned in place or needs to be completely removed. The contractor should assume that all utilities will be removed from within building areas unless provided written confirmation from both the owner and the geotechnical engineer.

Utilities extending beyond the building area may be abandoned in place provided the ends are plugged with concrete, they do not conflict with planned improvements, and that the trench fills do not pose significant risk to the planned surface improvements.

The risk for owners associated with abandoning utilities in place include the potential for future differential settlement of existing trench fills, and/or partial collapse and potential ground loss into utility lines that are not completely filled with grout.

6.2 SITE CLEARING AND PREPARATION

6.2.1 Site Stripping

The site should be stripped of all surface vegetation, and surface and subsurface improvements to be removed within the proposed development area. Demolition of existing improvements is discussed in the prior paragraphs. A detailed discussion of removal of existing fills is provided later in this report. Surface vegetation and topsoil should be stripped to a sufficient depth to remove all material greater than 3 percent organic content by weight.

6.2.2 Tree and Shrub Removal

Trees and shrubs designated for removal should have the root balls and any roots greater than ½-inch diameter removed completely. Mature trees are estimated to have root balls extending to depths of 2 to 4 feet, depending on the tree size. Significant root zones are anticipated to extend to the diameter of the tree canopy. Grade depressions resulting from root ball removal should be cleaned of loose material and backfilled in accordance with the recommendations in the "Compaction" section of this report.

6.3 REMOVAL OF EXISTING FILLS

As previously discussed, approximately 2½ feet of undocumented fill was encountered in boring EB-7. Additional fills may be present at the site that were not encountered in our borings and should be anticipated. All fills should be completely removed from within building areas and to a lateral distance of at least 5 feet beyond the building footprint or to a lateral distance equal to fill depth below the perimeter footing, whichever is greater. Provided the fills meet the "Material for Fill" requirements below, the fills may be reused when backfilling the excavations. Based on review of the samples collected from our borings, it appears that the fill may be reused. If materials are encountered that do not meet the requirements, such as debris, wood, trash, those materials should be screened out of the remaining material and be removed from the site. Backfill of excavations should be placed in lifts and compacted in accordance with the "Compaction" section below.

Fills extending into planned pavement and flatwork areas may be left in place provided they are determined to be a low risk for future differential settlement and that the upper 12 to 18 inches of fill below pavement subgrade is re-worked and compacted as discussed in the "Compaction" section below.

6.4 TEMPORARY CUT AND FILL SLOPES

The contractor is responsible for maintaining all temporary slopes and providing temporary shoring where required. Temporary shoring, bracing, and cuts/fills should be performed in

accordance with the strictest government safety standards. On a preliminary basis, the upper 10 feet at the site may be classified as OSHA Soil Type B or C materials. A Cornerstone representative should be retained to confirm the preliminary site classification.

Excavations performed during site demolition and fill removal should be sloped at 3:1 (horizontal:vertical) within the upper 5 feet below building subgrade. Excavations extending more than 5 feet below building subgrade and excavations in pavement and flatwork areas should be sloped in accordance with the OSHA soil classification.

6.5 SUBGRADE PREPARATION

After site clearing and demolition is complete, and prior to backfilling any excavations resulting from fill removal or demolition, the excavation subgrade and subgrade within areas to receive additional site fills, slabs-on-grade and/or pavements should be scarified to a depth of 6 inches, moisture conditioned, and compacted in accordance with the “Compaction” section below.

6.6 SUBGRADE STABILIZATION MEASURES

Soil subgrade and fill materials, especially soils with high fines contents such as clays and silty soils, can become unstable due to high moisture content, whether from high in-situ moisture contents or from winter rains. As the moisture content increases over the laboratory optimum, it becomes more likely the materials will be subject to softening and yielding (pumping) from construction loading or become unworkable during placement and compaction.

As discussed in the “Subsurface” section in this report, the in-situ moisture contents are up to about 15 percent over the estimated laboratory optimum in the upper 10 feet of the soil profile. The contractor should anticipate drying the soils prior to reusing them as fill. In addition, repetitive rubber-tire loading will likely de-stabilize the soils.

There are several methods to address potential unstable soil conditions and facilitate fill placement and trench backfill. Some of the methods are briefly discussed below. Implementation of the appropriate stabilization measures should be evaluated on a case-by-case basis according to the project construction goals and the particular site conditions.

6.6.1 Scarification and Drying

The subgrade may be scarified to a depth of 8 to 10 inches and allowed to dry to near optimum conditions, if sufficient dry weather is anticipated to allow sufficient drying. More than one round of scarification may be needed to break up the soil clods.

6.6.2 Removal and Replacement

As an alternative to scarification, the contractor may choose to over-excavate the unstable soils and replace them with dry on-site or import materials. A Cornerstone representative should be present to provide recommendations regarding the appropriate depth of over-excavation,

whether a geosynthethic (stabilization fabric or geogrid) is recommended, and what materials are recommended for backfill.

6.6.3 Chemical Treatment

Where the unstable area exceeds about 5,000 to 10,000 square feet and/or site winterization is desired, chemical treatment with quicklime (CaO), kiln-dust, or cement may be more cost-effective than removal and replacement. Recommended chemical treatment depths will typically range from 12 to 18 inches depending on the magnitude of the instability.

6.7 MATERIAL FOR FILL

6.7.1 Re-Use of On-site Soils

On-site soils with an organic content less than 3 percent by weight may be reused as general fill. General fill should not have lumps, clods or cobble pieces larger than 6 inches in diameter; 85 percent of the fill should be smaller than 2½ inches in diameter. Minor amounts of oversize material (smaller than 12 inches in diameter) may be allowed provided the oversized pieces are not allowed to nest together and the compaction method will allow for loosely placed lifts not exceeding 12 inches.

6.7.2 Re-Use of On-Site Site Improvements

We anticipate that significant quantities of asphalt concrete (AC) grindings and aggregate base (AB) [and Portland Cement Concrete (PCC)] will be generated during site demolition. If the AC grindings are mixed with the underlying AB to meet Class 2 AB specifications, they may be reused within the new pavement and flatwork structural sections. AC/AB grindings may not be reused within the habitable building areas. Laboratory testing will be required to confirm the grindings meet project specifications.

If the site area allows for on-site pulverization of PCC and provided the PCC is pulverized to meet the “Material for Fill” requirements of this report, it may be used as select fill within the habitable building areas, excluding the capillary break layer; as typically pulverized PCC comes close to or meets Class 2 AB specifications, the recycled PCC may likely be used within the pavement structural sections. PCC grindings also make good winter construction access roads, similar to a cement-treated base (CTB) section.

6.7.3 Potential Import Sources

Imported and non-expansive material should be inorganic with a Plasticity Index (PI) of 15 or less, and not contain recycled asphalt concrete where it will be used within the habitable building areas. To prevent significant caving during trenching or foundation construction, imported material should have sufficient fines. Samples of potential import sources should be delivered to our office at least 10 days prior to the desired import start date. Information regarding the import source should be provided, such as any site geotechnical reports. If the material will be derived from an excavation rather than a stockpile, potholes will likely be

required to collect samples from throughout the depth of the planned cut that will be imported. At a minimum, laboratory testing will include PI tests. Material data sheets for select fill materials (Class 2 aggregate base, ¾-inch crushed rock, quarry fines, etc.) listing current laboratory testing data (not older than 6 months from the import date) may be provided for our review without providing a sample. If current data is not available, specification testing will need to be completed prior to approval.

Environmental and soil corrosion characterization should also be considered by the project team prior to acceptance. Suitable environmental laboratory data to the planned import quantity should be provided to the project environmental consultant; additional laboratory testing may be required based on the project environmental consultant's review. The potential import source should also not be more corrosive than the on-site soils, based on pH, saturated resistivity, and soluble sulfate and chloride testing.

6.7.4 Non-Expansive Fill Using Lime Treatment

As discussed above, non-expansive fill should have a Plasticity Index (PI) of 15 or less. Due to the high clay content and PI of the on-site soil materials, it is not likely that sufficient quantities of non-expansive fill would be generated from cut materials. As an alternative to importing non-expansive fill, chemical treatment can be considered to create non-expansive fill. If this option is considered, additional laboratory tests should be performed during initial site grading to further evaluate the optimum percentage of quicklime required.

6.8 COMPACTION REQUIREMENTS

All fills, and subgrade areas where fill, slabs-on-grade, and pavements are planned, should be placed in loose lifts 8 inches thick or less and compacted in accordance with ASTM D1557 (latest version) requirements as shown in the table below. In general, clayey soils should be compacted with sheepsfoot equipment and sandy/gravelly soils with vibratory equipment; open-graded materials such as crushed rock should be placed in lifts no thicker than 18 inches consolidated in place with vibratory equipment. Each lift of fill and all subgrade should be firm and unyielding under construction equipment loading in addition to meeting the compaction requirements to be approved. The contractor (with input from a Cornerstone representative) should evaluate the in-situ moisture conditions, as the use of vibratory equipment on soils with high moistures can cause unstable conditions. General recommendations for soil stabilization are provided in the "Subgrade Stabilization Measures" section of this report. Where the soil's PI is 20 or greater, the expansive soil criteria should be used.

Table 3: Compaction Requirements

Description	Material Description	Minimum Relative[1] Compaction (percent)	Moisture[2] Content (percent)
General Fill (within upper 5 feet)	On-Site Expansive Soils	87 – 92	>3
	Low Expansion Soils	90	>1
General Fill (below a depth of 5 feet)	On-Site Expansive Soils	95	>3
	Low Expansion Soils	95	>1
Trench Backfill	On-Site Expansive Soils	87 – 92	>3
Trench Backfill	Low Expansion Soils	90	>1
Trench Backfill (upper 6 inches of subgrade)	On-Site Low Expansion Soils	95	>1
Crushed Rock Fill	¾-inch Clean Crushed Rock	Consolidate In-Place	NA
Non-Expansive Fill	Imported Non-Expansive Fill	90	Optimum
Flatwork Subgrade	On-Site Expansive Soils	87 - 92	>3
Flatwork Subgrade	Low Expansion Soils	90	>1
Flatwork Aggregate Base	Class 2 Aggregate Base[3]	90	Optimum
Pavement Subgrade	On-Site Expansive Soils	87 - 92	>3
Pavement Subgrade	Low Expansion Soils	95	>1
Pavement Aggregate Base	Class 2 Aggregate Base[3]	95	Optimum
Asphalt Concrete	Asphalt Concrete	95 (Marshall)	NA

1 – Relative compaction based on maximum density determined by ASTM D1557 (latest version)
2 – Moisture content based on optimum moisture content determined by ASTM D1557 (latest version)
3 – Class 2 aggregate base shall conform to Caltrans Standard Specifications, latest edition, except that the relative compaction should be determined by ASTM D1557 (latest version)

6.8.1 Construction Moisture Conditioning

Expansive soils can undergo significant volume change when dried then wetted. The contractor should keep all exposed expansive soil subgrade (and also trench excavation side walls) moist until protected by overlying improvements (or trenches are backfilled). If expansive soils are allowed to dry out significantly, re-moisture conditioning may require several days of re-wetting (flooding is not recommended), or deep scarification, moisture conditioning, and re-compaction.

6.9 TRENCH BACKFILL

Utility lines constructed within public right-of-way should be trenched, bedded and shaded, and backfilled in accordance with the local or governing jurisdictional requirements. Utility lines in private improvement areas should be constructed in accordance with the following requirements unless superseded by other governing requirements.

All utility lines should be bedded and shaded to at least 6 inches over the top of the lines with crushed rock (⅜-inch-diameter or greater) or well-graded sand and gravel materials conforming to the pipe manufacturer's requirements. Open-graded shading materials should be consolidated in place with vibratory equipment and well-graded materials should be compacted to at least 90 percent relative compaction with vibratory equipment prior to placing subsequent backfill materials.

General backfill over shading materials may consist of on-site native materials provided they meet the requirements in the "Material for Fill" section, and are moisture conditioned and compacted in accordance with the requirements in the "Compaction" section.

Where utility lines will cross perpendicular to strip footings, the footing should be deepened to encase the utility line, providing sleeves or flexible cushions to protect the pipes from anticipated foundation settlement, or the utility lines should be backfilled to the bottom of footing with sand-cement slurry or lean concrete. Where utility lines will parallel footings and will extend below the "foundation plane of influence," an imaginary 1:1 plane projected down from the bottom edge of the footing, either the footing will need to be deepened so that the pipe is above the foundation plane of influence or the utility trench will need to be backfilled with sand-cement slurry or lean concrete within the influence zone. Sand-cement slurry used within foundation influence zones should have a minimum compressive strength of 75 psi.

On expansive soils sites it is desirable to reduce the potential for water migration into building and pavement areas through the granular shading materials. We recommend that a plug of low-permeability clay soil, sand-cement slurry, or lean concrete be placed within trenches just outside where the trenches pass into building and pavement areas.

6.10 SITE DRAINAGE

6.10.1 Surface Drainage

Ponding should not be allowed adjacent to building foundations, slabs-on-grade, or pavements. Hardscape surfaces should slope at least 2 percent towards suitable discharge facilities; landscape areas should slope at least 3 percent towards suitable discharge facilities. Roof runoff should be directed away from building areas in closed conduits, to approved infiltration facilities, or on to hardscaped surfaces that drain to suitable facilities. Retention, detention or infiltration facilities should be spaced at least 10 feet from buildings, and preferably at least 5 feet from slabs-on-grade or pavements. However, if retention, detention or infiltration facilities are located within these zones, we recommend that these treatment facilities meet the requirements in the Storm Water Treatment Design Considerations section of this report.

6.11 LOW-IMPACT DEVELOPMENT (LID) IMPROVEMENTS

The Municipal Regional Permit (MRP) requires regulated projects to treat 100 percent of the amount of runoff identified in Provision C.3.d from a regulated project's drainage area with low impact development (LID) treatment measures onsite or at a joint stormwater treatment facility. LID treatment measures are defined as rainwater harvesting and use, infiltration,

evapotranspiration, or biotreatment. A biotreatment system may only be used if it is infeasible to implement harvesting and use, infiltration, or evapotranspiration at a project site.

Technical infeasibility of infiltration may result from site conditions that restrict the operability of infiltration measures and devices. Various factors affecting the feasibility of infiltration treatment may create an environmental risk, structural stability risk, or physically restrict infiltration. The presence of any of these limiting factors may render infiltration technically infeasible for a proposed project. To aid in determining if infiltration may be feasible at the site, we provide the following site information regarding factors that may aid in determining the feasibility of infiltration facilities at the site.

- The near-surface soils at the site are clayey, and categorized as Hydrologic Soil Group D, and is expected to have infiltration rates of less than 0.2 inches per hour. In our opinion, these clayey soils will significantly limit the infiltration of stormwater.
- Locally, seasonal high ground water is mapped at a depth between 5 to 10 feet, and therefore is expected to be within 10 feet of the base of the infiltration measure.
- The site has a known geotechnical hazard consisting of soils subject to liquefaction; therefore, stormwater infiltration facilities may not be feasible.
- In our opinion, infiltration locations within 10 feet of the buildings would create a geotechnical hazard.
- Infiltration devices should be located at least 100 feet away from septic tanks and underground storage tanks with hazardous materials, as well as any other potential underground sources of pollution.
- Infiltration measures, devices, or facilities may conflict with the location of existing or proposed underground utilities or easements. Infiltration measures, devices, or facilities should not be placed on top of or very near to underground utilities such that they discharge to the utility trench, restrict access, or cause stability concerns.
- Local Water District policies or guidelines may limit locations where infiltration may occur, require greater separation from seasonal high groundwater, or require greater setbacks from potential sources of pollution.

6.11.1 Storm Water Treatment Design Considerations

If storm water treatment improvements, such as shallow bio-retention swales, basins or pervious pavements, are required as part of the site improvements to satisfy Storm Water Quality (C.3) requirements, we recommend the following items be considered for design and construction.

6.11.1.1 GENERAL BIOSWALE DESIGN GUIDELINES

- If possible, avoid placing bioswales or basins within 10 feet of the building perimeter or within 5 feet of exterior flatwork or pavements. If bioswales must be constructed within these setbacks, the side(s) and bottom of the trench excavation should be lined with 10-mil visqueen to reduce water infiltration into the surrounding expansive clay.

- Bioswales constructed within 3 feet of proposed buildings may be within the foundation zone of influence for perimeter wall loads. Therefore, where bioswales will parallel foundations and will extend below the "foundation plane of influence," an imaginary 1:1 plane projected down from the bottom edge of the foundation, the foundation will need to be deepened so that the bottom edge of the bioswale filter material is above the foundation plane of influence.

- The bottom of bioswale or detention areas should include a perforated drain placed at a low point, such as a shallow trench or sloped bottom, to reduce water infiltration into the surrounding soils near structural improvements, and to address the low infiltration capacity of the on-site clay soils.

6.11.1.2 BIOSWALE INFILTRATION MATERIAL

- Gradation specifications for bioswale filter material, if required, should be specified on the grading and improvement plans.

- Compaction requirements for bioswale filter material in non-landscaped areas or in pervious pavement areas, if any, should be indicated on the plans and specifications to satisfy the anticipated use of the infiltration area.

- If required, infiltration (percolation) testing should be performed on representative samples of potential bioswale materials prior to construction to check for general conformance with the specified infiltration rates.

- It should be noted that multiple laboratory tests may be required to evaluate the properties of the bioswale materials, including percolation, landscape suitability and possibly environmental analytical testing depending on the source of the material. We recommend that the landscape architect provide input on the required landscape suitability tests if bioswales are to be planted.

- If bioswales are to be vegetated, the landscape architect should select planting materials that do not reduce or inhibit the water infiltration rate, such as covering the bioswale with grass sod containing a clayey soil base.

- If required by governing agencies, field infiltration testing should be specified on the grading and improvement plans. The appropriate infiltration test method, duration and frequency of testing should be specified in accordance with local requirements.

- Due to the relatively loose consistency and/or high organic content of many bioswale filter materials, long-term settlement of the bioswale medium should be anticipated. To reduce initial volume loss, bioswale filter material should be wetted in 12 inch lifts during placement to pre-consolidate the material. Mechanical compaction should not be allowed, unless specified on the grading and improvement plans, since this could significantly decrease the infiltration rate of the bioswale materials.

- It should be noted that the volume of bioswale filter material may decrease over time depending on the organic content of the material. Additional filter material may need to be added to bioswales after the initial exposure to winter rains and periodically over the life of the bioswale areas, as needed.

6.11.1.3 BIOSWALE CONSTRUCTION ADJACENT TO PAVEMENTS

If bio-infiltration swales or basins are considered adjacent to proposed parking lots or exterior flatwork, we recommend that mitigative measures be considered in the design and construction of these facilities to reduce potential impacts to flatwork or pavements. Exterior flatwork, concrete curbs, and pavements located directly adjacent to bio-swales may be susceptible to settlement or lateral movement, depending on the configuration of the bioswale and the setback between the improvements and edge of the swale. To reduce the potential for distress to these improvements due to vertical or lateral movement, the following options should be considered by the project civil engineer:

- Improvements should be setback from the vertical edge of a bioswale such that there is at least 1 foot of horizontal distance between the edge of improvements and the top edge of the bioswale excavation for every 1 foot of vertical bioswale depth, or

- Concrete curbs for pavements, or lateral restraint for exterior flatwork, located directly adjacent to a vertical bioswale cut should be designed to resist lateral earth pressures in accordance with the recommendations in the “Retaining Walls” section of this report, or concrete curbs or edge restraint should be adequately keyed into the native soil or engineered to reduce the potential for rotation or lateral movement of the curbs.

6.12 LANDSCAPE CONSIDERATIONS

Since the near-surface soils are moderately to highly expansive, we recommend greatly reducing the amount of surface water infiltrating these soils near foundations and exterior slabs-on-grade. This can typically be achieved by:

- Using drip irrigation

- Avoiding open planting within 3 feet of the building perimeter or near the top of existing slopes

- Regulating the amount of water distributed to lawns or planter areas by using irrigation timers

- Selecting landscaping that requires little or no watering, especially near foundations.

We recommend that the landscape architect consider these items when developing landscaping plans.

SECTION 7: FOUNDATIONS

7.1 SUMMARY OF RECOMMENDATIONS

Due to the estimated total and differential seismic settlement and the potential for lateral spreading, the proposed structure may need to be supported on shallow foundations overlying ground improvement. As an alternative, the proposed structure may be supported on a mat foundation provided ground improvement or a shear key is implemented to reduce the potential for lateral spreading and the anticipated settlements are considered acceptable. For our preliminary settlement estimates, we have used the loads provided to us by Pangolin Structural. Additional recommendations for lateral spreading mitigation and ground improvement are provided below. The recommendations in the "Earthwork" section and the sections below should be followed.

7.2 SEISMIC DESIGN CRITERIA

We understand that the project structural design will be based on the 2016 California Building Code (CBC), which provides criteria for the seismic design of buildings in Chapter 16. The "Seismic Coefficients" used to design buildings are established based on a series of tables and figures addressing different site factors, including the soil profile in the upper 100 feet below grade and mapped spectral acceleration parameters based on distance to the controlling seismic source/fault system. Shear wave velocity measurements performed at CPT-4 to a depth of 110 feet resulted in an average shear wave velocity of 857 feet per second (or 261 meters per second). Therefore, we have classified the site as Soil Classification D. The mapped spectral acceleration parameters S_S and S_1 were calculated using the ASCE 7 web-based program *ASCE 7 Hazard Tool*, located at http://asce7hazardtool.online, 2017-2018, based on the site coordinates presented below and the site classification. The table below lists the various factors used to determine the seismic coefficients and other parameters.

Table 4: CBC Site Categorization and Site Coefficients

Classification/Coefficient	Design Value
Site Class	D
Site Latitude	37.38386°
Site Longitude	-121.96553°
0.2-second Period Mapped Spectral Acceleration[1], S_S	1.500g
1-second Period Mapped Spectral Acceleration[1], S_1	0.600g
Short-Period Site Coefficient – Fa	1.0
Long-Period Site Coefficient – Fv	1.5
0.2-second Period, Maximum Considered Earthquake Spectral Response Acceleration Adjusted for Site Effects - S_{MS}	1.500g
1-second Period, Maximum Considered Earthquake Spectral Response Acceleration Adjusted for Site Effects – S_{M1}	0.900g
0.2-second Period, Design Earthquake Spectral Response Acceleration – S_{DS}	1.000g
1-second Period, Design Earthquake Spectral Response Acceleration – S_{D1}	0.600g

[1]For Site Class B, 5 percent damped.

Because the potential for liquefaction and the potential for affects to the structure appear high, based on Table 1613.5.2, Site Class Definitions, of the 2013 California Building Code (CBC), the site should be classified as Site Class F. Site Coefficients F_a and F_v are determined using Tables 1613.5.3(1) and 1613.5.3(2). Site Class F of those tables refers the determination of Site Coefficients F_a and F_v to Section 11.4.7 of ASCE 7-10. ASCE 7-10 generally indicates that sites classified as Site Class F shall have a site response analysis performed in accordance with Section 21.1 of ASCE 7-10, unless the proposed structure meets the following exception.

> **EXCEPTION:** For structures having fundamental periods of vibration equal to or less than 0.5s, site-response analysis is not required to determine spectral accelerations for liquefiable soils. Rather, a site class is permitted to be determined in accordance with Section 20.3 and the corresponding values of F_a and F_v determined from Tables 11.4-1 and 11.4-2.

We do not know what the fundamental period will be for the new structure. If the structure meets the requirements for Site Class F, the requirement for a site response analysis will likely be needed, and additional geotechnical analysis may be required. If ground improvement is performed to reduce the potential for liquefaction, the potential for liquefaction will be reduced to meet the requirements for Site Class D.

7.3 SHALLOW FOUNDATIONS OVERLYING GROUND IMPROVEMENT

7.3.1 Spread Footings

Spread footings should bear entirely on engineered fill overlying ground improvement or be designed to accommodate the anticipated total and differential settlement; spread footing should extend at least 30 inches below the lowest adjacent grade. Lowest adjacent grade is defined as the deeper of the following: 1) bottom of the adjacent interior slab-on-grade, or 2) finished exterior grade, excluding landscaping topsoil. The deeper footing embedment is due to the presence of highly to very highly expansive soils, and is intended to embed the footing below the zone of significant seasonal moisture fluctuation, reducing the potential for differential movement.

Bearing pressures will be dependent on the final ground improvement technique and spacing; however, substantial improvement in bearing capacity would be expected. On a preliminary basis, we expect allowable bearing pressures on the order of 4,000 psf to 5,000 psf for combined dead plus live loads would be feasible.

Ground improvement should be designed to reduce total settlement due to static and seismic conditions to tolerable levels and mitigate potential lateral displacement as described below.

7.3.2 Footing Settlement

As discussed in the “Ground Improvement” section below, the ground improvement design should be such that the total foundation settlement (static and seismic) are reduced to about 1 to 1½ inches or less, with no more than 1 inch for either the static or seismic component. As referenced, foundation loads have been provided by Pangolin Structural. Those loads and final settlement estimates should be reviewed by Pangolin Structural to meet their requirements.

7.3.3 Lateral Loading

Lateral loads may be resisted by friction between the bottom of footing and the supporting subgrade, and also by passive pressures generated against footing sidewalls. An ultimate frictional resistance of 0.40 applied to the footing dead load, and an ultimate passive pressure based on an equivalent fluid pressure of 450 pcf may be used in design. The structural engineer should apply an appropriate factor of safety (such as 1.5) to the ultimate values above. Where footings are adjacent to landscape areas without hardscape, the upper 12 inches of soil should be neglected when determining passive pressure capacity.

7.3.4 Spread Footing Construction Considerations

Where utility lines will cross perpendicular to strip footings, the footing should be deepened to encase the utility line, providing sleeves or flexible cushions to protect the pipes from anticipated foundation settlement, or the utility lines should be backfilled to the bottom of footing with sand-cement slurry or lean concrete. Where utility lines will parallel footings and will extend below the “foundation plane of influence,” an imaginary 1:1 plane projected down from the bottom edge of

the footing, either the footing will need to be deepened so that the pipe is above the foundation plane of influence or the utility trench will need to be backfilled with sand-cement slurry or lean concrete within the influence zone. Sand-cement slurry used within foundation influence zones should have a minimum compressive strength of 75 psi.

Footing excavations should be filled as soon as possible or be kept moist until concrete placement by regular sprinkling to prevent desiccation. A Cornerstone representative should observe all footing excavations prior to placing reinforcing steel and concrete. If there is a significant schedule delay between our initial observation and concrete placement, we may need to re-observe the excavations.

7.4 ALTERNATIVE FOUNDATION

As an alternative to spread footings overlying ground improvement and potential for lateral spreading is mitigated, the building may also potentially be supported on a reinforced concrete mat foundation bearing on natural soil or engineered fill prepared in accordance with the "Earthwork" section of this report, and designed in accordance with the 2016 California Building Code. Please be advised this foundation alternative will also require mitigating the potential for lateral spreading, as noted. If this option is desired, we should be provided additional information, including mat foundation contact pressures to provide additional recommendations.

7.5 GROUND IMPROVEMENT

7.5.1 Ground Improvement Requirements

Ground improvement should consist of densification techniques to improve the ground's resistance to liquefaction, reduce static settlement, and improve bearing capacity and seismic performance. Densification techniques could potentially consist of vibro replacement (i.e. stone columns), granular compaction piles (i.e. rammed aggregate), grouted displacement columns (i.e. CLSM), or similar densification techniques. The intent of the ground improvement design would be to increase the density of the potentially liquefiable sands and compressible clays by laterally displacing and/or densifying the existing in-place soils. The degree to which the density is increased will depend on the improvement method and spacing. Ground improvement can also be used to reduce static settlements and increase bearing capacity. Ground improvement can also be designed to act as a shear key along the western side of the site to mitigate the potential for lateral spreading.

Vibro replacement and granular compaction piles are similar in that a probe is vibrated into the ground to the design depth and a compacted open-graded gravel column is constructed from the bottom up. The surrounding soils are densified by the displacement of the soil as well as the vibrations from consolidating and expanding the gravel column laterally. One of the disadvantages of these densification pile types are the noise and vibration (and sometimes dust) produced during construction. The vibrations may cause noise and vibrations that can be heard or felt off-site. Pre-drilling through surficial materials may reduce noise and vibration, and should be anticipated for improvement areas adjacent to the site that may be sensitive to vibrations.

CLSM columns are formed in displaced soil cavities and displace liquefiable and compressible soil with cemented Controlled Low Strength Material. CLSM column ground improvement can mitigate liquefaction and settlement of heavy foundations and slabs. CLSM columns are ideal for sensitive project sites such as those near critical structures that require low noise and no vibration construction methods, unreinforced masonry walls, occupied offices, sensitive soil (e.g. Bay Mud), and hazardous/contaminated soil sites where deep ground improvement is required.

The CLSM columns are separated from the bottom of the footing using a minimum 6-inch layer of crushed rock or other material "cushion". No connectivity of the CLSM columns and overlying structural element is allowed. In some cases, a Ground Anchor may be used in a higher strength column to resist uplift forces. Lateral resistance is provided by footing, mat, or slab bottom friction at the concrete to cushion layer interface or passive resistance of the side walls. The target strengths of the CLSM are usually between 500 to 1,000 psi at 28 days, depending on load demands. The CLSM strength is tested using standard sampling and loading methods.

Based on the chosen ground improvement technique, the upper 1 to 2 feet or more of the working pad will likely need to be re-compacted after ground improvement installation, due to surface disturbance and potential ground heave. For this reason, we do not recommend preparation of the final pad, placement of non-expansive fill, or the construction of utilities prior to ground improvement.

Contractors to perform recommended ground improvement should have adequate experience for the proposed methods to address the requirements herein. All construction quality control and quality assurance records should be supplied to the design team for review on completion of the ground improvement. Adequate quality control readings must be available at the time of installation so that real time oversight can be provided. The instrumentation provided will depend on the ground improvement method chosen. Once a method is chosen, the geotechnical engineer should modify the project design guideline specification for the appropriate method.

7.5.2 Ground Improvement Design Guidelines

The ground improvement columns will extend from building subgrade to near the bottom of the potentially liquefiable layers as necessary to meet the design criteria, estimated to be as deep as 25 feet below existing grades. The ground improvement design should reduce the total (static plus seismic) settlement to 1½ inches or less, with no more than 1-inch of static nor 1-inch of seismic settlement allowed as a component of the total settlement. This total settlement is preliminary and this criteria should be confirmed collaboratively with the structural engineer and owner.

We anticipate a ground improvement element spacing of about 4 to 6 feet on center beneath spread footing foundations and 5 to 8 feet on center within slab-on-grade areas, including mats, to meet the performance criteria given above. Due to the variability and uncertainty of ground conditions, we recommend that ground improvement element spacing not exceed 6 feet in foundation areas, and 8 feet in slab-on-grade improvement areas. We anticipate a tighter spacing will likely be required for the CLSM column methodology, as vibratory consolidation of

sandy soils is typically more effective laterally at densification than non-vibratory displacement column construction.

Research indicates that pore pressure migration can affect even improved areas, and it is common to continue densification improvement to a distance outside of the building area. For that reason, ground improvement should be designed to provide adequate confinement around all foundations at the perimeter of the structure (at least one row of columns beyond the foundation limits) in addition to the foundation elements.

We recommend that the ground improvement design include, but not be limited to: 1) drawings showing the ground improvement layout, spacing and diameter, 2) the foundation layout plan, 3) proposed ground improvement length, 4) top and bottom elevations. We should be retained to review the ground improvement contractor's plan and settlement estimates prior to construction, and to review and confirm that the contractor's ground improvement design will satisfactorily meet the design criteria based on the performance testing. Following the completion of the Ground Improvement Performance Testing indicated below, a final ground improvement design report and calculation package, including support for the ground improvement design and indicating that the design criteria will be met, should be submitted to the design team for review and approval.

Ground improvement would generally be constructed as follows: 1) clear the site of existing demolition debris, 2) mass grading to the building pad subgrade elevation, 3) install performance test arrays to confirm the design spacing achieves the densification requirements, verified by CPT testing and additional liquefaction analyses, 4) install the ground improvement on the approved layout, and 5) re-compact top of building pad, as required, prior to construction of remainder of pad and the foundations.

7.5.3 Ground Improvement Performance Testing

On a preliminary basis, foundation and slab areas must meet the above total settlement criteria, which will include all settlement estimated from static loads and seismic shaking. Analysis of settlement for static loading should include compression within the treatment area due to structural loads, and long-term consolidation estimated for below the zone of treatment. Analysis of settlement for seismic loading should include settlement due to liquefaction strain, as well as any dry sand settlement. Ground improvement must also provide adequate support for the design bearing capacity.

Performance testing typically consists of a pre-construction test section to confirm design spacing with post-installation CPT testing to confirm that suitable ground improvement has occurred to meet the design criteria. If the design criteria have not been met, then additional testing may be required. Verification testing involves carrying out pre- and post-array penetration testing of the soil equidistant between treatment points for the analysis of liquefaction, and comparison with measurements before treatment. We recommend that liquefaction analysis methods used include the methods proposed by Idriss and Boulanger (2014). Because of detrimental effects of pore pressure on the results of testing, we recommend that testing of ground improvement test arrays occur no sooner than two weeks

after their installation. This should be incorporated into project planning, as well as the possibility that additional arrays and testing may be required if proposed spacing is inadequate.

Verification testing also includes the performance of a modulus test at each array location. To validate the parameters selected for a specific project, a modulus load test is performed on a test pier typically constructed in locations chosen in coordination with the geotechnical engineer. Modulus tests are conducted to a pressure equal to at least 150% of the maximum design top of pier stress to assure a reasonable level of safety which supports long term settlement control and demonstrates that the ground improvement element has adequate strength. Performing modulus testing beyond the limit state top of pier stress meets the intent of the building code with respect to shallow foundation support. Modulus testing should be performed in general accordance with ASTM D1143.

We should observe and monitor installation of the test arrays and production ground improvement on a full-time basis and review the post-test array settlement analyses provided by the contractor.

SECTION 8: CONCRETE SLABS AND PEDESTRIAN PAVEMENTS

8.1 INTERIOR SLABS-ON-GRADE

As the Plasticity Index (PI) of the surficial soils ranges up to 43, the proposed slabs-on-grade should be supported on at least 30 inches of non-expansive fill (NEF) to reduce the potential for slab damage due to soil heave. The NEF layer should be constructed over subgrade prepared in accordance with the recommendations in the “Earthwork” section of this report. If moisture-sensitive floor coverings are planned, the recommendations in the “Interior Slabs Moisture Protection Considerations” section below may be incorporated in the project design if desired. If significant time elapses between initial subgrade preparation and slab-on-grade NEF construction, the subgrade should be proof-rolled to confirm subgrade stability, and if the soil has been allowed to dry out, the subgrade should be re-moisture conditioned to at least 3 percent over the optimum moisture content.

The structural engineer should determine the appropriate slab reinforcement for the loading requirements and considering the expansion potential of the underlying soils. For unreinforced concrete slabs, ACI 302.1R recommends limiting control joint spacing to 24 to 36 times the slab thickness in each direction, or a maximum of 18 feet.

8.2 INTERIOR SLABS MOISTURE PROTECTION CONSIDERATIONS

The following general guidelines for concrete slab-on-grade construction where floor coverings are planned are presented for the consideration by the developer, design team, and contractor. These guidelines are based on information obtained from a variety of sources, including the American Concrete Institute (ACI) and are intended to reduce the potential for moisture-related problems causing floor covering failures, and may be supplemented as necessary based on project-specific requirements. The application of these guidelines or not will not affect the geotechnical aspects of the slab-on-grade performance.

- Place a minimum 10-mil vapor retarder conforming to ASTM E 1745, Class C requirements or better directly below the concrete slab; the vapor retarder should extend to the slab edges and be sealed at all seams and penetrations in accordance with manufacturer's recommendations and ASTM E 1643 requirements. A 4-inch-thick capillary break, consisting of crushed rock should be placed below the vapor retarder and consolidated in place with vibratory equipment. The mineral aggregate shall be of such size that the percentage composition by dry weight as determined by laboratory sieves will conform to the following gradation:

Sieve Size	Percentage Passing Sieve
1"	100
¾"	90 – 100
No. 4	0 - 10

  The capillary break rock may be considered as the upper 4 inches of the non-expansive fill previously recommended.

- The concrete water:cement ratio should be 0.45 or less. Mid-range plasticizers may be used to increase concrete workability and facilitate pumping and placement.

- Water should not be added after initial batching unless the slump is less than specified and/or the resulting water:cement ratio will not exceed 0.45.

- Polishing the concrete surface with metal trowels is not recommended.

- Where floor coverings are planned, all concrete surfaces should be properly cured.

- Water vapor emission levels and concrete pH should be determined in accordance with ASTM F1869-98 and F710-98 requirements and evaluated against the floor covering manufacturer's requirements prior to installation.

8.3 EXTERIOR FLATWORK

Exterior slabs-on-grade, such as pedestrian walkways, patios, driveways, and sidewalks, may experience seasonal movement due to the native expansive soils; therefore, some cracking or vertical movement of conventional slabs should be anticipated where imported fill is not planned in flatwork areas. There are several alternatives for mitigating the impacts of expansive soils beneath concrete flatwork. We are providing recommendations to reduce distress to concrete flatwork that includes moisture conditioning the subgrade soils, using non-expansive fill, and providing adequate construction and control joints to control cracks that do occur. It should be noted that minor slab movement or localized cracking and/or distress could still occur.

- The minimum recommendation for concrete flatwork constructed on highly to very highly expansive soils is to properly prepare the clayey soils prior to placing concrete. This is typically achieved by scarifying, moisture conditioning, and re-compacting the subgrade soil. Subgrade soil should be moisture conditioned to at least 3 percent over the

laboratory optimum and compacted using moderate compaction effort to a relative compaction of 87 to 92 percent (ASTM Test Method D1557). Since the near surface soils may have been previously compacted and tested, the subgrade soils could possibly be moisture conditioned by gradually wetting the soil, depending on the time of year slab construction occurs. This should not include flooding or excessively watering the soil, which would likely result in a soft, unstable subgrade condition, and possible delays in the construction while waiting for the soil to dry out. In general, the subgrade should be relatively firm and non-yielding prior to construction.

- Concrete flatwork, excluding pavements that would be subject to wheel loads, should be at least 4 inches thick and underlain by at least 12 inches of non-expansive fill. Non-expansive fill may include aggregate base, crushed rock, or imported soil with a PI of 15 or less. Non-expansive fill should be compacted to at least 90 percent relative compaction. Flatwork that will be subject to heavier or frequent vehicular loading should be designed in accordance with the recommendations in the "Vehicular Pavements" section below.

- We recommend a maximum control joint spacing of about 2 feet in each direction for each inch of concrete thickness and a construction joint spacing of 10 to 12 feet. Construction joints that abut the foundations or garage slabs should include a felt strip, or approved equivalent, that extends the full depth of the exterior slab. This will help to reduce the potential for permanent vertical offset between the slabs due to friction between the concrete edges. We recommend that exterior slabs be isolated from adjacent foundations.

At the owner's option, if desired to reduce the potential for vertical offset or widening of concrete cracks, consideration should be given to using reinforcing steel, such as No. 3 rebar spaced at 18 inches on center each direction.

SECTION 9: VEHICULAR PAVEMENTS

9.1 ASPHALT CONCRETE

The following asphalt concrete pavement recommendations tabulated below are based on the Procedure 608 of the Caltrans Highway Design Manual, estimated traffic indices for various pavement-loading conditions, and on a design R-value of 5. The design R-value was chosen based on engineering judgment considering the variable surface conditions. We have also included pavement structural section alternatives for lime-treated subgrade soil with an estimated design R-value of 50 for your consideration. If it is desired to lime-treat the proposed auto parking and truck parking/loading areas, we recommend that the upper 12 inches of expansive clay subgrade soil be treated, as discussed in the "Earthwork" section of this report.

Table 5: Asphalt Concrete Pavement Recommendations (Untreated Subgrade)

Design Traffic Index (TI)	Asphalt Concrete (inches)	Class 2 Aggregate Base* (inches)	Total Pavement Section Thickness (inches)
4.0	2.5	7.5	10.0
4.5	2.5	9.5	12.0
5.0	3.0	10.0	13.0
5.5	3.0	12.0	15.0
6.0	3.5	12.5	16.0
6.5	4.0	14.0	18.0

*Caltrans Class 2 aggregate base; minimum R-value of 78

Table 6: Asphalt Concrete Pavement Recommendations (Lime-Treated Subgrade)

Design Traffic Index (TI)	Asphalt Concrete (inches)	Class 2 Aggregate Base* (inches)	Total Pavement Section Thickness (inches)
4.0	2.5	4.0	6.5
4.5	2.5	4.0	6.5
5.0	3.0	4.0	7.0
5.5	3.0	4.0	7.0
6.0	3.5	4.0	7.5
6.5	3.5	4.5	8.0

* Caltrans Class 2 aggregate base or recycled crushed concrete with a minimum R-value of 78; minimum lime-treated subgrade R-value assumed to be 50.

Frequently, the full asphalt concrete section is not constructed prior to construction traffic loading. This can result in significant loss of asphalt concrete layer life, rutting, or other pavement failures. To improve the pavement life and reduce the potential for pavement distress through construction, we recommend the full design asphalt concrete section be constructed prior to construction traffic loading. Alternatively, a higher traffic index may be chosen for the areas where construction traffic will use the pavements.

Asphalt concrete pavements constructed on expansive subgrade where the adjacent areas will not be irrigated for several months after the pavements are constructed may experience longitudinal cracking parallel to the pavement edge. These cracks typically form within a few feet of the pavement edge and are due to seasonal wetting and drying of the adjacent soil. The cracking may also occur during construction where the adjacent grade is allowed to significantly dry during the summer, pulling moisture out of the pavement subgrade. Any cracks that form should be sealed with bituminous sealant prior to the start of winter rains. One alternative to reduce the potential for this type of cracking is to install a moisture barrier at least 24 inches deep behind the pavement curb.

9.2 PORTLAND CEMENT CONCRETE

The exterior Portland Cement Concrete (PCC) pavement recommendations tabulated below are based on methods presented in the Portland Cement Association (PCA) design manual (PCA, 1984). Recommendations for garage slabs-on-grade were provided in the "Concrete Slabs and Pedestrian Pavements" section above. We have provided a few pavement alternatives as an anticipated Average Daily Truck Traffic (ADTT) was not provided. An allowable ADTT should be chosen that is greater than what is expected for the development. PCC alternatives for lime treated subgrade are provided in Table 8 below.

Table 7: PCC Pavement Recommendations, Design R-value = 5

Allowable ADTT	Minimum PCC Thickness (inches)
13	5.5
130	6.0

Table 8: PCC Pavement Recommendations (Lime-Treated Subgrade)

Allowable ADTT	Minimum PCC Thickness (inches)
13	5.0
150	5.5

The PCC thicknesses above are based on a concrete compressive strength of at least 3,500 psi, supporting the PCC on at least 6 inches of Class 2 aggregate base compacted as recommended in the "Earthwork" section, and laterally restraining the PCC with curbs or concrete shoulders. Adequate expansion and control joints should be included. Consideration should be given to limiting the control joint spacing to a maximum of about 2 feet in each direction for each inch of concrete thickness. Due to the expansive surficial soils present, we recommend that the construction and expansion joints be dowelled.

9.2.1 Stress Pads for Trash Enclosures

Pads where trash containers will be stored, and where garbage trucks will park while emptying trash containers, should be constructed on Portland Cement Concrete. We recommend that the trash enclosure pads and stress (landing) pads where garbage trucks will store, pick up, and empty trash be increased to a minimum PCC thickness of 7 inches. The compressive strength, underlayment, and construction details should be consistent with the above recommendations for PCC pavements.

9.3 PAVEMENT CUTOFF

Surface water penetration into the pavement section can significantly reduce the pavement life, due to the native expansive clays. While quantifying the life reduction is difficult, a normal 20-year pavement design could be reduce to less than 10 years; therefore, increased long-term maintenance may be required.

It would be beneficial to include a pavement cut-off, such as deepened curbs, redwood-headers, or "Deep-Root Moisture Barriers" that are keyed at least 4 inches into the pavement subgrade. This will help limit the additional long-term maintenance.

SECTION 10: RETAINING WALLS

10.1 STATIC LATERAL EARTH PRESSURES

The structural design of any site retaining wall should include resistance to lateral earth pressures that develop from the soil behind the wall, any undrained water pressure, and surcharge loads acting behind the wall. Provided a drainage system is constructed behind the wall to prevent the build-up of hydrostatic pressures as discussed in the section below, we recommend that the walls with level backfill be designed for the following pressures:

Table 9: Recommended Lateral Earth Pressures

Wall Condition	Lateral Earth Pressure*	Additional Surcharge Loads
Unrestrained – Cantilever Wall	45 pcf	⅓ of vertical loads at top of wall
Restrained – Braced Wall	45 pcf + 8H** psf	½ of vertical loads at top of wall

* Lateral earth pressures are based on an equivalent fluid pressure for level backfill conditions
** H is the distance in feet between the bottom of footing and top of retained soil

If adequate drainage cannot be provided behind the wall, an additional equivalent fluid pressure of 62 pcf should be added to the values above for both restrained and unrestrained walls for the portion of the wall that will not have drainage. Damp proofing or waterproofing of the walls may be considered where moisture penetration and/or efflorescence are not desired.

10.2 SEISMIC LATERAL EARTH PRESSURES

10.2.1 Site Walls

The 2016 CBC states that lateral pressures from earthquakes should be considered in the design of basements and retaining walls. At this time, we are not aware of any retaining walls for the project. However, minor landscaping walls (i.e. walls 6 feet or less in height) may be proposed. In our opinion, design of these walls for seismic lateral earth pressures in addition to static earth pressures is not warranted.

10.3 WALL DRAINAGE

10.3.1 At-Grade Site Walls

Adequate drainage should be provided by a subdrain system behind all walls. This system should consist of a 4-inch minimum diameter perforated pipe placed near the base of the wall (perforations placed downward). The pipe should be bedded and backfilled with Class 2 Permeable Material per Caltrans Standard Specifications, latest edition. The permeable backfill should extend at least 12 inches out from the wall and to within 2 feet of outside finished grade. Alternatively, ½-inch to ¾-inch crushed rock may be used in place of the Class 2 Permeable Material provided the crushed rock and pipe are enclosed in filter fabric, such as Mirafi 140N or approved equivalent. The upper 2 feet of wall backfill should consist of compacted on-site soil. The subdrain outlet should be connected to a free-draining outlet or sump.

Miradrain, Geotech Drainage Panels, or equivalent drainage matting can be used for wall drainage as an alternative to the Class 2 Permeable Material or drain rock backfill. Horizontal strip drains connecting to the vertical drainage matting may be used in lieu of the perforated pipe and crushed rock section. The vertical drainage panel should be connected to the perforated pipe or horizontal drainage strip at the base of the wall, or to some other closed or through-wall system such as the TotalDrain system from AmerDrain. Sections of horizontal drainage strips should be connected with either the manufacturer's connector pieces or by pulling back the filter fabric, overlapping the panel dimples, and replacing the filter fabric over the connection. At corners, a corner guard, corner connection insert, or a section of crushed rock covered with filter fabric must be used to maintain the drainage path.

Drainage panels should terminate 18 to 24 inches from final exterior grade. The Miradrain panel filter fabric should be extended over the top of and behind the panel to protect it from intrusion of the adjacent soil.

10.4 BACKFILL

Where surface improvements will be located over the retaining wall backfill, backfill placed behind the walls should be compacted to at least 95 percent relative compaction using light compaction equipment. Where no surface improvements are planned, backfill should be compacted to at least 90 percent. If heavy compaction equipment is used, the walls should be temporarily braced.

10.5 FOUNDATIONS

Retaining walls may be supported on a continuous spread footing designed in accordance with the recommendations presented in the "Foundations" section of this report.

SECTION 11: LIMITATIONS

This report, an instrument of professional service, has been prepared for the sole use of EdgeCore Internet Real Estate specifically to support the design of the 2201 Laurelwood Road

project in Santa Clara, California. The opinions, conclusions, and recommendations presented in this report have been formulated in accordance with accepted geotechnical engineering practices that exist in Northern California at the time this report was prepared. No warranty, expressed or implied, is made or should be inferred.

Recommendations in this report are based upon the soil and ground water conditions encountered during our subsurface exploration. If variations or unsuitable conditions are encountered during construction, Cornerstone must be contacted to provide supplemental recommendations, as needed.

EdgeCore Internet Real Estate may have provided Cornerstone with plans, reports and other documents prepared by others. EdgeCore Internet Real Estate understands that Cornerstone reviewed and relied on the information presented in these documents and cannot be responsible for their accuracy.

Cornerstone prepared this report with the understanding that it is the responsibility of the owner or his representatives to see that the recommendations contained in this report are presented to other members of the design team and incorporated into the project plans and specifications, and that appropriate actions are taken to implement the geotechnical recommendations during construction.

Conclusions and recommendations presented in this report are valid as of the present time for the development as currently planned. Changes in the condition of the property or adjacent properties may occur with the passage of time, whether by natural processes or the acts of other persons. In addition, changes in applicable or appropriate standards may occur through legislation or the broadening of knowledge. Therefore, the conclusions and recommendations presented in this report may be invalidated, wholly or in part, by changes beyond Cornerstone's control. This report should be reviewed by Cornerstone after a period of three (3) years has elapsed from the date of this report. In addition, if the current project design is changed, then Cornerstone must review the proposed changes and provide supplemental recommendations, as needed.

An electronic transmission of this report may also have been issued. While Cornerstone has taken precautions to produce a complete and secure electronic transmission, please check the electronic transmission against the hard copy version for conformity.

Recommendations provided in this report are based on the assumption that Cornerstone will be retained to provide observation and testing services during construction to confirm that conditions are similar to that assumed for design, and to form an opinion as to whether the work has been performed in accordance with the project plans and specifications. If we are not retained for these services, Cornerstone cannot assume any responsibility for any potential claims that may arise during or after construction as a result of misuse or misinterpretation of Cornerstone's report by others. Furthermore, Cornerstone will cease to be the Geotechnical-Engineer-of-Record if we are not retained for these services.

SECTION 12: REFERENCES

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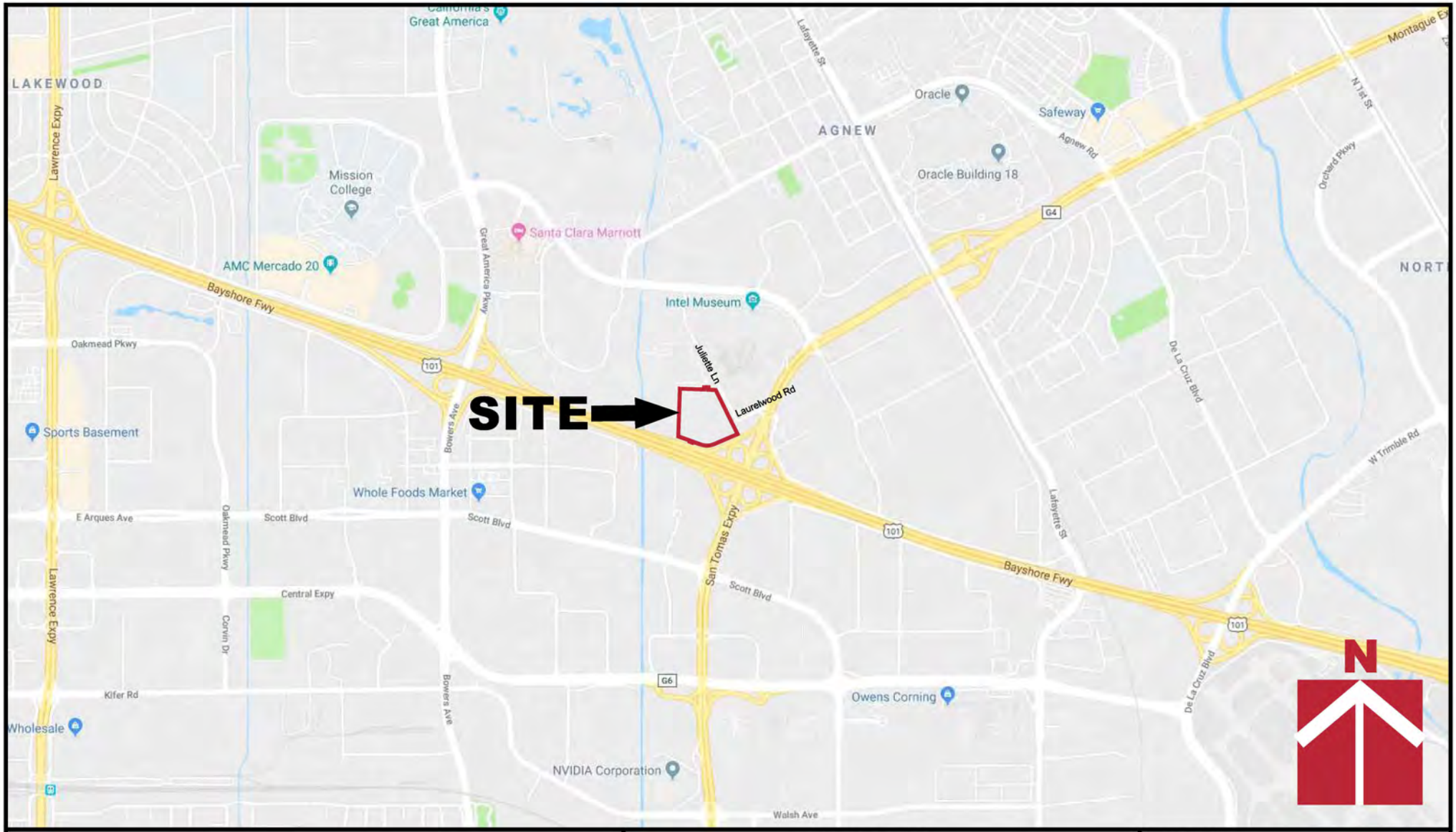
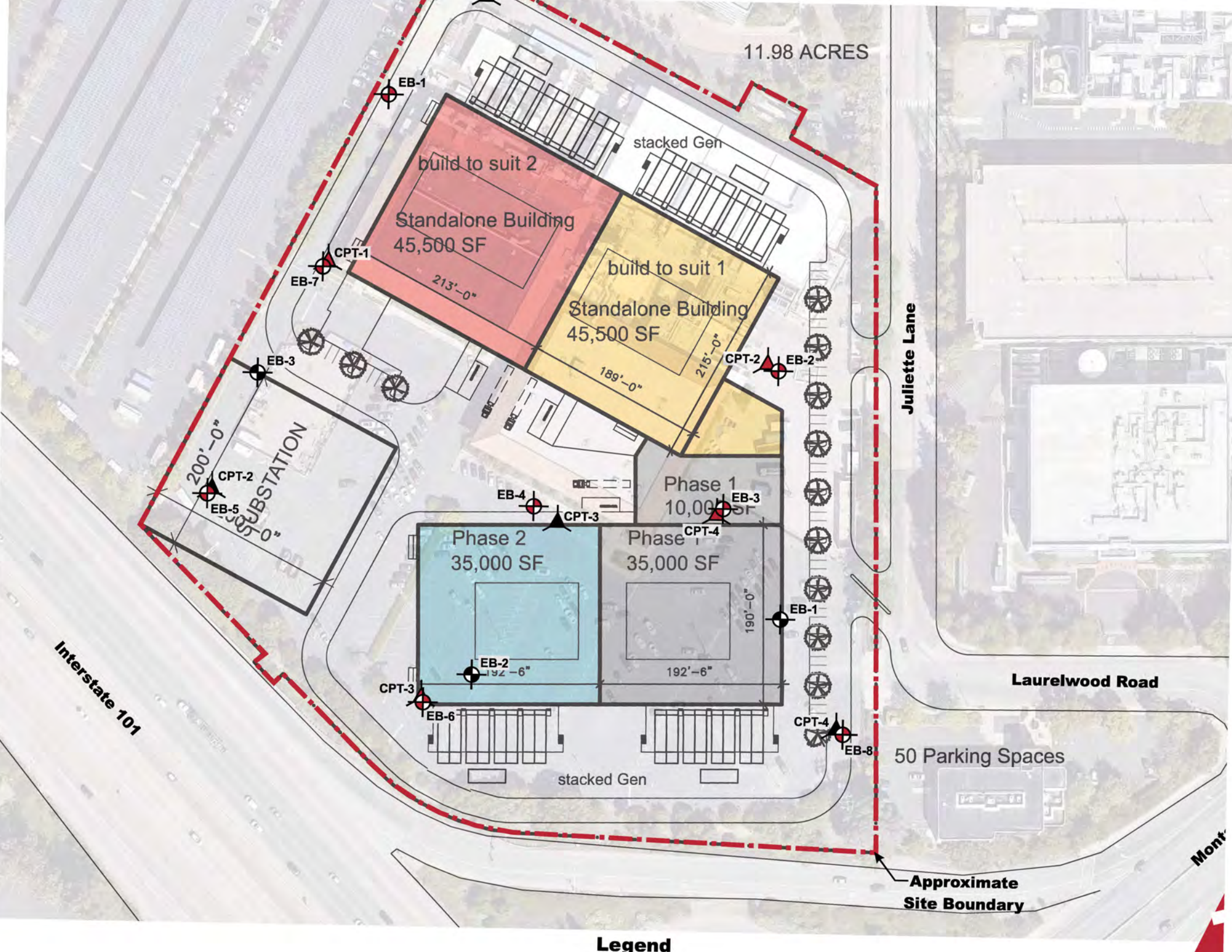


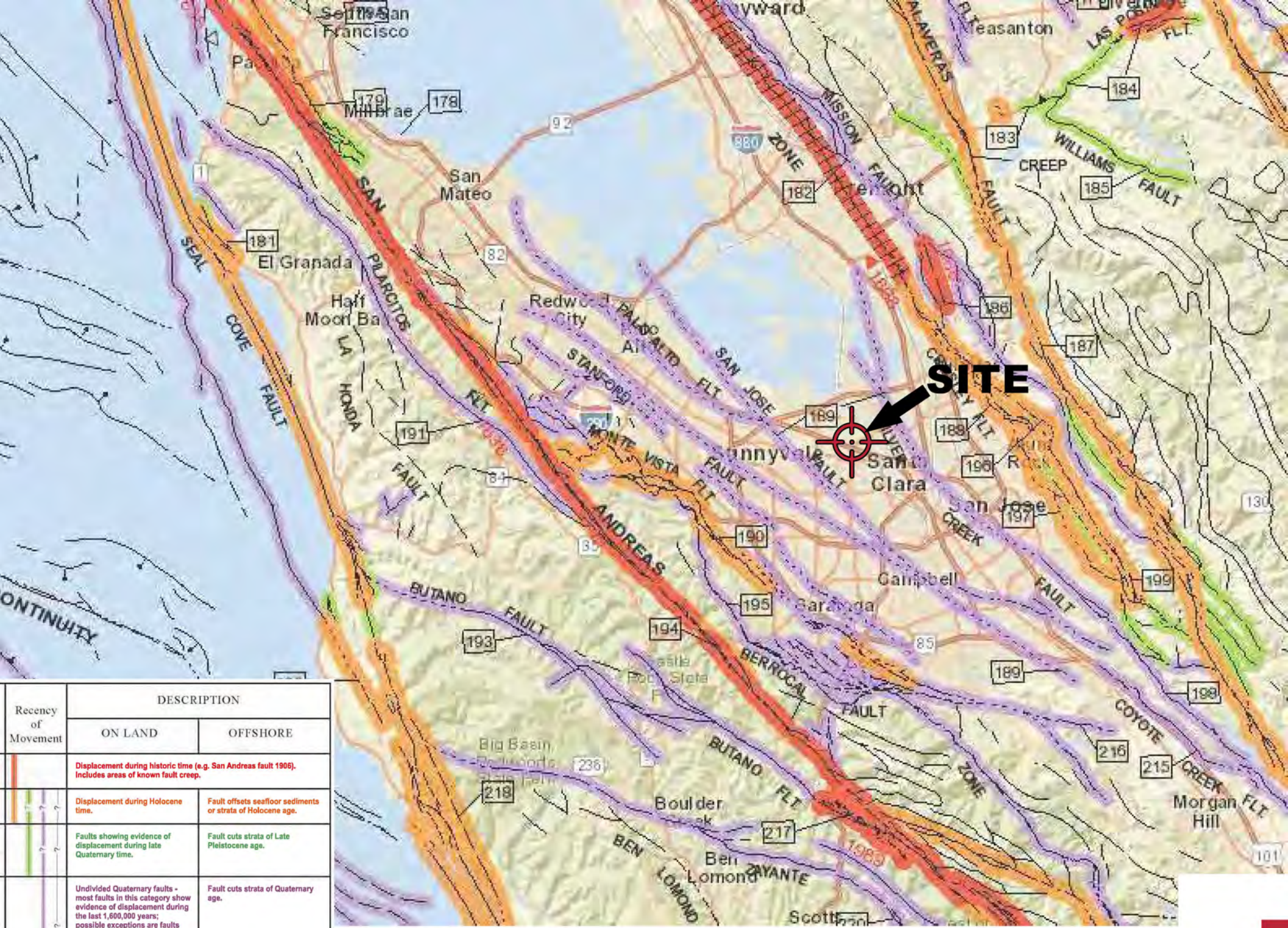
CORNERSTONE EARTH GROUP

Vicinity Map

Laurelwood Data Center Campus
2201 Laurelwood Road
Santa Clara, CA

Project Number	1075-1-2
Figure Number	Figure 1
Date	February 2019
Drawn By	RRN


11.98 ACRES
EB-1
stacked Gen
build to suit 2
Standalone Building
45,500 SF
213'–0"
CPT-1
EB-7
build to suit 1
Standalone Building
45,500 SF
189'–0"
215'–0"
CPT-2
EB-2
EB-3
Juliette Lane
200'–0"
CPT-2
EB-5
SUBSTATION
EB-4
CPT-3
Phase 1
10,000 SF
EB-3
CPT-4
Phase 2
35,000 SF
Phase 1
35,000 SF
190'–0"
EB-1
EB-2
192'–6"
192'–6"
CPT-3
EB-6
CPT-4
EB-8
50 Parking Spaces
stacked Gen
Laurelwood Road
Interstate 101
Approximate
Site Boundary
Legend



Recency of Movement	DESCRIPTION	
	ON LAND	OFFSHORE
	Displacement during historic time (e.g. San Andreas fault 1906). Includes areas of known fault creep.	
	Displacement during Holocene time.	Fault offsets seafloor sediments or strata of Holocene age.
	Faults showing evidence of displacement during late Quaternary time.	Fault cuts strata of Late Pleistocene age.
	Undivided Quaternary faults - most faults in this category show evidence of displacement during the last 1,600,000 years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age.	Fault cuts strata of Quaternary age.
	Faults without recognized Quaternary displacement or	Fault cuts strata of Pliocene or older age.

CORNERSTONE EARTH GROUP

FIGURE 4A

CPT NO. 1

PROJECT/CPT DATA

Project Title	Laurelwood
Project No.	1075-1-2
Project Manager	MR

SEISMIC PARAMETERS

Controlling Fault	San Andreas	
Earthquake Magnitude (Mw)	7.9	
PGA (Amax)	0.5	(g)

SITE SPECIFIC PARAMETERS

Ground Water Depth at Time of Drilling (feet)	8.8
Design Water Depth (feet)	5
Ave. Unit Weight Above GW (pcf)	125
Ave. Unit Weight Below GW (pcf)	120

CPT ANALYSIS RESULTS

DRY SAND SETTLEMENT FROM 5 FEET

0.00 (Inches)

LIQUEFACTION SETTLEMENT FROM 50 FEET

0.99 (Inches)

TOTAL SEISMIC SETTLEMENT 1.0 **INCHES**

POTENTIAL LATERAL DISPLACEMENT

LDI[2] 1.22 L/H 29.7

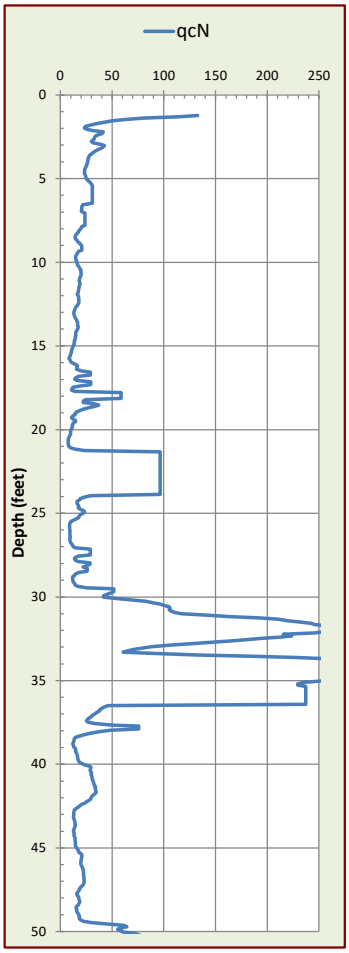
LDI[1] Corrected for Distance 0.48 (4 < L/H < 40)

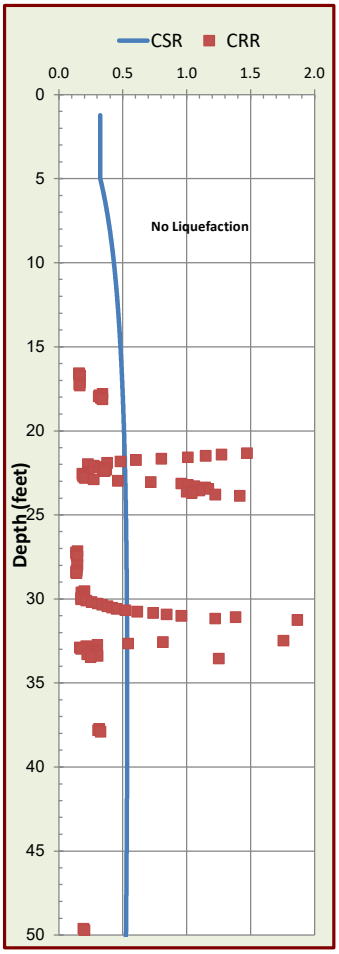
EXPECTED RANGE OF DISPLACEMENT

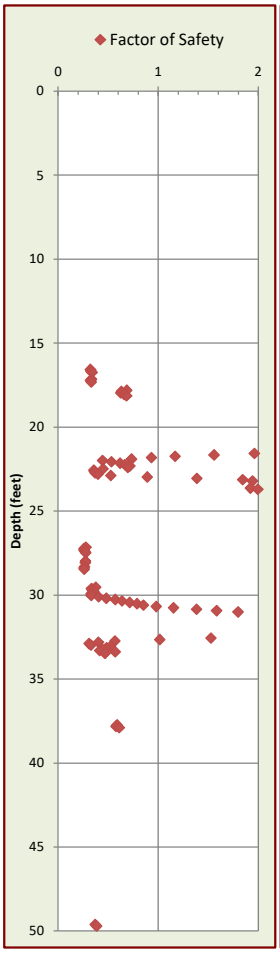
0.2 to 1.0 feet

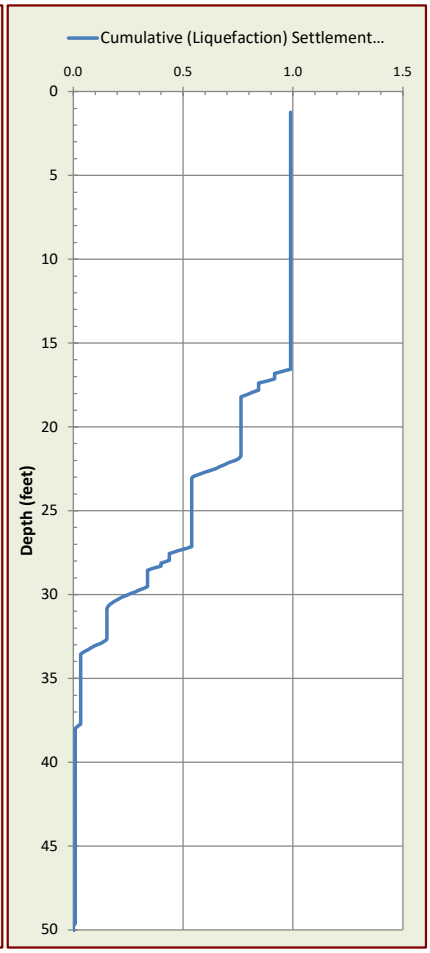
[1]Not Valid for L/H Values < 4 and > 40.

[2]LDI Values Only Summed to 2H Below Grade.









CORNERSTONE EARTH GROUP

FIGURE 4B

CPT NO. 2

PROJECT/CPT DATA

Project Title	Laurelwood
Project No.	1075-1-2
Project Manager	MR

SEISMIC PARAMETERS

Controlling Fault	San Andreas	
Earthquake Magnitude (Mw)	7.9	
PGA (Amax)	0.5	(g)

SITE SPECIFIC PARAMETERS

Ground Water Depth at Time of Drilling (feet)	6.5
Design Water Depth (feet)	5
Ave. Unit Weight Above GW (pcf)	125
Ave. Unit Weight Below GW (pcf)	120

CPT ANALYSIS RESULTS

DRY SAND SETTLEMENT FROM	5	FEET
	0.00	(Inches)
LIQUEFACTION SETTLEMENT FROM	50	FEET
	0.34	(Inches)
TOTAL SEISMIC SETTLEMENT	**0.3**	**INCHES**

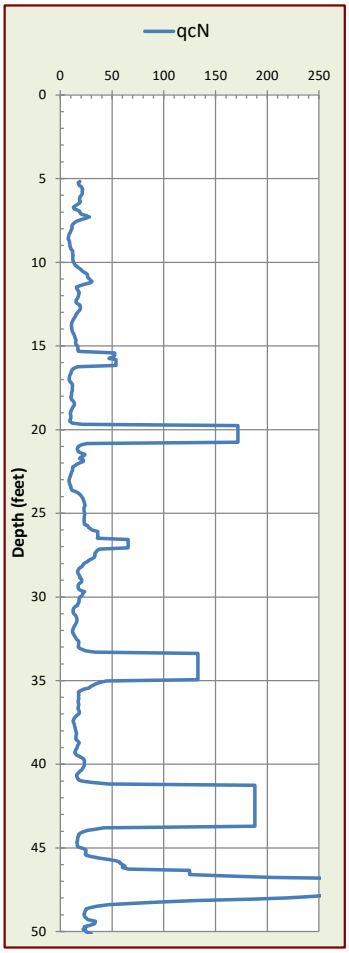
POTENTIAL LATERAL DISPLACEMENT

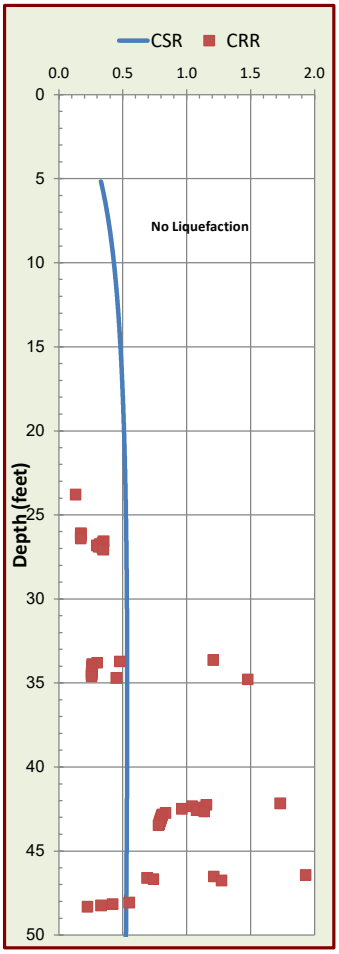
LDI[2]	0.29	L/H	54.7
LDI[1] Corrected for Distance	0.07	(4 < L/H < 40)	

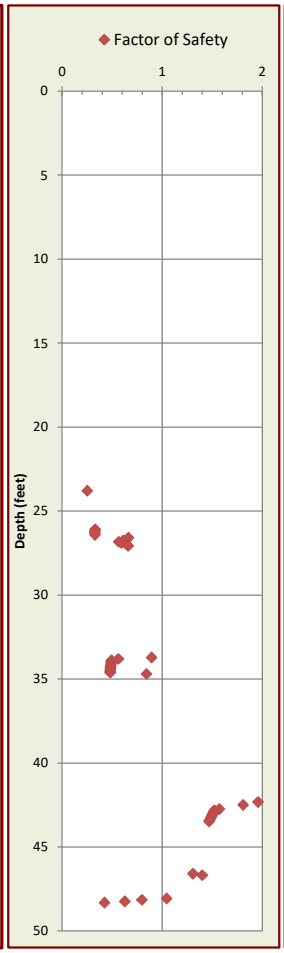
EXPECTED RANGE OF DISPLACEMENT

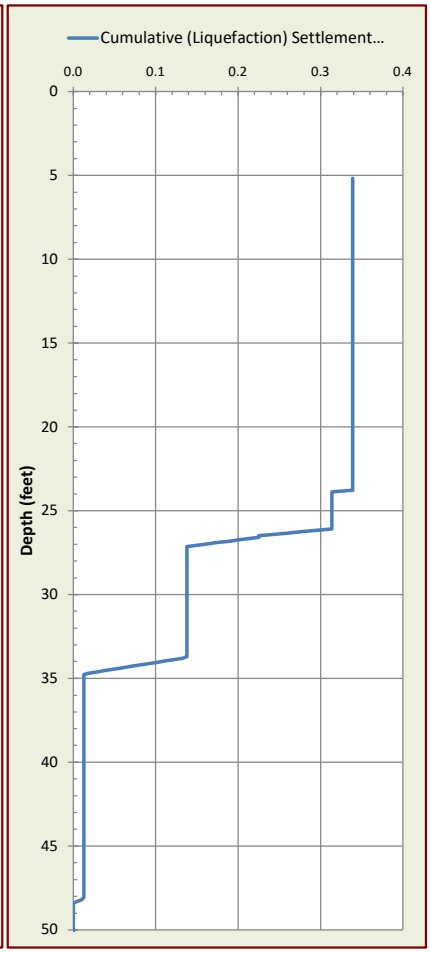
0.0 to 0.1 feet

[1]Not Valid for L/H Values < 4 and > 40.
[2]LDI Values Only Summed to 2H Below Grade.









CORNERSTONE EARTH GROUP

FIGURE 4C

CPT NO. 3

PROJECT/CPT DATA

Project Title	Laurelwood
Project No.	1075-1-2
Project Manager	MR

SEISMIC PARAMETERS

Controlling Fault	San Andreas	
Earthquake Magnitude (Mw)	7.9	
PGA (Amax)	0.5	(g)

SITE SPECIFIC PARAMETERS

Ground Water Depth at Time of Drilling (feet)	6.5
Design Water Depth (feet)	5
Ave. Unit Weight Above GW (pcf)	125
Ave. Unit Weight Below GW (pcf)	120

CPT ANALYSIS RESULTS

DRY SAND SETTLEMENT FROM 5 FEET

0.00 (Inches)

LIQUEFACTION SETTLEMENT FROM 50 FEET

1.65 (Inches)

TOTAL SEISMIC SETTLEMENT 1.7 **INCHES**

POTENTIAL LATERAL DISPLACEMENT

LDI[2] 1.92 L/H 47.1

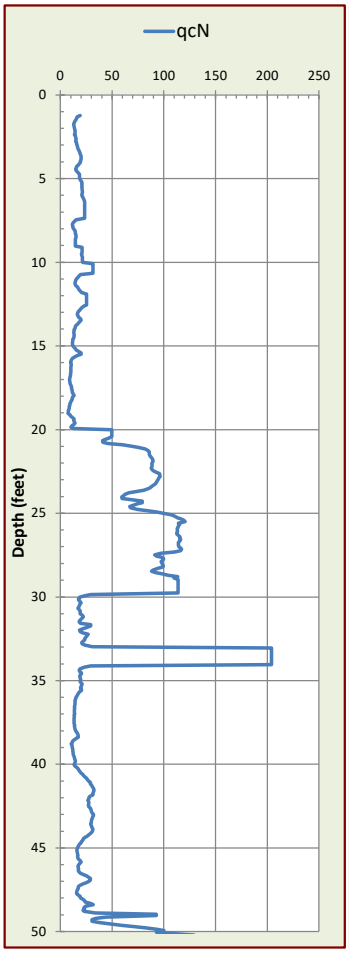
LDI[1] Corrected for Distance 0.53 (4 < L/H < 40)

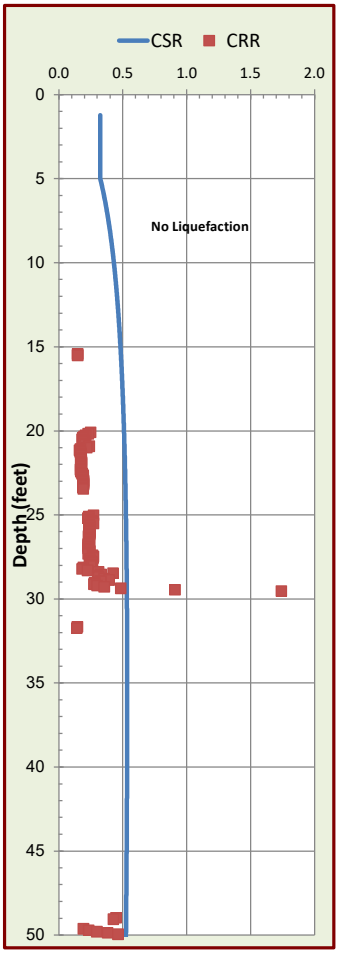
EXPECTED RANGE OF DISPLACEMENT

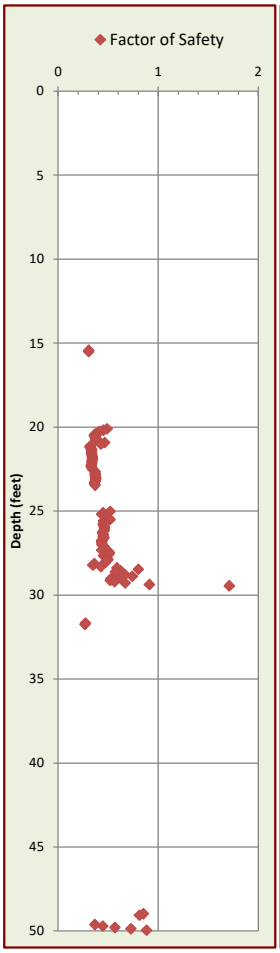
0.3 to 1.1 feet

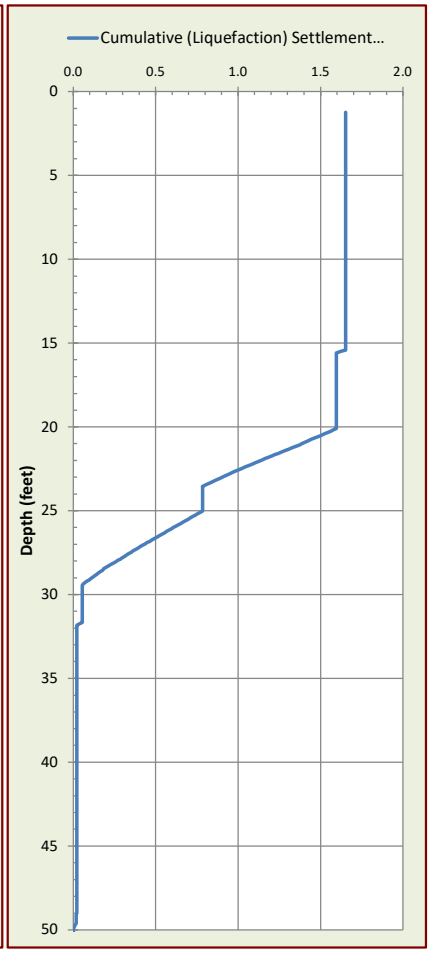
[1]Not Valid for L/H Values < 4 and > 40.

[2]LDI Values Only Summed to 2H Below Grade.









CORNERSTONE EARTH GROUP

FIGURE 4D

CPT NO. 4

PROJECT/CPT DATA

Project Title	Laurelwood
Project No.	1075-1-2
Project Manager	MR

SEISMIC PARAMETERS

Controlling Fault	San Andreas	
Earthquake Magnitude (Mw)	7.9	
PGA (Amax)	0.5	(g)

SITE SPECIFIC PARAMETERS

Ground Water Depth at Time of Drilling (feet)	5.7
Design Water Depth (feet)	5
Ave. Unit Weight Above GW (pcf)	125
Ave. Unit Weight Below GW (pcf)	120

CPT ANALYSIS RESULTS

DRY SAND SETTLEMENT FROM 5 FEET

0.00 (Inches)

LIQUEFACTION SETTLEMENT FROM 50 FEET

0.92 (Inches)

TOTAL SEISMIC SETTLEMENT 0.9 **INCHES**

POTENTIAL LATERAL DISPLACEMENT

LDI[2] 0.92 L/H 55.3

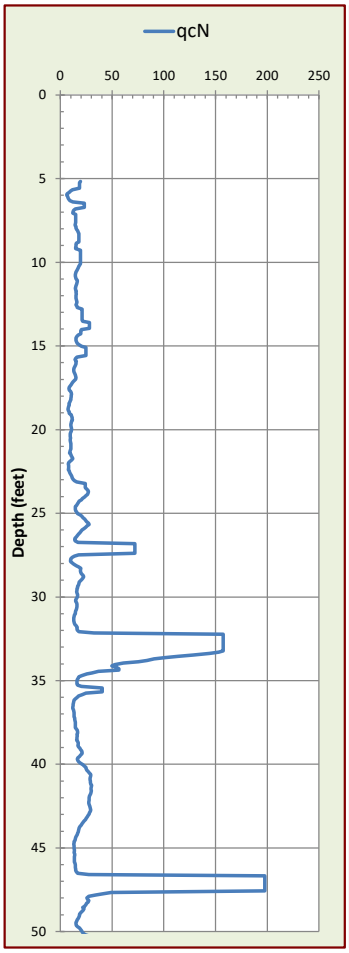
LDI[1] Corrected for Distance 0.22 (4 < L/H < 40)

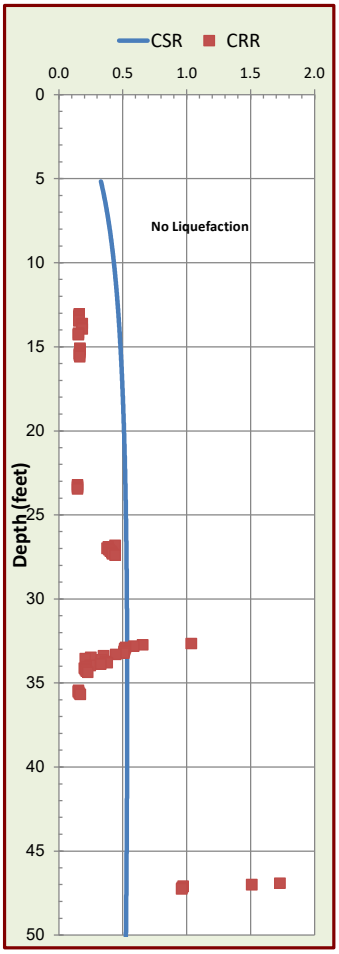
EXPECTED RANGE OF DISPLACEMENT

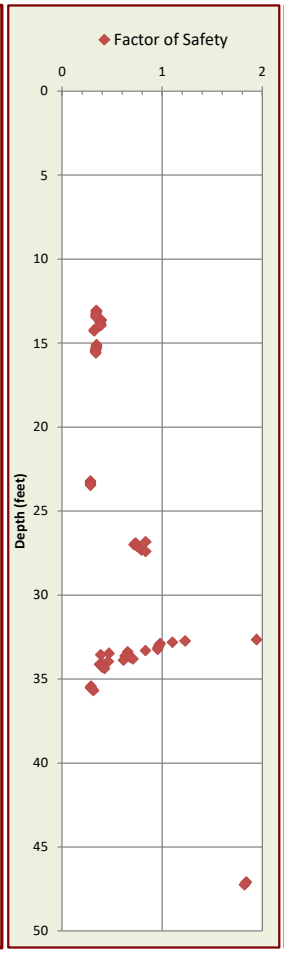
0.1 to 0.4 feet

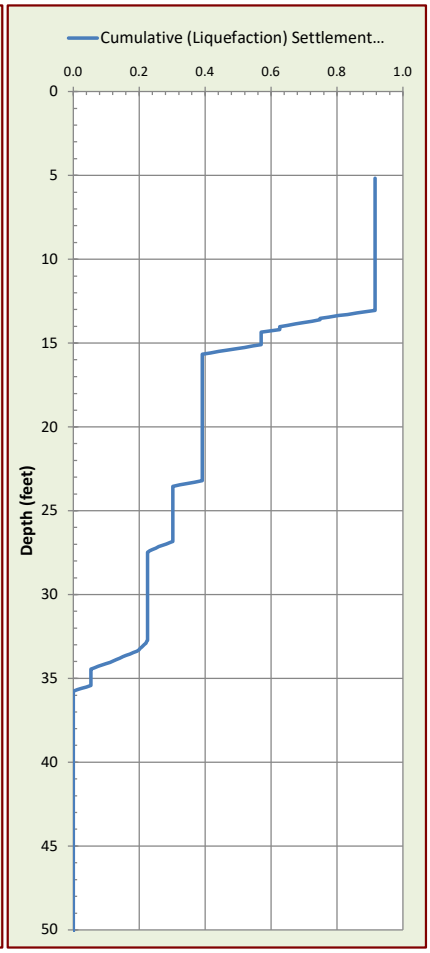
[1]Not Valid for L/H Values < 4 and > 40.

[2]LDI Values Only Summed to 2H Below Grade.









CORNERSTONE EARTH GROUP

FIGURE 4E

CPT NO. 1P

PROJECT/CPT DATA

Project Title	Prologis Santa Clara
Project No.	1075-1-2
Project Manager	MFR

SEISMIC PARAMETERS

Controlling Fault	San Andreas	
Earthquake Magnitude (Mw)	7.9	
PGA (Amax)	0.5	(g)

SITE SPECIFIC PARAMETERS

Ground Water Depth at Time of Drilling (feet)	5
Design Water Depth (feet)	5
Ave. Unit Weight Above GW (pcf)	125
Ave. Unit Weight Below GW (pcf)	120

CPT ANALYSIS RESULTS

DRY SAND SETTLEMENT FROM 5 FEET

0.00 (Inches)

LIQUEFACTION SETTLEMENT FROM 50 FEET

0.57 (Inches)

TOTAL SEISMIC SETTLEMENT 0.6 INCHES

POTENTIAL LATERAL DISPLACEMENT

LDI[2] 0.44 L/H 28.2

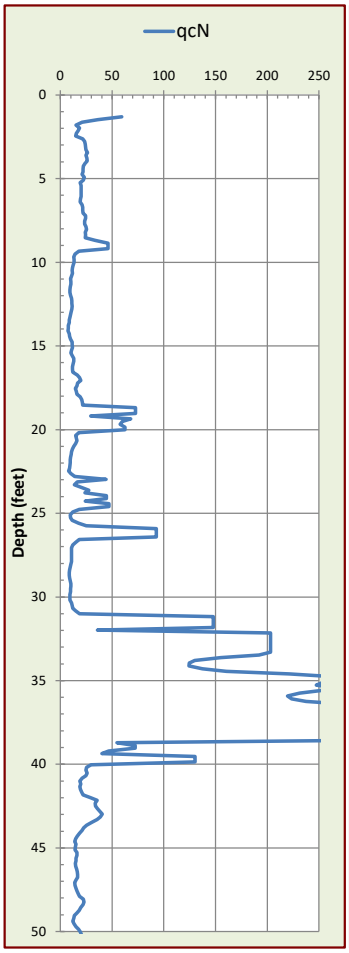
LDI[1] Corrected for Distance 0.18 (4 < L/H < 40)

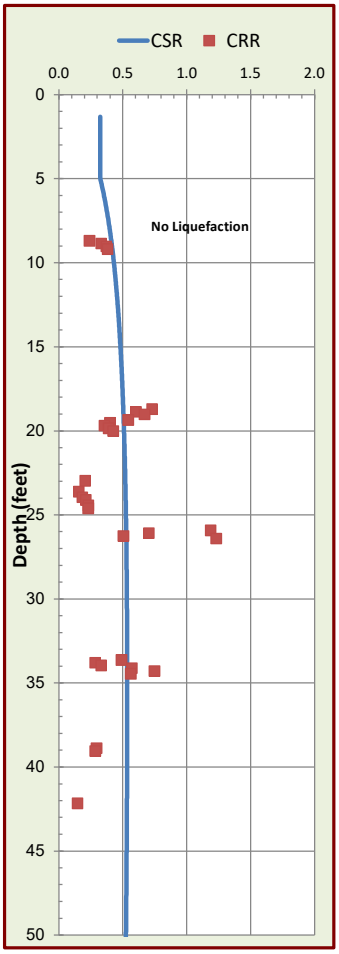
EXPECTED RANGE OF DISPLACEMENT

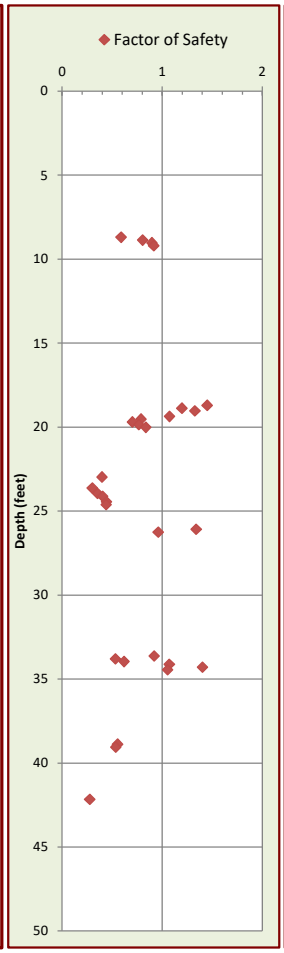
0.1 to 0.4 feet

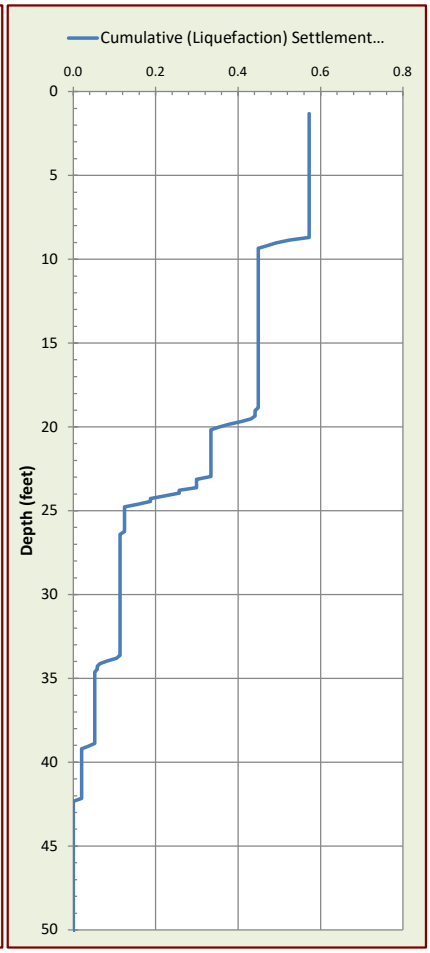
[1]Not Valid for L/H Values < 4 and > 40.

[2]LDI Values Only Summed to 2H Below Grade.









CORNERSTONE EARTH GROUP

FIGURE 4F

CPT NO. 2P

PROJECT/CPT DATA

Project Title	Prologis Santa Clara
Project No.	1075-1-2
Project Manager	MFR

SEISMIC PARAMETERS

Controlling Fault	San Andreas	
Earthquake Magnitude (Mw)	7.9	
PGA (Amax)	0.5	(g)

SITE SPECIFIC PARAMETERS

Ground Water Depth at Time of Drilling (feet)	8
Design Water Depth (feet)	5
Ave. Unit Weight Above GW (pcf)	125
Ave. Unit Weight Below GW (pcf)	120

CPT ANALYSIS RESULTS

DRY SAND SETTLEMENT FROM	5	FEET
	0.01	(Inches)
LIQUEFACTION SETTLEMENT FROM	50	FEET
	0.08	(Inches)
TOTAL SEISMIC SETTLEMENT	0.1	INCHES

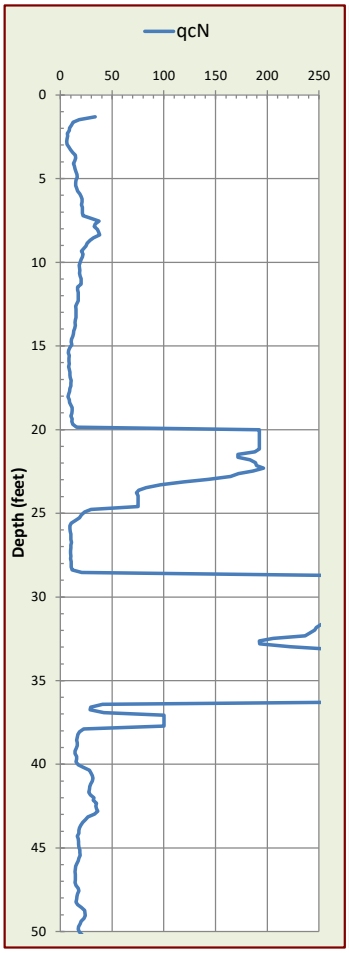
POTENTIAL LATERAL DISPLACEMENT

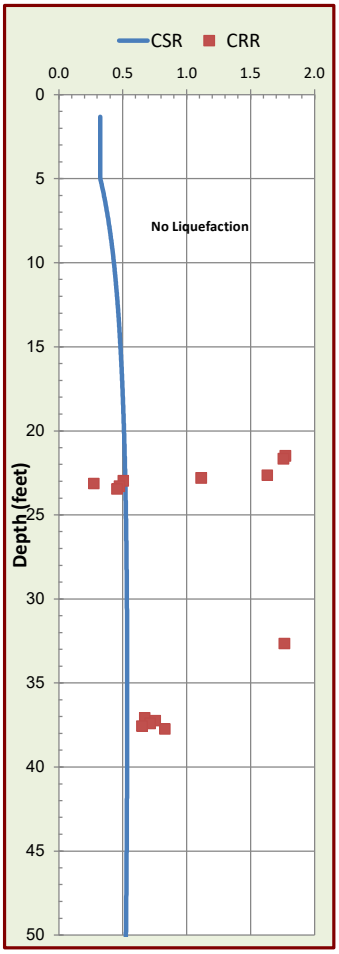
LDI[2]	0.05	L/H	26.5
LDI[1] Corrected for Distance	0.02	(4 < L/H < 40)	

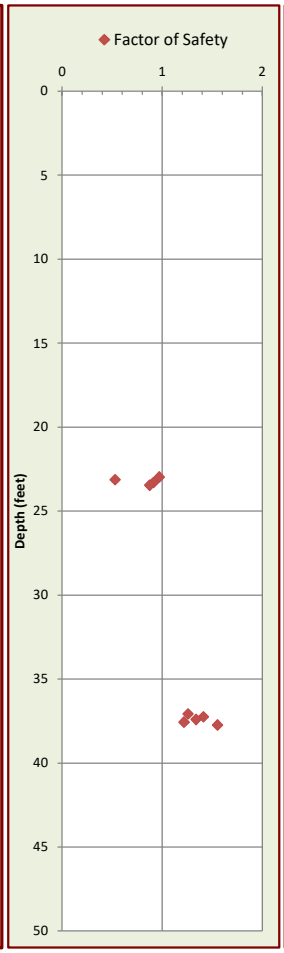
EXPECTED RANGE OF DISPLACEMENT

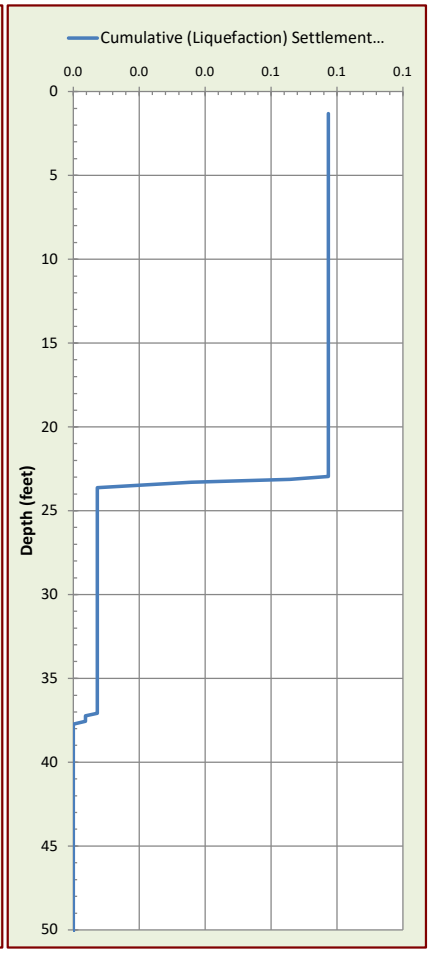
0.0 to 0.0 feet

[1]Not Valid for L/H Values < 4 and > 40.
[2]LDI Values Only Summed to 2H Below Grade.









CORNERSTONE EARTH GROUP

FIGURE 4G

CPT NO. 3P

PROJECT/CPT DATA

Project Title	Prologis Santa Clara
Project No.	1075-1-2
Project Manager	MFR

SEISMIC PARAMETERS

Controlling Fault	San Andreas	
Earthquake Magnitude (Mw)	7.9	
PGA (Amax)	0.5	(g)

SITE SPECIFIC PARAMETERS

Ground Water Depth at Time of Drilling (feet)	12
Design Water Depth (feet)	5
Ave. Unit Weight Above GW (pcf)	125
Ave. Unit Weight Below GW (pcf)	120

CPT ANALYSIS RESULTS

DRY SAND SETTLEMENT FROM	5	FEET
	0.00	(Inches)
LIQUEFACTION SETTLEMENT FROM	50	FEET
	1.97	(Inches)
TOTAL SEISMIC SETTLEMENT	**2.0**	**INCHES**

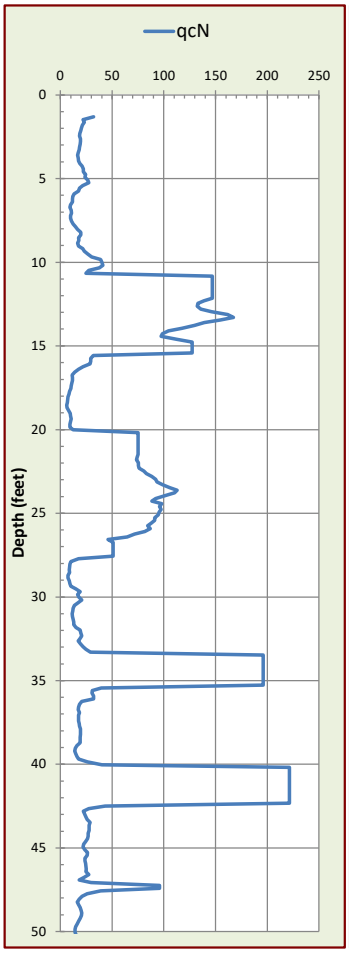
POTENTIAL LATERAL DISPLACEMENT

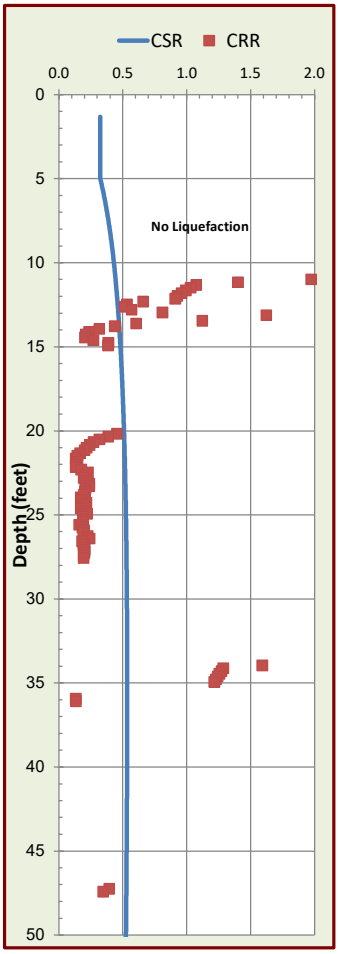
LDI[2]	2.19	L/H	46.5
LDI[1] Corrected for Distance	0.61	(4 < L/H < 40)	

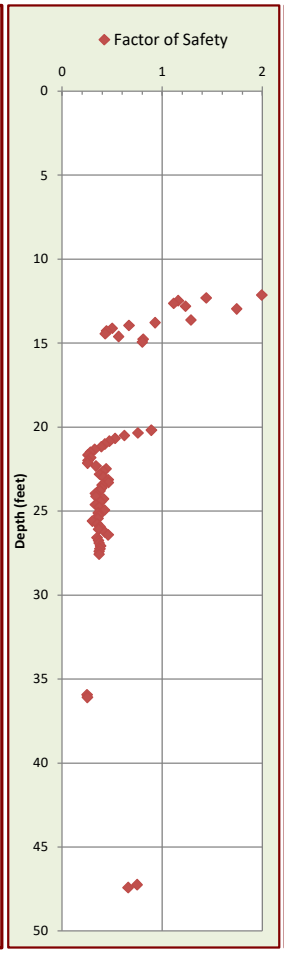
EXPECTED RANGE OF DISPLACEMENT

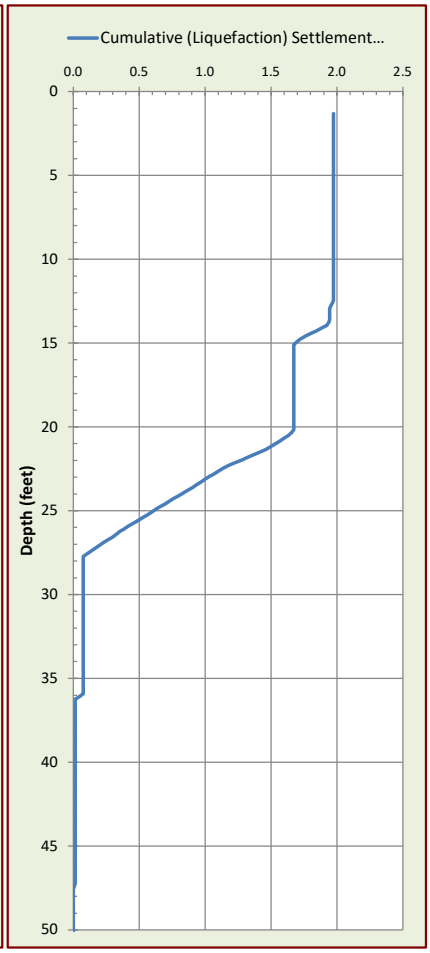
0.3 to 1.2 feet

[1]Not Valid for L/H Values < 4 and > 40.
[2]LDI Values Only Summed to 2H Below Grade.









CORNERSTONE EARTH GROUP

FIGURE 4H

CPT NO. 4P

PROJECT/CPT DATA

Project Title	Prologis Santa Clara
Project No.	1075-1-2
Project Manager	MFR

SEISMIC PARAMETERS

Controlling Fault	San Andreas	
Earthquake Magnitude (Mw)	7.9	
PGA (Amax)	0.5	(g)

SITE SPECIFIC PARAMETERS

Ground Water Depth at Time of Drilling (feet)	9
Design Water Depth (feet)	5
Ave. Unit Weight Above GW (pcf)	125
Ave. Unit Weight Below GW (pcf)	120

CPT ANALYSIS RESULTS

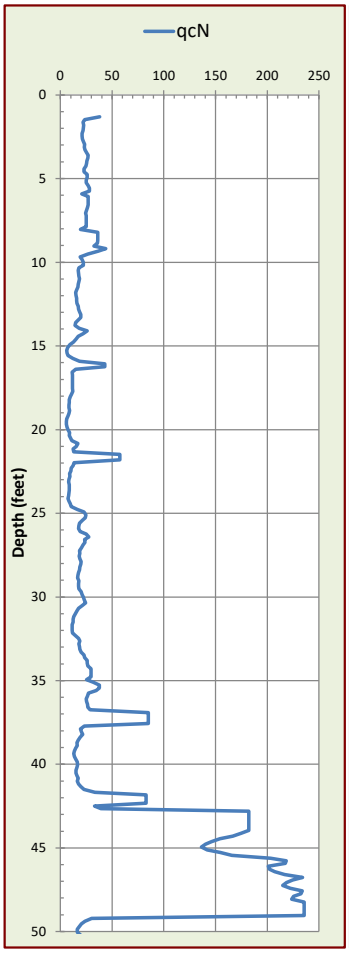
DRY SAND SETTLEMENT FROM	5	FEET
	0.00	(Inches)
LIQUEFACTION SETTLEMENT FROM	50	FEET
	0.50	(Inches)
TOTAL SEISMIC SETTLEMENT	0.5	INCHES

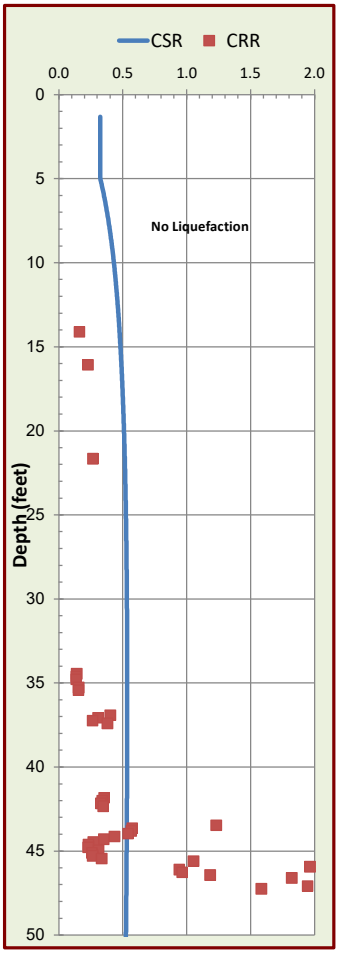
POTENTIAL LATERAL DISPLACEMENT

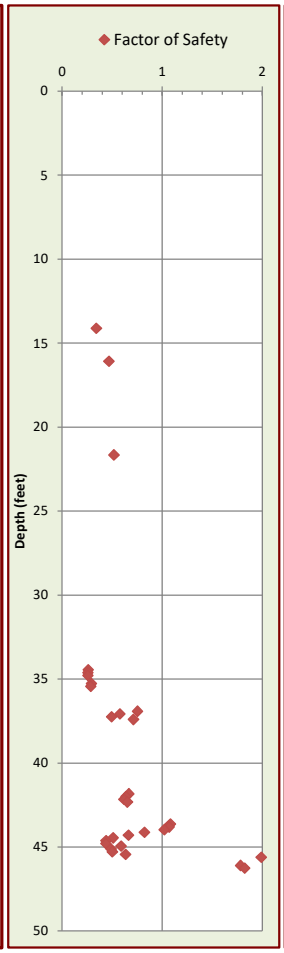
LDI[2]	0.12	L/H	68.8
LDI[1] Corrected for Distance	0.03	(4 < L/H < 40)	

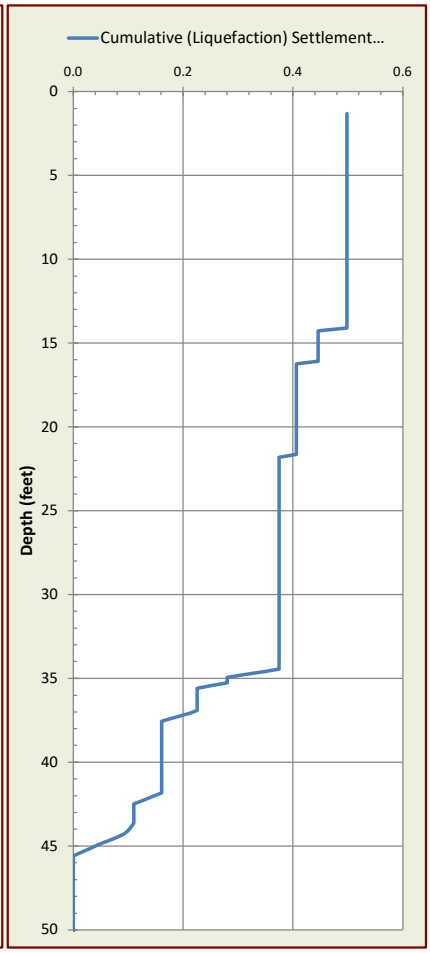
EXPECTED RANGE OF DISPLACEMENT: 0.0 to 0.1 feet

[1]Not Valid for L/H Values < 4 and > 40.
[2]LDI Values Only Summed to 2H Below Grade.









APPENDIX A: FIELD INVESTIGATION

The field investigation consisted of a surface reconnaissance and a subsurface exploration program using truck-mounted, hollow-stem auger drilling equipment and 20-ton truck-mounted Cone Penetration Test equipment. Eight 8-inch-diameter exploratory borings were drilled on January 8, 14, 15, and 16, 2019 to depths of 29½ to 80 feet. Four CPT soundings were also performed in accordance with ASTM D 5778-95 (revised, 2002) on December 21, 2018, to depths ranging from 50 to 110 feet. The approximate locations of exploratory borings and CPTs are shown on the Site Plan, Figure 2. The soils encountered were continuously logged in the field by our representative and described in accordance with the Unified Soil Classification System (ASTM D2488). Boring logs, as well as a key to the classification of the soil and bedrock, are included as part of this appendix.

Boring and CPT locations were approximated using existing site boundaries, and other site features as references. Boring and CPT elevations were not determined. The locations of the borings and CPTs should be considered accurate only to the degree implied by the method used.

Representative soil samples were obtained from the borings at selected depths. All samples were returned to our laboratory for evaluation and appropriate testing. The standard penetration resistance blow counts were obtained by dropping a 140-pound hammer through a 30-inch free fall. The 2-inch O.D. split-spoon sampler was driven 18 inches and the number of blows was recorded for each 6 inches of penetration (ASTM D1586). 2.5-inch I.D. samples were obtained using a Modified California Sampler driven into the soil with the 140-pound hammer previously described. Relatively undisturbed samples were also obtained with 2.875-inch I.D. Shelby Tube sampler which were hydraulically pushed. Unless otherwise indicated, the blows per foot recorded on the boring log represent the accumulated number of blows required to drive the last 12 inches. The various samplers are denoted at the appropriate depth on the boring logs.

The CPT involved advancing an instrumented cone-tipped probe into the ground while simultaneously recording the resistance at the cone tip (q_c) and along the friction sleeve (f_s) at approximately 5-centimeter intervals. Based on the tip resistance and tip to sleeve ratio (R_f), the CPT classified the soil behavior type and estimated engineering properties of the soil, such as equivalent Standard Penetration Test (SPT) blow count, internal friction angle within sand layers, and undrained shear strength in silts and clays. A pressure transducer behind the tip of the CPT cone measured pore water pressure (u_2). Graphical logs of the CPT data is included as part of this appendix.

Field tests included an evaluation of the unconfined compressive strength of the soil samples using a pocket penetrometer device. The results of these tests are presented on the individual boring logs at the appropriate sample depths.

Attached boring and CPT logs and related information depict subsurface conditions at the locations indicated and on the date designated on the logs. Subsurface conditions at other locations may differ from conditions occurring at these boring [and CPT] locations. The passage of time may result in altered subsurface conditions due to environmental changes. In

addition, any stratification lines on the logs represent the approximate boundary between soil types and the transition may be gradual.

UNIFIED SOIL CLASSIFICATION (ASTM D-2487-98)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES			GROUP SYMBOL	SOIL GROUP NAMES & LEGEND
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO 4. SIEVE	CLEAN GRAVELS <5% FINES	Cu>4 AND 1<Cc<3	GW	WELL-GRADED GRAVEL
			Cu>4 AND 1>Cc>3	GP	POORLY-GRADED GRAVEL
		GRAVELS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR CL	GM	SILTY GRAVEL
			FINES CLASSIFY AS CL OR CH	GC	CLAYEY GRAVEL
	SANDS >50% OF COARSE FRACTION PASSES ON NO 4. SIEVE	CLEAN SANDS <5% FINES	Cu>6 AND 1<Cc<3	SW	WELL-GRADED SAND
			Cu>6 AND 1>Cc>3	SP	POORLY-GRADED SAND
		SANDS AND FINES >12% FINES	FINES CLASSIFY AS ML OR CL	SM	SILTY SAND
			FINES CLASSIFY AS CL OR CH	SC	CLAYEY SAND
FINE-GRAINED SOILS >50% PASSES NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT<50	INORGANIC	PI>7 AND PLOTS>"A" LINE	CL	LEAN CLAY
			PI>4 AND PLOTS<"A" LINE	ML	SILT
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OL	ORGANIC CLAY OR SILT
	SILTS AND CLAYS LIQUID LIMIT>50	INORGANIC	PI PLOTS >"A" LINE	CH	FAT CLAY
			PI PLOTS <"A" LINE	MH	ELASTIC SILT
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OH	ORGANIC CLAY OR SILT
HIGHLY ORGANIC SOILS		PRIMARILY ORGANIC MATTER, DARK IN COLOR, AND ORGANIC ODOR		PT	PEAT

OTHER MATERIAL SYMBOLS

- Poorly-Graded Sand with Clay
- Clayey Sand
- Sandy Silt
- Artificial/Undocumented Fill
- Poorly-Graded Gravelly Sand
- Topsoil
- Well-Graded Gravel with Clay
- Well-Graded Gravel with Silt
- Sand
- Silt
- Well Graded Gravelly Sand
- Gravelly Silt
- Asphalt
- Boulders and Cobble

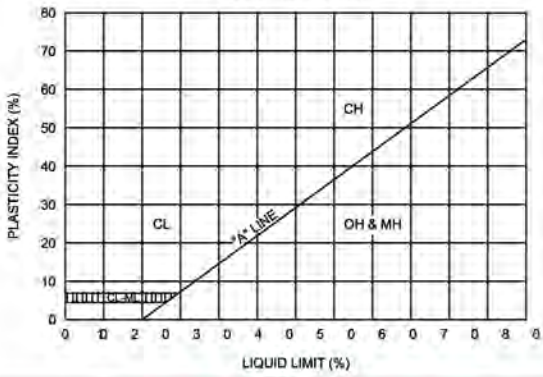
SAMPLER TYPES

- SPT
- Modified California (2.5" I.D.)
- Rock Core
- Shelby Tube
- No Recovery
- Grab Sample

ADDITIONAL TESTS

CA	-	CHEMICAL ANALYSIS (CORROSIVITY)	PI	-	PLASTICITY INDEX
CD	-	CONSOLIDATED DRAINED TRIAXIAL	SW	-	SWELL TEST
CN	-	CONSOLIDATION	TC	-	CYCLIC TRIAXIAL
CU	-	CONSOLIDATED UNDRAINED TRIAXIAL	TV	-	TORVANE SHEAR
DS	-	DIRECT SHEAR	UC	-	UNCONFINED COMPRESSION
PP	-	POCKET PENETROMETER (TSF)	(1.5)	-	(WITH SHEAR STRENGTH IN KSF)
(3.0)	-	(WITH SHEAR STRENGTH IN KSF)			
RV	-	R-VALUE	UU	-	UNCONSOLIDATED UNDRAINED TRIAXIAL
SA	-	SIEVE ANALYSIS: % PASSING #200 SIEVE			
▼	-	WATER LEVEL			

PLASTICITY CHART



PENETRATION RESISTANCE (RECORDED AS BLOWS / FOOT)				
SAND & GRAVEL		SILT & CLAY		
RELATIVE DENSITY	BLOWS/FOOT*	CONSISTENCY	BLOWS/FOOT*	STRENGTH** (KSF)
VERY LOOSE	0 - 4	VERY SOFT	0 - 2	0 - 0.25
LOOSE	4 - 10	SOFT	2 - 4	0.25 - 0.5
MEDIUM DENSE	10 - 30	MEDIUM STIFF	4 - 8	0.5 - 1.0
DENSE	30 - 50	STIFF	8 - 15	1.0 - 2.0
VERY DENSE	OVER 50	VERY STIFF	15 - 30	2.0 - 4.0
		HARD	OVER 30	OVER 4.0

* NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1-3/8 INCH I.D.) SPLIT-BARREL SAMPLER THE LAST 12 INCHES OF AN 18-INCH DRIVE (ASTM-1586 STANDARD PENETRATION TEST).

** UNDRAINED SHEAR STRENGTH IN KIPS/SQ. FT. AS DETERMINED BY LABORATORY TESTING OR APPROXIMATED BY THE STANDARD PENETRATION TEST, POCKET PENETROMETER, TORVANE, OR VISUAL OBSERVATION.

CORNERSTONE EARTH GROUP

LEGEND TO SOIL DESCRIPTIONS

Figure Number A-1

BORING NUMBER EB-1

CORNERSTONE EARTH GROUP

PROJECT NAME Laurelwood Data Center
PROJECT NUMBER 1075-1-2
PROJECT LOCATION Santa Clara, CA

DATE STARTED 1/16/19 DATE COMPLETED 1/16/19
GROUND ELEVATION _____ BORING DEPTH 60 ft.
DRILLING CONTRACTOR Exploration Geoservices, Inc.
LATITUDE _____ LONGITUDE _____
DRILLING METHOD Mobile B-53, 8 inch Hollow-Stem Auger
GROUNDWATER LEVELS:
LOGGED BY BCG
▽ AT TIME OF DRILLING 13 ft.
NOTES _____
▼ AT END OF DRILLING Not Encountered

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH, ksf (○ HAND PENETROMETER, △ TORVANE, ● UNCONFINED COMPRESSION, ▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL; 1.0 2.0 3.0 4.0)
	0		5 inches asphalt concrete							
			Fat Clay (CH) very stiff to stiff, moist, dark brown, some fine sand, high plasticity	18	MC-1B	97	26			○
				17	MC-2B		corr			○
	5			17	MC-3B	91	29			○
			Sandy Lean Clay (CL) very stiff, moist, light brown, fine to medium sand, some fine subangular to subrounded gravel, low to moderate plasticity	24	MC					○
	10		**Lean Clay (CL)** very stiff, moist, brown, some fine sand, moderate plasticity							
▽			**Lean Clay with Sand (CL)** medium stiff, moist, brown with gray mottles, fine sand, moderate plasticity	6	MC-5C	97	29			○
	15				ST					○
			Lean Clay (CL) medium stiff, moist, brown, some fine sand, moderate plasticity							
			Silty Sand (SM) medium dense, moist, gray, fine sand	24	MC-7C	103	23			○
	20			21	SPT-8B					○
			Lean Clay with Sand (CL) medium stiff to stiff, moist, gray, fine to medium sand, moderate plasticity							
				28	MC					○
	25		**Silty Sand (SM)** medium dense, moist, gray, fine to coarse sand	25	SPT					
			Lean Clay (CL) medium stiff, moist, gray, some fine sand, moderate plasticity							

Continued Next Page

BORING NUMBER EB-1

CORNERSTONE EARTH GROUP

PROJECT NAME Laurelwood Data Center

PROJECT NUMBER 1075-1-2

PROJECT LOCATION Santa Clara, CA

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ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH, ksf (○ HAND PENETROMETER, △ TORVANE, ● UNCONFINED COMPRESSION, ▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL) 1.0 2.0 3.0 4.0
	30		**Lean Clay (CL)** medium stiff, moist, gray, some fine sand, moderate plasticity	12	SPT-11		35			○
			Poorly Graded Sand (SP) medium dense, wet, gray, fine to coarse sand	15	SPT					
	35			30	SPT-13E		22			
			Clayey Sand with Gravel (SC) dense, moist, gray, fine to medium sand, fine subangular to subrounded gravel							
			Lean Clay with Sand (CL) medium stiff, moist, gray, fine to medium sand, moderate plasticity	30	MC					○
	40		becomes stiff	21	MC-15	107	21			○
	45		**Poorly Graded Sand (SP)** very dense, wet, gray, fine to medium sand	58	SPT					
			Lean Clay with Sand (CL) stiff, moist, gray with brown mottles, fine sand, moderate plasticity	20	NR					○
	50			22	SPT					○
			Sandy Lean Clay (CL) medium stiff, moist, gray with brown mottles, fine sand, moderate plasticity	21	MC-19	103	24			○
	55		**Lean Clay with Sand (CL)** stiff, moist, gray with brown mottles, fine sand, moderate plasticity							
				26	MC					○
	60		Bottom of Boring at 60.0 feet.							

BORING NUMBER EB-2

CORNERSTONE EARTH GROUP

PROJECT NAME Laurelwood Data Center
PROJECT NUMBER 1075-1-2
PROJECT LOCATION Santa Clara, CA

DATE STARTED 1/16/19 DATE COMPLETED 1/16/19
GROUND ELEVATION _____ BORING DEPTH 35 ft.
DRILLING CONTRACTOR Exploration Geoservices, Inc.
LATITUDE _____ LONGITUDE _____
DRILLING METHOD Mobile B-53, 8 inch Hollow-Stem Auger
GROUNDWATER LEVELS:
LOGGED BY BCG
▽ AT TIME OF DRILLING 15 ft.
NOTES _____
▼ AT END OF DRILLING 10 ft.

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
	0	3½ inches asphalt concrete over 8 inches aggregate base						
		Fat Clay (CH) very stiff, moist, dark brown, some fine sand, high plasticity Liquid Limit = 63, Plastic Limit = 20	30	MC-1B	94	28	43	
			20	MC-2B	103	23		
	5	**Lean Clay with Sand (CL)** very stiff, moist, brown, fine to medium sand, moderate plasticity	26	MC				
		Sandy Lean Clay (CL) very stiff, moist, light brown, fine to medium sand, some fine subangular to subrounded gravel, low to moderate plasticity Liquid Limit = 33, Plastic Limit = 19	13	3A MC 3B	99 110	25 18	14	
			11	MC-5B	108	19		
	10	**Clayey Sand (SC)** medium dense, moist, gray and brown mottled, fine to medium sand	15	MC				
		Lean Clay (CL) very stiff, moist, brown with gray mottles, some fine sand, moderate plasticity						
	15	becomes stiff	16	MC-7B	96	28		
		Lean Clay with Sand (CL) medium stiff, moist, gray with brown mottles, fine to medium sand, moderate plasticity	14	MC				
	20	becomes stiff	32	MC-9B	110	19		
	25							

UNDRAINED SHEAR STRENGTH, ksf
○ HAND PENETROMETER
△ TORVANE
● UNCONFINED COMPRESSION
▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL
1.0 2.0 3.0 4.0

Continued Next Page

BORING NUMBER EB-2

CORNERSTONE EARTH GROUP

PROJECT NAME Laurelwood Data Center

PROJECT NUMBER 1075-1-2

PROJECT LOCATION Santa Clara, CA

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH, ksf (○ HAND PENETROMETER, △ TORVANE, ● UNCONFINED COMPRESSION, ▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL) 1.0 2.0 3.0 4.0
			Lean Clay with Sand (CL) very stiff, moist, brown, fine to medium sand, moderate plasticity							
	30			25	MC					○
			Lean Clay (CL) very stiff, moist, brown, trace fine sand, moderate plasticity							
	35			29	MC-11B	105	22			○
			Bottom of Boring at 35.0 feet.							
	40									
	45									
	50									
	55									

BORING NUMBER EB-3

CORNERSTONE EARTH GROUP

PROJECT NAME Laurelwood Data Center
PROJECT NUMBER 1075-1-2
PROJECT LOCATION Santa Clara, CA

DATE STARTED 1/14/19 DATE COMPLETED 1/14/19
GROUND ELEVATION _____ BORING DEPTH 40 ft.
DRILLING CONTRACTOR Exploration Geoservices, Inc.
LATITUDE _____ LONGITUDE _____
DRILLING METHOD Mobile B-56, 8 inch Hollow-Stem Auger
GROUNDWATER LEVELS:
LOGGED BY BCG
AT TIME OF DRILLING 9 ft.
NOTES _____
AT END OF DRILLING 26 ft.

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ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
	0	4 inches asphalt concrete over 5 inches aggregate base						
		Fat Clay (CH) very stiff, moist, dark brown, some fine sand, high plasticity	36	MC-1B	94	28		
		Lean Clay with Sand (CL) very stiff, moist, brown, fine sand, moderate plasticity	32	MC-2B	109	20		
	5	**Sandy Lean Clay (CL)** stiff, moist, light brown, fine to medium sand, some fine subangular to subrounded gravel, low to moderate plasticity Liquid Limit = 30, Plastic Limit = 17	21	MC-3	100	26	13	
			28	MC-4B	109	21		
		Lean Clay with Sand (CL) very stiff, moist, brown with gray mottles, fine to medium sand, moderate plasticity	27	MC				
	10		36	MC-6B	98	27		
			26	MC				
		Silty Sand (SM) medium dense, moist, brown, fine to medium sand	30	MC				
	15	NP = Non Plastic	9	8A SPT		24	NP	
		Lean Clay with Sand (CL) stiff, moist, gray with brown mottles, fine to medium sand, moderate plasticity		8B		22		
			20	MC-9B	98	28		
	20	**Sandy Lean Clay (CL)** medium stiff, moist, gray, fine sand, low to moderate plasticity	13	SPT				
		Lean Clay with Sand (CL) very stiff, moist, gray with brown mottles, fine to medium sand, moderate plasticity	47	MC				
	25							

Continued Next Page

UNDRAINED SHEAR STRENGTH, ksf
○ HAND PENETROMETER
△ TORVANE
● UNCONFINED COMPRESSION
▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL
1.0 2.0 3.0 4.0

BORING NUMBER EB-3

CORNERSTONE EARTH GROUP

PROJECT NAME Laurelwood Data Center

PROJECT NUMBER 1075-1-2

PROJECT LOCATION Santa Clara, CA

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ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH, ksf (○ HAND PENETROMETER, △ TORVANE, ● UNCONFINED COMPRESSION, ▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL) 1.0 2.0 3.0 4.0
	30		**Lean Clay with Sand (CL)** stiff, moist, gray with brown mottles, fine to medium sand, moderate plasticity	30	MC-12B	107	21			○
	35		**Poorly Graded Sand with Silt (SP-SM)** medium dense, moist, gray, fine to medium sand	30	MC					
	40		**Sandy Lean Clay (CL)** stiff, moist, gray, fine to medium sand, low plasticity	30	MC-14B	109	21			○
			Bottom of Boring at 40.0 feet.							
	45									
	50									
	55									

BORING NUMBER EB-4

CORNERSTONE EARTH GROUP

PROJECT NAME Laurelwood Data Center
PROJECT NUMBER 1075-1-2
PROJECT LOCATION Santa Clara, CA

DATE STARTED 1/8/19 DATE COMPLETED 1/8/19
GROUND ELEVATION _____ BORING DEPTH 80 ft.
DRILLING CONTRACTOR Exploration Geoservices, Inc.
LATITUDE _____ LONGITUDE _____
DRILLING METHOD Mobile B-56, 8 inch Hollow-Stem Auger
GROUNDWATER LEVELS:
LOGGED BY JLC
▽ AT TIME OF DRILLING 12 ft.
NOTES _____
▼ AT END OF DRILLING 38 ft.

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ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
	0		3 inches asphalt concrete over 15 inches aggregate base						
			Fat Clay (CH) very stiff to hard, moist, dark brown, some fine sand, high plasticity	78	MC-1B		corr		
			some brown mottles	61	MC-2B	110	19		
	5		**Sandy Lean Clay (CL)** very stiff, moist, light brown, fine to medium sand, some fine subangular to subrounded gravel, low plasticity	38	MC-3B	108	19		
			Lean Clay with Sand (CL) stiff, moist, gray and brown mottled, fine to medium sand, moderate plasticity	29	MC				
			Sandy Lean Clay (CL) stiff, moist, gray, fine to medium sand, low plasticity	25	MC-5B	112	20		
	10			14	6B MC	103	20		
			Clayey Sand (SC) loose, moist, brown, fine to medium sand		6C	103	23		
▽				13	MC				
			Poorly Graded Sand with Silt (SP-SM) medium dense, moist, brown, fine to medium sand, some fine subangular to subrounded gravel	30	MC-8		25		
	15								
			Lean Clay (CL) stiff, moist, gray, some fine sand, moderate plasticity		ST-9	91	32		
	20		**Clayey Sand (SC)** medium dense, moist, gray with brown mottles, fine to medium sand						
			Lean Clay with Sand (CL) stiff, moist, gray, fine to medium sand, moderate plasticity	23	SPT-10B		18		
	25								

Continued Next Page

UNDRAINED SHEAR STRENGTH, ksf
○ HAND PENETROMETER
△ TORVANE
● UNCONFINED COMPRESSION
▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL
1.0 2.0 3.0 4.0

CORNERSTONE EARTH GROUP

PROJECT NAME Laurelwood Data Center
PROJECT NUMBER 1075-1-2
PROJECT LOCATION Santa Clara, CA

This log is a part of a report by Cornerstone Earth Group, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH, ksf
			Sandy Lean Clay (CL) stiff, moist, gray, fine to medium sand, low plasticity		ST					○ HAND PENETROMETER △ TORVANE ● UNCONFINED COMPRESSION ▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL 1.0 2.0 3.0 4.0
	30			35	MC-12B	107	23			
			Clayey Sand (SC) medium dense, moist, brown, fine to medium sand							
			Poorly Graded Sand with Silt (SP-SM) medium dense, moist, brown, fine to medium sand	52	MC					
	35									
▼			**Sandy Lean Clay (CL)** very stiff, moist, gray, fine to medium sand, low to moderate plasticity							
	40			52	MC-14B	113	21			
			Lean Clay with Sand (CL) hard, moist, gray, fine sand, moderate plasticity							
				78	MC-15B	106	23			>4.5
	45									
				55	MC-16B	109	21			>4.5
	50									
			Poorly Graded Sand with Silt (SP-SM) dense, moist, brown, fine to coarse sand							
				70	MC					
	55									

Continued Next Page

BORING NUMBER EB-4

CORNERSTONE EARTH GROUP

PROJECT NAME Laurelwood Data Center

PROJECT NUMBER 1075-1-2

PROJECT LOCATION Santa Clara, CA

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ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH, ksf (○ HAND PENETROMETER, △ TORVANE, ● UNCONFINED COMPRESSION, ▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL) 1.0 2.0 3.0 4.0
			Poorly Graded Sand with Silt (SP-SM) dense, moist, brown, fine to coarse sand							
			Lean Clay (CL) hard, moist, gray, some fine sand, moderate plasticity	50/5"	MC-18C	104	23			>4.5 ○
	60		becomes very stiff	62	MC-19B	102	25			○
	65			71	MC-20B	102	23			○
	70		**Clayey Sand (SC)** medium dense, moist, gray, fine to medium sand	65	MC-21B	113	18			
	75		**Lean Clay with Sand (CL)** very stiff, moist, gray, fine sand, moderate plasticity	68	MC-22B	101	24			○
	80		Bottom of Boring at 80.0 feet.							
	85									

BORING NUMBER EB-5

CORNERSTONE EARTH GROUP

PROJECT NAME Laurelwood Data Center
PROJECT NUMBER 1075-1-2
PROJECT LOCATION Santa Clara, CA

DATE STARTED 1/15/19 DATE COMPLETED 1/15/19
GROUND ELEVATION _____ BORING DEPTH 29.5 ft.
DRILLING CONTRACTOR Exploration Geoservices, Inc.
LATITUDE _____ LONGITUDE _____
DRILLING METHOD Mobile B-56, 8 inch Hollow-Stem Auger
GROUNDWATER LEVELS:
LOGGED BY BCG
▽ AT TIME OF DRILLING 9 ft.
NOTES _____
▼ AT END OF DRILLING 8 ft.

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ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
	0	5 inches asphalt concrete over 2 inches aggregate base						
		Fat Clay (CH) very stiff, moist, dark brown, some fine sand, high plasticity some brown mottles	19	MC-1B		28		
			37	MC-2C	100	24		
	5		39	MC				
		Sandy Lean Clay (CL) very stiff, moist, light brown to brown, fine to medium sand, some fine subangular to subrounded gravel, low to moderate plasticity Liquid Limit = 35, Plastic Limit = 17	40	MC-4B	110	20		
			50	MC-5B	115	18	19	
	10	**Lean Clay with Sand (CL)** very stiff, moist, brown, fine to medium sand, moderate plasticity	25	MC-6B	110	20		
			45	MC				
	15							
		Lean Clay (CL) stiff, moist, gray, some fine sand, moderate plasticity	21	MC-8B	99	26		
	20							
			21	MC				
	25							
		Poorly Graded Sand with Silt and Gravel (SP-SM) very dense, moist, gray, fine to medium sand	50/6"	SPT-10		14		
	30	Bottom of Boring at 29.5 feet.						

UNDRAINED SHEAR STRENGTH, ksf
○ HAND PENETROMETER
△ TORVANE
● UNCONFINED COMPRESSION
▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL
1.0 2.0 3.0 4.0

BORING NUMBER EB-6

CORNERSTONE EARTH GROUP

PROJECT NAME Laurelwood Data Center
PROJECT NUMBER 1075-1-2
PROJECT LOCATION Santa Clara, CA

DATE STARTED 1/14/19 DATE COMPLETED 1/14/19
GROUND ELEVATION _____ BORING DEPTH 29.9 ft.
DRILLING CONTRACTOR Exploration Geoservices, Inc.
LATITUDE _____ LONGITUDE _____
DRILLING METHOD Mobile B-56, 8 inch Hollow-Stem Auger
GROUNDWATER LEVELS:
LOGGED BY BCG
▽ AT TIME OF DRILLING 11 ft.
NOTES _____
▼ AT END OF DRILLING 8 ft.

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ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
	0		3 inches asphalt concrete over 8 inches aggregate base						
			Fat Clay (CH) very stiff, moist, dark brown, some fine sand, high plasticity	38	MC-1A	100	27		
				60	MC-2B	100	27		
	5		**Lean Clay with Sand (CL)** very stiff, moist, brown, fine sand, moderate plasticity	42	MC				
			Sandy Lean Clay (CL) hard to very stiff, moist, light brown, fine to medium sand, some fine subangular to subrounded gravel, low to moderate plasticity	41	MC-4B	104	23		
				28	MC				
	10		**Clayey Sand (SC)** medium dense, moist, brown, fine to medium sand Liquid Limit = 26, Plastic Limit = 15	27	MC-6B	107	21	11	
				28	MC-7B	103	24		
			Lean Clay with Sand (CL) very stiff, moist, brown with gray mottles, fine sand, moderate plasticity						
	15								
			Sandy Silty Clay (CL-ML) very stiff, moist, brown, fine sand, low plasticity						
	20			31	MC-8B	103	23		
			Lean Clay with Sand (CL) stiff, moist, brown with gray mottles, fine to medium sand, moderate plasticity	10	SPT-9		35		
	25		**Poorly Graded Sand with Silt and Gravel (SP-SM)** very dense, wet, brown, fine to medium sand, fine to coarse subangular to subrounded gravel	50/5"	SPT				
	30		Bottom of Boring at 29.9 feet.						

UNDRAINED SHEAR STRENGTH, ksf
○ HAND PENETROMETER
△ TORVANE
● UNCONFINED COMPRESSION
▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL
1.0 2.0 3.0 4.0

BORING NUMBER EB-7

CORNERSTONE EARTH GROUP

PROJECT NAME Laurelwood Data Center
PROJECT NUMBER 1075-1-2
PROJECT LOCATION Santa Clara, CA

DATE STARTED 1/15/19 DATE COMPLETED 1/15/19
GROUND ELEVATION _____ BORING DEPTH 30 ft.
DRILLING CONTRACTOR Exploration Geoservices, Inc.
LATITUDE _____ LONGITUDE _____
DRILLING METHOD Mobile B-56, 8 inch Hollow-Stem Auger
GROUNDWATER LEVELS:
LOGGED BY BCG
▽ AT TIME OF DRILLING 10 ft.
NOTES _____
▼ AT END OF DRILLING 8 ft.

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ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE	UNDRAINED SHEAR STRENGTH, ksf (○ HAND PENETROMETER, △ TORVANE, ● UNCONFINED COMPRESSION, ▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL; 1.0 2.0 3.0 4.0)
	0		**Fat Clay with Gravel (CH) [Fill]** hard, moist, dark brown with brown mottles, fine to coarse subangular gravel, some fine sand, high plasticity	57	MC-1B	108	19			>4.5 ○
			Fat Clay (CH) hard, moist, dark brown, some fine sand, high plasticity	53	MC-2B	104	19			>4.5 ○
	5			52	MC-3B		corr			>4.5 ○
			Lean Clay with Sand (CL) very stiff, moist, brown to light brown, fine to medium sand, low to moderate plasticity	37	MC-4B	103	20			○
▼				32	MC-5B	99	23			○
	10									
			Lean Clay (CL) very stiff, moist, brown with gray mottles, some fine sand, moderate plasticity	29	MC-6B	107	23			○
	15									
			becomes stiff	23	MC					○
	20									
			Silty Sand (SM) medium dense, moist, gray, fine to medium sand	29	MC-8B	101	24			
	25		**Sandy Lean Clay (CL)** stiff, moist, brown, fine to medium sand, low to moderate plasticity	25	SPT					○
			Silty Sand (SM) medium dense, moist, gray, fine to medium sand	19	SPT-10		20			
	30		Bottom of Boring at 30.0 feet.							

BORING NUMBER EB-8

CORNERSTONE EARTH GROUP

PROJECT NAME Laurelwood Data Center
PROJECT NUMBER 1075-1-2
PROJECT LOCATION Santa Clara, CA

DATE STARTED 1/14/19 DATE COMPLETED 1/14/19
GROUND ELEVATION _____ BORING DEPTH 60 ft.
DRILLING CONTRACTOR Exploration Geoservices, Inc.
LATITUDE _____ LONGITUDE _____
DRILLING METHOD Mobile B-56, 8 inch Hollow-Stem Auger
GROUNDWATER LEVELS:
LOGGED BY BCG
▽ AT TIME OF DRILLING 9 ft.
NOTES _____
▼ AT END OF DRILLING 22 ft.

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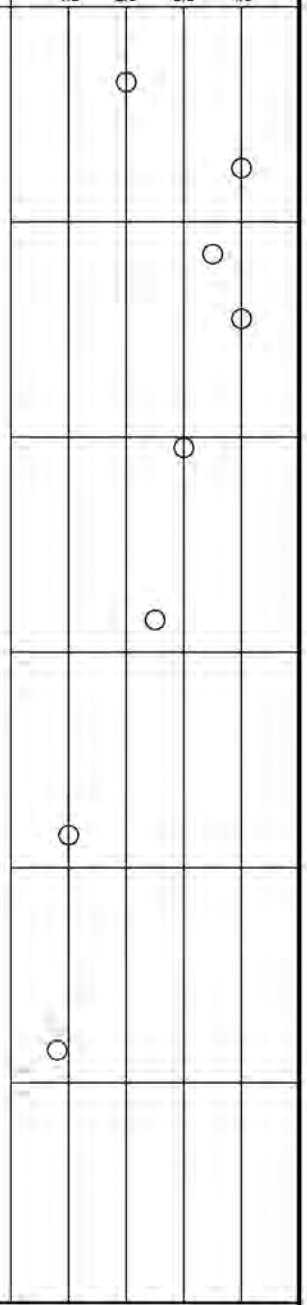
ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
	0	4 inches asphalt concrete over 4 inches aggregate base						
		Fat Clay (CH) very stiff, moist, dark brown, some fine sand, high plasticity	48	MC-1B	92	31		
			68	MC-2B	107	20		
	5	**Lean Clay with Sand (CL)** very stiff, moist, brown, fine to medium sand, moderate plasticity	52	MC-3B	111	19		
		Sandy Lean Clay (CL) very stiff, moist, light brown, fine to medium sand, some fine subangular to subrounded gravel, low to moderate plasticity	59	MC				
			50/5"	MC-5B	127	9		
	10	**Clayey Sand (SC)** very dense to medium dense, wet, gray and brown mottled, fine to coarse sand, some fine subangular to subrounded gravel	18	SPT-5B		17		
		Lean Clay with Sand (CL) very stiff, moist, gray with brown mottles, fine to medium sand, moderate plasticity	38	MC				
	15							
		Lean Clay (CL) stiff to medium stiff, moist, gray with brown mottles, some fine sand, moderate plasticity	17	MC-8C	95	29		
	20							
			18	MC				
	25	**Lean Clay (CL)** very stiff, moist, gray with brown mottles, some fine sand, moderate plasticity						

Continued Next Page

UNDRAINED SHEAR STRENGTH, ksf
○ HAND PENETROMETER
△ TORVANE
● UNCONFINED COMPRESSION
▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL
1.0 2.0 3.0 4.0



BORING NUMBER EB-8

CORNERSTONE EARTH GROUP

PROJECT NAME Laurelwood Data Center

PROJECT NUMBER 1075-1-2

PROJECT LOCATION Santa Clara, CA

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ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT	PLASTICITY INDEX, %	PERCENT PASSING No. 200 SIEVE
	30		**Lean Clay (CL)** very stiff, moist, gray with brown mottles, some fine sand, moderate plasticity	28	MC-10B	101	27		
	35		**Clayey Sand (SC)** medium dense, moist, gray, fine sand	32	MC-11B		23		
				16	SPT				
	40		**Lean Clay with Sand (CL)** very stiff, moist, brown, fine to medium sand, moderate plasticity	27	MC				
			Silty Sand (SM) very dense, moist, gray, fine sand	56	SPT-14B		14		
	45		**Poorly Graded Sand with Silt (SP-SM)** very dense, wet, brown, fine to coarse sand	47	MC				
	50		**Lean Clay with Sand (CL)** very stiff, moist, gray, fine sand, low plasticity	53	MC-16B	103	24		
	55		**Lean Clay with Sand (CL)** very stiff, moist, gray, fine to medium sand, moderate plasticity	58	MC				
	60		Bottom of Boring at 60.0 feet.						

UNDRAINED SHEAR STRENGTH, ksf

○ HAND PENETROMETER

△ TORVANE

● UNCONFINED COMPRESSION

▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL

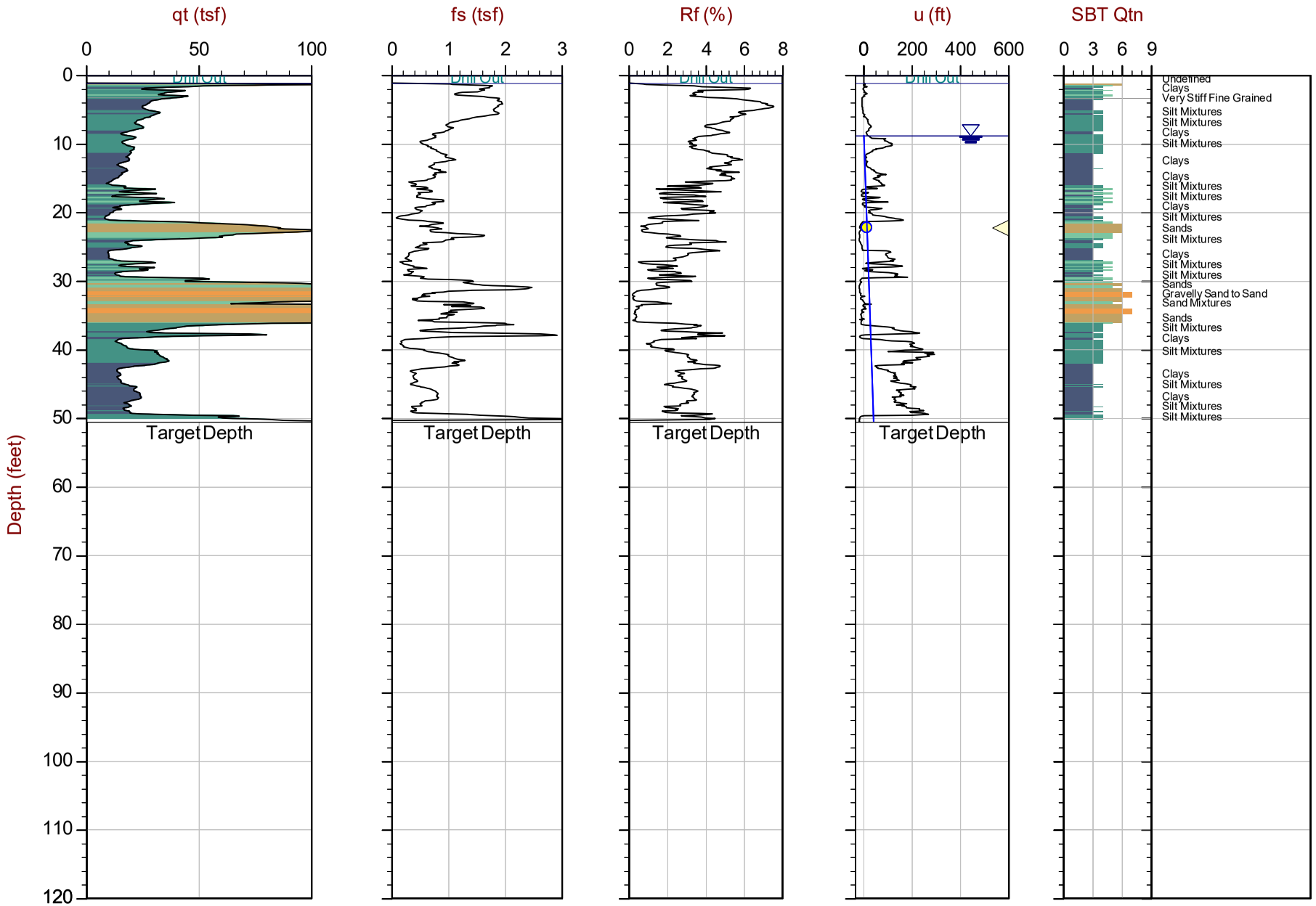
1.0 2.0 3.0 4.0

CONETEC

Cornerstone

Job No: 18-56212
Date: 2018-12-21 12:14
Site: 2201 Laurelwood

Sounding: CPT-01
Cone: 448:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 18-56212_CP01.COR
Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM10N: 4137996m E: 591464m
Sheet No: 1 of 1

Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq unachieved, Hydrostatic Line

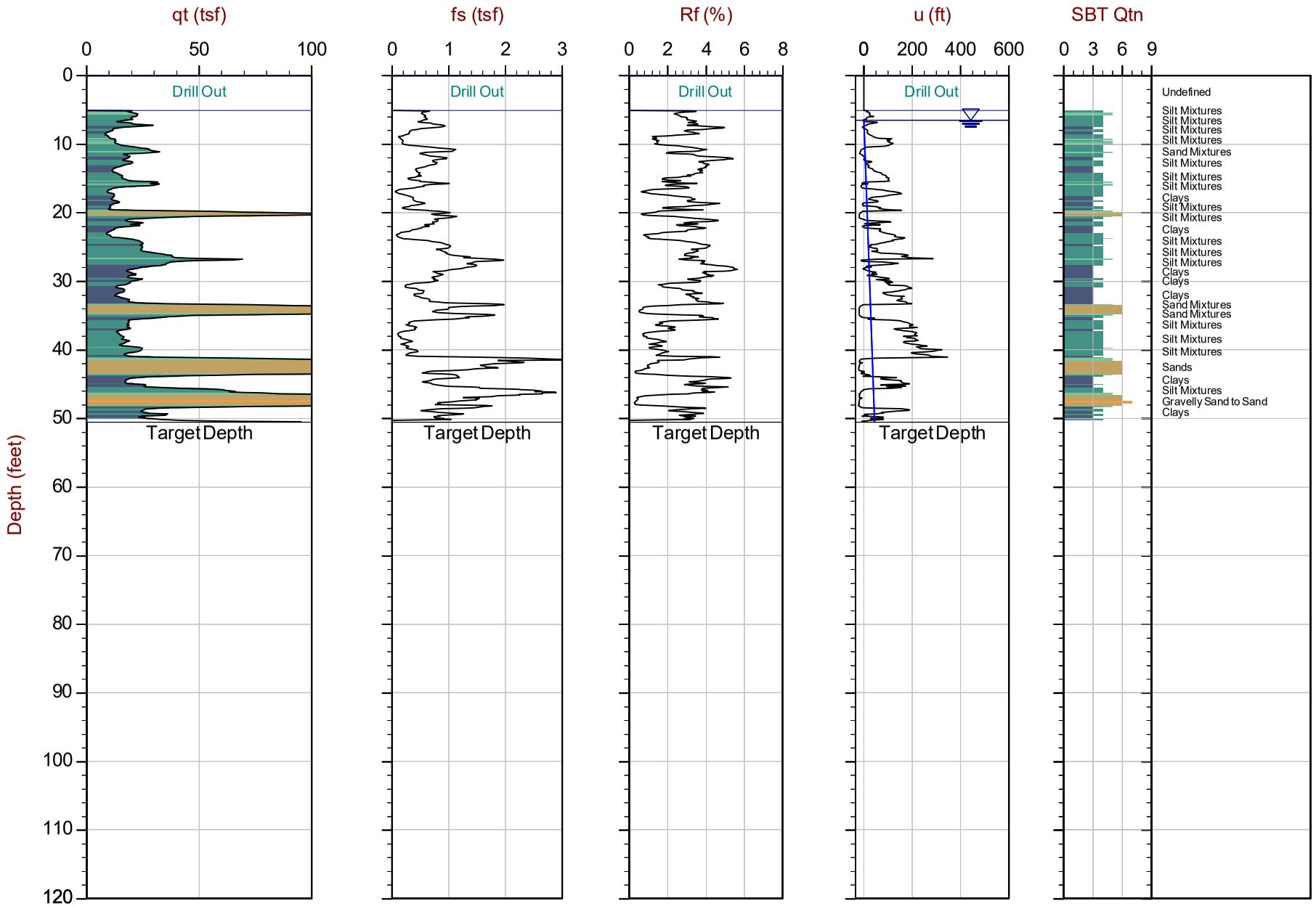
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Cornerstone

Job No: 18-56212
Date: 2018-12-21 13:55
Site: 2201 Laurelwood

Sounding: CPT-02
Cone: 448:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 18-56212_CP02.COR
Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM10N: 4138050m E: 591611m
Sheet No: 1 of 1

Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq unachieved, Hydrostatic Line

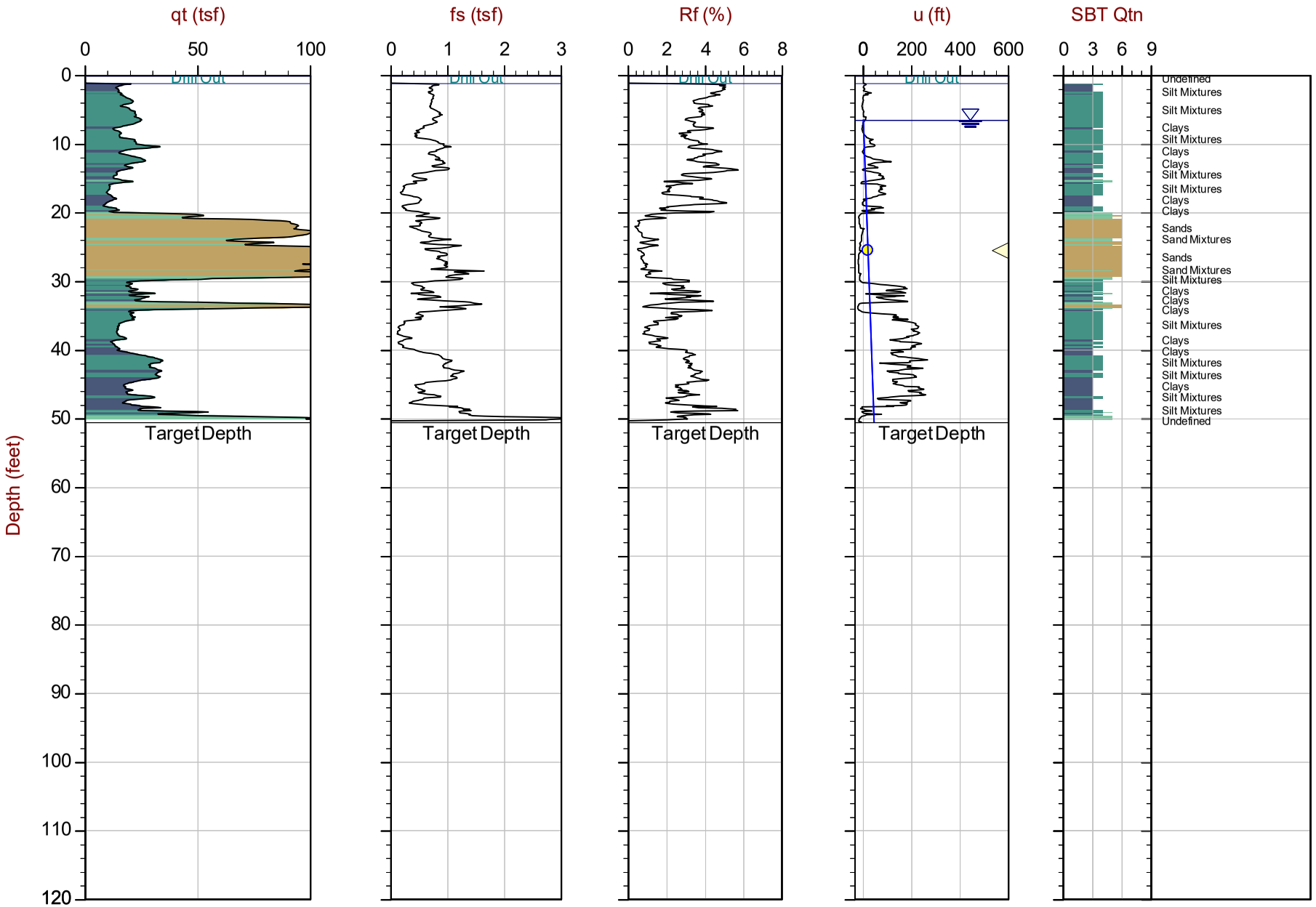
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Cornerstone

Job No: 18-56212
Date: 2018-12-21 11:19
Site: 2201 Laurelwood

Sounding: CPT-03
Cone: 448:T1500F15U500



Max Depth: 15.400 m / 50.52 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 18-56212_CP06.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM 10N: 4137887m E: 591562m
Sheet No: 1 of 1

Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq unachieved, Hydrostatic Line

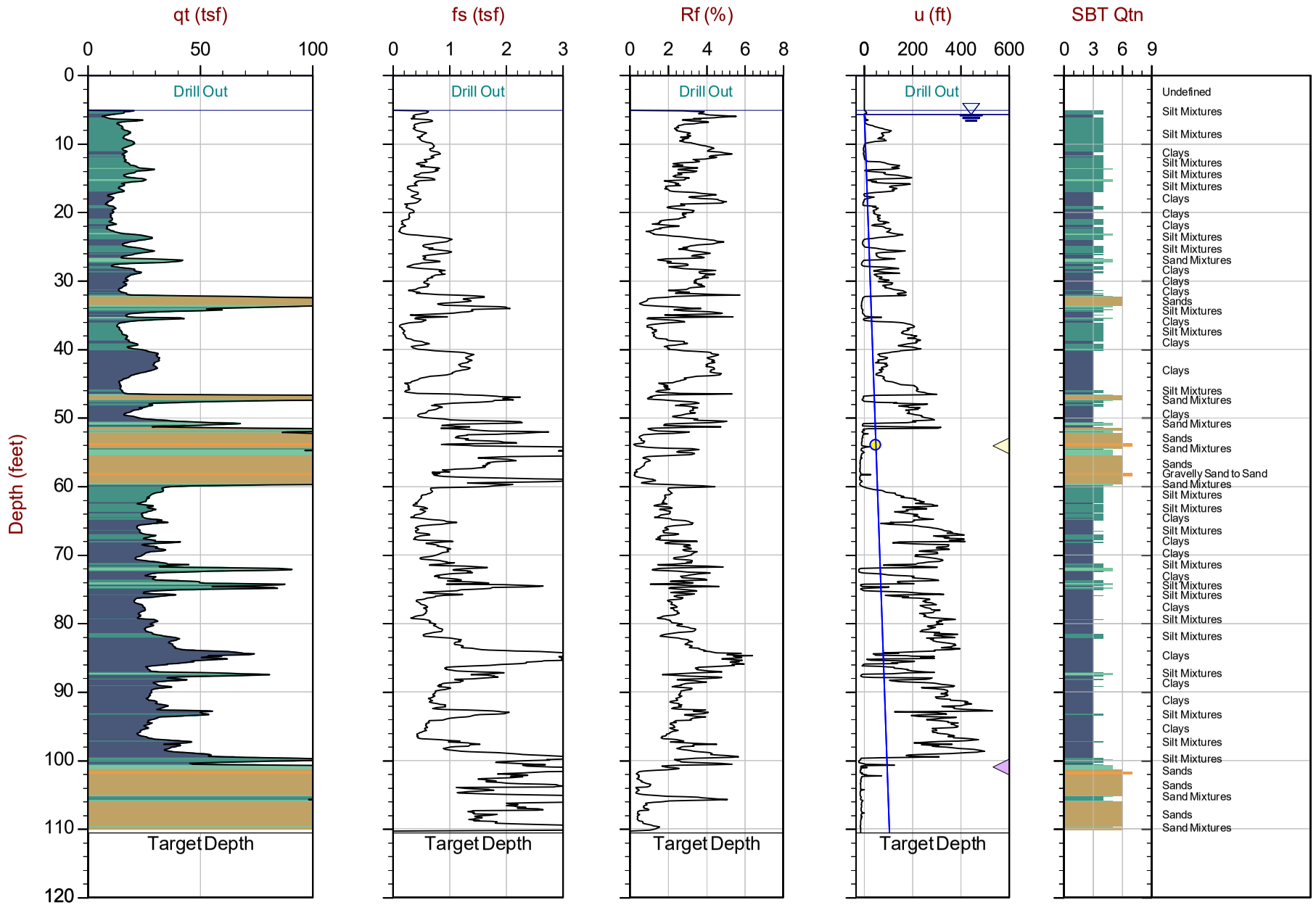
The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Cornerstone

Job No: 18-56212
Date: 2018-12-21 09:13
Site: 2201 Laurelwood

Sounding: CPT-04
Cone: 448:T1500F15U500



Max Depth: 33.700 m / 110.56 ft
Depth Inc: 0.025 m / 0.082 ft
Avg Int: Every Point

File: 18-56212_SP04.COR
Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010
Coords: UTM10N: 4137987m E: 591617m
Sheet No: 1 of 1

Overplot Item: Ueq, Assumed Ueq, Dissipation, Ueq achieved, Dissipation, Ueq unachieved, Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

APPENDIX B: LABORATORY TEST PROGRAM

The laboratory testing program was performed to evaluate the physical and mechanical properties of the soils retrieved from the site to aid in verifying soil classification.

Moisture Content: The natural water content was determined (ASTM D2216) on 74 samples of the materials recovered from the borings. These water contents are recorded on the boring logs at the appropriate sample depths.

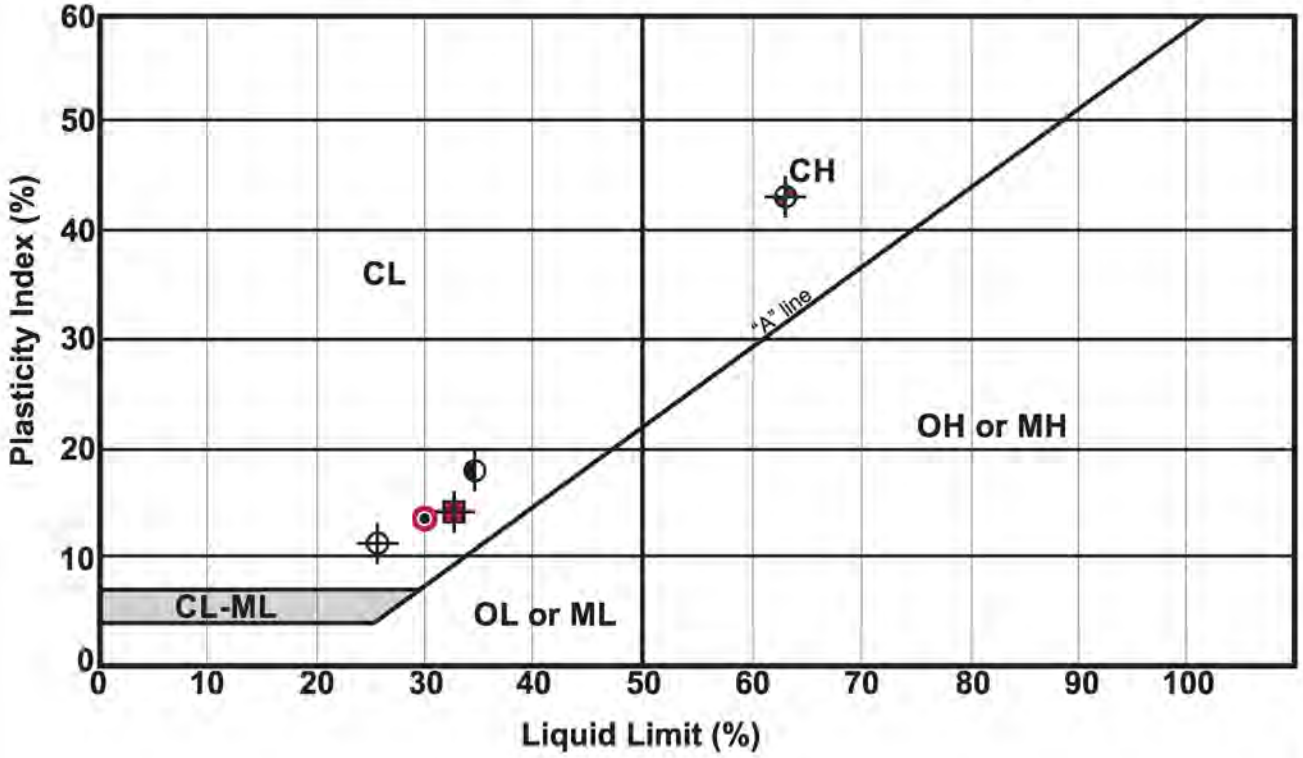
Dry Densities: In place dry density determinations (ASTM D2937) were performed on 61 samples to measure the unit weight of the subsurface soils. Results of these tests are shown on the boring logs at the appropriate sample depths.

Plasticity Index: Six Plasticity Index determinations (ASTM D4318) were performed on samples of the subsurface soils to measure the range of water contents over which this material exhibits plasticity. The Plasticity Index was used to classify the soil in accordance with the Unified Soil Classification System and to evaluate the soil expansion potential. Results of these tests are shown on the boring logs at the appropriate sample depths.

Consolidation: One consolidation test (ASTM D2435) was performed on a relatively undisturbed sample of the subsurface clayey soils to assist in evaluating the compressibility property of this soil. Results of the consolidation test are presented graphically in this appendix.

Soluble Sulfate: Five soluble sulfate determinations (California Test Method No. 417-Modified) were performed on sample of the subsurface soils to measure the water soluble sulfate content. Results of these tests are attached is this appendix.

Plasticity Index (ASTM D4318) Testing Summary



Symbol	Boring No.	Depth (ft)	Natural Water Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index	Passing No. 200 (%)	Group Name (USCS - ASTM D2487)
⊕	EB-2	1.5	28	63	20	43	—	Fat Clay (CH)
■	EB-2	7.0	25	33	19	14	—	Sandy Lean Clay (CL)
◉	EB-3	5.0	26	30	17	13	—	Sandy Lean Clay (CL)
	EB-3	15.0	24	determined non-plastic			—	Silty Sand (SM)
◐	EB-5	9.0	18	35	17	18	—	Sandy Lean Clay (CL)
⊕	EB-6	10.0	21	26	15	11	—	Clayey Sand (SC)(CL fines)

Samples prepared in accordance with ASTM D421

CORNERSTONE EARTH GROUP

Plasticity Index Testing Summary

2201 Laurelwood Road
Santa Clara, CA

Project Number: 1075-1-2

Figure Number: Figure B1

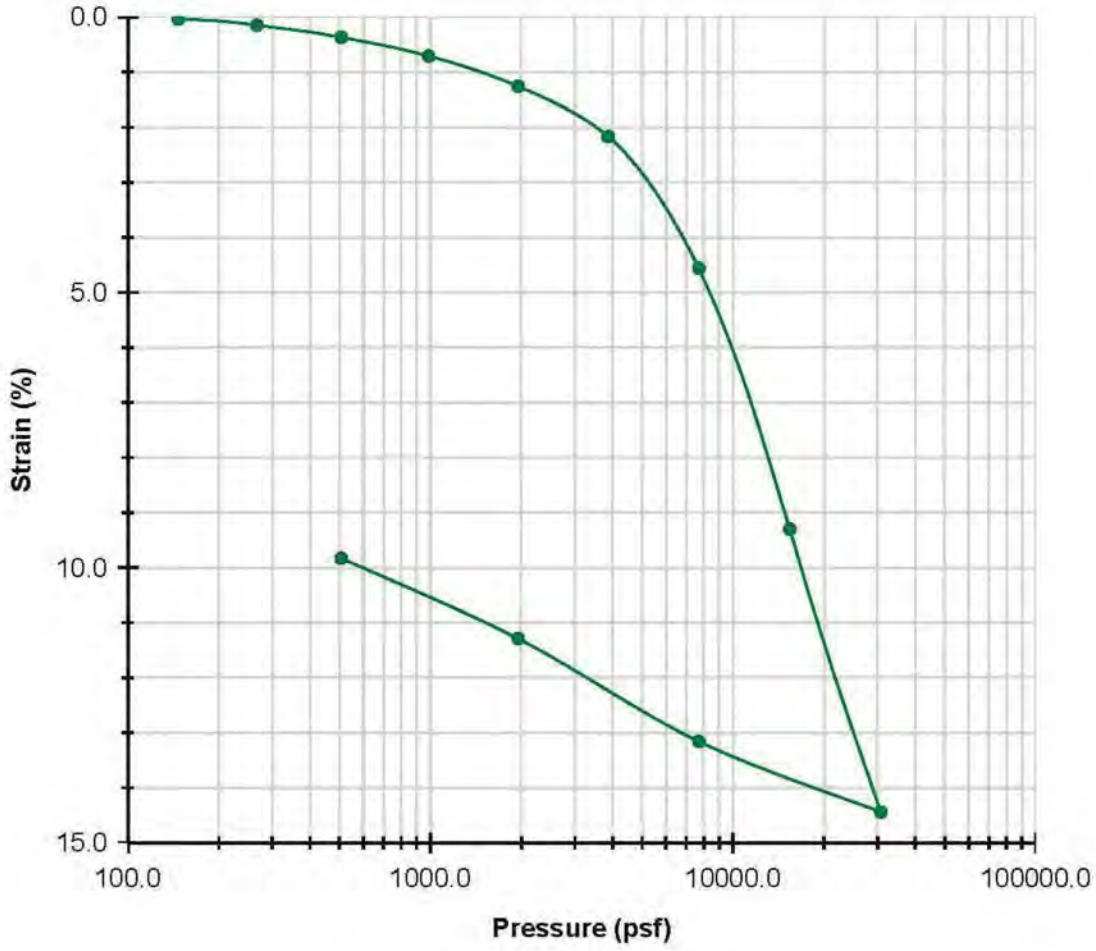
Date: February 2019

Drawn By: FLL

Consolidation Test ASTM D2435

Boring: EB-4 **Sample:** 9 **Depth:** 19.5'

Desription: Lean Clay (CL)



	BEFORE	AFTER
Moisture (%)	31.5	26.9
Dry Density (pcf)	91.3	98.1
Saturation (%)	99.8	100.0
Void Ratio	0.86	0.73

(A) Stress Strain Curve

CORNERSTONE EARTH GROUP

Strain-Log Curve - EB-4 @ 19.5'

2201 Laurelwood Road
Santa Clara, CA

Project Number: 1075-1-2

Figure Number: Figure B2

Date: February 2019

Drawn By: FLL

Corrosivity Tests Summary

CTL # 640-1288 **Date:** 2/11/2019 **Tested By:** PJ **Checked:** PJ
Client: Cornerstone Earth Group **Project:** Laurelwood **Proj. No:** 1075-1-8
Remarks:

Sample Location or ID			Resistivity @ 15.5 °C (Ohm-cm)			Chloride	Sulfate		pH	ORP (Redox)		Sulfide	Moisture	Soil Visual Description
			As Rec.	Min	Sat.	mg/kg	mg/kg	%				Qualitative	At Test	
						Dry Wt.	Dry Wt.	Dry Wt.		E_H (mv)	At Test	by Lead	%	
Boring	Sample, No.	Depth, ft.	ASTM G57	Cal 643	ASTM G57	ASTM D4327	ASTM D4327	ASTM D4327	ASTM G51	ASTM G200	Temp °C	Acetate Paper	ASTM D2216	
EB-1	2B	4	-	-	1,204	6	139	0.0139	7.4	-	-	-	28.4	Black CLAY
EB-4	1B	2	-	-	1,323	5	13	0.0013	7.5	-	-	-	25.2	Black CLAY, trace Gravel
EB-6	3A	5.5	-	-	1,307	6	57	0.0057	7.8	-	-	-	24.1	Gray CLAY
EB-7	3B	6	-	-	1,509	6	92	0.0092	7.9	-	-	-	17.7	Gray CLAY w/ Sand
EB-8	2A	3	-	-	1,234	15	144	0.0144	7.9	-	-	-	22.6	Dark Gray CLAY w/ organics

APPENDIX C: PREVIOUS EXPLORATIONS BY OTHERS

EXPLORATORY BORING: EB-1

DRILL RIG: TRUCK MOUNTED FAILING 1500
BORING TYPE: HOLLOW-STEM AUGER/MUD ROTARY
LOGGED BY: JA
START DATE: 7-19-18 FINISH DATE: 7-19-18

PROJECT NO: 302733
PROJECT: PROLOGIS SANTA CLARA
LOCATION: SANTA CLARA, CA
COMPLETION DEPTH: 44.0 FT.

This log is a part of a report by TRC, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
		SURFACE ELEVATION:						
	0	**4" of AC over 6" of AB**	AC/AB					
		FAT CLAY (CH) very stiff, moist, dark gray, high plasticity Liquid Limit = 51, Plasticity Index = 35	CH	17		21	98	
		SANDY FAT CLAY (CH) very stiff, moist, dark olive gray, high plasticity, fine sand	CH	22		18	112	
	5	**SANDY LEAN CLAY WITH GRAVEL (CL)** medium stiff, moist, olive brown, medium plasticity, fine to coarse sand, fine to coarse gravel (sub-angular/rounded)	CL	4		13	105	
		SANDY LEAN CLAY (CL) medium stiff, moist, olive-brown, medium plasticity, fine to coarse sand, trace fine gravel (sub-angular/rounded)	CL	9		18	107	
	10							
				6				
	15	**LEAN CLAY (CL)** medium stiff, moist, olive brown, medium plasticity, trace fine to coarse sand, trace fine gravel (sub-angular/rounded)	CL					
		LEAN CLAY WITH SAND (CL) medium stiff, moist, gray, medium plasticity, fine to medium sand	CL	5				
	20	**LEAN CLAY (CL)** stiff, moist, greenish gray, medium plasticity	CL	24		23	104	
	25	**SANDY LEAN CLAY (CL)** stiff, moist, greenish gray, medium plasticity, fine to medium sand	CL					
		very stiff		16				
	30	*Continued Next Page*						

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 6.5 FEET

LA_CORP.GDT 8/27/18 MV, CA*

EXPLORATORY BORING: EB-1 Cont'd

DRILL RIG: TRUCK MOUNTED FAILING 1500
BORING TYPE: HOLLOW-STEM AUGER/MUD ROTARY
LOGGED BY: JA
START DATE: 7-19-18 FINISH DATE: 7-19-18

PROJECT NO: 302733
PROJECT: PROLOGIS SANTA CLARA
LOCATION: SANTA CLARA, CA
COMPLETION DEPTH: 44.0 FT.

This log is a part of a report by TRC, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	30			CL					
			CLAYEY SAND (SC) medium dense, moist, brown, medium plasticity, fine to medium sand	SC	13		23		45
	35		**LEAN CLAY (CL)** stiff, moist, greenish gray, medium plasticity, trace fine to medium sand		8				
	40		trace fine to coarse sand, trace fine gravel (sub-angular/rounded) brown	CL	29		25	98	
			Botttom of boring at 44 feet						
	45								
	50								
	55								
	60								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 6.5 FEET

LA_CORP.GDT 8/27/18 MV, CA*

EXPLORATORY BORING: EB-2

DRILL RIG: TRUCK MOUNTED FAILING 1500
BORING TYPE: HOLLOW-STEM AUGER/MUD ROTARY
LOGGED BY: JA
START DATE: 7-19-18 FINISH DATE: 7-19-18

PROJECT NO: 302733
PROJECT: PROLOGIS SANTA CLARA
LOCATION: SANTA CLARA, CA
COMPLETION DEPTH: 45.0 FT.

This log is a part of a report by TRC, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
		SURFACE ELEVATION:						
	0	**4" of AC over 6" of AB**	AC/AB					
		FAT CLAY WITH SAND (CH) very stiff, moist, dark gray, high plasticity, fine to medium sand	CH	19		31	90	
		LEAN CLAY (CL) very stiff, moist, greenish gray, medium plasticity, trace fine sand		19		27	91	
	5	gray to brown		22		26	90	
▽			CL					
	10	brown						
		SANDY LEAN CLAY (CL) stiff, moist, brown, medium plasticity, fine sand		10		25	98	
	15		CL					
		LEAN CLAY WITH SAND (CL) stiff, moist, gray, medium plasticity, fine to coarse sand		9		23	100	
	20		CL					
		LEAN CLAY (CL) medium stiff, moist, gray, medium plasticity, trace fine sand		25				
	25		CL					
		LEAN CLAY WITH SAND (CL) medium stiff, moist, brown, medium plasticity, fine to coarse sand, few fine gravel (sub-angular/rounded)	CL	16		23	98	
	30							

Continued Next Page

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 6.5 FEET

LA_CORP.GDT 8/27/18 MV, CA*

EXPLORATORY BORING: EB-2 Cont'd

DRILL RIG: TRUCK MOUNTED FAILING 1500
BORING TYPE: HOLLOW-STEM AUGER/MUD ROTARY
LOGGED BY: JA
START DATE: 7-19-18 FINISH DATE: 7-19-18

PROJECT NO: 302733
PROJECT: PROLOGIS SANTA CLARA
LOCATION: SANTA CLARA, CA
COMPLETION DEPTH: 45.0 FT.

This log is a part of a report by TRC, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	30		**LEAN CLAY WITH SAND (CL)** medium stiff, moist, brown, medium plasticity, fine to coarse sand, few fine gravel (sub-angular/rounded)	CL					
	35		**CLAYEY SAND (SC)** medium dense, moist, brown, medium plasticity, fine sand	SC	18		17		43
			SANDY LEAN CLAY (CL) stiff, moist, brown, medium plasticity, fine to coarse sand, trace fine gravel (sub-angular/rounded)	CL					
	40		**LEAN CLAY (CL)** very stiff, moist, brown, medium plasticity	CL	23		21	100	
			LEAN CLAY WITH SAND (CL) hard, moist, brown, medium plasticity, fine sand	CL					
	45		Botttom of boring at 45 feet		37		21	103	
	50								
	55								
	60								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 6.5 FEET

LA_CORP.GDT 8/27/18 MV, CA*

EXPLORATORY BORING: EB-3

DRILL RIG: TRUCK MOUNTED FAILING 1500
BORING TYPE: HOLLOW-STEM AUGER/MUD ROTARY
LOGGED BY: JA
START DATE: 7-19-18 FINISH DATE: 7-19-18

PROJECT NO: 302733
PROJECT: PROLOGIS SANTA CLARA
LOCATION: SANTA CLARA, CA
COMPLETION DEPTH: 45.0 FT.

This log is a part of a report by TRC, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
		SURFACE ELEVATION:						
	0	**4" of AC over 6" of AB**	AC/AB					
		CLAYEY SAND WITH GRAVEL (SC) medium dense, moist, brown, medium plasticity, fine to coarse sand, fine to coarse gravel (sub-angular/rounded)	SC	13		28	84	
		FAT CLAY (CH) very stiff, moist, dark gray, high plasticity Liquid Limit = 53, Plasticity Index = 36	CH	25				
	5			27		22	101	
▽		**LEAN CLAY (CL)** very stiff, moist, gray-brown, medium plasticity, trace fine sand	CL					
		LEAN CLAY WITH SAND (CL) very stiff, moist, gray-brown, medium plasticity, fine to coarse sand		19		20	98	
	10							
		stiff, brown, fine sand	CL					
	15							
		gray		19		26	92	
	20	**LEAN CLAY (CL)** stiff, moist, gray, medium plasticity, trace fine sand	CL					
				21		22		52
	25	**SANDY LEAN CLAY (CL)** stiff, moist, gray, medium plasticity, fine sand	CL					
		CLAYEY SAND (SC) medium dense, moist, gray, medium plasticity, fine sand		14		22		24
	30							

Continued Next Page

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 6.5 FEET

LA_CORP.GDT 8/27/18 MV, CA*

EXPLORATORY BORING: EB-3 Cont'd

DRILL RIG: TRUCK MOUNTED FAILING 1500
BORING TYPE: HOLLOW-STEM AUGER/MUD ROTARY
LOGGED BY: JA
START DATE: 7-19-18 FINISH DATE: 7-19-18

PROJECT NO: 302733
PROJECT: PROLOGIS SANTA CLARA
LOCATION: SANTA CLARA, CA
COMPLETION DEPTH: 45.0 FT.

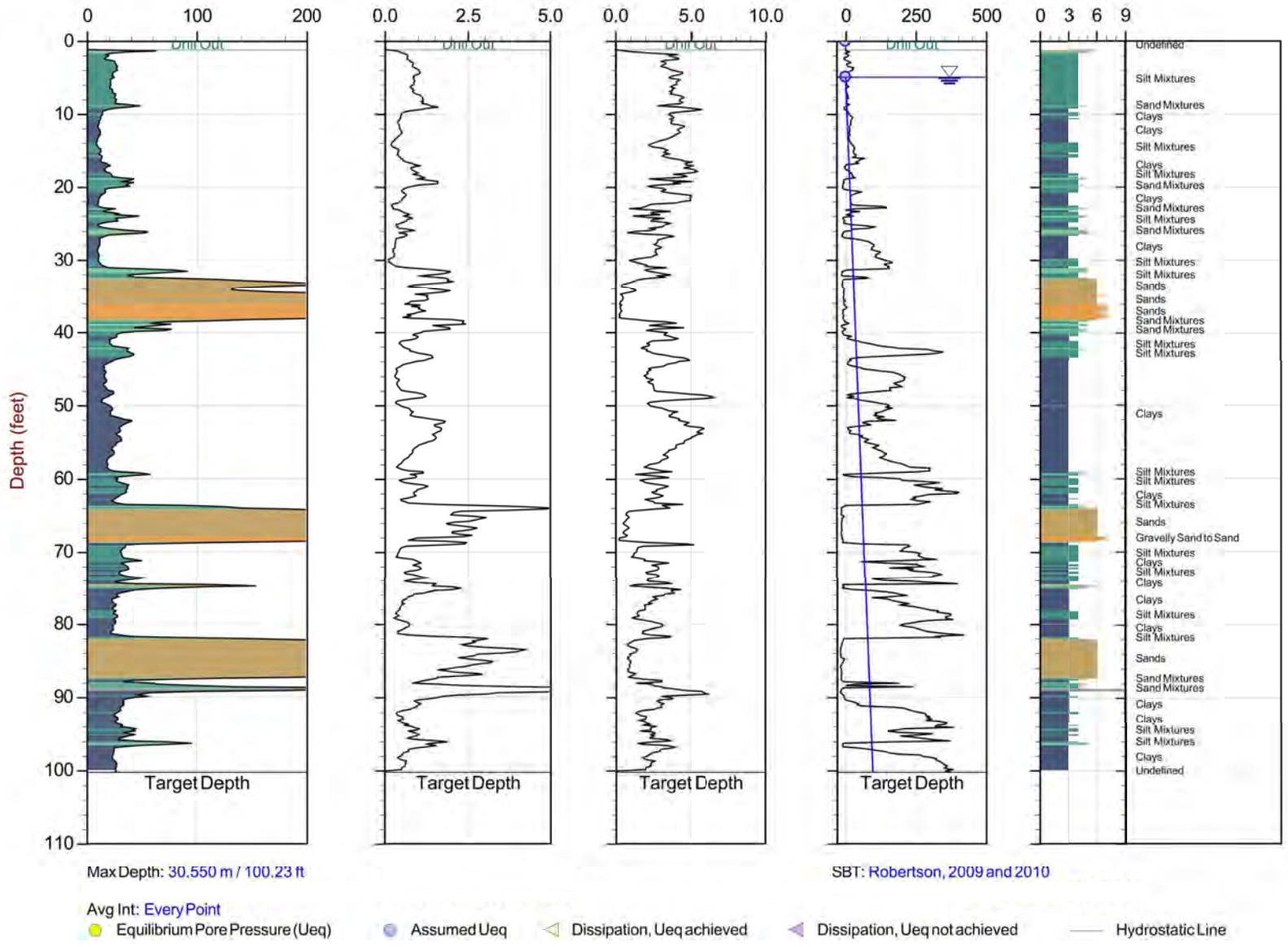
This log is a part of a report by TRC, and should not be used as a stand-alone document. This description applies only to the location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with time. The description presented is a simplification of actual conditions encountered. Transitions between soil types may be gradual.

ELEVATION (FT)	DEPTH (FT)	SOIL LEGEND	MATERIAL DESCRIPTION AND REMARKS	SOIL TYPE	PENETRATION RESISTANCE (BLOWS/FT.)	SAMPLER	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	PERCENT PASSING NO. 200 SIEVE
	30		**CLAYEY SAND (SC)** medium dense, moist, gray, medium plasticity, fine sand						
			POORLY GRADED SAND WITH CLAY AND GRAVEL (SP-SC) dense, moist, gray, medium plasticity, fine to coarse sand, fine to coarse gravel (sub-angular/rounded)	SP-SC	30				
	35								
			LEAN CLAY (CL) hard, moist, gray, medium plasticity, trace fine sand	CL	38				
	40								
			LEAN CLAY WITH SAND (CL) very stiff, moist, gray, medium plasticity, fine to medium sand	CL					
	45		**LEAN CLAY (CL)** very stiff, moist, gray, medium plasticity, trace fine to medium sand Botttom of boring at 45 feet	CL					
	50								
	55								
	60								

Undrained Shear Strength (ksf)
○ Pocket Penetrometer
△ Torvane
● Unconfined Compression
▲ U-U Triaxial Compression
1.0 2.0 3.0 4.0

GROUND WATER OBSERVATIONS:
▽: FREE GROUND WATER MEASURED DURING DRILLING AT 6.5 FEET

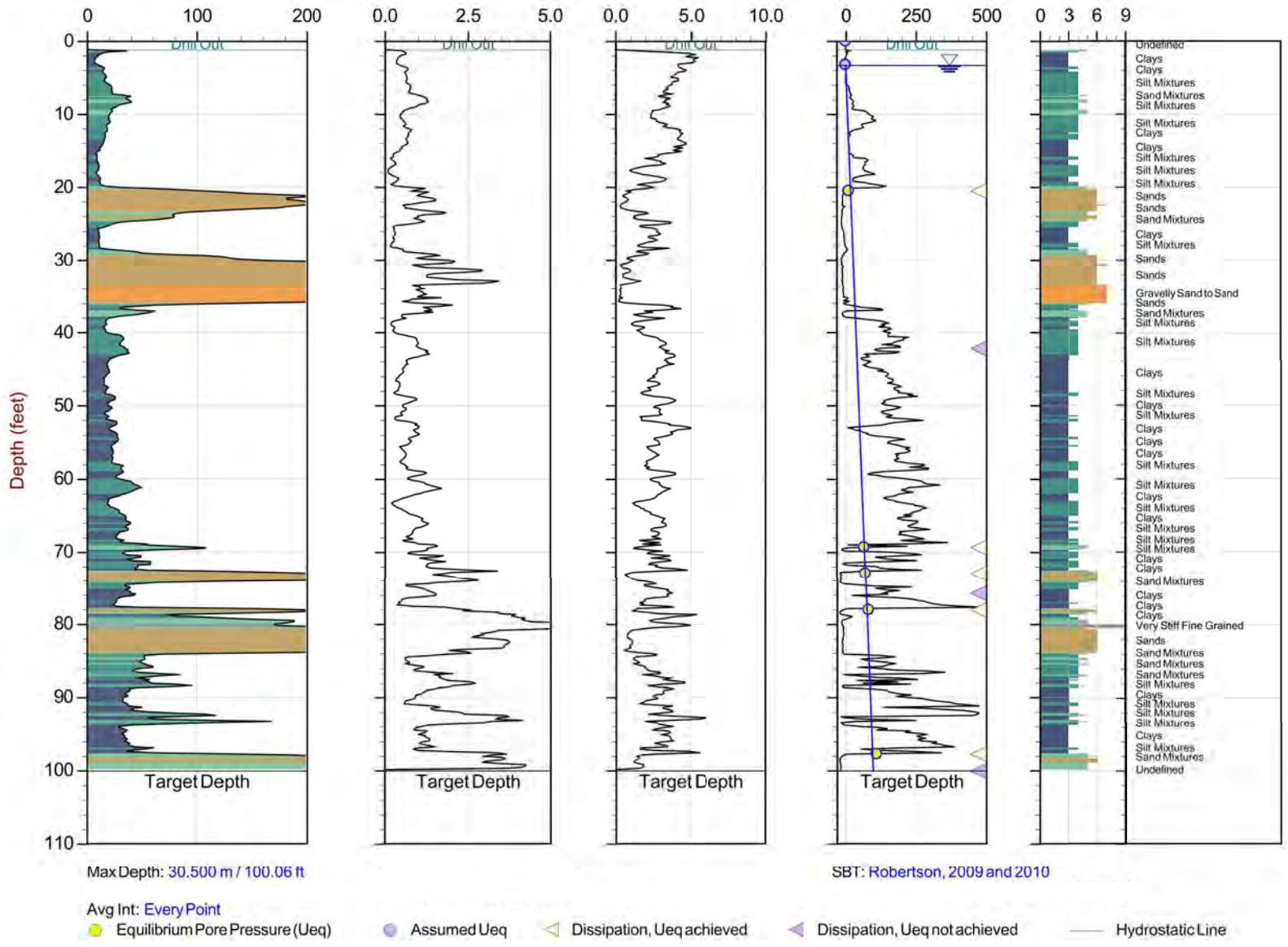
LA_CORP.GDT 8/27/18 MV, CA*



CONE PENETRATION TEST
CPT-1

Prologis Santa Clara
2201 Laurelwood Road
Santa Clara, California

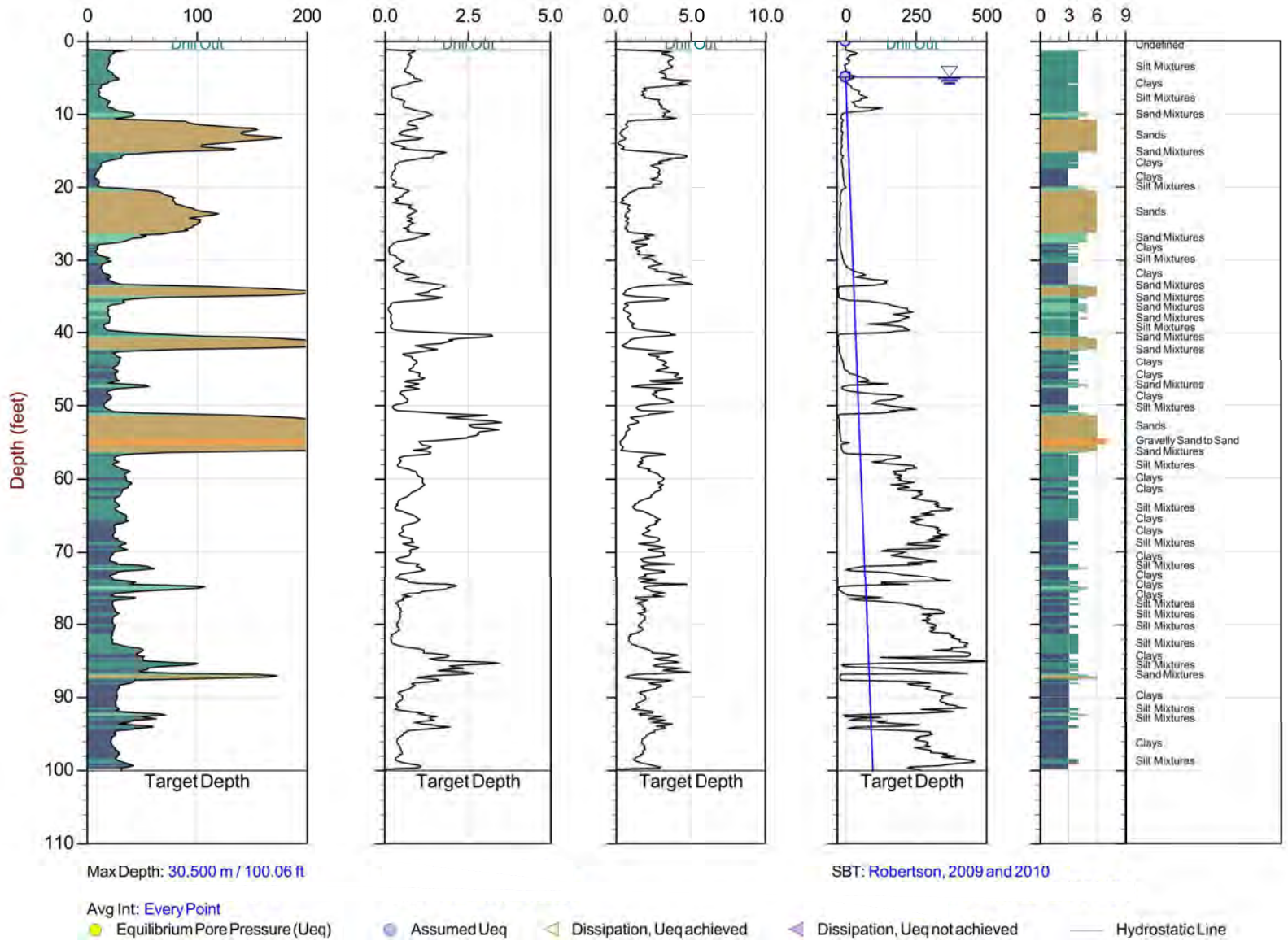
TRC	302733	**CPT-1**



CONE PENETRATION TEST
CPT-2

Prologis Santa Clara
2201 Laurelwood Road
Santa Clara, California

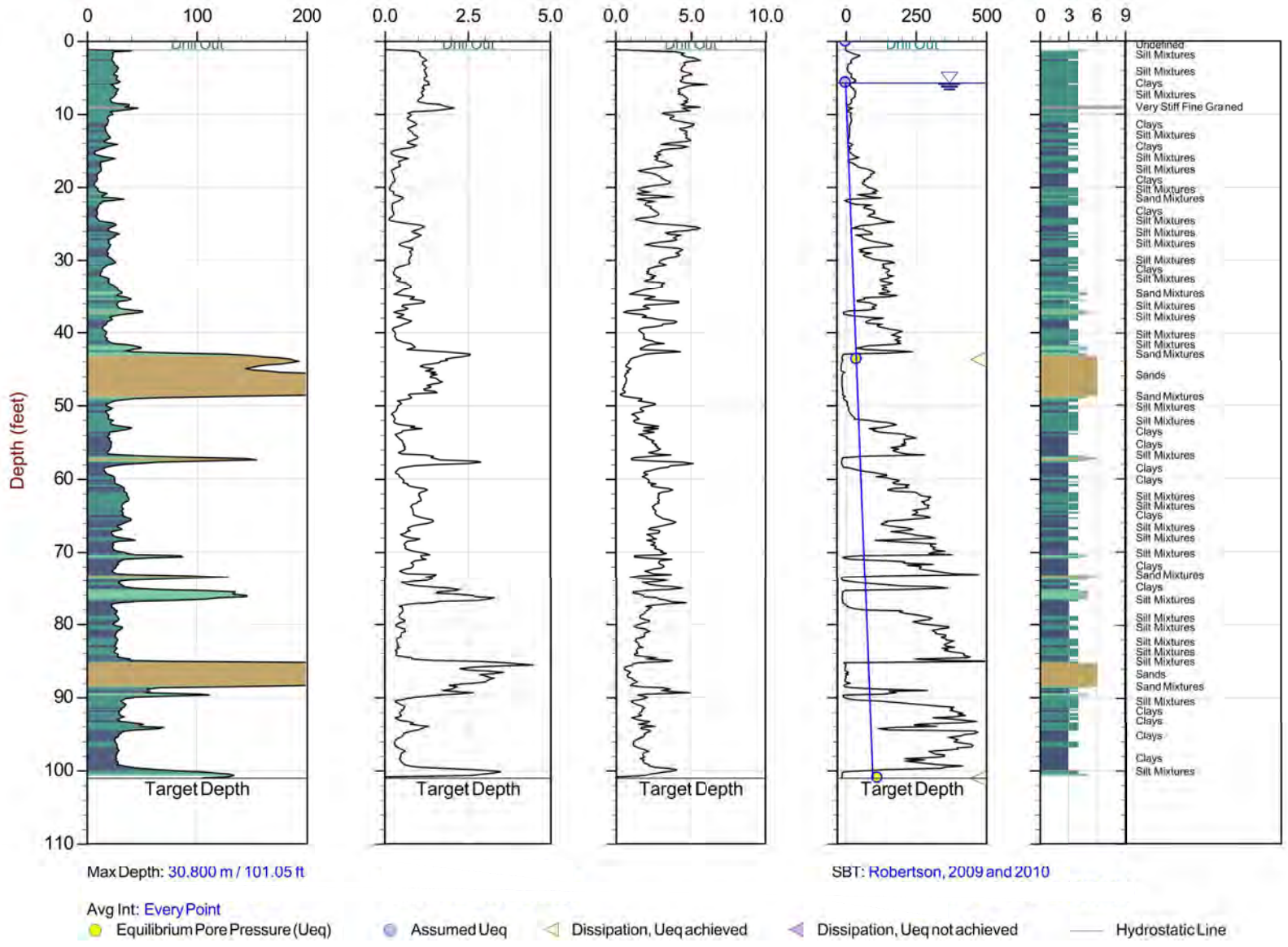
TRC	302733	**CPT-2**



CONE PENETRATION TEST
CPT-3

Prologis Santa Clara
2201 Laurelwood Road
Santa Clara, California

TRC | 302733 | **CPT-3**



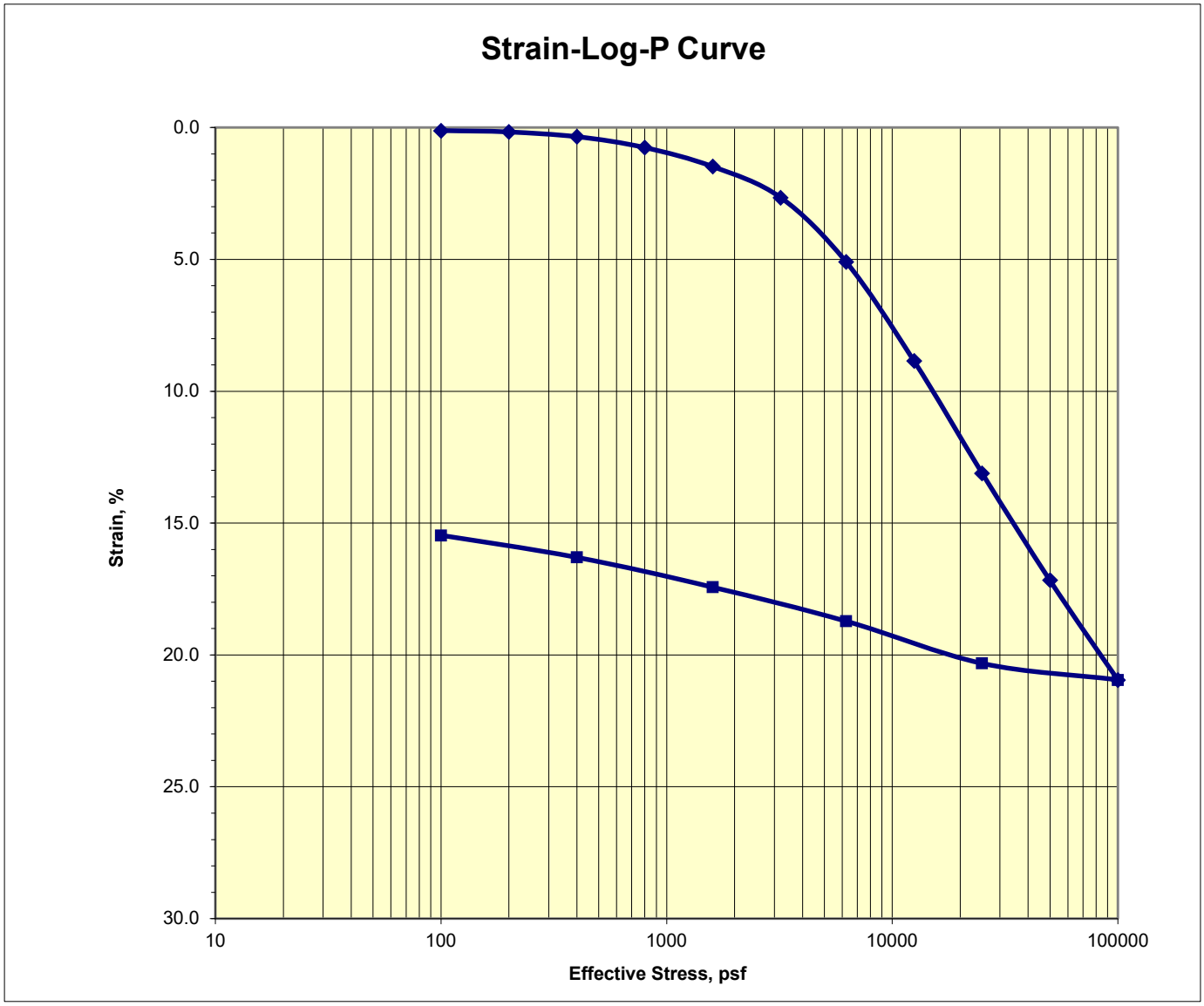
CONE PENETRATION TEST
CPT-4

Prologis Santa Clara
2201 Laurelwood Road
Santa Clara, California

TRC | 302733 | **CPT-4**

Consolidation Test
ASTM D2435

Job No.:	028-2760	**Boring:**	EB-1	**Run By:**	MD
Client:	TRC	**Sample:**	6A	**Reduced:**	PJ
Project:	302733	**Depth, ft.:**	15.5(Tip-6")	**Checked:**	PJ/DC
Soil Type:	Greenish Gray Clayey SAND			**Date:**	8/14/2018

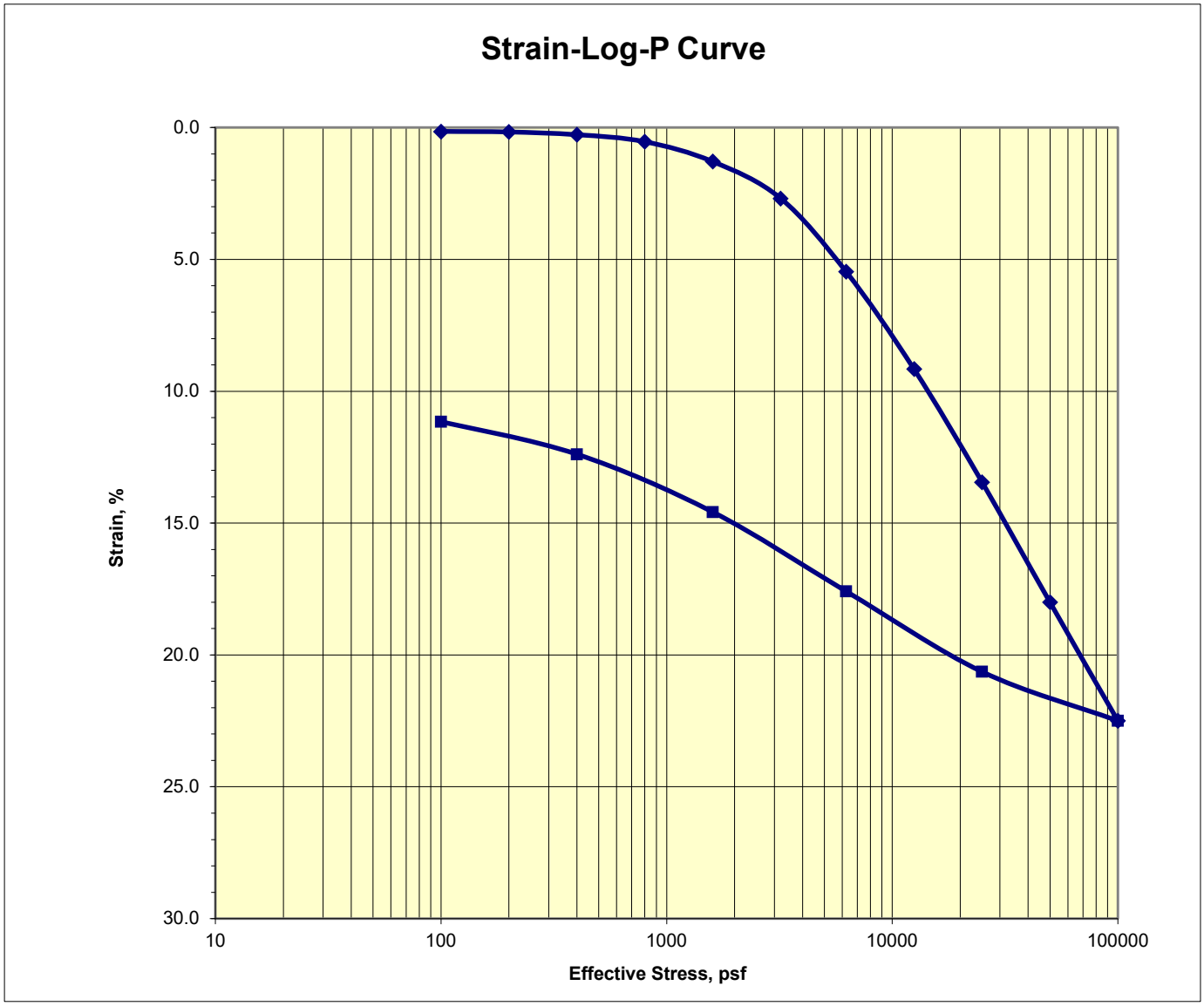


Assumed Gs 2.75	Initial	Final
Moisture %:	22.7	15.9
Dry Density, pcf:	100.5	119.4
Void Ratio:	0.709	0.438
% Saturation:	88.0	100.0

Remarks:

Consolidation Test
ASTM D2435

Job No.:	028-2760	**Boring:**	EB-2	**Run By:**	MD
Client:	TRC	**Sample:**	4A	**Reduced:**	PJ
Project:	302733	**Depth, ft.:**	9.5(Tip-3")	**Checked:**	PJ/DC
Soil Type:	Olive Sandy CLAY			**Date:**	8/8/2018

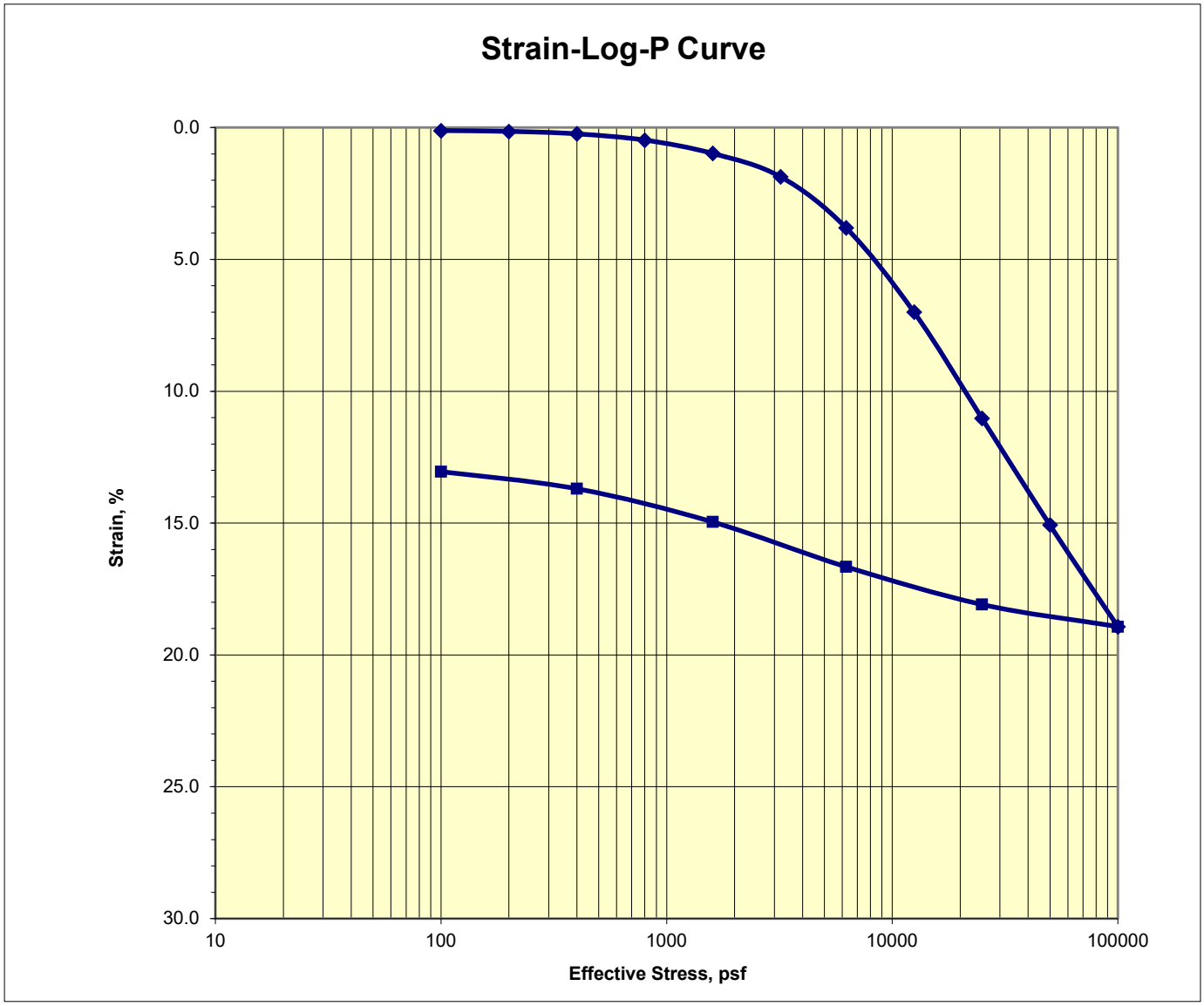


Assumed Gs 2.8	Initial	Final
Moisture %:	29.3	24.8
Dry Density, pcf:	93.0	103.2
Void Ratio:	0.879	0.693
% Saturation:	93.3	100.0

Remarks:

Consolidation Test
ASTM D2435

Job No.:	028-2760	**Boring:**	EB-3	**Run By:**	MD
Client:	TRC	**Sample:**	11A	**Reduced:**	PJ
Project:	302733	**Depth, ft.:**	42.5(Tip-3")	**Checked:**	PJ/DC
Soil Type:	Greenish Gray Sandy CLAY w/ nodules			**Date:**	8/10/2018



Assumed Gs 2.75	Initial	Final
Moisture %:	23.1	17.4
Dry Density, pcf:	101.0	116.0
Void Ratio:	0.700	0.479
% Saturation:	90.7	100.0

Remarks:

Attachment SQ-15
Literature Search Reports (Confidential)

Attachment SQ-15 Literature Search Reports (Confidential)

Literature Search Reports for the following studies have been provided under a request for confidentiality.

Basin 1983—Basin Research Associates. Request for Determination of Eligibility for Inclusion in the National Register of Historic Places, Guadalupe Corridor Transportation Project, Santa Clara County Transportation Agency. On file, Northwest Information Center, California Historical Resources Information System, Rohnert Park. Study S-006066.

Basin 1995—Basin Research Associates. Final Report: Archaeological Collections Project for the Redevelopment Agency of the City of San Jose. On file, Northwest Information Center, California Historical Resources Information System, Rohnert Park. Study S-034214.

Brady 2015—Ryan Brady. Letter Report Regarding Cultural Resources Monitoring at 3303 Scott Boulevard, Santa Clara County, California. Albion Environmental. On file, Northwest Information Center, California Historical Resources Information System, Rohnert Park. Study S-046801.

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