County of Santa Clara

Department of Environmental Health

Hazardous Materials Compliance Division
Site Mitigation Program
1555 Berger Drive, Suite 300
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October 25, 2019

SENT VIA ELECTRONIC MAIL ONLY

Google LLC
c/o Mr. Jeff Holzman
jholzman@google.com

Re: Site Cleanup Program Case No. 2018-20s – Google Caribbean Campus
100/200 Caribbean Dr., Sunnyvale, CA

Dear Mr. Holzman:

The Department of Environmental Health (DEH) has reviewed the *Vapor Mitigation Plan* (VMP) prepared by Cornerstone Earth Group (Cornerstone) and dated July 20, 2019. The VMP includes details and design of two Vapor Intrusion Mitigation Systems (VIMS), Construction Quality Assurance (CQA) protocols for the VIMS installation, and Operation Maintenance and Monitoring (OM&M) protocols for the management and performance of the VIMS.

BACKGROUND

The proposed development is comprised of ten properties across approximately 40 acres. The DEH understands the proposed development plan includes demolition of all existing buildings and structures for construction of two five-story Class A office buildings (100 Caribbean and 200 Caribbean) and a four-story open-air parking garage. The ten properties will be consolidated into two properties subsequent to construction.

Due to the groundwater and soil vapor contamination beneath the "100 Caribbean" properties, the DEH requires a VIMS to be installed during development to reduce the potential for vapor intrusion.

The DEH does not require a VIMS to be installed beneath the "200 Caribbean" building since the location of the proposed building is not in an area of elevated groundwater and soil vapor contamination. Although the DEH does not require a VIMS at 200 Caribbean, Google will be installing a VIMS voluntarily as a greater level of protection to future occupants. Since the VIMS at 200 Caribbean will be installed voluntarily, the DEH will not comment on the VIMS design, CQA, and OM&M at that location.

100 CARIBBEAN VMP

The DEH conditionally approves the VMP and accepts the VIMS design for the 100 Caribbean building provided all of the following comments and conditions are met.

The proposed VIMS design for 100 Caribbean as described in the VMP shall be included with the final building design plans submitted to the City of Sunnyvale. The City of Sunnyvale is the lead agency responsible for approving the final building design plans, including the proposed VIMS design. Please submit documentation of City approval of the final VIMS design plans for 100 Caribbean to the DEH prior to installation of the VIMS.

POST CONSTRUCTION MONITORING

Post construction monitoring is required at the 100 Caribbean building only. A minimum of five post-construction soil vapor and indoor air monitoring events shall be performed to confirm the operational effectiveness of the VIMS. After Sampling Event 5, the DEH will determine if additional sampling shall be required. The five sampling events are described below.

1. Sampling Events 1 and 2 – Sampling to take place after the building at 100 Caribbean is complete, but before occupancy in accordance with Sections 6.1.3 and 6.1.4 of the VMP. Soil gas, indoor air, and ambient air samples shall be collected at the same time. Indoor air samples shall be collected over two 24-hour sampling periods: one with the HVAC system on and one with the HVAC system off. The results shall be included in a Pre-Occupancy Verification Monitoring Report, which must be approved in writing by the DEH before the buildings are occupied.

2. Sampling Events 3 and 4 – Sampling to take place 6 and 12 months after the buildings are occupied. The results shall be included in the Post-Occupancy Verification Monitoring Report (1-Year Event). Soil gas, indoor air, and ambient air samples shall be collected at the same time.

3. Sampling Event 5 – Sampling to take place 1 year after Sampling Event 4. The results shall be included in the Post-Occupancy Verification Monitoring Report (2-Year Event). Soil gas, indoor air, and ambient air samples shall be collected at the same time.

100 CARIBBEAN PRE-OCCUPANCY SUBMITTALS

After construction is complete (including VIMS installation), but before the building is occupied, the following documents shall be submitted to the DEH.

1. **VIMS Installation Report -** The VIMS Installation Report shall include the items listed below, at minimum.

    - Final as-built drawings, specifications, and photo documentation of the VIMS installation.
    - Construction observation, integrity and thickness testing and certification records.
    - Documentation of trench dam installations and dry-conduit sealants.
    - Summary of deviations from the VMP.

2. **Pre-Occupancy Verification Monitoring Report**. This report shall include the results of Sampling Events 1 and 2.

The VIMS Completion Report and Pre-Occupancy Verification Monitoring Report may be submitted separately or together as one report. <u>Both reports must be approved by the DEH in writing before the 100 Caribbean building is occupied</u>.

100 CARIBBEAN POST-OCCUPANCY SUBMITTALS

After the buildings are occupied, Post-Occupancy Verification Monitoring Reports shall be submitted to the DEH after the 1-year and 2-year monitoring events as described above. Results of the monitoring events shall be compared to Environmental Screening Levels (ESLs) applicable at the time of the evaluation. If indoor air concentrations exceed screening criteria, the DEH shall be notified as soon as possible and no later than 14 days after the analytical work is complete.

A Deed Restriction/Environmental Covenant shall be filed for the 100 Caribbean property with the County of Santa Clara Clerk Recorder within 3 months of building occupancy. A copy of the filing receipt and the fully executed deed restriction shall be provided to the DEH. The deed restriction shall include the items listed below.

- State that actions which damage the VIMS are prohibited.
- State that if the VIMS is damaged, the DEH must be notified and the VIMS shall be repaired.
- Include a fact sheet describing the environmental site conditions and the technical purpose of the VIMS.
- Include a copy of the OM&M Plan.

TECHNICAL REPORT REQUIREMENT

Please submit the following documents and/or technical reports to DEH via GeoTracker according to the following schedule:

VIMS Installation Report	**Prior to building occupancy, and no later than October 25, 2020**
Pre-Occupancy Verification Monitoring Report	**Prior to building occupancy, and no later than October 25, 2020**
Deed Restriction/Environmental Covenant	**Within 3 months of building occupancy**

Reports are required pursuant to our authority under Section 101480 of the California Health and Safety Code. Each report shall include conclusions and recommendations for the next phases of work required to protect water resources, human health and safety, and the environment at the site. We require that all work be performed in a prompt and timely manner. Revisions to the schedule shall be requested at least two (2) weeks prior to the due date in writing with appropriate justification for the anticipated delays and a proposed revised schedule.

The California Business and Professions Code (Sections 6735, 7835, and 7835.1) require that work plans and technical or implementation reports containing geologic or engineering evaluations and/or judgments must be performed under the direction of an appropriately registered or certified professional.

ELECTRONIC SUBMITTAL OF INFORMATION (ESI) REQUIREMENT

As indicated in the Remedial Action Agreement you are required to submit to the State Water Resources Control Board GeoTracker database over the internet, laboratory data (EDF), reports, surveyed elevations of permanent monitoring wells, in addition to other data. Your case will not be closed prior to completion of this requirement.

Please refer to the following regulation for a listing of all required submittals:
https://www.waterboards.ca.gov/ust/electronic_submittal/docs/text_regs.pdf

If you have any questions, please contact me at (408) 918-1954 or via email.

Sincerely,

Digitally signed by
Aaron Costa
Date: 2019.10.25
11:40:28 -07'00'

Aaron Costa
Senior Hazardous Materials Specialist
Site Mitigation Program
aaron.costa@cep.sccgov.org

cc: Ryan Kuchenig, City of Sunnyvale Planning, rkuchenig@sunnyvale.ca.gov
Peter McDonnell, pmcdonnell@google.com
Kurt Soenen, Cornerstone, ksoenen@cornerstoneearth.com

CORNERSTONE EARTH GROUP

Type of Services	**Vapor Mitigation Plan**
Location	**Caribbean Campus Development** **West Caribbean Drive and Borregas Avenue** **Sunnyvale, California**
Client	**Google LLC**
Client Address	**1600 Amphitheatre Parkway** **Mountain View, California 94043**
Project Number	**678-3-2**
Date	**July 30, 2019**

Kurt M. Soenen, P.E.
Principal Engineer

Ron L. Helm, C.E.G.
Senior Principal Geologist
Quality Assurance Reviewer

CORNERSTONE EARTH GROUP

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FIGURES

APPENDICES

Type of Services	**Vapor Mitigation Plan**
Location	**Caribbean Office Campus Development West Caribbean Drive and Borregas Avenue Sunnyvale, California**

SECTION 1: INTRODUCTION

On behalf of Google LLC (Google), Cornerstone Earth Group, Inc. (Cornerstone) has prepared this Vapor Mitigation Plan (VMP) for the planned commercial development at the Caribbean Campus in Sunnyvale, California (Site) as shown on Figures 1 and 2. This VMP presents the measures that will be implemented at the Site to effectively eliminate vapor intrusion concerns into the planned 5-story office buildings. It contains the following:

- Description of the vapor intrusion mitigation system (VIMS) design components and operation;
- Construction quality control measures to help confirm the VIMS is installed in accordance with the design documents;
- Performance monitoring and measurements to help demonstrate that the VIMS is functioning properly and is effective in helping to prevent vapor intrusion concerns;
- Criteria for conversion to an alternate active sub-slab ventilation (SSV) or depressurization (SSD) system;
- Description of VIMS design components and operation for an active SSV/SSD system, if needed.

1.1 SITE DESCRIPTION

The combined area of the Caribbean Campus is approximately 40-acres and consists of 10 parcels developed with 13 commercial buildings. The Sunnyvale West Channel bisects the Site separating the 100 Caribbean Campus (referred to as 100 Caribbean) from the 200 Caribbean Campus (referred to as 200 Caribbean). Tables 1 and 2 describes the physical location of the parcels.

TABLE 1. SITE PROPERTIES – 100 CARIBBEAN

Reported Address/Location	Assessor's Parcel No. (APN)	Approximate Lot Size (acres)	Existing Building Footprint (approx. square feet)
140-146 West Caribbean Drive	110-26-027	4.50	90,000
141 Caspian Court	110-26-031	3.63	57,344
1325 Borregas Avenue	110-26-030	3.61	50,000
1383 Borregas Avenue	110-26-029	2.63	50,880
1393-1395 Borregas Avenue	110-26-028	2.88	50,880

TABLE 2. SITE PROPERTIES – 200 CARIBBEAN

Reported Address/Location	Assessor's Parcel No. (APN)	Approximate Lot Size (acres)	Existing Building Footprint (approx. square feet)
360-364 West Caribbean Drive	110-26-023	3.49	72,000
370-376 West Caribbean Drive	110-26-022	2.91	54,000
380-384 West Caribbean Drive	110-26-021	2.95	54,000
390-394 West Caribbean Drive	110-26-020	4.58	86,000
1330-1338 Bordeaux Drive	110-26-025	9.26	25,200
1340-1346 Bordeaux Drive			50,400
1350 Bordeaux Drive			34,500
1360-1368 Bordeaux Drive			25,200

1.2 REDEVELOPMENT PLAN

Google plans to demolish the buildings and redevelop the Site with Class A office space. The planned five-story building at 100 Caribbean will consist of approximately 536,750 square feet of office space with a ground floor footprint of approximately 207,828 square feet. For 200 Caribbean, the planned 5-story, approximately 505,140 square foot building will have a ground floor footprint of approximately 187,356 square feet. The Caribbean campus office buildings have a unique design with the stepped, sloped green roofs and facades with fixed geometrically intricate shading devices. A four level, 371,034 square foot parking garage (referred to as 400 Caribbean) and attached 79,200 square foot structure (referred to as 300 Caribbean) will also be constructed on the Caribbean Campus to support the completed development. The ground floor of the parking garage and attached structure will be at street grade and will consist of vehicle parking except for the main electrical room in the southwest corner of the building. Conceptual development plans are included in Figures 2A, 2B, and 2C.

The planned development for the office buildings includes the construction of deep foundations. Auger cast pressure grouted displacement (APGD) piles will be used to help eliminate the potential for downward migration of contaminated groundwater. This pile type has become more common in the Bay Area; they are a proven foundation element where a deep foundation is required. Benefits of APGD piles include the ability to penetrate dense layers, with low noise and vibration during installation as compared to driven pile types. In addition, APGD piles provide several advantages for sites with subsurface contamination, such as the minimal generation of soil spoils and mitigation of the potential for vertical migration of contamination.

APGD piles will be installed on a maximum approximately 35-foot centers, capped with concrete (referred to as a “pile cap”) and interconnected by a series of grade beams. The elevation of the top of the pile cap generally will coincide with the top of the grade beams. Gravel will be placed between the grade beams and an approximately 6-inch thick slab will be poured that will be tied into the grade beams. The thickened slab sections at the grade beams will create a waffle-like foundation system that will create dead zones for air flow communication from one gravel zone to another.

The finished floor slab elevation will be at 12 feet mean sea level (msl) with the structural slab in the northern approximate one-third of each building depressed by approximately 32 inches. Based on average existing Site grades of elevation 4 to 5 feet msl, the surface elevation beneath the planned buildings will be raised by approximately 4½ to 7 feet. Approximately 200,000 cubic yards of “clean” soil will be imported to raise Site grades.

Google is working in partnership with the Santa Clara Valley Water District (SCVWD) to enhance a portion of the Sunnyvale West Channel between West Caribbean Drive and Caspian Court in Sunnyvale as a part of the larger Sunnyvale East and West Channels Protection Flood Project. The planned improvements on the SCVWD’s parcel will include reconfiguring the channel geometry, widening the channel, creating wetland and riparian habitats, multi-use path and maintenance access, and transitional landscape areas along the channel. There will also be two bridges over the channel to meet emergency vehicle access requirements.

1.3 REGULATORY STATUS

Google has obtained regulatory oversight from the Santa Clara County Department of Environmental Health (DEH) under a Remedial Action Agreement (July 17, 2018). Cornerstone prepared a Site Management Plan (SMP, February 14, 2019) for the development that was reviewed and approved by DEH (March 13, 2019).

This VMP will be submitted to the DEH to obtain their written approval prior to initiating construction activities.

SECTION 2: BACKGROUND

In 2017, Cornerstone performed separate Phase II Soil, Soil Vapor, and Groundwater Quality Evaluations at 200 Caribbean (Cornerstone, 2018a) and 100 Caribbean (Cornerstone, 2018b). A discussion of these reports was included the DEH-approved SMP and is summarized below.

2.1 PRIOR STUDIES – CORNERSTONE PHASE II INVESTIGATION

During Cornerstone's 2017 investigations, soil, soil vapor and groundwater sampling were performed to help evaluate potential impacts from reported off-Site[1] and on-Site[2] volatile organic compound (VOC) releases, and from unidentified regional VOC groundwater contamination[3].

2.1.1 Groundwater

The approximate lateral extent of VOC-impacted groundwater exceeding Maximum Contaminant Levels (MCLs) is shown on Figure 3.

At 200 Caribbean, laboratory analyses of the grab groundwater samples detected VOCs above laboratory reporting limits in 7 of 19 samples. The occurrence of VOCs in these seven groundwater samples is likely attributed to the VOC-impacted groundwater that has migrated beneath the Site from the Lockheed groundwater contaminant plume and/or releases associated with the on-Site former A.C. Ball Company (located at 100 Caribbean).

At 100 Caribbean, laboratory analyses of the grab groundwater samples detected VOCs above laboratory reporting limits in 15 of 17 samples. Perchloroethene (PCE), TCE, and 1,1-dichloroethene (DCE) were detected with the greatest frequency and concentration. Other VOCs with a lower frequency of detection that also exceeded MCLs included 1,2-dichlorothane (DCA), 1,1-DCA, 1,4-dioxane, cis-1,2-DCE, and vinyl chloride.

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[1] The Site is located adjacent to the approximately 560-acre Lockheed Martin Space Systems Company Plant One Facility (Lockheed). Since approximately 1988, several environmental investigations and remedial efforts have been completed at Lockheed. These investigations were performed under the regulatory oversight of the San Francisco Bay Regional Water Quality Control Board (Water Board) due to the reported releases of VOCs, hexavalent chromium, and nitrates that have impacted soil and groundwater quality. Groundwater monitoring and remediation is ongoing. A groundwater extraction system designed to contain and remove contaminants of concern in the first and second water-bearing zones has operated at Lockheed since 1992. Additionally, an in-situ bioremediation (ISBR) pilot system has been operating since 2009 in the deeper water-bearing zones near the Lockheed source area at Building 182, located approximately 0.3 miles southwest of 200 Caribbean. Trichloroethene (TCE) is the tprimary contaminant of concern that extends beyond the Lockheed property and onto the northwest portion of 200 Caribbean.

[2] A.C. Ball Company, a Department of Defense specialty contractor, formerly occupied the 141 Caspian Court Site building from 1978 to 1982. During A.C. Ball Company's occupancy of Site building 141 Caspian Court, volatile organic compounds (VOCs) were released to soil and groundwater as a result of leaking underground solvent storage tanks. Under the regulatory oversight of the San Francisco Bay Regional Water Quality Control Board (Water Board), the underground storage tanks (USTs) were removed in 1987 along with some impacted soil. A dual phase extraction system was installed that operated until November 1996. The system extracted approximately 11 million gallons of groundwater, 40 million cubic feet of soil gas, and 130 pounds of VOCs. During the last groundwater monitoring event in 2002, maximum VOC concentrations in groundwater were 10 micrograms per liter (µg/L) for perchloroethene (PCE), 42 µg/L for trichloroethene (TCE), 69 µg/L for 1,1,1-trichloroethane (TCA), 190 µg/L for 1,1-dichloroethane (DCA), 17 µg/L for 1,2-dichloroethene (DCE), and 22 µg/L for 1,4-dioxane. The case was closed by the Water Board in their letter dated December 15, 2004.

[3] The Site is located in an area of regional VOC groundwater contamination from unknown sources. Regulatory agencies have not yet identified a responsible party for the regional contamination. Prior studies have been performed at several properties to help demonstrate these properties are not a potential source of the VOC contamination and the VOCs detected in shallow groundwater are reportedly associated with up-gradient sources of contamination.

2.1.2 Soil Vapor

The approximate lateral extent of VOC-impacted soil vapor exceeding commercial ESLs is shown on Figure 4.

Laboratory analyses of the soil vapor samples collected from 38 temporary vapor probes installed at the Site detected similar VOCs as were detected in the paired groundwater data. The greatest concentrations and extent of impact appears associated with 100 Caribbean due to historical on-Site releases from the former A.C. Ball Company. PCE, TCE and their breakdown products including, but not limited to, cis-1,2 DCE, trans-1,2 DCE, 1,1-DCE, and/or vinyl chloride were detected in vapor samples collected from 15 of 17 probes installed at 100 Caribbean. These VOCs were detected in the 15 soil vapor samples at concentrations that exceed commercial Environmental Screening Levels (ESLs) established by the Water Board using attenuation factors of 1/1000 (February 2016 ESLs) and 1/30 (February 2019 ESLs). The lateral extent of soil vapor impacts exceeding commercial ESLs published in 2016 correlates with the groundwater contaminant plume and groundwater exceedances. This data indicates the source of these VOCs in soil vapor is likely due to off-gassing of VOC-impacted groundwater from beneath this portion of the Site.

At 200 Caribbean, soil vapor samples with VOC concentrations exceeding commercial ESLs were mostly limited to the vapor probes installed at the western boundary of the Site. The source of these VOCs appears associated with the off-Site Lockheed VOC release.

2.2 CHEMICALS OF CONCERN

Chemicals of Concern (COC) in the subsurface are defined as those detected at or above their respective ESLs established by the Water Board or MCLs established by the State Water Board. COC in soil vapor and groundwater at 200 Caribbean are PCE, TCE, cis-1,2-DCE, and vinyl chloride. At 100 Caribbean, COC in soil vapor and groundwater are PCE, TCE, cis-1,2 DCE, trans-1,2 DCE, 1,1-DCE, vinyl chloride, 1,2-DCA, 1,1-DCA, and 1,4-dioxane.

SECTION 3: LITHOLOGY AND HYDROGEOLOGY

Based on Cornerstone's prior studies at the Site, the upper approximate ½ to 1 foot consisted of finished surface materials including landscape materials, Portland cement concrete, asphalt concrete or asphalt pavement over aggregate base. Beneath the surface materials, up to approximately 5 feet of possible fill and/or reworked native soils consisting of medium stiff brown lean sandy clays with gravel and clayey sands with gravel were observed. In general, the greater thicknesses of the fill and/or reworked native soil were observed in the borings located on the northern half of the Site. Below the fill and/or reworked native soil were stiff expansive clays with varying amounts of sand to approximately 5 to 7 feet, followed by stiff to medium stiff lean sandy clays with varying amounts of sands and gravels. In approximately half of the borings, lean clay with varying amounts of sand extended to the maximum depth explored of approximately 15 to 20 feet. In general, groundwater was not readily observed in the soil column from these borings; however, after drilling, groundwater was measured in the boreholes at approximate depths ranging from 7 to 10 feet.

In the other half of the borings, beneath the lean clay was a sand layer with varying amounts of clay and gravel; it was observed to be approximately ½ to 4 feet thick. Groundwater was observed in this layer at approximate depths ranging from 9 to 18 feet. After drilling, groundwater was measured in the boreholes at approximate depths ranging from 6 to 12 feet, indicating possible semi-confined to confined groundwater conditions.

The design level groundwater elevation recommended by the Geotechnical Engineer of Record is approximately 2½ to 3½ feet below existing Site grade, corresponding to an approximate elevation of 1.5 feet msl[4].

SECTION 4: VAPOR INTRUSION CONTROL SYSTEM DESIGN

4.1 VAPOR INTRUSION PROCESS

Vapor intrusion is the movement of chemical vapors from contaminated groundwater or soil into a nearby building. As vapor accumulates underneath a building slab, the vapor concentration and pressure in the soil pores increases. Pressure gradient is the primary driving force for vapor migration (e.g., vapor flows from high to low pressure). Accumulated soil vapor will potentially migrate through cracks in the foundation, drain tiles, utility pipes, sumps, and conduit penetrations if the pressure underneath the slab is greater than the pressure inside the building. Once inside the workplace, vapors may be inhaled posing potential health risks.

4.2 DESCRIPTION OF SELECTED VAPOR MITIGATION SYSTEM

4.2.1 100 Caribbean

To help eliminate vapor intrusion concerns into the planned office building, a passive SSV system will be installed. The passive SSV system contains no active mechanical equipment, but it was designed to be installed with the ability to easily convert to an active system if necessary. The passive SSV system is designed to allow for the unimpeded movement of soil gas vapors to the atmosphere. In addition to a permeable venting layer, perforated collection pipes are installed laterally in the venting layer to assist the collection of the soil gas and route it to an exhaust point outside the building. With a passive SSV system, vapor intrusion is effectively prevented by the natural movement of air through the venting layer, diluting the contaminants in the sub-slab, and allowing for a natural exhaust point before the contaminants have an opportunity to enter the building. Vent caps installed on the riser pipes will promote natural air flow from the subsurface. Additionally, natural diurnal oscillations in barometric pressure (typically 4 to 5 millibars or 1 to 2 inches of water column) will create a pressure gradient that will result in venting of gases in the permeable gravel layer during periods decreasing barometric pressure. As the barometric pressure rises, a gradient is imposed that will allow fresh ambient air to enter the permeable gravel layer. This natural process is referred to as "barometric pumping" and is further discussed in Section 4.3.1.

A planned spray-applied membrane (i.e., Liquid Boot® Plus) or waterproofing membrane (COREFLEX® 60) will provide an additional level of protection. This membrane will be placed between the concrete slab and permeable gravel layer discussed in Section 4.3.2, effectively sealing penetrations and the sub-slab to create an additional barrier to vapors from permeating through the slab and into the building.

If the performance criteria for the passive SSV system as discussed in Section 6.2 are not met, the system will be converted into an active SSV or SSD system with mechanical blower

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[4] The average existing Site grade elevation is approximately 4 to 5 feet msl; the surface elevation beneath the planned buildings will be raised by approximately 4½ to 7 feet.

equipment. The active SSV/SSD system will be designed to move larger volumes of air through the gravel blanket continuously creating a lower pressure directly underneath the building slab relative to the pressure within the building. The resulting sub-slab negative pressure will inhibit soil gases from flowing into the building. If present, volatile chemicals caught in this negative pressure field will be collected and piped to ambient air discharge points.

4.2.2 200 Caribbean

As shown on Figures 3 and 4, the 200 Caribbean office building is in the central area of the Site where vapor intrusion does not appear to be a significant concern. Impacted soil vapor and groundwater are greater than 100 feet from the perimeter of the 200 Caribbean building. The overall footprint of these plume boundaries is expected to continue to decrease over time. To help reduce potential vapor migration pathways towards the building from areas of impacted soil vapor or groundwater, utility trench plugs and dry conduit sealants will be installed.

Based on the analytical data and the planned vapor mitigation measures to address preferential pathways, installation of a VIMS beneath the planned building does not appear needed. However, for a greater level of protection to future occupants, Google has voluntarily elected to install a passive SSV vapor mitigation system beneath the planned building. Design details are provided in Section 4.3.

4.2.3 300/400 Caribbean

The first level of the 300/400 Caribbean parking structure will consist almost entirely of vehicle parking stalls and drive aisles and will have primarily open walls for natural ventilation. No closed rooms will be installed on the first floor except for the main electrical room that is located on the southwest corner of the structure. The electrical room will not be occupied except for infrequent maintenance visits over short durations; however, for added protection, the Liquid Boot® Plus vapor membrane system discussed in Section 4.3.4 will be installed on the underside of the slab below this room.

4.3 KEY COMPONENTS FOR PASSIVE SYSTEM

4.3.1 Raising Site Grades

Grades beneath the planned 100 and 200 Caribbean buildings will be raised up to approximately 4½ to 7 feet using “clean” imported fill. The upper approximate 28 inches below the structural slab will consist of approximately 10 inches of highly permeable gravel over 18 inches of non-expansive fill. The remaining section will be imported soil from other sources. Imported fill sources must meet unrestricted use screening levels and require pre-approval from DEH prior to importing to the Site.

Increasing the separation between the building slab and contaminant source (i.e. VOC-impacted groundwater and/or soil vapor) likely will help to decrease vapor intrusion concerns due to the influence of natural barometric pressure forces. “Barometric pumping” (the movement of ambient air into and out of the vadose zone in response to changes in atmospheric pressure) and atmospheric mixing are anticipated to affect the rate of contaminant transport from the subsurface up to the building slab. Barometric pressure fluctuations consist of diurnal fluctuations due to thermal and gravitational effects, and longer-term fluctuations that result from regional scale weather patterns.

The low permeability native clay below existing Site grades also will help to act as a geologic barrier to gas migration and will reduce the soil vapor flow rate into the overlying fill section. Additionally, the advective flux rate into and out of the imported fill section due to barometric pumping is anticipated to be greater than the diffusive flux of VOC vapors from the low permeability native clays. The barometric pumping processes also will be enhanced by: 1) the uncapped landscape areas surrounding the buildings, allowing ambient air to more easily enter the subsurface; and 2) the presence of what is anticipated to be fill material with higher permeabilities compared to native soils, which will permit pressure variations to propagate deeper into the fill.

4.3.2 Permeable Gravel Layer – 100 and 200 Caribbean

The SSV system includes a vapor permeable gravel layer that will be placed across the entire footprint of the 100 and 200 Caribbean buildings. The gravel will provide a path of least resistance for the soil vapor to migrate, and a system of perforated pipes (soil vapor vent pipes) will collect the vapor and vent it to the atmosphere (via vent risers). A minimum 10-inch thick permeable gravel blanket will be installed over the compacted sub-grade of the entire building footprint. A minimum 2-inch thick aggregate bedding and cover will be installed at all perforated pipe locations to facilitate adequate vapor migration. The aggregate will be free of organic or deleterious matter and conform to the specifications provided in Table 3.

Table 3. AASHTO #5 Gravel Gradation

Percent Passing	Screen Size
90-100%	1-inch
20-55%	¾-inch
0-10%	½-inch
0-5%	⅜-inch
0%	#4 Sieve

4.3.3 Sub-Slab Vent System – 100 and 200 Caribbean

The sub-slab vent system piping layout will extend across the entire building footprint to be occupied by office space. For design purposes, perforated vent piping will be installed in most sub-slab areas that are isolated due the presence of sub-slab walls or foundation elements. Pipe sleeves will be installed in smaller isolated sub-slab areas allowing for an air flow pathway to an adjacent sub-slab area where perforated vent piping is present. A maximum perforated pipe run of approximately 400 feet and maximum pipe spacing of approximately 50 foot on center and 25 feet from the building perimeter were used as general design parameters.

The perforated vent piping below the slab will consist of 6-inch diameter Schedule 40 PVC pipe positioned in the middle of the minimum 10-inch thick gravel blanket. The perforation pattern for the PVC pipe will consist of three rows of perforations consistent with ASTM D2729. Circumferential hole spacing will be 60 degrees with a hole diameter of ½ inch across the upper one-third of the pipe. Longitudinal hole spacing is three inches. For water drainage purposes, if any, an additional ½ inch hole will be added to the underside of the pipe with longitudinal spacing of approximately every 1 foot. This hole pattern exceeds the minimum required equivalent openings per length of perforated pipe of 1.0 $inch^2$ per lineal foot of pipe. The perforated piping will be fitted with a polyester filter sock with a minimum air permeability of 700 $ft^3/ft^3/min$.

The piping networks will be embedded in the permeable gravel layer and connected to 6-inch solid vent riser pipes. Approximately 2 feet above the slab penetration the 6-inch PVC pipe will transition to 6-inch cast iron piping with gas-tight no-hub fittings. The solid vent riser pipes will extend from below the slab to the mechanical rooftop or to exterior lamp posts.

4.3.3.1 Design Details for 100 Caribbean

The occupied building footprint, approximately 186,300 square feet, was divided into four quadrants with the two northern quadrants located in the depressed slab area. The interconnected grade beams and pile caps serve as boundary conditions for each quadrant and effectively prevent the air-filled pores in the gravel blankets from communicating with the gravel pore spaces in other quadrants. Each quadrant contains dedicated perforated piping that does not extend into adjacent quadrants. The perforated piping is connected to riser pipes routed to lamp posts or to the mechanical rooftop. The piping networks are designed to allow cross-flow ventilation through the gravel layer in the event active SSV is needed. The perforated piping connected to the lamp post riser pipes serve as air intakes allowing ambient air to enter the gravel blanket. The ambient air will be drawn through gravel blanket by perforated exhaust piping connected to the mechanical rooftop riser pipes. Approximately 3 to 5 riser pipes will be installed in each quadrant (a total of 19 risers) based on an approximate frequency of one riser pipe for every approximately 10,000 to 15,000 square feet of floor space. This frequency is consistent with guidelines outlined in published guidance. The sub-slab vent piping layout is shown on Figure 5A. Additional design details are provided below in Table 4.

Table 4. Design Details – 100 Caribbean

Quadrant Service Area	Approximate Size (square feet)	Maximum Pipe Runs
NW Quadrant	34,300	615 feet: 144 feet perforated 471 feet blank
SW Quadrant	56,000	374 feet: 297 feet perforated 77 feet blank
NE Quadrant	30,000	714 feet: 351 feet perforated 363 feet blank
SE Quadrant	66,000	438 feet: 205 feet perforated 233 feet blank

Butterfly valves will be installed in-line with the solid piping routed to each lamp post riser. The valves will remain open during passive ventilation. In the event active ventilation is needed, the butterfly valves can be partially closed as needed to assist in balancing air intake flows. Alternatively, if conversion from an active SSV to SSD system is needed, the butterfly valves can be completely or partially closed to assist in creating a negative pressure field beneath the slab.

4.3.3.2 Design Details for 200 Caribbean

Similar to 100 Caribbean, the occupied building footprint of approximately 170,000 square feet was divided into four quadrants. The interconnected grade beams and pile caps serve as boundary conditions for each quadrant and prevent the air-filled pores in the gravel blanket from communicating with the gravel pore spaces in adjacent quadrants. Each quadrant contains dedicated perforated piping that is connected to riser pipes routed to lamp posts or to the mechanical rooftop. Seventeen lamp post risers and four rooftop risers will be installed. In general, each lamp post riser services one row of foundation grid zones with a maximum overall service area of approximately 10,000 square feet. To enhance air flow at the end of the service area, the perforated piping is connected to blank piping that is dedicated to each quadrant and is routed to the mechanical rooftop. The quadrants range in size from approximately 25,000 to 60,000 square feet. In the unlikely event active ventilation is needed, mechanical blower equipment can be installed on the mechanical rooftop and connected to the riser pipes. The sub-slab vent piping layout is shown on Figure 5B.

4.3.4 Gas Vapor Barrier System – 100 and 200 Caribbean

The gas vapor barrier system beneath the 100 and 200 Caribbean building slabs will consist of vapor barrier products manufactured by CETCO. Two vapor barrier assemblies will be installed: Liquid Boot® Plus System and COREFLEX® 60 System. The Liquid Boot® Plus System will be installed on the southern approximate two-thirds of the 100 and 200 Caribbean building footprints where the structural floor slab is present at elevation 12 feet msl. The COREFLEX® 60 System will be installed in all slab depressions that are below the flood plain elevation (11 feet msl); these areas include the large building depressions in the northern approximate one-third of the 100 and 200 Caribbean buildings and elevator pits.

The Liquid Boot® Plus System will be installed on top of the gravel layer and adhered to the underside of the structural slab and will consist of three products: a protection base course, middle course vapor barrier, and a protection top course. The VI-20™ base course will be placed directly on top of the gravel layer and consists of a 20-mil, high performance polyethylene-EVOH copolymer geomembrane. VI-20™ also meets the Class A requirement for water vapor barriers; Class A is the highest rating for puncture resistance. Liquid Boot® is a seamless spray-applied water-based membrane that will be installed over the base course at a minimum 60 mil cured thickness. The membrane will terminate at least 3 inches onto grade beams and pile caps at each foundation grid zone. Ultrashield™ G-1000 is a polypropylene, staple fiber non-woven geotextile fabric that will be placed over the spray-applied membrane.

The COREFLEX® 60 System is a thermoplastic waterproofing membrane with active polymer core that is also protective against chemical vapor intrusion. COREFLEX® 60 is a 1.5 mm (60 mil) nominal thermoplastic membrane reinforced with a 5.0 ounce weft inserted knit polyester fabric integrally bonded to an Active Polymer Core (APC). The barrier performance starts with a thermoplastic membrane with welded seams providing a monolithic watertight barrier layer. The thermoplastic membrane is reinforced with a weft inserted knit polyester reinforcement fabric and is produced with DuPont's Elvaloy-KEE® (Keytone Ethylene Ester), a solid phase high molecular weight ethylene interpolymer. The COREFLEX® 60 System will be installed without terminations (i.e., grade beams and pile caps will be wrapped) and will tie into the Liquid Boot® Plus System at the underside of the structural slab.

4.3.5 Sub-Slab Monitoring Probes – 100 and 200 Caribbean

To help evaluate soil vapor quality in the gravel venting layer and measure pressure differential if needed for active ventilation, monitoring probes will be installed at various locations beneath the 100 and 200 Caribbean building slabs where the SSV system is present. Based on the building size and configuration, 8 to 10 probes will be installed beneath each office structure (approximately 1 probe per 20,000 square feet of ground floor office space). The probes will consist of a porous polypropylene tip embedded in the permeable gravel layer and connected to ¼-inch diameter polyethylene tubing. Additional installation instructions are provided below.

4.3.5.1 100 Caribbean

The monitoring tubing will be routed in 1.5-inch SCH 80 PVC conduit that will penetrate the floor slab at an interior wall location selected by the architect. The conduit will be routed to an approximate 12 inch by 12 inch by 8 inch deep dead front panel enclosure that will be installed flush mounted in the interior wall. Expandable foam will be sprayed inside the conduit below the slab and within approximately 12 inches of where the conduit penetrates the panel enclosure. The gap between the dead front panel face to inside of enclosure cover will be approximately 1¼ inches. The monitoring tubing will be connected to a quick connect fitting that will be mounted in the dead panel. Mounting channels will be installed in the back of the enclosure panel for future equipment, if needed. Additionally, ethernet network cable and 120-volt power will be routed to the panel. Installation details are shown on Figure 6A.

4.3.5.2 200 Caribbean

The monitoring probe tubing will be routed into nearby perforated piping then will extend in the direction of the lamp post riser pipe. Outside the building envelope at a location selected by the architect, the tubing will be routed up to a monitoring station Christy box in 1½-inch SCH 80 PVC conduit. Expandable foam will be sprayed inside the conduit to prevent migration of vapors into the Christy box. A quick connect fitting will be installed on the end of the tubing. Installation details are shown on Figure 6B.

4.3.6 Utility Trench Dams

Trench dams will be installed in new utility trenches throughout the Caribbean Campus to help prevent the migration of contaminated soil vapor and/or groundwater. The trench dams will be installed both along the utility alignment at evenly spaced intervals and at the edge of building slab where the utility line extends beneath the building. Preliminary trench dam locations are shown on the utility plan sheets included in Appendix A.

The trench dams will be at least 3 feet in length and will consist of sand-cement slurry with 4 percent Type II cement and 2 percent powdered bentonite with a compressive strength range of 75 to 200 pounds per square inch (psi). If sand-cement slurry is not allowed (e.g. trenches conveying Pacific Gas & Electric gas lines), the trench dam will consist of fly ash and sand slurry with a mixture of 10 percent fly ash (ASTM C618, Class F), 90 percent fine aggregate sand, and water. The sidewalls and bottom of the trench must be undisturbed native soil and/or engineered fill with equal or lower permeability than the surrounding soil. The trench dam must extend from the bottom of the trench up to the top of permeable backfill section or up to the design groundwater elevation (1.5 feet msl), whichever is higher. Trench dam construction details are shown on Figure 7.

As shown in Appendix A, trench dams will not be installed for the electrical and telecommunication utilities since permeable backfill will not be used and the duct work will be fully encased in sand-cement slurry. The project team intends to use concrete slurry with a minimum compressive strength of 150 pounds psi. The slurry will be placed along the entire trench alignment, including the trench sections that extend below the buildings.

4.3.7 Dry-Conduit Sealants

Subsurface dry conduit typically is not pressure tested to confirm its air tightness. Additionally, the conduit can become damaged during construction. To help prevent the migration of vapors, sealant will be added to the interior piping of all dry conduits throughout the Caribbean Campus that penetrate the floor slab. The sealant will be added to the conduit within approximately 18 inches of the conduit penetrating the floor slab. For conduits two inches or larger, the Polywater® FST™ duct sealant will be installed. FST™ closed-cell duct sealant is chemically resistant and designed to protect electrical and telecommunication equipment from chemical gases. The FST-MINI product will be used for smaller conduits, including at both ends of the branch conduits that penetrate the slab and extend from electrical or communications rooms to the targeted destination. Installation instructions are included on the electrical details sheet included in Appendix B.

4.3.8 Utility Vaults and Manholes

Several underground utility vaults will be installed throughout the Caribbean Campus. These vaults will be for the Pacific Gas & Electric (PG&E) service entrance (approximately 4'-6" x 8'-6" x 4'-6" deep with spring assist hinge covers), 12 kilovolt (KV) power distribution vaults (4'-6" x 8'-6" x 4'-6" deep with spring assist hinge covers), emergency power distribution vaults (3' x 5' x 3' deep with lift off covers), pull box vaults for site power and lighting distribution (2' x 3' x 2' with lift off covers), typical N40 and N48 concrete Christy boxes for wiring and/or telecommunications equipment. Additionally, two utility manholes will be installed at 100 Caribbean and two at 200 Caribbean. These vault/manhole locations are shown on the electrical plan sheets included in Appendix A.

The concrete vaults will be monolithically poured by a local manufacturer without any concrete cold joints. Prior to pouring, pipe penetration locations will be identified by the electrical engineer and pipe fittings will be installed for welded dry conduit connections. Each vault will have a closed sump that will collect nuisance water, if any, and will require physical removal using mechanical equipment.

To help limit potential migration of vapors into vaults, open conduits inside the vaults will be sealed with closed-cell expandable foam duct sealant. Additionally, vaults located in areas of TCE-impacted soil vapor and/or groundwater will contain ventilated lids with the ability to test the internal atmosphere before removing the cover.

4.4 CONTINGENCIES FOR CONVERSION TO ACTIVE SYSTEM – 100 CARIBBEAN

4.4.1 Design Criteria/Assumptions for Blower Selection

If the passive SSV system is not effective in mitigating potential vapor intrusion concerns, conversion to an active system will be performed. To assist in estimating an appropriately-sized blower for an active system, the largest quadrant was selected (southeast quadrant, 66,000 square feet) and pressure losses in the gravel blanket and collection pipes were estimated. Darcy's Law was used to calculate pressure losses in the gravel layer and standard fluid mechanics head loss equations were used to estimate pipe losses.

For design calculation purposes, pressure losses were estimated for an approximate 35-foot by 35-foot grade beam grid zone (approximately 1,225 square feet). Approximately 54 grid zones were assumed for the 66,000 square foot quadrant. Assuming an approximate 10-inch gravel section with a porosity of 0.3 and approximately one air exchange per hour, the estimated design flow rate per 1,225 square foot grid zone is assumed to be approximately 5 cubic feet per minute (CFM) or approximately 280 CFM for the entire 66,000 square foot quadrant. Assuming an intrinsic permeability of 1,000 Darcys for the AASHTO #5 gravel gradation, an average distance of 35 feet between the air intake piping and exhaust piping, pressure losses through the gravel layer are estimated to be 0.69 inches of water column (inches WC) per grid zone, or approximately 37 inches WC for the entire quadrant. Pressure losses through the pipe sleeves and along the grade beams are negligible.

Pressure losses in the solid and perforated piping are minimized because of the diameter and pipe type selected (6-inch SCH 40 PVC pipe). For pipe loss calculations, air flow was assumed to be evenly disturbed across the air intake/exhaust pipes, i.e. with a total flow of 280 CFM and four intake pipes, the assumed flow in each intake pipe was estimated to be 70 CFM. For the solid exhaust piping, the maximum air flow was conservatively assumed. The calculated pressure losses in the piping are estimated to be approximately 4 inches WC.

Based on the above calculations, the design criteria for the mechanical blower that may be needed for the largest quadrant is 280 CFM at a static pressure of 41 inches WC. For conservative planning purposes, these design criteria will also be used for the other three quadrants which vary in size from approximately 30,000 square feet to 56,000 square feet. Additionally, as shown on Figure 5A, the collection piping network is designed such that a second blower can be added to the larger southwest and southeast quadrants, if needed.

4.4.2 Key Components for Active System

If performance criteria are not met and contingency measures are needed to convert to an active SSV or SSD system, the building portion of concern will be identified, and its associated quadrant will be selected to install and operate mechanical blower equipment. As shown on Figure 5B, up to six blowers may be needed for active mode ventilation beneath the entire building; however, final blower sizing and selection will be determined at time of construction and installation. Each blower will be equipped with its own variable frequency drive (VFD) to assist in controlling the motor speed. A steel rack system (approximately 27 inches by 30 inches by 91 inches tall) designed to accommodate up to three blowers will be installed on the mechanical rooftop; a second rack system would be needed if additional blowers were added. The rack systems will be installed in the central portion of the rooftop within the mechanical equipment screen. For preliminary planning purposes, 230/460 voltage, three phase, 60-hertz AC power will be routed to an electrical disconnect for the blower equipment.

A single control panel, approximately 2 feet by 2 feet, will be installed in a central location that will include magnehelic pressure gauges that will measure the static pressure for the blower equipment. Both power and ethernet network conduit and cabling will need to be routed to the control panel. The magnehelic gauges will be connected to a human machine interface (HMI) touch screen that will provide a textual or graphical view of the system conditions. In addition to blower static pressure, the HMI touch display screen will also display the measured pressure differential across the concrete slab at the remote monitoring stations that will be performed by installing a magnehelic differential pressure gauge and remote I/O chassis and module in each remote panel. The remote and rooftop monitoring system will provide the ability to monitor real-time pressure differential data with alarm notifications if there is a loss of power and/or the pressure differential drops below the targeted criteria.

Figure 8 presents a process and instrumentation diagram for conversion to an active system, if needed.

SECTION 5: CONSTRUCTION QUALITY CONTROL

5.1 SUBMITTALS

Before any of the materials identified relating to the VIMS are delivered to the Site, the installation contractor will be required to submit complete certified Shop Drawings for review and approval by the owner's representative. The Shop Drawings will include all details of fabrication, assembly, installation, descriptive literature, bulletins, catalog cut sheets of the components, complete manufacturer's specifications and materials of construction, and manufacturer's current recommended method of installation for materials provided.

5.2 FIELD DOCUMENTATION

Cornerstone will perform periodic observations to document installation activities are performed in accordance with this VMP. As part of this process, field reports documenting activities will be completed and made available for inspection by authorized oversight personnel for the duration of the project. At a minimum, field observation will be performed by Cornerstone during the following stages of installation:

- Installation of the sub-slab vent piping;
- Installation of the monitoring probes and associated equipment and wiring;
- Placement and backfilling of the permeable gravel layer;
- Installation of the vapor barrier system; and
- Installation and integrity testing of the vapor barrier and riser pipes.

Photographs will be taken to help document information entered in the daily field report. When a photograph is taken, the following information will be written in the daily field report: time, date, location, and, if appropriate, weather conditions; description of the subject photographed; and name of person taking the photograph.

5.3 VAPOR BARRIER INSTALLATION – 100 AND 200 CARIBBEAN

This section presents the construction quality control measures that will be implemented during vapor barrier installation activities.

5.3.1 Contractor Certification

The selected vapor barrier contractor/applicator must be trained and approved by CETCO. The contractor/applicator will be required to provide a letter from CETCO confirming the contractor/applicator is certified by the manufacturer for installation of the product and warranting its product to be free of defects when that product is installed by the certified contractor/applicator.

5.3.2 Vapor Membrane Coupon Sampling

Coupon samples of the Liquid Boot® vapor membrane will be collected to confirm the membrane thickness meets or exceeds 60 mils. A minimum of one coupon sample with a maximum area of 2 square inches will be collected from the membrane per 500 to 1,500 square feet of application. The location of the coupon sample will be recorded on a Site map and included with the daily field report. Calipers will be used to measure the thickness of the coupon sample. Coupon samples will be retained by Cornerstone for review by authorized representatives. Prior to performance of the integrity testing described in Section 5.3.4, the coupon sample location will be patched in accordance with the manufacturers approved methods. Spray or trowel applied Liquid Boot® will be applied to an approximate 120 mil minimum dry thickness, extending at least two inches beyond the base course.

5.3.3 Membrane Termination Field Quality Control

On concrete footings, pile caps, and/or grade beams, the vapor membrane will be checked by Cornerstone for coverage with a depth gauge. Four readings will be recorded over a one square inch area for every 500 lineal feet of membrane application along the structural element. The minimum readings will be recorded, and the test area will be marked for repair. Test areas will be patched with a minimum 60-mil dry thickness extending approximately one inch beyond the test perimeter.

5.3.4 Vapor-Tight Integrity Testing

Following installation of the vapor barrier, but before placement of the protection top course, smoke/pressure testing will be performed by the applicator under the observation of Cornerstone to document the integrity of the membrane system. A second smoke/pressure test will be performed after installation of the structural rebar and other materials required for installation prior to the concrete pour. The smoke/pressure testing procedure typically involves using the following equipment: portable and reversible blower or ventilator capable of producing an airflow rate of 200 cubic feet per minute (cfm) at 2 inches water column equivalency; a fireproof smoke chamber with a 2-inch hose for connection to the geomembrane ventilation hole; and industrial smoke bombs or canisters sufficient to produce a quantity of smoke equal to two pore volumes of the gravel blanket. The smoke/pressure testing will be completed by the contractor/applicator and observed by Cornerstone. The smoke testing procedure generally will consist of the following steps:

1) The designated smoke testing control areas will consist of each underslab section bound by grade beams. The smoke testing assembly (blower and smoke chamber) will be connected to ventilation hole using a gas-tight boot to inject smoke beneath the membrane.

2) To facilitate airflow through the testing area, a penetration of the vapor membrane is made to allow the smoke to displace the existing air volume. The initial ventilation hole should be located on the opposite side of the testing area from the smoke injection point. A sufficient volume of smoke will be applied to purge the pore volume of the gravel blanket.

3) The vapor membrane, seams, penetration boots, and perimeter batten seals will be observed to document no leakage of smoke (or air) occurs at any location other than the ventilation hole. The vent hole should also be monitored to observe if air and/or smoke are dispersed through the soil vapor venting system and vented out through the penetration.

4) Following completion of the additional individual penetrations and smoke/pressure tests, all penetrations will be permanently sealed.

5) Any leaks in the vapor barrier, perimeter batten seals, and/or piping boots other than the induced ventilation holes will need to be marked and appropriately repaired, followed by the completion of an additional smoke/pressure test to verify the vapor-tight integrity of the membrane.

SECTION 6: OPERATION, MAINTENANCE, AND MONITORING

System monitoring will generally entail two phases: (i) an initial post-construction phase; and (ii) a subsequent phase comprised of fewer diagnostic tests/inspections conducted periodically as part of the long-term vapor intrusion Operations, Maintenance, and Monitoring (OM&M) Plan. Adjustments to the mitigation system and/or additional diagnostic testing may be warranted if the results of such testing do not clearly demonstrate that the system is achieving its intended performance and effectiveness.

6.1 INITIAL POST-CONSTRUCTION OBSERVATION AND MONITORING

Initial post-construction monitoring activities will be performed at 100 Caribbean prior to building occupancy and will include: 1) visual observations; 2) collecting system measurements such as vacuum and pressure differential readings from the monitoring probes; and 3) collecting and analyzing air samples from indoor air, outdoor ambient air, and sub-slab monitoring probes. These activities will be performed during both HVAC-on and HVAC-off modes.

Initial post-construction monitoring activities described in Sections 6.1.3 and 6.1.4 will not be performed at the 200 Caribbean building since vapor intrusion does not appear to pose a significant human health risk and installation of a VIMS technically is not needed.

6.1.1 System Observation

Observation of visible components of the VIMS including piping, seals, membranes and collection points will be performed to evaluate any readily observable defects, damage, or degradation. In addition, the foundation walls and slabs will be visually evaluated for cracks, damage and/or disturbance. If needed, corrective measures will be addressed and documented in the VIMS Implementation Report, as outlined in Section 6.1.5.

6.1.2 System Measurements

Diagnostic testing of a passive vapor mitigation system can be difficult due to the low and variable flow rates and vacuum pressures generated with this type of mitigation system. Nonetheless, prior to and/or during each air sampling event, system measurements will be recorded. Vacuum measurements will be taken using an appropriately-scaled micromanometer from the sub-slab monitoring probes. Air velocity / flow measurements will also be taken from the vent risers using a velocity meter. Air velocity is measured in feet per minute and then multiplied by the cross-sectional surface area of the pipe to obtain flow in cubic feet per minute (CFM). Pressure differential readings between the indoor air and sub slab air will also be recorded.

6.1.3 Air Sample Collection and Analyses – Indoor/Outdoor Air

HVAC-on and HVAC-off indoor air sampling will be performed d prior to building occupancy. One sample will be collected for every approximately 20,000 square feet of building footprint on the ground level. The intake sampling port of the Summa Canister will be placed approximately 3 to 4 feet above the ground surface. To the extent practical, doors, windows, intake vents, and other openings will remain closed during sampling activities.

Outdoor air sampling will also be simultaneously performed at four locations: two samples will be collected at ground level at an up-wind location relative to each building; the other two samples will be collected from each building's rooftop.

The indoor and outdoor air samples will be collected in 6-liter Summa canisters using a 24-hour flow controller. The canister and sampling trains will be individually certified by the laboratory for low level SIM analyses. Canister pressures will be measured before and after the monitoring period and will be verified on receipt at the laboratory. The samples will be submitted under standard chain of custody for analysis of PCE, TCE, 1,1-DCE, cis-1,2 DCE, trans-1,2 DCE, vinyl chloride, 1,2-DCA, 1,1-DCA, and 1,4-dioxane using EPA Method TO-15 GC/MS analysis by SIM mode for the highest sensitivity analysis.

6.1.4 Air Sample Collection and Analyses – Sub-Slab Probes

Sub-slab sampling will be performed concurrently with the indoor air sampling event performed during HVAC-on or HVAC-off mode. The sampling will consist of connecting Teflon tubing (¼-inch diameter) to a dedicated sampling port and the other end of the tubing to a "T" fitting. A 6-liter Summa canister will be connected to the "T" fitting. The other end of the "T" fitting will be affixed to a digital vacuum gauge and a 1-liter Summa canister utilized for purging.

A minimum 10-minute vacuum tightness test will be performed on the manifold and connections by opening and closing the 1-liter purge canister valve and applying and monitoring a vacuum on the vacuum gauge. The sample shut-off valve on the downhole side of the sampling manifold will remain in the "off" position. When gauge vacuum is maintained for at least 10 minutes without any noticeable decrease (less than approximately 0.1 inches of mercury (Hg) for properly connected fittings), purging will begin. The shut off valve will be opened and approximately three tubing volumes of vapor will be removed using the purging 1-liter Summa.

The volume of air removed will be estimated by the calculated pressure drop in the purging Summa canister. The purge volume will be calculated based on the length and inner diameter of the Teflon sampling tube and the connected sampling tubing and equipment.

The soil gas samples will be collected in 6-liter Summa canisters using a 24-hour flow controller. The canister and sampling trains will be individually certified by the laboratory for low level SIM analyses. Canister pressures will be measured before and after the monitoring period and will be verified on receipt at the laboratory. The samples will be submitted under standard chain of custody for analysis of PCE, TCE, 1,1-DCE, cis-1,2 DCE, trans-1,2 DCE, vinyl chloride, 1,2-DCA, 1,1-DCA, and 1,4-dioxane using EPA Method TO-15 GC/MS analysis by SIM mode for the highest sensitivity analysis.

6.1.5 Reporting

6.1.5.1 100 Caribbean

A VIMS Implementation Report will be provided to DEH within 60 days of completing the initial post-construction monitoring activities. The report will include:

- Description of the work performed;
- Documentation of installation of trench dams and dry-conduit sealants;
- Contractor certification indicating that the vapor barrier was installed and tested in accordance with manufacturer's specifications and is free of leaks;
- As-built plans of the vapor mitigation system including approved construction submittals and shop drawings provided by the installation contractor;
- Results of the vapor membrane coupon sampling and vapor-tight integrity testing;
- Documentation of initial post-construction monitoring activities including visits and monitoring results to document effectiveness of the mitigation system;
- Results of the indoor air, outdoor air, and sub-slab sampling performed during post-construction monitoring;
- Corrective measures (if any) completed as result of initial post-construction operation inspection and monitoring activities;
- Summary of deviations to the construction, installation, operation, and/or maintenance of the vapor mitigation system; and
- Task list and schedule for implementation of future activities and documents, including the OM&M Plan (refer to Section 6.3).

6.1.5.2 200 Caribbean

Since building construction and completion will occur during different time periods, a separate VIMS Implementation Report will be prepared for 200 Caribbean. The report will include the same elements as for 100 Caribbean. Documentation of initial post-construction indoor air and sub-slab monitoring activities will not be included in the report since these tasks will not be performed.

6.2 CRITERIA FOR CONVERSION TO ACTIVE SYSTEM

If contaminants of concern are detected in the post-construction indoor air samples at concentrations that exceed Environmental Screening Criteria, and follow-up indoor air and/or pathway sampling confirms the source of the indoor air contaminants is due to vapor intrusion, the contingency actions presented in the Section 4.4 will be implemented. DEH will be notified and a construction schedule will be provided for conversion to an active VIMS. These measures will be documented in the VIMS Implementation Report prepared for 100 Caribbean.

6.3 LONG-TERM OPERATION, MAINTENANCE, AND MONITORING PLAN

Once an adequate demonstration of effectiveness has been made for the vapor intrusion mitigation system, periodic monitoring will be performed to verify that this performance is sustained. A long-term Operation, Maintenance, and Monitoring (OM&M) Plan for the vapor intrusion control system will be provided to DEH within 60 days after DEH approval of the VIMS Implementation Report prepared for 100 Caribbean. The OM&M Plan will be prepared for both 100 and 200 Caribbean and will include:

- Description of the installed vapor mitigation measures;
- Description and schedule of normal operation and maintenance tasks, including equipment and material requirements, anticipated equipment replacement for significant components, provisions for remote monitoring and control, operator training and certification requirements, staffing needs, and related requirements;
- Description of record keeping and reporting requirements, including operation and inspection logs, maintenance records and checklists;
- Description and analysis of potential operating problems and contingency plan (e.g., equipment failure, higher than expected contaminant concentrations), including emergency operating and response activities and relevant health and safety information;
- Description of the types of monitoring data to be collected, including sampling and data gathering methods, if applicable;
- Recommended frequency and methodologies of sampling, types of samples, and performance monitoring;
- Description of how the performance data will be analyzed, interpreted, and reported to evaluate system performance, if applicable;
- Description of air emission monitoring to verify that air emissions from treatment operations do not exceed requirements established by the Bay Area Air Quality Management District, if applicable;
- Quality Assurance/Quality Control activities;

- Project organization and responsibility;
- Overall operations, maintenance, and monitoring schedule;
- Description of the building-specific institutional controls monitoring, management, and implementation plan;
- Proposed decision-making process and criteria for determining the VIMS is no longer necessary as a vapor intrusion remedy; and
- Description of the contents, format, and frequency of progress reporting.

SECTION 7: LIMITATIONS

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SECTION 8: REFERENCES

Cornerstone Earth Group, 2018a. *Phase II Soil, Soil Vapor, and Ground Water Quality Evaluation, Caribbean Office Campus, 1330-1338, 1340-1346, 1350, 1360-1368 Bordeaux Drive, and 360-364, 370-376, 380-382, and 390-394 West Caribbean Drive, Sunnyvale, California,* dated March 9, 2018.

Cornerstone Earth Group, 2018b. *Phase II Soil, Soil Vapor, and Ground Water Quality Evaluation, Borregas Office Campus, 140-146 West Caribbean Drive, 1325, 1383, and 1393-1395 Borregas Avenue, and 141 Caspian Court, Sunnyvale, California,* dated March 9, 2018.

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FIGURES

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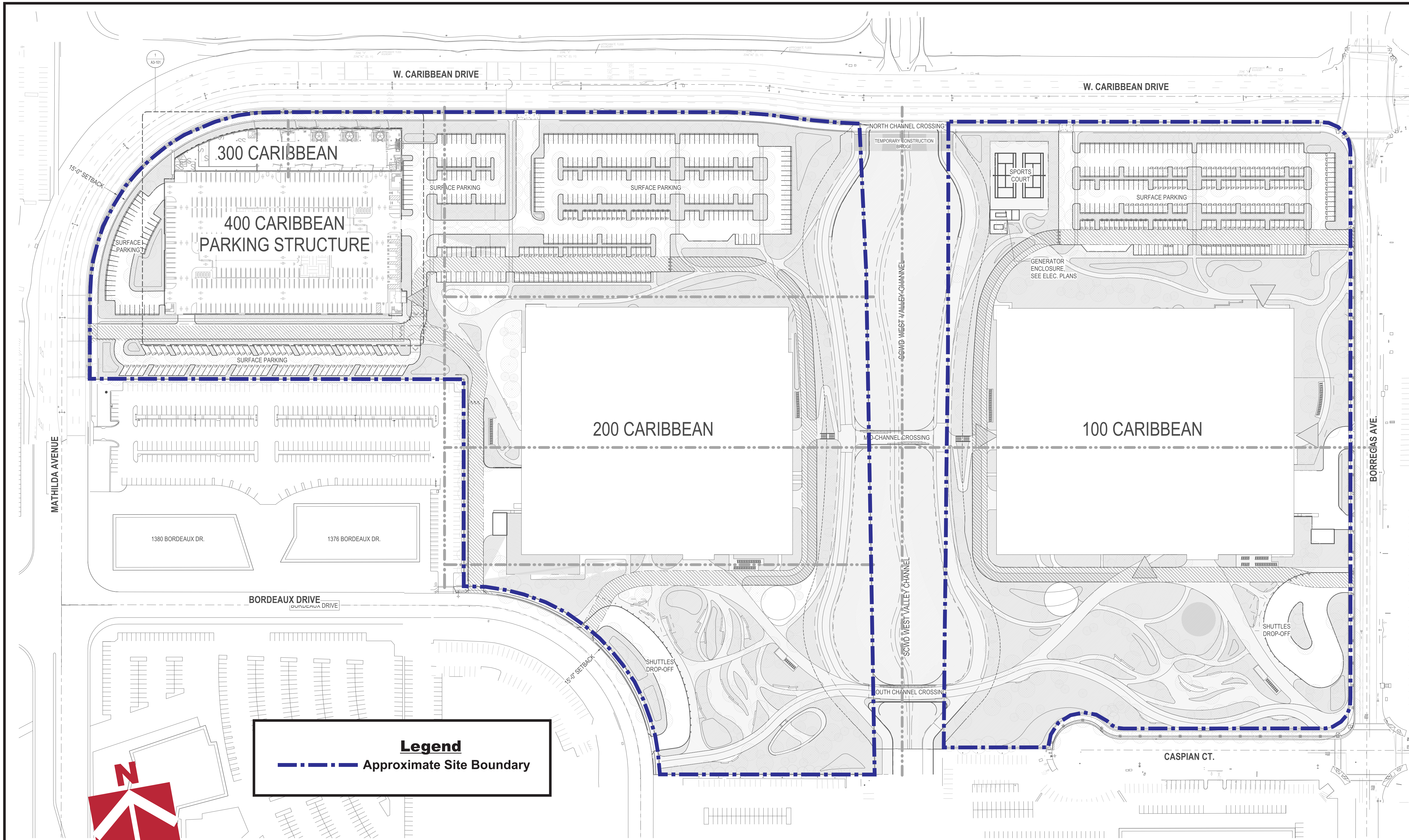
Vicinity Map	Project Number
Caribbean Campus Development Sunnyvale, CA	678-3-2
	Figure Number: Figure 1
	Date: June 2019
	Drawn By: RRN



Base by DEVCON, Overall Campus Site Plan - A3-100, dated 12/21/2018

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Overall Site Plan	Project Number: 678-3-2
Caribbean Campus Development Sunnyvale, CA	Figure Number: Figure 2A
	Date: June 2019 / Drawn By: RRN

Base by DEVCON, Cover Sheet, 100 Caribbean - A1 - VOL1, dated 12/21/2018

Planned Development - 100 Caribbean

Caribbean Campus Development
Sunnyvale, CA

Project Number 678-3-2

Figure Number Figure 2B

Date June 2019

Drawn By RRN

CORNERSTONE EARTH GROUP

Base by DEVCON, Cover Sheet, 200 Caribbean - A2 - VOL1, dated 12/21/2018

Project Number 678-3-2

Figure Number Figure 2C

Drawn By RRN

Date June 2019

Planned Development - 200 Caribbean

Caribbean Campus Development
Sunnyvale, CA

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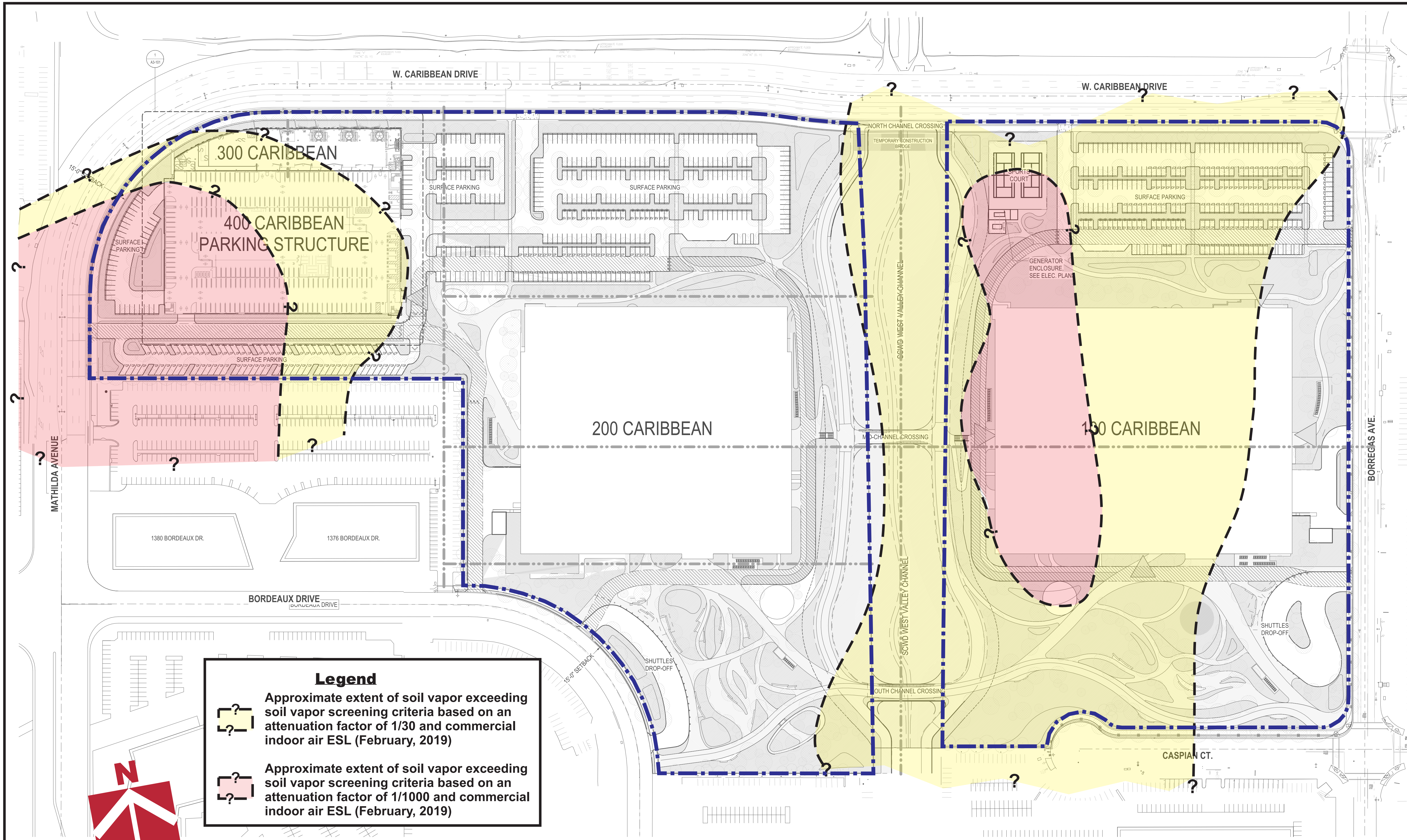

Base by DEVCON, Overall Campus Site Plan - A3-100, dated 12/21/2018

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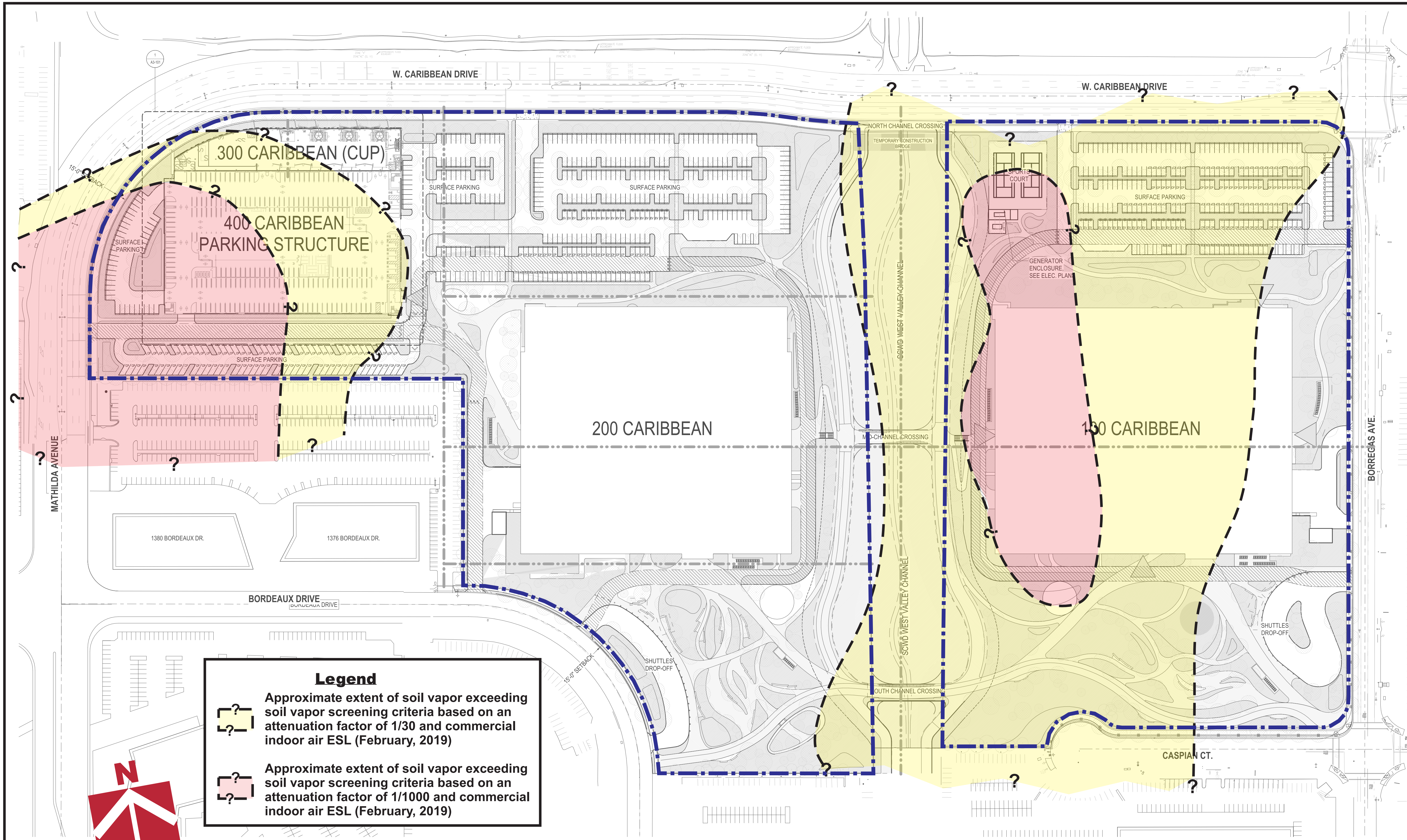
Soil Vapor Plume Map

Caribbean Campus Development
Sunnyvale, CA

Project Number	678-3-2
Figure Number	Figure 4
Date	June 2019
Drawn By	RRN



Base by DEVCON, Overall Campus Site Plan - A3-100, dated 12/21/2018

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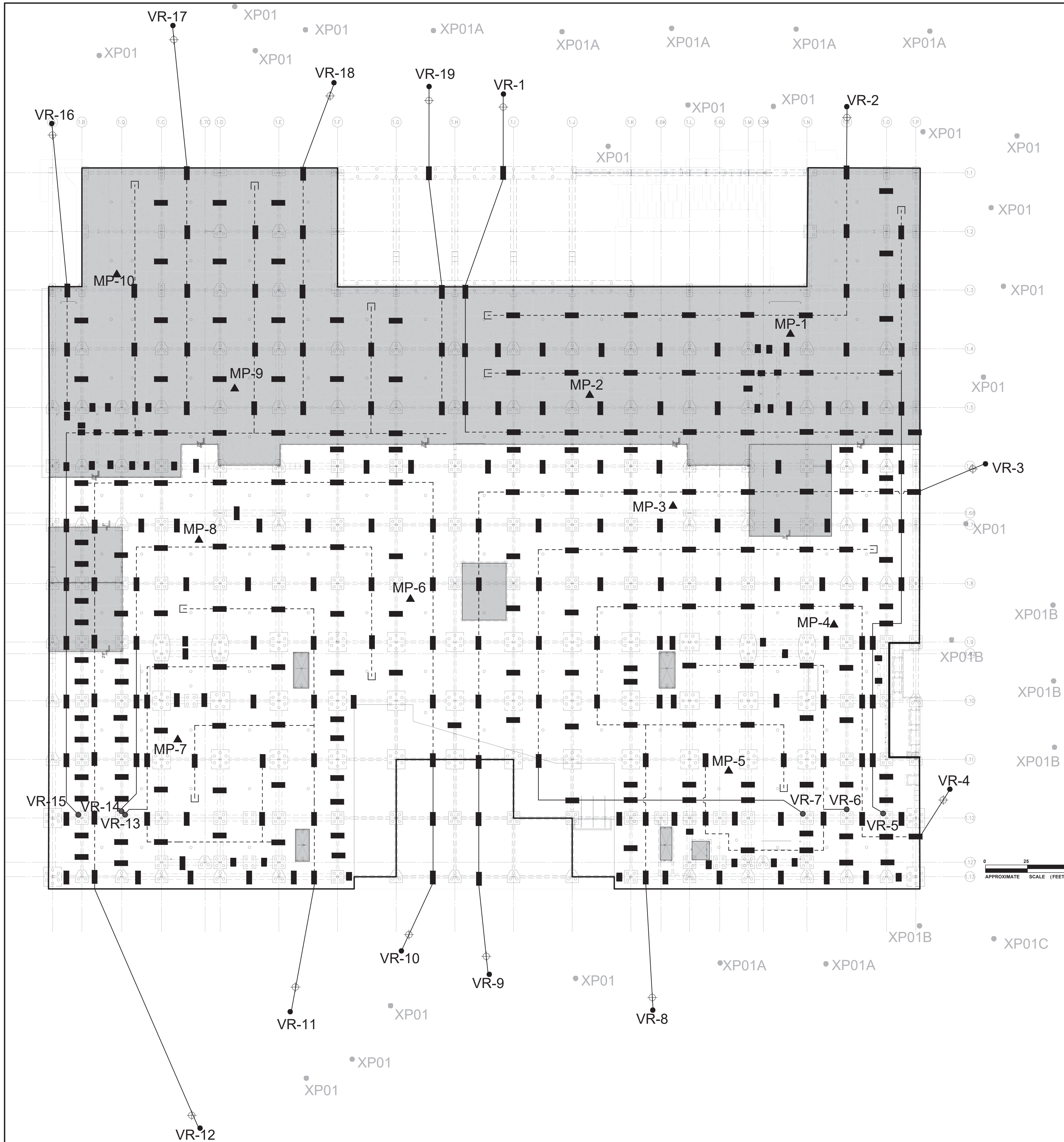
Soil Vapor Plume Map	Project Number 678-3-2
Caribbean Campus Development Sunnyvale, CA	Figure Number Figure 4
	Date June 2019 / Drawn By RRN



LEGEND

(heavy outline)	HORIZONTAL EXTENT OF SUB-SLAB VENTING (SSV) SYSTEM WITH MINIMUM 10-INCH THICK GAS PERMEABLE AGGREGATE
(long dashed line)	6-INCH DIAMETER PERFORATED SSV COLLECTION PIPE WITH FILTER SOCK BENEATH FLOOR SLAB TO RISER PIPES AT ROOF TOP
(short dashed line)	6-INCH DIAMETER PERFORATED SSV COLLECTION PIPE WITH FILTER SOCK BENEATH FLOOR SLAB TO RISER PIPES AT LIGHT POSTS
(solid line)	6-INCH DIAMETER SCHEDULE 40 SOLID PVC SSV COLLECTION PIPE
VR- 5, 6, 7, 13, 14, 15	6-INCH DIAMETER VERTICAL RISER AT IDENTIFICATION NUMBER. EXTEND THROUGH ROOF
VR-1	6" DIAMETER VERTICAL RISER AND LAMP POST WITH IDENTIFICATION NUMBER
MP-1	APPROXIMATE LOCATION OF MONITORING PROBES. EXTEND 1/4" DIA. TUBING TO MONITORING STATION LOCATION SELECTED BY ARCHITECT
(dashed line with block)	6-INCH DIAMETER SCHEDULE 40 PERFORATED SSV COLLECTION PIPE CONNECTING TO 6-INCH DIAMETER SCHEDULE 40 SOLID PVC PIPE TO TRANSITION THROUGH GRADE BEAM
(block)	6-INCH DIAMETER SCHEDULE 40 SOLID PVC PIPE SLEEVE
(grey box)	ELEVATOR PITS, SLAB DEPRESSIONS , AND SLAB ELEVATION CHANGES.
(hatched line)	CHANGE IN SLAB-AT-GRADE ELEVATION.
XP01	LAMP POST AVAILABLE FOR VERTICAL RISER PLACEMENT
(crosshair)	CAST IRON 6" DIAMETER BUTTERFLY VALVE

Project Number 678-3-2

Figure Number 5A

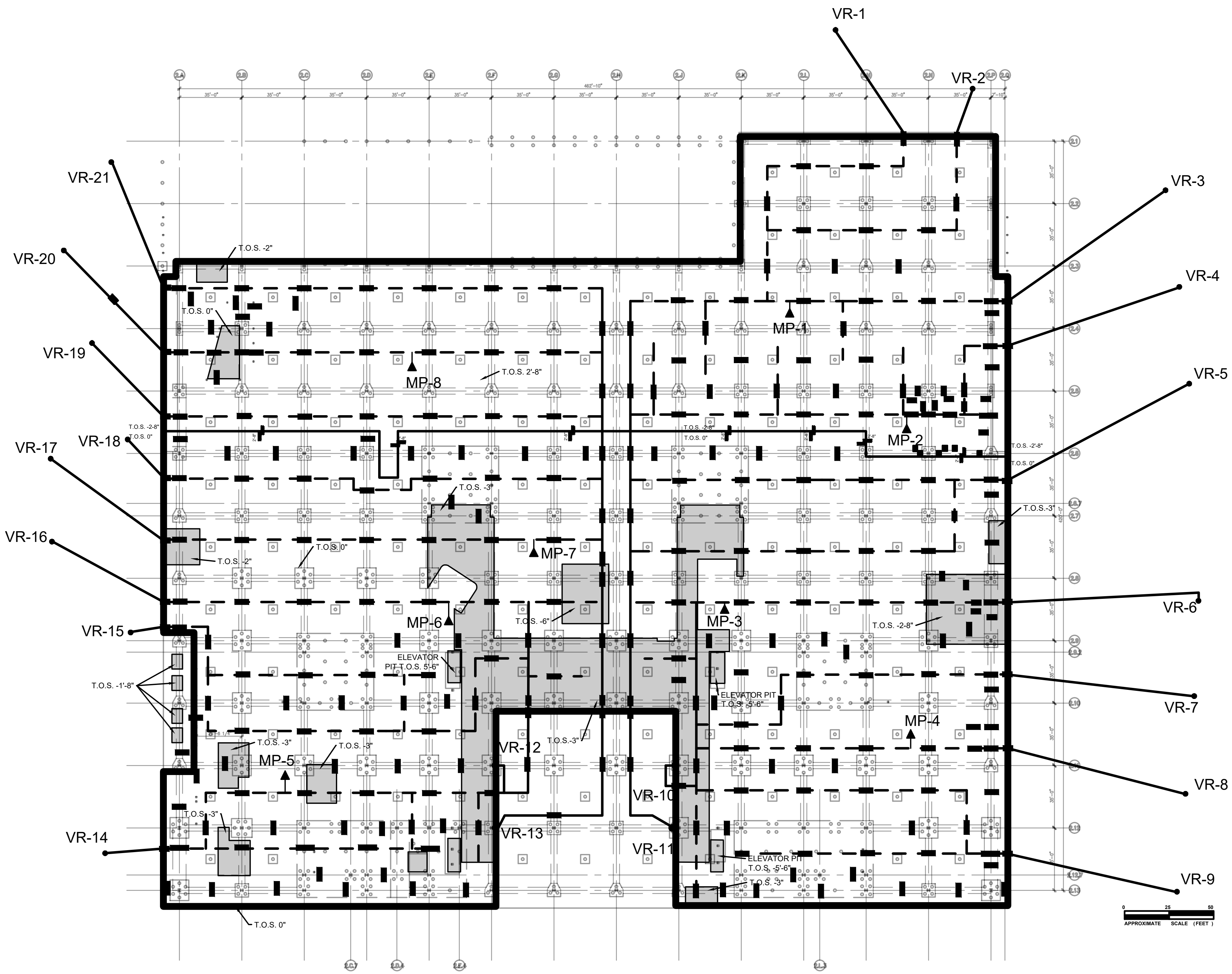
Drawn By MFC/JMA/ELH

Date JUNE 2019

Venting Plan - 100 Caribbean

100 Caribbean
Sunnyvale, California

CORNERSTONE EARTH GROUP



LEGEND

HORIZONTAL EXTENT OF SUB-SLAB VENTING (SSV) SYSTEM WITH GAS VAPOR BARRIER AND MINIMUM 10-INCH THICK GAS PERMEABLE AGGREGATE

6-INCH DIAMETER PERFORATED SSV COLLECTION PIPE WITH FILTER SOCK BENEATH FLOOR SLAB

6-INCH DIAMETER SCHEDULE 40 SOLID PVC SSV COLLECTION PIPE

VR-10,11,12,13 — 6-INCH DIAMETER VERTICAL RISER AND IDENTIFICATION NUMBER. EXTEND THROUGH ROOF TO EXHAUST STACK

VR-1 — 6" DIAMETER VERTICAL RISER ATTACHED TO LAMP POST WITH IDENTIFICATION NUMBER

MP-1 — APPROXIMATE LOCATION OF MONITORING PROBES. EXTEND 1/4" DIA. TUBING TO MONITORING STATION LOCATION SELECTED BY ARCHITECT

6-INCH DIAMETER SCHEDULE 40 PERFORATED SSV COLLECTION PIPE CONNECTING TO 6-INCH DIAMETER SCHEDULE 40 SOLID PVC PIPE TO TRANSITION THROUGH GRADE BEAM

6-INCH DIAMETER SCHEDULE 40 SOLID PVC PIPE SLEEVE

ELEVATOR PITS, SLAB DEPRESSIONS , AND SLAB ELEVATION CHANGES.

CHANGE IN SLAB-AT-GRADE ELEVATION.

Project Number 678-3-2

Figure Number 5B

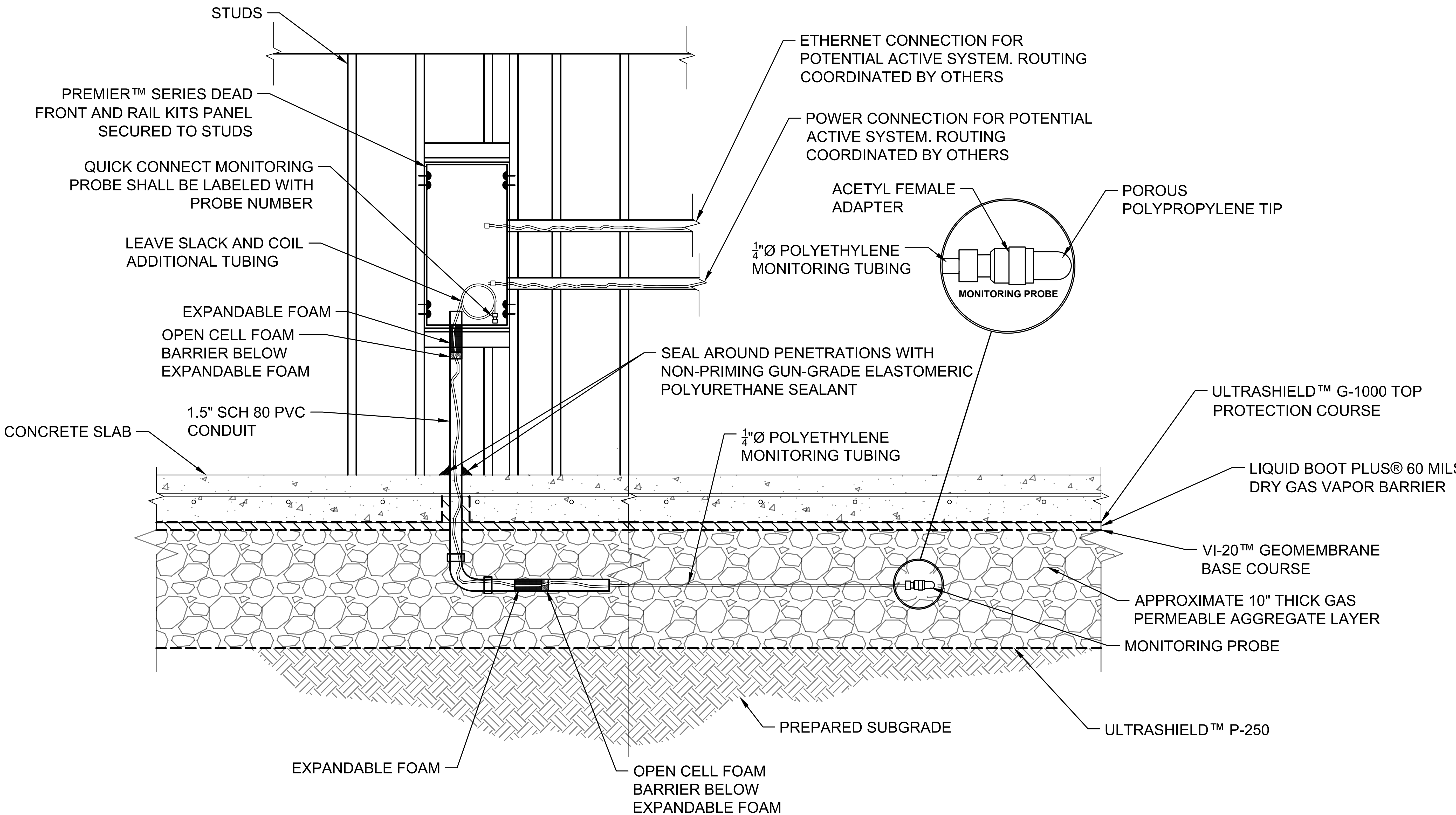
Date JUNE 2019

Drawn By ELH

Venting Plan - 200 Caribbean

Caribbean Campus Development
Sunnyvale, California

CORNERSTONE EARTH GROUP



1 **TYPICAL MONITORING PROBE CONFIGURATION AND STATION**

NOT TO SCALE

Project Number 678-3-2

Figure Number 6A

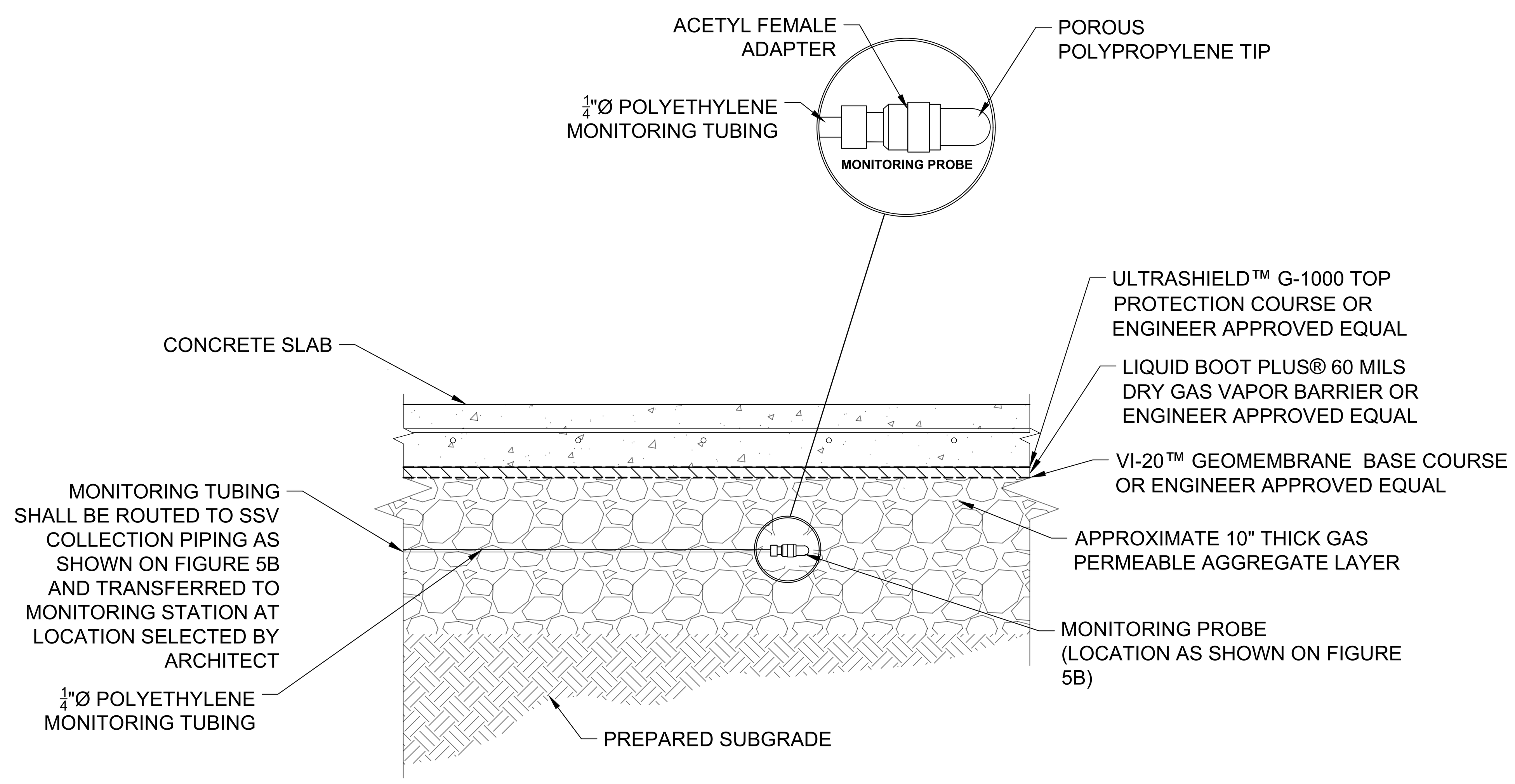
Date JUNE 2019

Drawn By ELH

Subslab Monitoring Probe/Stations - 100 Caribbean

Caribbean Campus Development
Sunnyvale, California

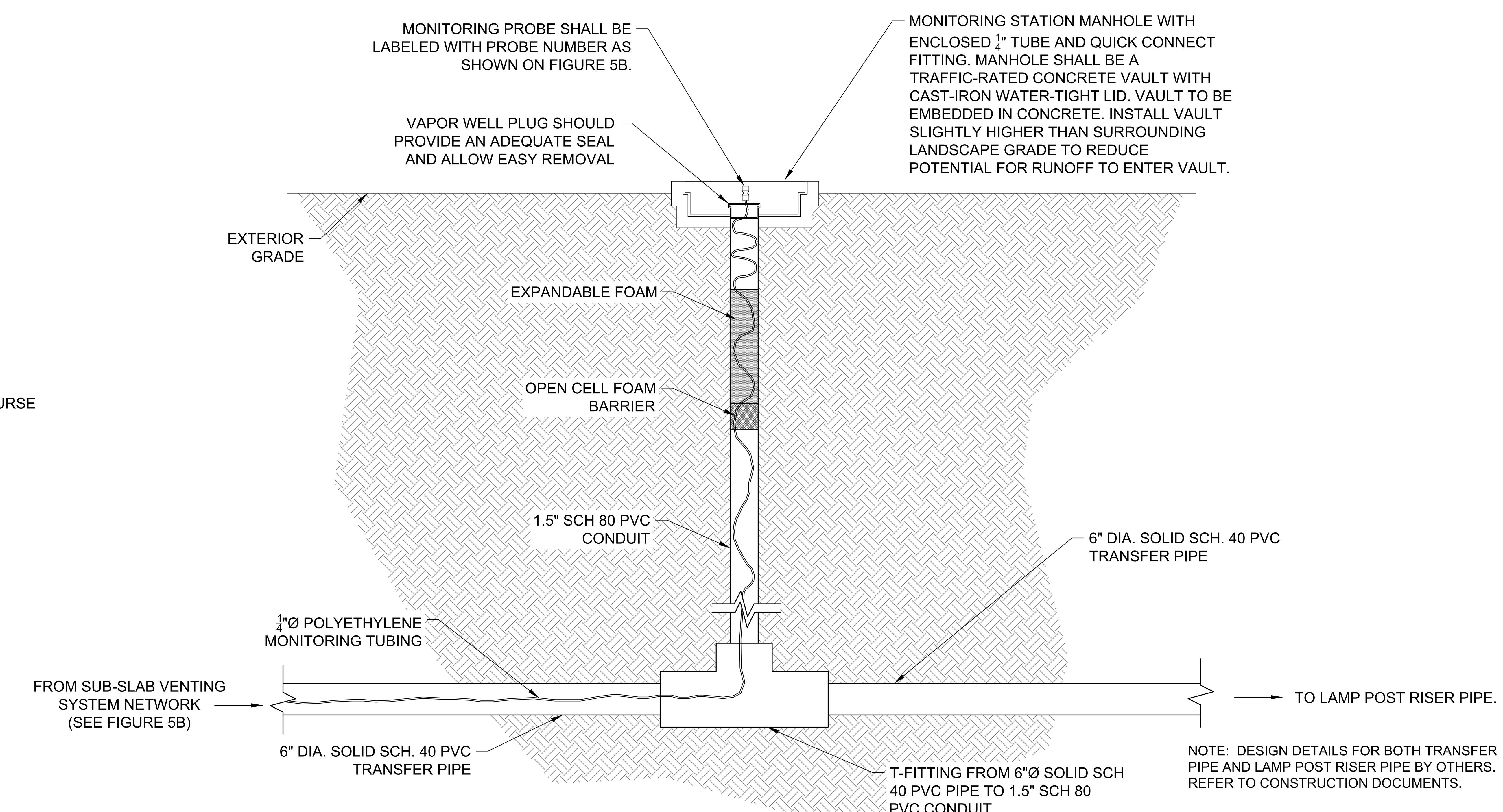
CORNERSTONE EARTH GROUP



NOTE: REFER TO FIGURE 5B FOR MONITORING PROBE LOCATION. MONITORING STATION MANHOLE SHALL BE LOCATED IN AN EASILY ACCESSIBLE AREA WITHIN LANDSCAPING. PRIOR TO INSTALLATION COORDINATE LOCATIONS WITH ARCHITECT, STRUCTURAL ENGINEER, AND OTHER TRADES.

1 **TYPICAL MONITORING PROBE CONFIGURATION**

NOT TO SCALE



NOTE: DESIGN DETAILS FOR BOTH TRANSFER PIPE AND LAMP POST RISER PIPE BY OTHERS. REFER TO CONSTRUCTION DOCUMENTS.

2 **TYPICAL SUB-SLAB MONITORING PROBE STATION**

NOT TO SCALE

Subslab Monitoring Probe/Stations - 200 Caribbean

Caribbean Campus Development
Sunnyvale, California

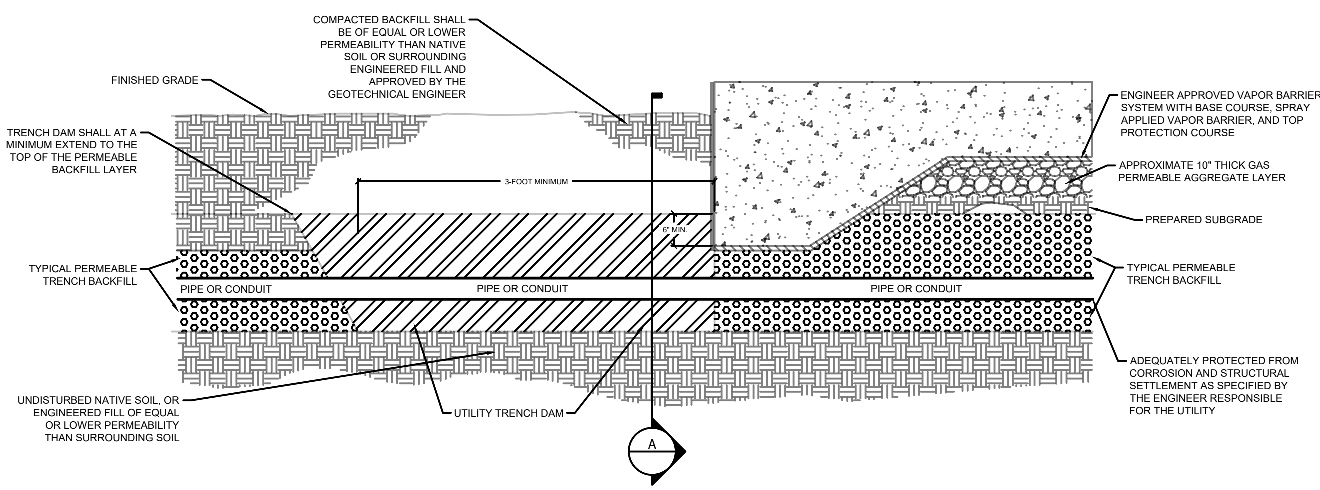
678-3-2

Figure Number 6B

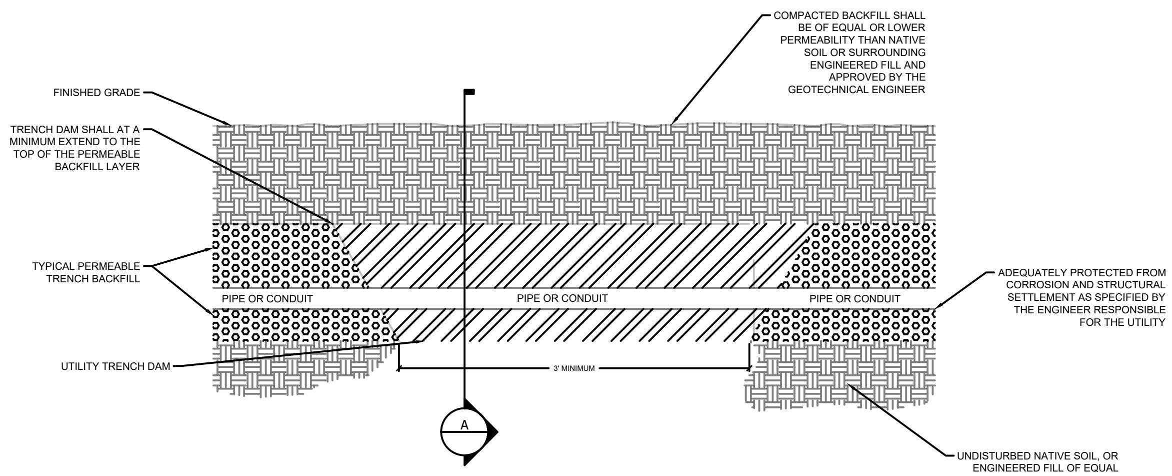
Date JUNE 2019

Drawn By JMA/ELH

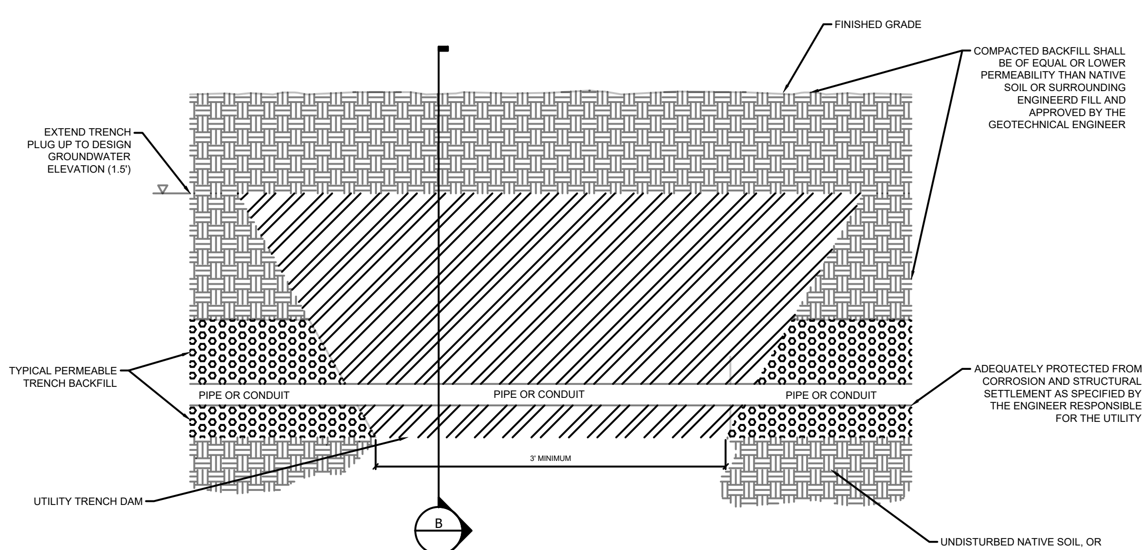
CORNERSTONE EARTH GROUP



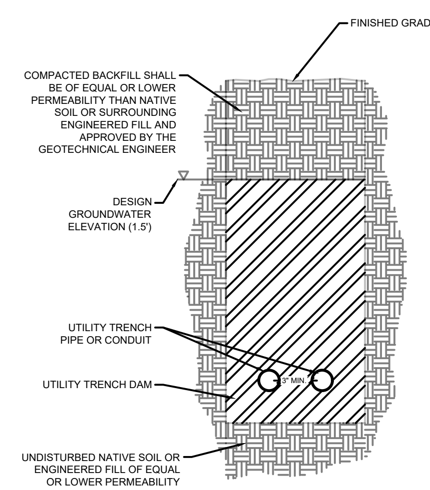
1 **TYPICAL TRENCH DAM DETAIL AT EDGE OF BUILDING SLAB**
NOT TO SCALE



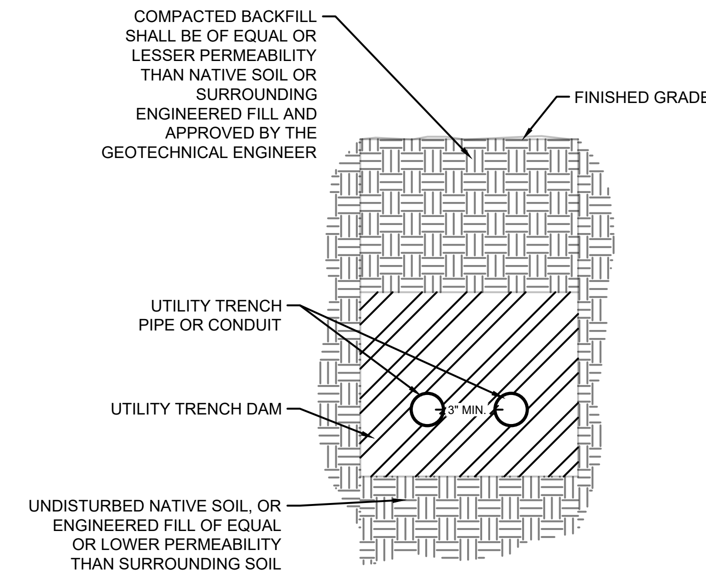
2 **TYPICAL SHALLOW TRENCH DAM DETAIL - LONGITUDINAL SECTION (UTILITIES ABOVE GROUNDWATER DESIGN ELEVATION)**
NOT TO SCALE



3 **TYPICAL DEEP TRENCH DAM DETAIL - LONGITUDINAL SECTION (UTILITIES BELOW GROUNDWATER DESIGN ELEVATION)**
NOT TO SCALE



B **DEEP TRENCH DAM SECTION**
NOT TO SCALE



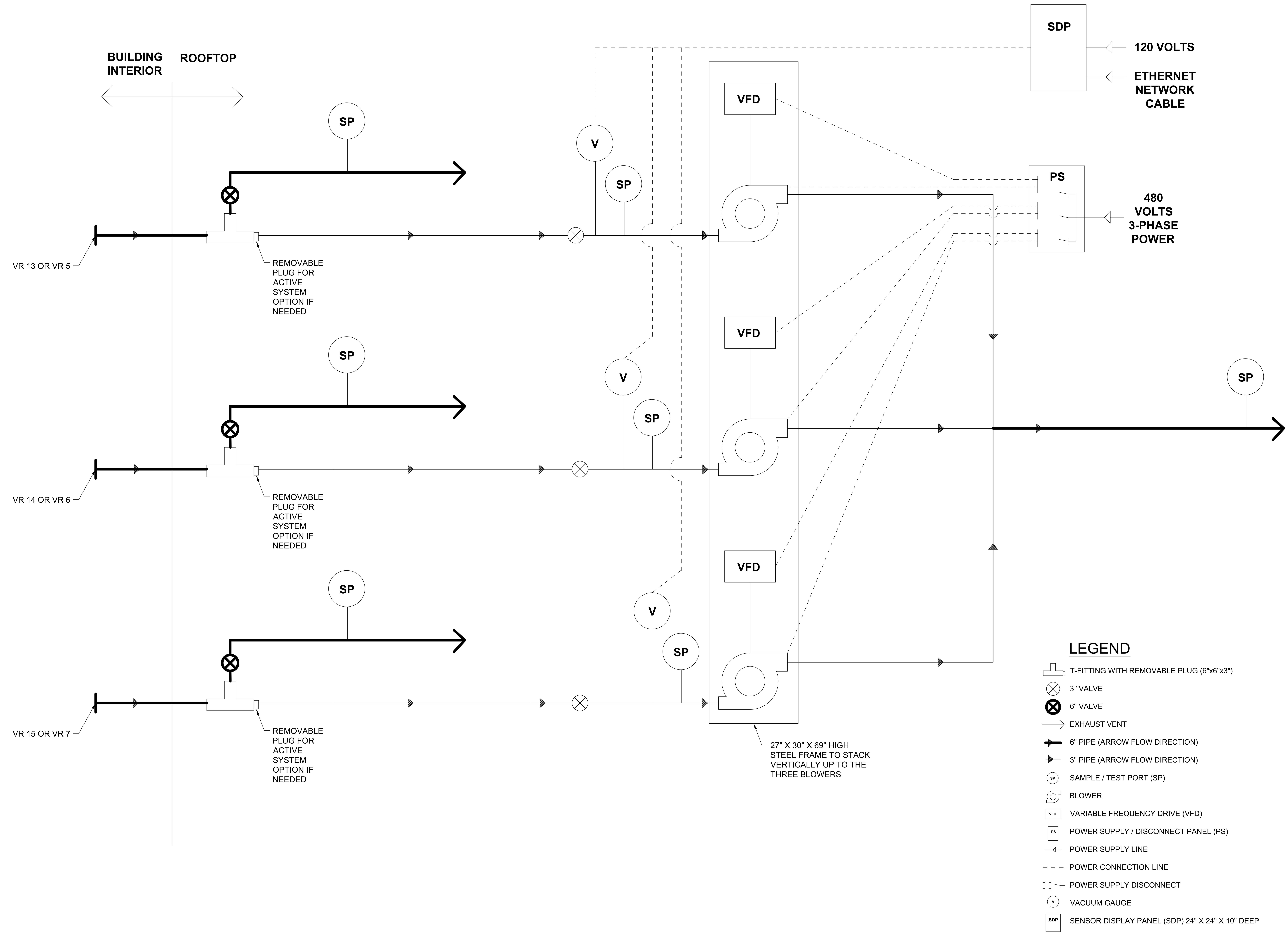
A **TRENCH DAM SECTION**
NOT TO SCALE

Trench Plug Details

100/200 Caribbean
Sunnyvale, California

Project Number 678-3-2
Figure Number 7
Date JUNE 2019
Drawn By MFC/JMA/ELH

CORNERSTONE EARTH GROUP



Project Number 678-3-2

Figure Number 8

Date JUNE 2019

Drawn By ELH

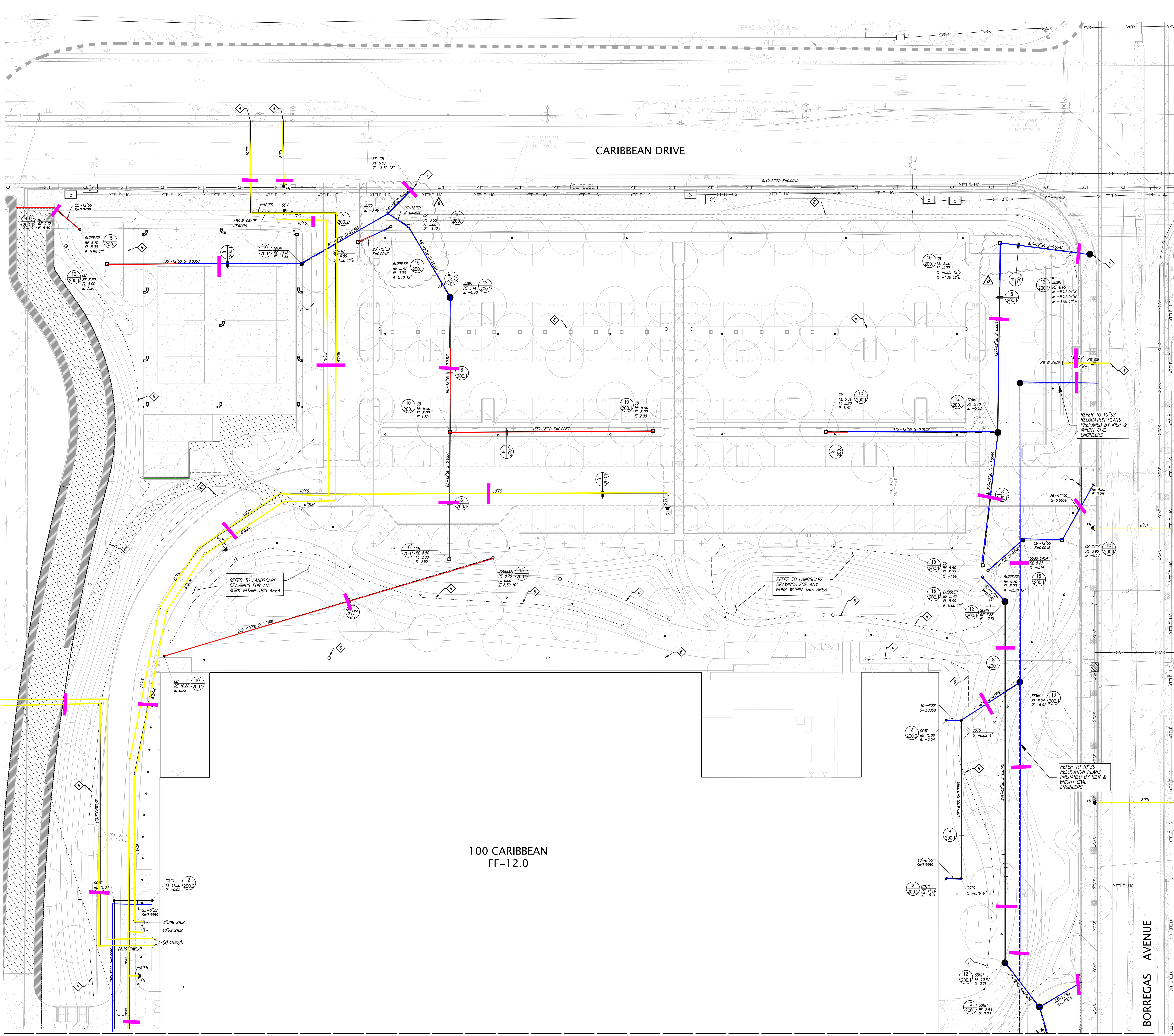
Active System Process and Instrumentation Diagram - 100 Caribbean

Caribbean Campus Development
Sunnyvale, California

CORNERSTONE EARTH GROUP

CORNERSTONE EARTH GROUP

APPENDIX A – PRELIMINARY TRENCH DAM LOCATIONS



KEY NOTES

1. STORM DRAIN CONNECTION TO EXISTING STRUCTURE
2. SDMH STRUCTURE ON EXISTING STORM DRAIN SYSTEM PER CITY OF SUNNYVALE STANDARDS.
3. RECLAIMED WATER CONNECTION TO EXISTING RECLAIMED WATERLINE PER CITY OF SUNNYVALE STANDARDS.
4. FIRE SERVICE CONNECTION TO EXISTING WATERLINE PER CITY OF SUNNYVALE STANDARDS.
5. EXISTING FIBER OPTIC LINE TO REMAIN AND BE PROTECTED IN PLACE DURING CONSTRUCTION.
6. REFER TO LANDSCAPE DRAWINGS FOR AREA DRAINS AND PIPING CONNECTIONS TO CIVIL GRADING AND DRAINAGE SYSTEM
7. INSTALL 4" WIDE SLOPED S300 K POWERDRAIN BY ACO, REFER TO LANDSCAPE PLANS FOR GRATE TYPE.

LEGEND

XJT	EXISTING JOINT TRENCH
XTELE-UG	EXISTING UNDERGROUND TELEPHONE SERVICE
XGAS	EXISTING GAS SERVICE
EX FO	EXISTING FIBER OPTIC SERVICE

NOTE:

1. ALL ONSITE EXISTING UTILITIES IF NOT SHOWN PROTECTED THEN ASSUME REMOVED OR ABANDONED.
2. ALL FIBER OPTICS, JT LOCATIONS WILL BE POTHOLED & VERIFIED IN THE FIELD PRIOR TO COMPLETION OF THE UTILITY DESIGN.
3. JT FOR REFERENCE ONLY.
4. UTILITIES TO BE POTHOLED PRIOR TO FINAL DESIGN.
5. THE UNDERGROUND PRIVATE SITE FIRE PROTECTION SYSTEMS ARE "LOOPED" SYSTEMS WITH TWO 10"FIRE SERVICE CONNECTIONS TO THE 12" PUBLIC MAIN (W. CARIBBEAN AND BORDEAUX DRIVE.) THERE IS A 10"DIAMETER ABOVE GRADE REDUCED PRESSURE DETECTOR ASSEMBLY (RPDA) AT EACH FIRE SERVICE CONNECTION. AS SUCH, NOTE THE FOLLOWING: THE 10"RPDA HAS A LISTED FLOW RATE OF 2,300 GPM. BEING THAT BUILDING 200 CARIBBEAN HAS THE LARGEST FIRE FLOW REQUIREMENT, 4500 GPM AT 20 PSI, NO ADDITIONAL RPDA'S ARE NEEDED.

D	03.22.2019	PERMIT SUBMITTAL
C	02.22.2019	ADDENDUM C
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	10.26.2018	100% DD
	06.29.2018	50% DD
	03.29.2018	50%DD SKIN BID
	03.09.2018	50% DD BID
	03.02.2018	50% DD

SEAL

NOT FOR CONSTRUCTION

KEY PLAN

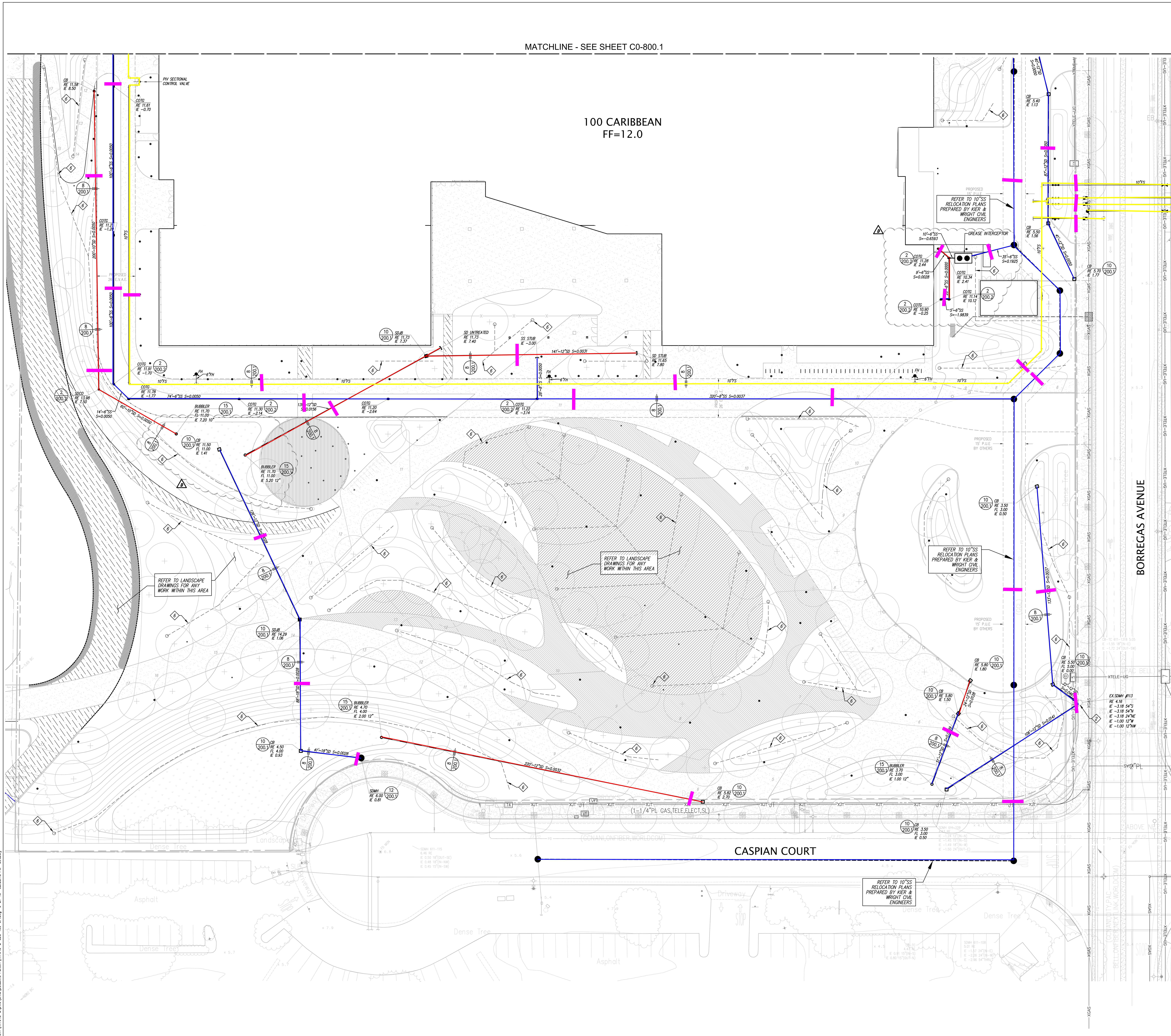
BAR SCALE

SHEET NAME

UTILITY PLAN

PROJECT NO A17048-2
DOB NO
SCALE AS SHOWN
ISSUE PERMIT SUBMITTAL
DATE 03/22/19

SHEET NO C0-800.1



KEY NOTES

1. STORM DRAIN CONNECTION TO EXISTING STRUCTURE
2. SDMH STRUCTURE ON EXISTING STORM DRAIN SYSTEM PER CITY OF SUNNYVALE STANDARDS.
3. RECLAIMED WATER CONNECTION TO EXISTING RECLAIMED WATERLINE PER CITY OF SUNNYVALE STANDARDS.
4. FIRE SERVICE CONNECTION TO EXISTING WATERLINE PER CITY OF SUNNYVALE STANDARDS.
5. EXISTING FIBER OPTIC LINE TO REMAIN AND BE PROTECTED IN PLACE DURING CONSTRUCTION.
6. REFER TO LANDSCAPE DRAWINGS FOR AREA DRAINS AND PIPING CONNECTIONS TO CIVIL GRADING AND DRAINAGE SYSTEM
7. INSTALL 4" WIDE SLOPED S300 K POWERDRAIN BY ACO, REFER TO LANDSCAPE PLANS FOR GRATE TYPE.

LEGEND

XJT	EXISTING JOINT TRENCH
XTELE-UG	EXISTING UNDERGROUND TELEPHONE SERVICE
XGAS	EXISTING GAS SERVICE
EX FO	EXISTING FIBER OPTIC SERVICE

NOTE:

1. ALL ONSITE EXISTING UTILITIES IF NOT SHOWN PROTECTED THEN ASSUME REMOVED OR ABANDONED.
2. ALL FIBER OPTICS, JT LOCATIONS WILL BE POTHOLED & VERIFIED IN THE FIELD PRIOR TO COMPLETION OF THE UTILITY DESIGN.
3. JT FOR REFERENCE ONLY.
4. UTILITIES TO BE POTHOLED PRIOR TO FINAL DESIGN.
5. THE UNDERGROUND PRIVATE SITE FIRE PROTECTION SYSTEMS ARE "LOOPED" SYSTEMS WITH TWO 10"FIRE SERVICE CONNECTIONS TO THE 12" PUBLIC MAIN (W. CARIBBEAN AND BORDEAUX DRIVE.) THERE IS A 10"DIAMETER ABOVE GRADE REDUCED PRESSURE DETECTOR ASSEMBLY (RPDA) AT EACH FIRE SERVICE CONNECTION. AS SUCH, NOTE THE FOLLOWING: THE 10"RPDA HAS A LISTED FLOW RATE OF 2,300 GPM. BEING THAT BUILDING 200 CARIBBEAN HAS THE LARGEST FIRE FLOW REQUIREMENT, 4500 GPM AT 20 PSI, NO ADDITIONAL RPDA'S ARE NEEDED.

CLIENT: Google
DEVELOPMENT MANAGER: SARES REGIS
DESIGN CONSULTANT: BIG
DEVCON CONSTRUCTION INC
CIVIL ENGINEER: KIER & WRIGHT
LANDSCAPE ARCHITECT: OLIN
STRUCTURAL ENGINEER: kpff
INTERIOR ARCHITECT: CLIVE WILKINSON ARCHITECTS
POINT ENERGY INNOVATIONS
LIGHTING DESIGN CONSULTANT: BOLD
RICCA DESIGN STUDIO
EGG OFFICE
CURTAIN WALL DESIGN CONSULTING: CDC
ENCLOS
ALLANA BUICK & BERS, LLC.
HIGHLINE CONSULTING, INC.
ACCO ENGINEERED SYSTEMS
ROSENDIN ELECTRIC
SILVERMAN & LIGHT
KDS PLUMBING
TEECOM
COREBRACE

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	06.29.2018	50% DD
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	03.09.2018	50% DD BID
	03.02.2018	50% DD

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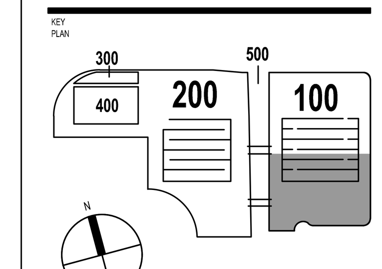
KEY PLAN

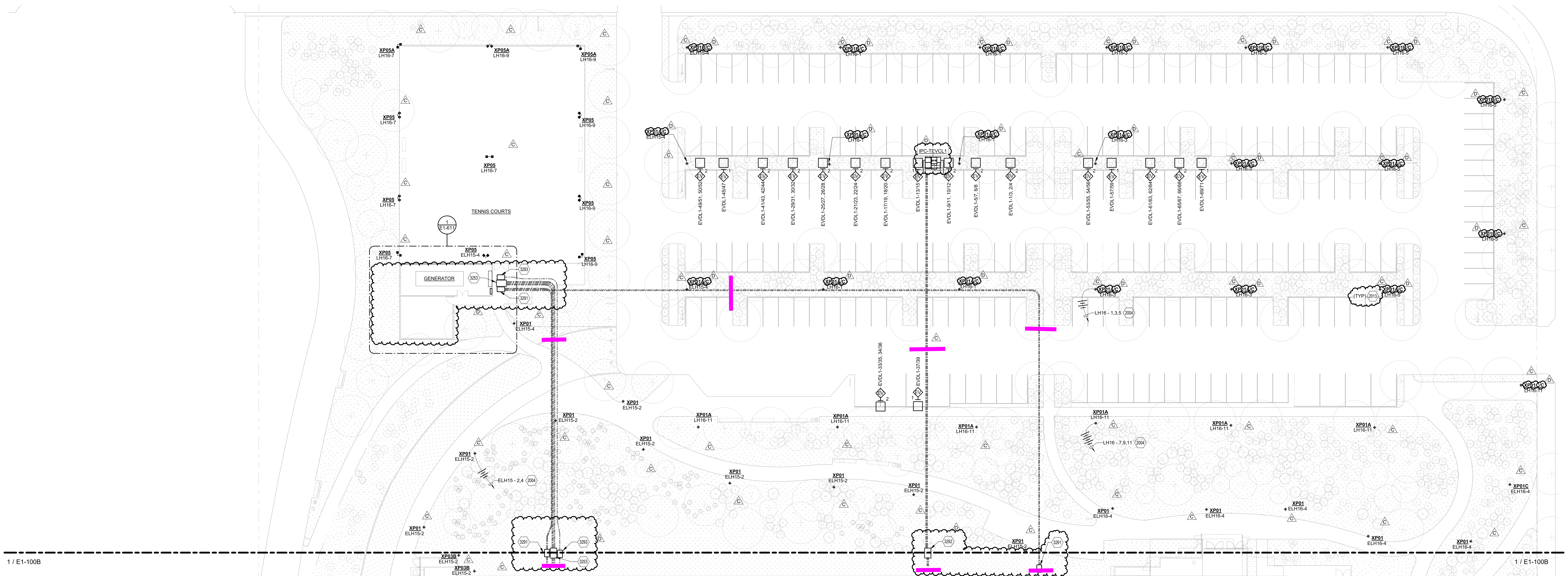


SHEET NAME

UTILITY PLAN

PROJECT NO **A17048-2**
DOB NO
SCALE **AS SHOWN**
ISSUE **PERMIT SUBMITTAL**
DATE **03/22/19**

SHEET NO **C0-800.2**



1 ELECTRICAL SITE SECTOR PLAN - AREA C1
1" = 20'-0"

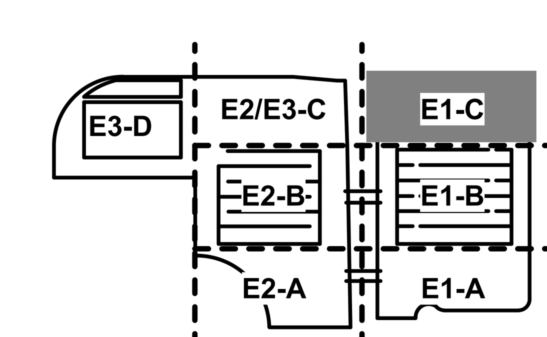
GENERAL NOTES

1. ALL SITE LIGHTING CONDUCTORS SHALL BE #10 AWG.

NUMBERED NOTES

2004	ROUTE CIRCUITS CONTROLLING EXTERIOR LIGHTING VIA ENLIGHTED DIGITAL LIGHTING CONTROL SYSTEM FOR TIMECLOCK CONTROL OF EXTERIOR LIGHTING.
2013	FOR ALL SITE POLE FIXTURES WITH '/C' AFTER THE FIXTURE TAG, PROVIDE WITH ABOVE GRADE CONCRETE BASE. SEE BASE DETAIL ON DETAIL SHEET. FOR THESE FIXTURES ORDER WITH SHORTER POLE SO THAT OVERALL FIXTURE HEIGHT OF ANY GIVEN TYPE REMAINS THE SAME, WHETHER IT HAS THE ABOVE GRADE BASE OR NOT.
3253	(N) UNDERGROUND VAULT FOR EMERGENCY POWER DISTRIBUTION. 3'-0" X 5'-0" X 3'-0" WITH LIFT OFF COVERS.
3291	(N) UNDERGROUND VAULT FOR CONTROLLER WIRING, N40 CHRISTY BOX.
3292	(N) UNDERGROUND VAULT FOR EV STATION POWER DISTRIBUTION, N48 CHRISTY BOX.
3293	(N) UNDERGROUND VAULT FOR TELECOM, N40 CHRISTY BOX.

KEY PLAN - SITE



PROJECT NAME

NO	DATE	REVISION
D	03.22.2019	PERMIT SUBMITTAL
C	02.08.2019	ADDENDUM C
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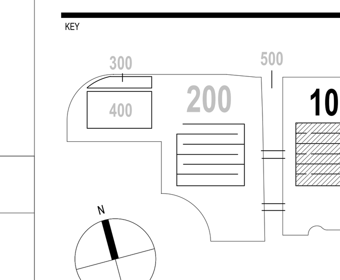
	10.26.2018	100% DD
	06.29.2018	50% DD
	03.29.2018	50%DD SKIN BID
	03.09.2018	50% DD BID
	03.02.2018	50% DD

SEAL

NOT FOR CONSTRUCTION

KEY



BAR

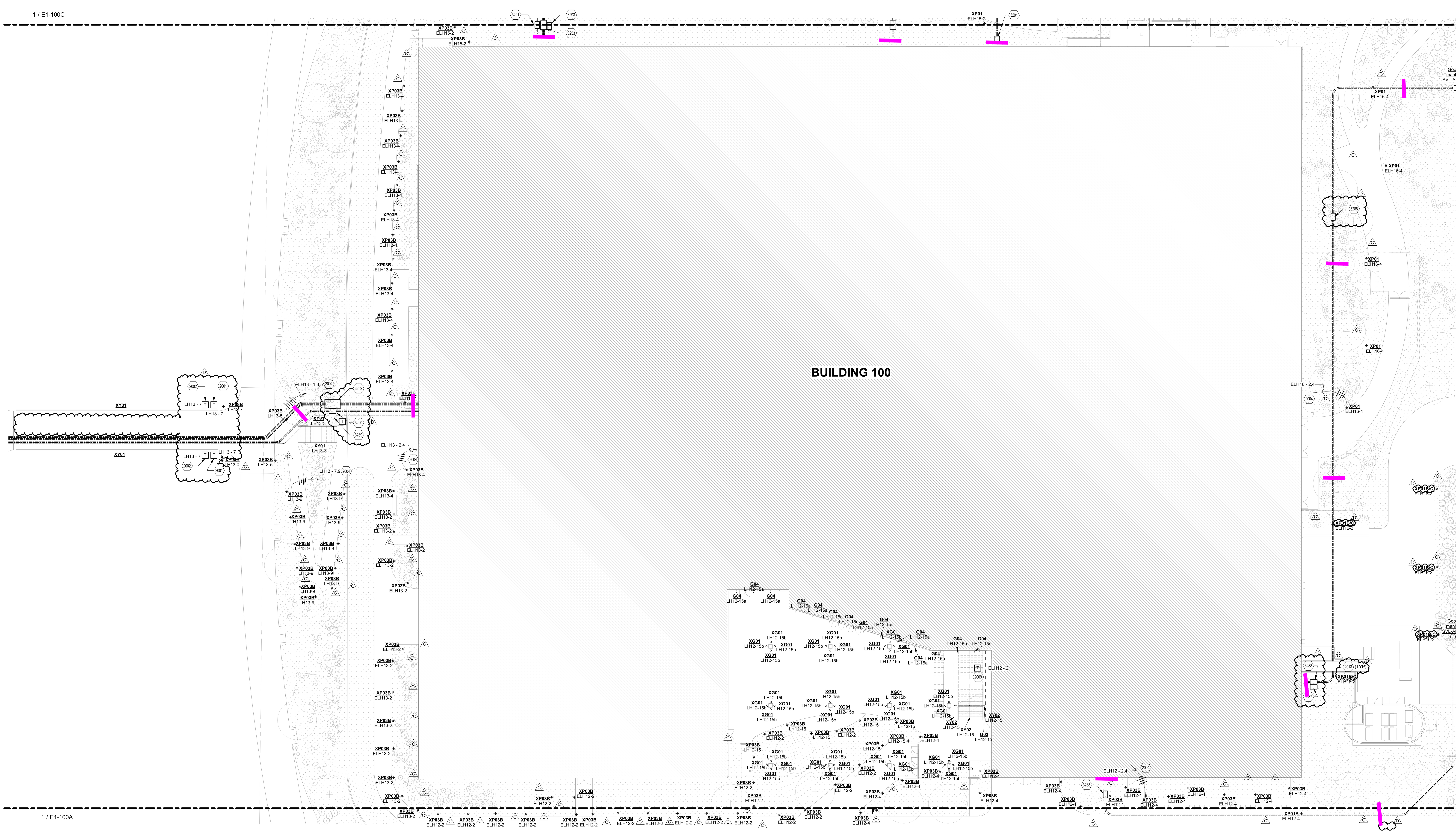
SHEET NAME

ELECTRICAL SITE PLAN - AREA C

PROJECT NO: PROJECT NUMBER
SHEET NO: E1-100C
DOB NO
SCALE: 1" = 20'-0"
ISSUE: PERMIT SUBMITTAL
DATE: 03/22/19

CPRA CONFIDENTIAL TREATMENT REQUEST
NOT FOR PUBLIC RELEASE - CPRA EXEMPT
CONFIDENTIAL & PROPRIETARY BUSINESS/SITING INFO
PRE-DECISIONAL DRAFT FOR REVIEW ONLY

1 / E1-100C



1 ELECTRICAL SITE SECTOR PLAN - AREA B1
1" = 20'-0"

GENERAL NOTES

1. ALL SITE LIGHTING CONDUCTORS SHALL BE #10 AWG.

NUMBERED NOTES

2001 AT THIS LOCATION, PROVIDE ONE (1) WATERTIGHT NEMA 4 ENCLOSURE, KLIK USA #LPNEMA4ENCL. EACH ENCLOSURE SHALL HOUSE TWO (2) 100 WATT DIMMABLE DRIVERS, KLIK USA #LP100WPRITRNDM TO CONTROL TYPE XY01 LED HANDRAIL. COORDINATE LOCATION AND MOUNTING WITH ARCHITECT.

2002 AT THIS LOCATION, PROVIDE ONE (1) WATERTIGHT NEMA 4 ENCLOSURE, KLIK USA #LPNEMA4ENCL. EACH ENCLOSURE SHALL HOUSE ONE (1) 100 WATT DIMMABLE DRIVER, KLIK USA #LP100WPRITRNDM TO CONTROL TYPE XY01 LED HANDRAIL. COORDINATE LOCATION AND MOUNTING WITH ARCHITECT.

2004 ROUTE CIRCUITS CONTROLLING EXTERIOR LIGHTING VIA ENLIGHTED DIGITAL LIGHTING CONTROL SYSTEM FOR TIMECLOCK CONTROL OF EXTERIOR LIGHTING.

2009 PROVIDE TWO (2) WATERTIGHT NEMA 4 ENCLOSURES, OLS #011300. ONE ENCLOSURE SHALL HOUSE TWO (2) 100 WATT DRIVERS, OLS #011384, AND THE OTHER ENCLOSURE SHALL HOUSE ONE (1) DRIVER FOR LIGHTED HANDRAIL, FIXTURE TYPE XY02. COORDINATE ENCLOSURE LOCATIONS AND MOUNTING WITH ARCHITECT. NOTE: EACH SYMBOL IDENTIFIED BY THIS NOTE ON THE DRAWING REPRESENTS A TOTAL OF TWO (2) ENCLOSURES AND FOUR(43 DRIVERS.

2013 FOR ALL SITE POLE FIXTURES WITH '/C' AFTER THE FIXTURE TAG, PROVIDE WITH ABOVE GRADE CONCRETE BASE. SEE BASE DETAIL ON DETAIL SHEET. FOR THESE FIXTURES ORDER WITH SHORTER POLE SO THAT OVERALL FIXTURE HEIGHT OF ANY GIVEN TYPE REMAINS THE SAME, WHETHER IT HAS THE ABOVE GRADE BASE OR NOT.

3252 (N) UNDERGROUND VAULT FOR NORMAL 12KV POWER DISTRIBUTION. 4'-6" X 8'-6" X 4'-6" WITH SPRING ASSIST HINGED COVERS.

3253 (N) UNDERGROUND VAULT FOR EMERGENCY POWER DISTRIBUTION. 3'-0" X 5'-0" X 3'-0" WITH LIFT OFF COVERS.

3287 (N) AT&T VAULT. AT&T TO CONFIRM SIZE.

3288 (N) UNDERGROUND VAULT FOR TELECOM, N48 CHRISTY BOX.

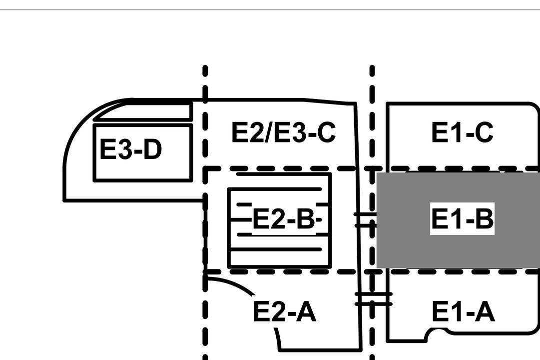
3289 (N) UNDERGROUND VAULT FOR ERRCS, N40 CHRISTY BOX.

3290 (N) UNDERGROUND VAULT FOR TELECOM/DAS, N40 CHRISTY BOX.

3291 (N) UNDERGROUND VAULT FOR CONTROLLER WIRING, N40 CHRISTY BOX.

3293 (N) UNDERGROUND VAULT FOR TELECOM, N40 CHRISTY BOX.

KEY PLAN - SITE



PROJECT NAME

NO	DATE	REVISION
D	03.22.2019	PERMIT SUBMITTAL
C	02.08.2019	ADDENDUM C
	12.21.2018	50% CD
	10.26.2018	100% DD
	06.29.2018	50% DD
	03.29.2018	50%DD SKIN BID
	03.09.2018	50% DD BID
	03.02.2018	50% DD

SEAL

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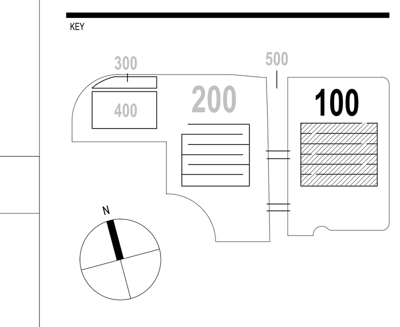
KEY



BAR

SHEET NAME

ELECTRICAL SITE PLAN - AREA B

PROJECT NO
PROJECT NUMBER
DOB NO
SCALE
1" = 20'-0"
ISSUE
PERMIT SUBMITTAL
DATE
03/22/19

SHEET NO
E1-100B

CPRA CONFIDENTIAL TREATMENT REQUEST
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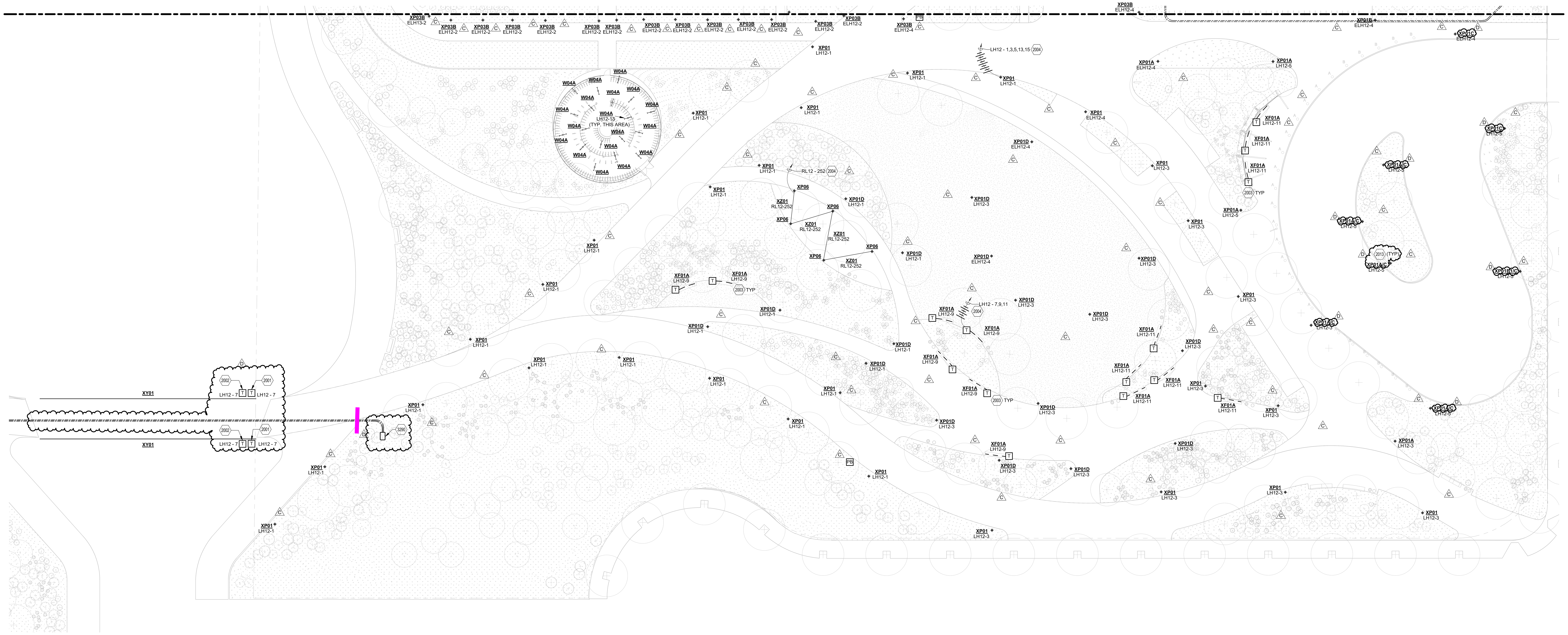
CONFIDENTIAL & PROPRIETARY BUSINESS/SITING INFO
PRE-DECISIONAL DRAFT FOR REVIEW ONLY



1 ELECTRICAL SITE SECTOR PLAN - AREA A1
1" = 20'-0"

GENERAL NOTES

1. ALL SITE LIGHTING CONDUCTORS SHALL BE #10 AWG.

NUMBERED NOTES

2001 AT THIS LOCATION, PROVIDE ONE (1) WATERTIGHT NEMA 4 ENCLOSURE, KLIK USA #LPNEMA4ENCL. EACH ENCLOSURE SHALL HOUSE TWO (2) 100 WATT DIMMABLE DRIVERS, KLIK USA #LP100WPRITRNDM TO CONTROL TYPE XY01 LED HANDRAIL. COORDINATE LOCATION AND MOUNTING WITH ARCHITECT.

2002 AT THIS LOCATION, PROVIDE ONE (1) WATERTIGHT NEMA 4 ENCLOSURE, KLIK USA #LPNEMA4ENCL. EACH ENCLOSURE SHALL HOUSE ONE (1) 100 WATT DIMMABLE DRIVER, KLIK USA #LP100WPRITRNDM TO CONTROL TYPE XY01 LED HANDRAIL. COORDINATE LOCATION AND MOUNTING WITH ARCHITECT.

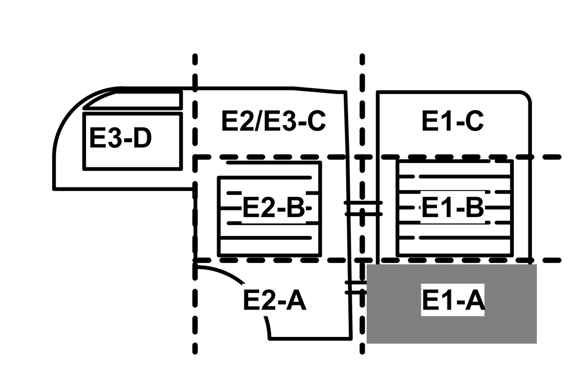
2003 LED DRIVER FOR TYPE XF01 BENCH LIGHTS SHALL BE UNIVERAL PRIMARY VOLTAGE, 100 WATT, LOW PROFILE, QTRAN SLV100-124V-FC. DRIVER SHALL MOUNT TO UNDERSIDE OF BENCH. COORDINATE LOCATION AND MOUNTING WITH LANDSCAPE ARCHITECT.

2004 ROUTE CIRCUITS CONTROLLING EXTERIOR LIGHTING VIA ENLIGHTED DIGITAL LIGHTING CONTROL SYSTEM FOR TIMECLOCK CONTROL OF EXTERIOR LIGHTING.

2013 FOR ALL SITE POLE FIXTURES WITH '/C' AFTER THE FIXTURE TAG, PROVIDE WITH ABOVE GRADE CONCRETE BASE. SEE BASE DETAIL ON DETAIL SHEET. FOR THESE FIXTURES ORDER WITH SHORTER POLE SO THAT OVERALL FIXTURE HEIGHT OF ANY GIVEN TYPE REMAINS THE SAME, WHETHER IT HAS THE ABOVE GRADE BASE OR NOT.

3290 (N) UNDERGROUND VAULT FOR TELECOM/DAS, N40 CHRISTY BOX.

KEY PLAN - SITE



PROJECT NAME

NO	DATE	REVISION
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C	02.08.2019	ADDENDUM C
	12.21.2018	50% CD
	10.26.2018	100% DD
	06.29.2018	50% DD
	03.29.2018	50%DD SKIN BID
	03.09.2018	50% DD BID
	03.02.2018	50% DD

SEAL

NOT FOR CONSTRUCTION

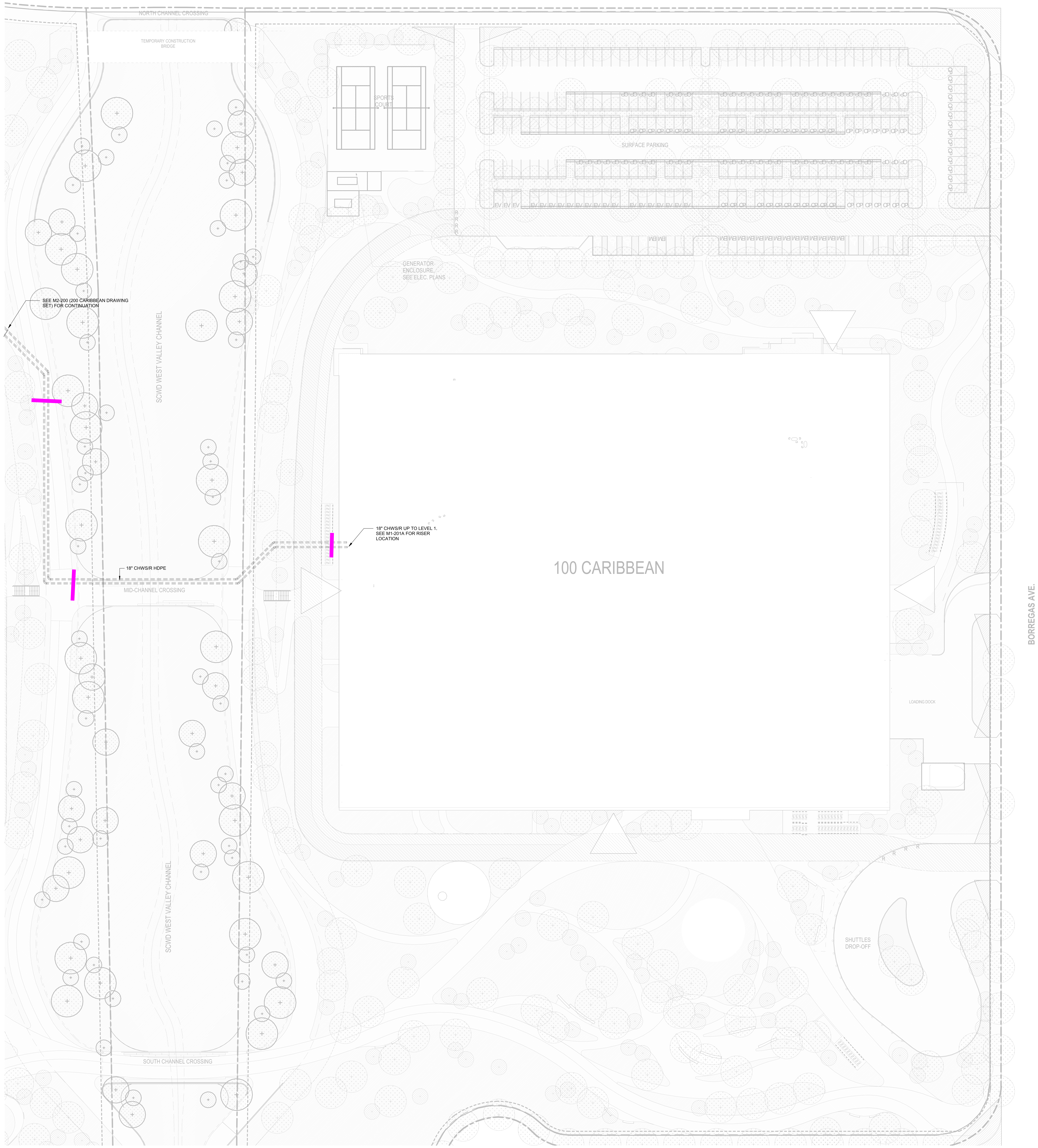
KEY

BAR

SHEET NAME

ELECTRICAL SITE PLAN - AREA A

PROJECT NO: PROJECT NUMBER
DOB NO
SCALE: 1" = 20'-0"
ISSUE: PERMIT SUBMITTAL
DATE: 03/22/19
SHEET NO: E1-100A



1 UNDERGROUND PIPING PLAN
SCALE: 1/32" = 1'-0"

CARIBBEAN CAMPUS
100 W CARIBBEAN DRIVE
SUNNYVALE, CA

CLIENT
GOOGLE
1600 AMPHITHEATRE PARKWAY
MOUNTAINVIEW, CA
T +1 650 253 0000

DEVELOPMENT MANAGER
SARES - REGIS
901 MARINERS ISLAND BLVD, SUITE 700
SAN MATEO, CA 94404
T +1 949 756 5959

DESIGN CONSULTANT
BJARKE INGELS GROUP
61 BROADWAY, SUITE 3300
NEW YORK, NY 10006, USA
T +1 347 549 4141

ARCHITECT OF RECORD / DESIGN BUILD CONTRACTOR
build perform design sustain
DEVCON CONSTRUCTION INC
690 GIBRALTAR DRIVE
MILPITAS, CA 95035
T +1 408 942 8200

CIVIL ENGINEER
KIER & WRIGHT
3350 SCOTT BOULEVARD, BUILDING 22
SANTA CLARA, CA 95054
T +1 408 727 6665

LANDSCAPE ARCHITECT
OLIN
150 SOUTH INDEPENDENCE MALL WEST
PHILADELPHIA, PA 19106
T +1 215 440 0030

STRUCTURAL ENGINEER
KPFF
45 FREMONT STREET, 28TH FLOOR
SAN FRANCISCO, CA 94105
T +1 415 989 1004

INTERIOR ARCHITECT
CLIVE WILKINSON ARCHITECTS
6116 WASHINGTON BOULEVARD
CULVER CITY, CA 90232
T +1 310 358 2200

MECHANICAL | PLUMBING | ELECTRICAL
POINT ENERGY INNOVATIONS
220 MONTGOMERY STREET, SUITE 321
SAN FRANCISCO, CA94104
T +1 415 663 6340

LIGHTING DESIGN CONSULTANT
BOLD
5455 WILSHIRE BLVD, SUITE 1210
LOS ANGELAS, CA 90036
T +1 213 412 3180

FOOD SERVICE DESIGNER
RICCA DESIGN STUDIO
5325 S. VALENTIA WAY
GREENWOOD VILLAGE, CO 80111
T +1 303 221 0500

BRAND DESIGN
EGG OFFICE
2673 S. LA CIENEGA BLVD
LOS ANGELES, CA 90034
T +1 310 425 8942

CURTAIN WALL CONSULTANT
CURTAIN WAL DESIGN CONSULTING
12 GEARY BLVD. #503
SAN FRANCISCO, CA 94108
T +1 925 906 9255

CURTAIN WALL DESIGN/BUILD CONTRACTOR
ENCLOS
14870 CENTRAL AVENUE
CHINO, CA 91710
T +1 909 597 2037

WATERPROOFING CONSULTANT
ALLANA BUICK & BERS, LLC.
990 COMMERCIAL STREET
PALO ALTO, CA 94303
T +1 415 543 5600

FACADE MAINTENANCE
HIGHLINE CONSULTING, INC.
4361 TECHNOLOGY DR. UNIT D
LIVERMORE, CA 94551
T +1 925 245 841

MECHANICAL DESIGN/BUILD ENGINEER
ACCO ENGINEERED SYSTEMS
1133 ALADDIN AVE.
SAN LEANDRO, CA 94577
T +1 510 346 4300

ELECTRICAL DESIGN/BUILD ENGINEERS
ROSENDIN ELECTRIC
880 MABURY RD.
SAN JOSE, CA 95133
T +1 408 286 2800

SILVERMAN & LIGHT
1201 Park Ave # 100
Emeryville, CA 94608
T +1 510 655 1200

PLUMBING DESIGN/BUILD ENGINEER
KDS PLUMBING
2087 RINGWOOD AVE, #10
SAN JOSE, CA 95131
T +1 408 435 1685

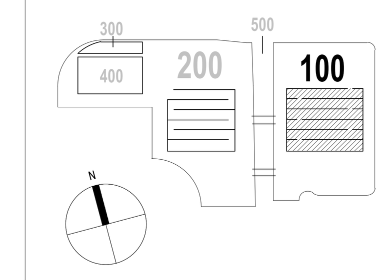
TELECOM DESIGN ENGINEER
TEECOM
1333 BROADWAY, STE-601
OAKLAND, CA 94612
T +1 (510) 337 2800

STRUCTURAL BRACING ENGINEER
COREBRACE
5789 WEST WELLS PARK ROAD
WEST JORDAN, UT 84081
(801) 280-4934

NO	DATE	REVISION
D	03.22.2019	PERMIT SUBMITTAL
C	02.08.2019	ADDENDUM C
	12.21.2018	50% CD
	10.26.2018	100% DD
	07.13.2018	50% DD

SEAL
REGISTERED PROFESSIONAL ENGINEER
CRAIG A. SILVEY
No. M031857
EXP. 09/30/19
MECHANICAL
STATE OF CALIFORNIA

NOT FOR CONSTRUCTION

KEY


BAR

SHEET NAME

UNDERGROUND PIPING PLAN

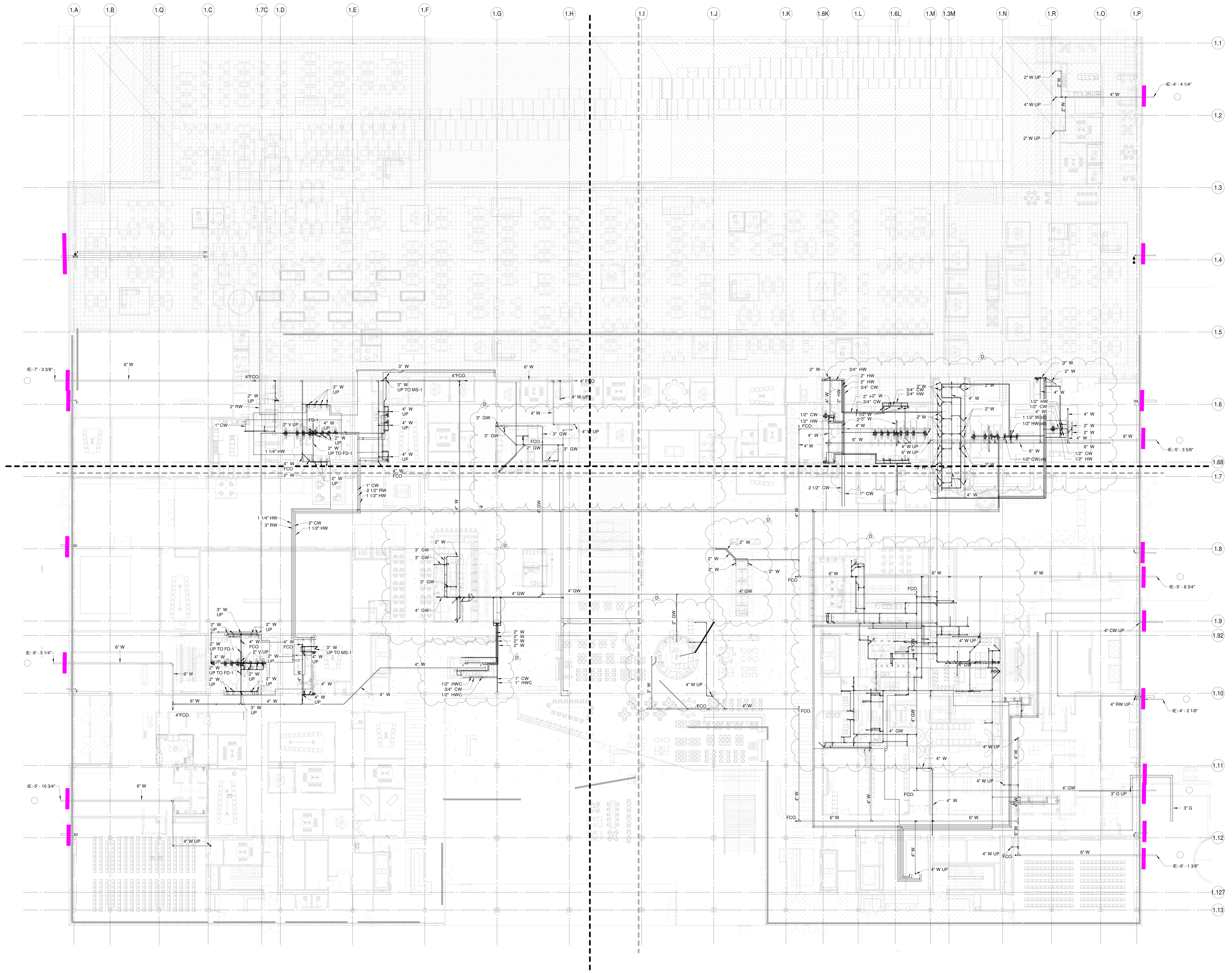
PROJECT NO
622905
DOB NO
SCALE
1/32" = 1'-0"
ISSUE
PERMIT SUBMITTAL
DATE
03/22/2019

SHEET NO
M1-200

CPRA CONFIDENTIAL TREATMENT REQUEST
NOT FOR PUBLIC RELEASE - CPRA EXEMPT
CONFIDENTIAL & PROPRIETARY BUSINESS/SITING INFO
PRE-DECISIONAL DRAFT FOR REVIEW ONLY

SHEET NOTES:

1. SEE CIVIL DRAWINGS FOR CONTINUATION.



LEVEL 01
T.O.F.F 18'-6" = 0'-0"

Project Name

Enter address here

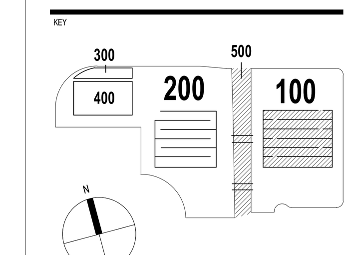
CLIENT	Owner	1600 AMPHITHEATRE PARKWAY, MOUNTAINVIEW, CA, T +1 650 253 0000
DEVELOPMENT MANAGER	SARES - REGIS	901 MARINERS ISLAND BLVD, SUITE 700, SAN MATEO, CA 94404, T +1 949 756 5959
DESIGN CONSULTANT	BJARKE INGELS GROUP	61 BROADWAY, SUITE 3300, NEW YORK, NY 10006, USA, T +1 347 549 4141
ARCHITECT OF RECORD / DESIGN BUILD CONTRACTOR	DEVCON CONSTRUCTION INC	690 GIBRALTAR DRIVE, MILPITAS, CA 95035, T +1 408 942 8200
CIVIL ENGINEER	KIER & WRIGHT	3350 SCOTT BOULEVARD, BUILDING 22, SANTA CLARA, CA 95054, T +1 408 727 6665
LANDSCAPE ARCHITECT	OLIN	150 SOUTH INDEPENDENCE MALL WEST, PHILADELPHIA, PA 19106, T +1 215 440 0030
STRUCTURAL ENGINEER	KPFF	45 FREMONT STREET, 28TH FLOOR, SAN FRANCISCO, CA 94105, T +1 415 989 1004
INTERIOR ARCHITECT	CLIVE WILKINSON ARCHITECTS	6116 WASHINGTON BOULEVARD, CULVER CITY, CA 90232, T +1 310 358 2200
MECHANICAL | PLUMBING | ELECTRICAL	POINT ENERGY INNOVATIONS	220 MONTGOMERY STREET, SUITE 321, SAN FRANCISCO, CA94104, T +1 415 663 6340
LIGHTING DESIGN CONSULTANT	BOLD	5455 WILSHIRE BLVD, SUITE 1210, LOS ANGELAS, CA 90036, T +1 213 412 3180
FOOD SERVICE DESIGNER	RICCA DESIGN STUDIO	5325 S. VALENTIA WAY, GREENWOOD VILLAGE, CO 80111, T +1 303 221 0500
BRAND DESIGN	EGG OFFICE	2673 S. LA CIENEGA BLVD, LOS ANGELES, CA 90034, T +1 310 425 8942
CURTAIN WALL CONSULTANT	CURTAIN WAL DESIGN CONSULTING	12 GEARY BLVD. #503, SAN FRANCISCO, CA 94108, T +1 925 906 9255
CURTAIN WALL DESIGN/BUILD CONTRACTOR	ENCLOS	14870 CENTRAL AVENUE, CHINO, CA 91710, T +1 909 597 2037
WATERPROOFING CONSULTANT	ALLANA BUICK & BERS, LLC.	990 COMMERCIAL STREET, PALO ALTO, CA 94303, T +1 415 543 5600
FACADE MAINTENANCE	HIGHLINE CONSULTING, INC.	4361 TECHNOLOGY DR. UNIT D, LIVERMORE, CA 94551, T +1 925 245 841
MECHANICAL DESIGN/BUILD ENGINEER	ACCO ENGINEERED SYSTEMS	1133 ALADDIN AVE., SAN LEANDRO, CA 94577, T +1 510 346 4300
ELECTRICAL DESIGN/BUILD ENGINEERS	ROSENDIN ELECTRIC	880 MABURY RD., SAN JOSE, CA 95133, T +1 408 286 2800
	SILVERMAN & LIGHT	1201 Park Ave # 100, Emeryville, CA 94608, T +1 510 655 1200
PLUMBING DESIGN/BUILD ENGINEER	KDS PLUMBING	2087 RINGWOOD AVE, #10, SAN JOSE, CA 95131, T +1 408 435 1685
TELECOM DESIGN ENGINEER	TEECOM	1333 BROADWAY, STE-601, OAKLAND, CA 94612, T +1 (510) 337 2800
STRUCTURAL BRACING ENGINEER	COREBRACE	5789 WEST WELLS PARK ROAD, WEST JORDAN, UT 84081, (801) 280-4934

NO	DATE	REVISION
D	03.22.2019	PERMIT SUBMITTAL
C	02.08.2019	ADDENDUM C
	12.21.2018	50% CD
	10.26.2018	100% DD
	06.29.2018	50% DD
	03.29.2018	50%DD SKIN BID
	03.09.2018	50% DD BID
	03.02.2018	50% DD

SEAL

NOT FOR CONSTRUCTION

KEY



BAR

SHEET NAME

PLUMBING LEVEL 1 FLOOR PLAN UNDERGROUND

PROJECT NO 17-185

DOB NO

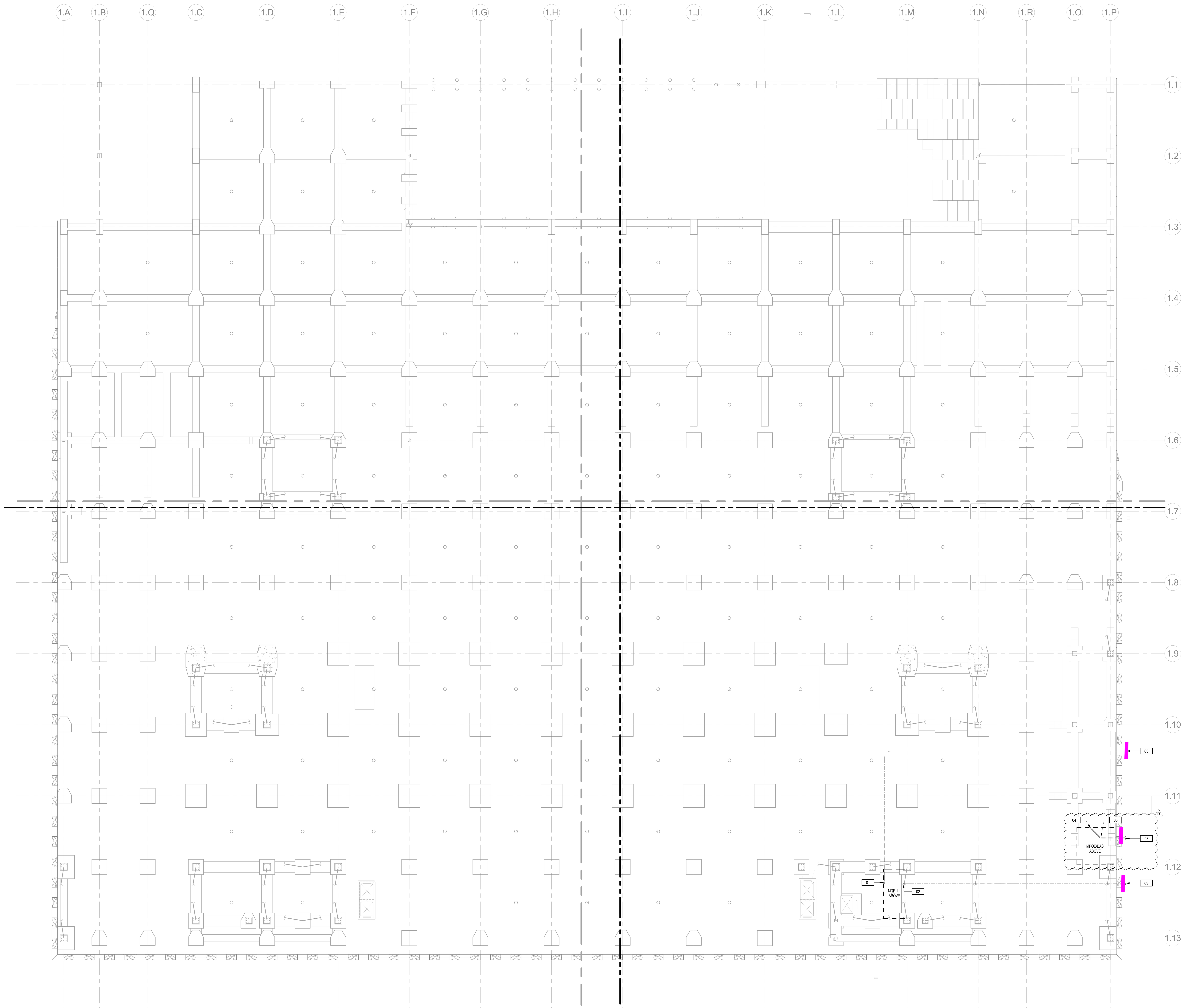
SCALE 1/16" = 1'-0"

ISSUE PERMIT SUBMITTAL

SUBMITTAL 03/22/19

SHEET NO **P1-210**

CPRA CONFIDENTIAL TREATMENT REQUEST
NOT FOR PUBLIC RELEASE - CPRA EXEMPT
CONFIDENTIAL & PROPRIETARY BUSINESS/SITING INFO
PRE-DECISIONAL DRAFT FOR REVIEW ONLY



GENERAL NOTES

1. REFER TO SHEET T1 - 001 FOR ABBREVIATIONS, GENERAL NOTES, AND SYMBOL DEFINITIONS.
2. REFER TO SHEET T1 - 002 FOR PRIMARY PATHWAY REQUIREMENTS AND DEFINITIONS.

NUMBERED NOTES

01 OSP CONDUITS ROUTING FROM THE EAST SIDE OF THE BUILDING. REFER TO THE MDF-1.1 ENLARGED PLANS FOR STUB-UP LOCATION. REFER TO THE PATHWAYS RISER FOR CONDUIT SIZE AND QUANTITY. PROVIDE A MINIMUM OF 36" BEND RADIUS FOR THE 90-DEGREE TRANSITION INTO THE MDF ROOM. FIELD COORDINATE ROUTE WITH BUILDING'S FOOTINGS AND OTHER UNDERGROUND UTILITIES.

02 OSP CONDUITS ROUTING FROM THE SOUTHEAST SIDE OF THE BUILDING. REFER TO THE MDF-1.1 ENLARGED PLANS FOR STUB-UP LOCATION. REFER TO THE PATHWAYS RISER DIAGRAM FOR CONDUIT SIZE AND QUANTITY. PROVIDE A MINIMUM OF 36" BEND RADIUS FOR THE 90-DEGREE TRANSITION INTO THE MDF ROOM. FIELD COORDINATE ROUTE WITH BUILDING'S FOOTINGS AND OTHER UNDERGROUND UTILITIES.

03 REFER TO THE ELECTRICAL SITE PLAN FOR ROUTE CONTINUATION AND CONNECTION TO THE TELECOMMUNICATIONS SITE PATHWAYS INFRASTRUCTURE.

04 OSP CONDUITS ROUTING FROM EAST SIDE OF THE BUILDING. STUB CONDUITS ALONG THE EAST WALL OF THE MPOE/DAS ROOM. REFER TO THE PATHWAYS RISER DIAGRAM FOR CONDUIT SIZE AND QUANTITY. PROVIDE A MINIMUM OF 36" BEND RADIUS FOR THE 90-DEGREE TRANSITION INTO THE ROOM. FIELD COORDINATE ROUTE WITH BUILDING'S FOOTINGS AND OTHER UNDERGROUND UTILITIES.

05 DO NOT EXCEED 45" BEND FOR THE OSP CONDUITS.

Caribbean Campus
100 / 200 W CARIBBEAN DRIVE
SUNNYVALE, CA

CLIENT
Google
Owner
1600 AMPHITHEATRE PARKWAY
MOUNTAINVIEW, CA
T +1 650 253 0000

DEVELOPMENT MANAGER
SARES - REGIS
901 MARINERS ISLAND BLVD, SUITE 700
SAN MATEO, CA 94404
T +1 949 756 5959

DESIGN CONSULTANT
BJARKE INGELS GROUP
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T +1 415 989 1004

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POINT ENERGY INNOVATIONS
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T +1 415 663 6340

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BOLD
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LOS ANGELAS, CA 90036
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RICCA DESIGN STUDIO
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T +1 303 221 0500

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CURTAIN WAL DESIGN CONSULTING
12 GEARY BLVD. #503
SAN FRANCISCO, CA 94108
T +1 925 906 9255

CURTAIN WALL DESIGN/BUILD CONTRACTOR
ENCLOS
14870 CENTRAL AVENUE
CHINO, CA 91710
T +1 909 597 2037

WATERPROOFING CONSULTANT
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990 COMMERCIAL STREET
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SAN LEANDRO, CA 94577
T +1 510 346 4300

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SAN JOSE, CA 95133
T +1 408 286 2800

SILVERMAN & LIGHT
1201 Park Ave # 100
Emeryville, CA 94608
T +1 510 655 1200

PLUMBING DESIGN/BUILD ENGINEER
KDS PLUMBING
2087 RINGWOOD AVE, #10
SAN JOSE, CA 95131
T +1 408 435 1685

TELECOM DESIGN ENGINEER
TEECOM
1333 BROADWAY, STE-601
OAKLAND, CA 94612
T +1 (510) 337 2800

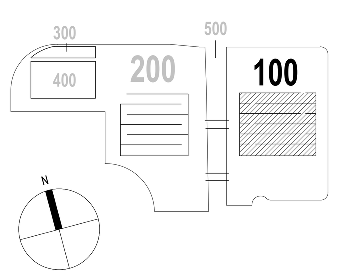
STRUCTURAL BRACING ENGINEER
COREBRACE
5789 WEST WELLS PARK ROAD
WEST JORDAN, UT 84081
(801) 280-4934

NO	DATE	REVISION
D	03.22.2019	PERMIT SUBMITTAL
C	02.08.2019	ADDENDUM C
	12.21.2018	50% CD
	10.26.2018	100% DD

SEAL

NOT FOR CONSTRUCTION

KEY



BAR

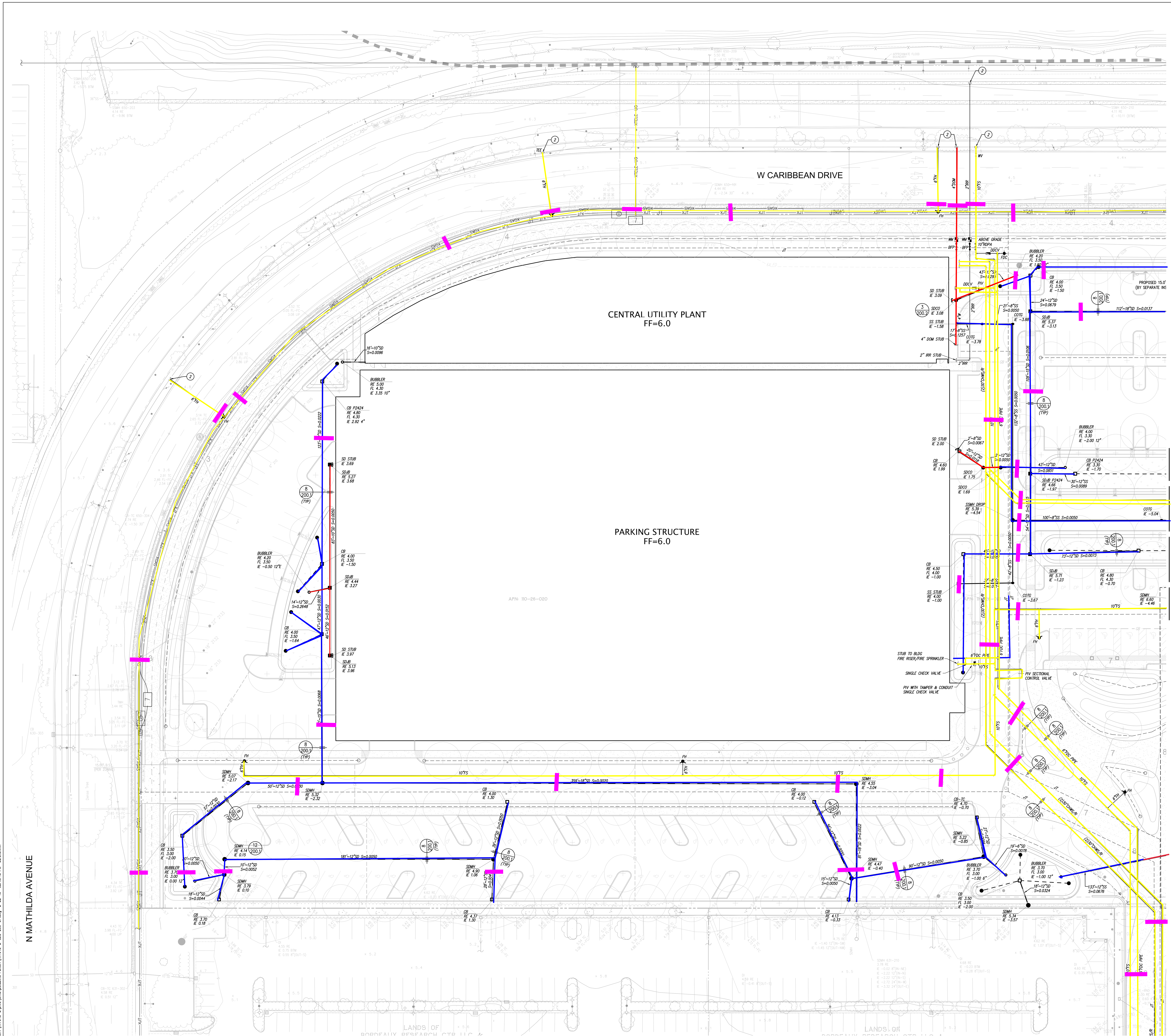
SHEET NAME

OVERALL UNDERSLAB PLAN

PROJECT NO
18367
DOB NO
SCALE
1/16" = 1'-0"
ISSUE
PERMIT SUBMITTAL
DATE
03/22/19

SHEET NO
T1 - 200

CPRA CONFIDENTIAL TREATMENT REQUEST
NOT FOR PUBLIC RELEASE - CPRA EXEMPT
CONFIDENTIAL & PROPRIETARY BUSINESS/SITING INFO
PRE-DECISIONAL DRAFT FOR REVIEW ONLY



Scale 1" = 20'

KEY NOTES

1. BACKFLOW PREVENTORS ARE TO BE LOCATED ON PRIVATE PROPERTY OUTSIDE OF ANY PUBLIC EASEMENTS
2. CONNECT TO EXISTING WATERLINE PER CITY OF SUNNYVALE STANDARDS AND SPECIFICATIONS.
3. INSTALL 4" WIDE SLOPED S300 K POWERDRAIN BY ACO, REFER TO LANDSCAPE PLANS FOR GRATE TYPE.

LEGEND

XJT	EXISTING JOINT TRENCH
XTELE-UG	EXISTING UNDERGROUND TELEPHONE SERVICE
XGAS	EXISTING GAS SERVICE
EX FO	EXISTING FIBER OPTIC SERVICE

CLIENT: Google
DEVELOPMENT MANAGER: SARES REGIS
DESIGN CONSULTANT: BIG BJARKE INGELS GROUP
CIVIL ENGINEER: KIER & WRIGHT
LANDSCAPE ARCHITECT: OLIN
STRUCTURAL ENGINEER: KPFF

2	02/22/2019	ADDENDUM C
1	12/07/2018	95% CDS SITE CIVIL

SEAL

NOT FOR CONSTRUCTION

KEY PLAN

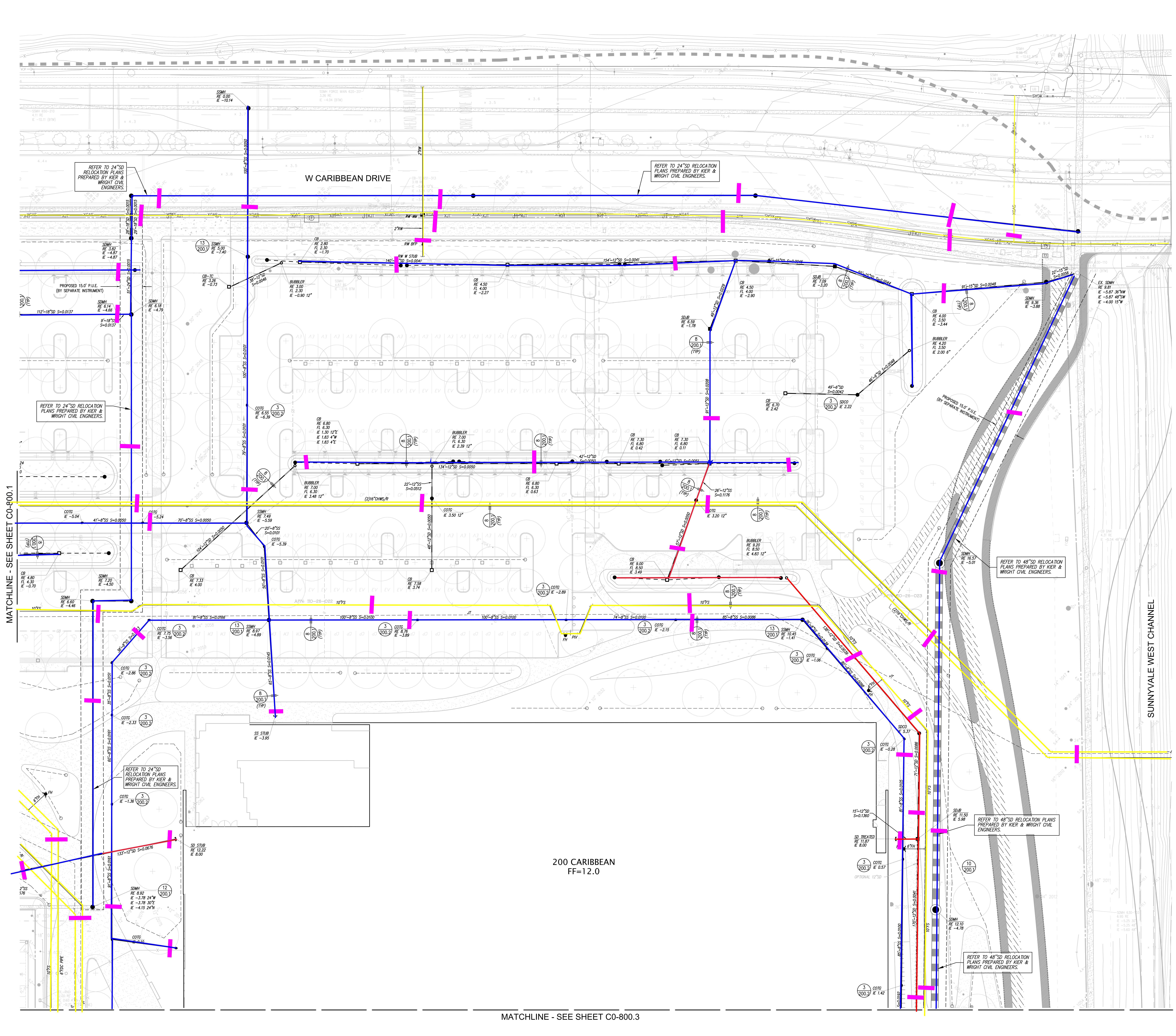
BAR SCALE

SHEET NAME

UTILITY PLAN

PROJECT NO: A17048-2
DOB NO:
SCALE: AS SHOWN
ISSUE: ADDENDUM C
DATE: 02.22.2019

SHEET NO: C0-800.1



Scale 1" = 20'

KEY NOTES

1. BACKFLOW PREVENTORS ARE TO BE LOCATED ON PRIVATE PROPERTY OUTSIDE OF ANY PUBLIC EASEMENTS
2. CONNECT TO EXISTING WATERLINE PER CITY OF SUNNYVALE STANDARDS AND SPECIFICATIONS.
3. INSTALL 4" WIDE SLOPED S300 K POWERDRAIN BY ACO, REFER TO LANDSCAPE PLANS FOR GRATE TYPE.

LEGEND

XJT	EXISTING JOINT TRENCH
XTELE-UG	EXISTING UNDERGROUND TELEPHONE SERVICE
XGAS	EXISTING GAS SERVICE
EX FO	EXISTING FIBER OPTIC SERVICE

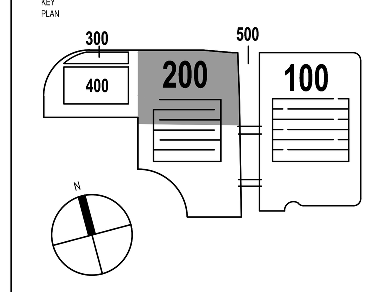
Google
SARES REGIS
BIG
DEVCON
KIER & WRIGHT
OLIN
kpff
CLIVE WILKINSON ARCHITECTS
POINT ENERGY INNOVATIONS
BOLD
RICCA DESIGN STUDIO
EGG OFFICE
CDC
enclos
ALLANA BUICK & BERS
HIGHLINE
ACCO ENGINEERED SYSTEMS
ROSENDIN ELECTRIC
SILVERMAN & LIGHT
KDS PLUMBING
TEECOM
COREBRACE

2 02/22/2019 ADDENDUM C
1 12/07/2018 95% CDS SITE CIVIL

SEAL

NOT FOR CONSTRUCTION

KEY PLAN



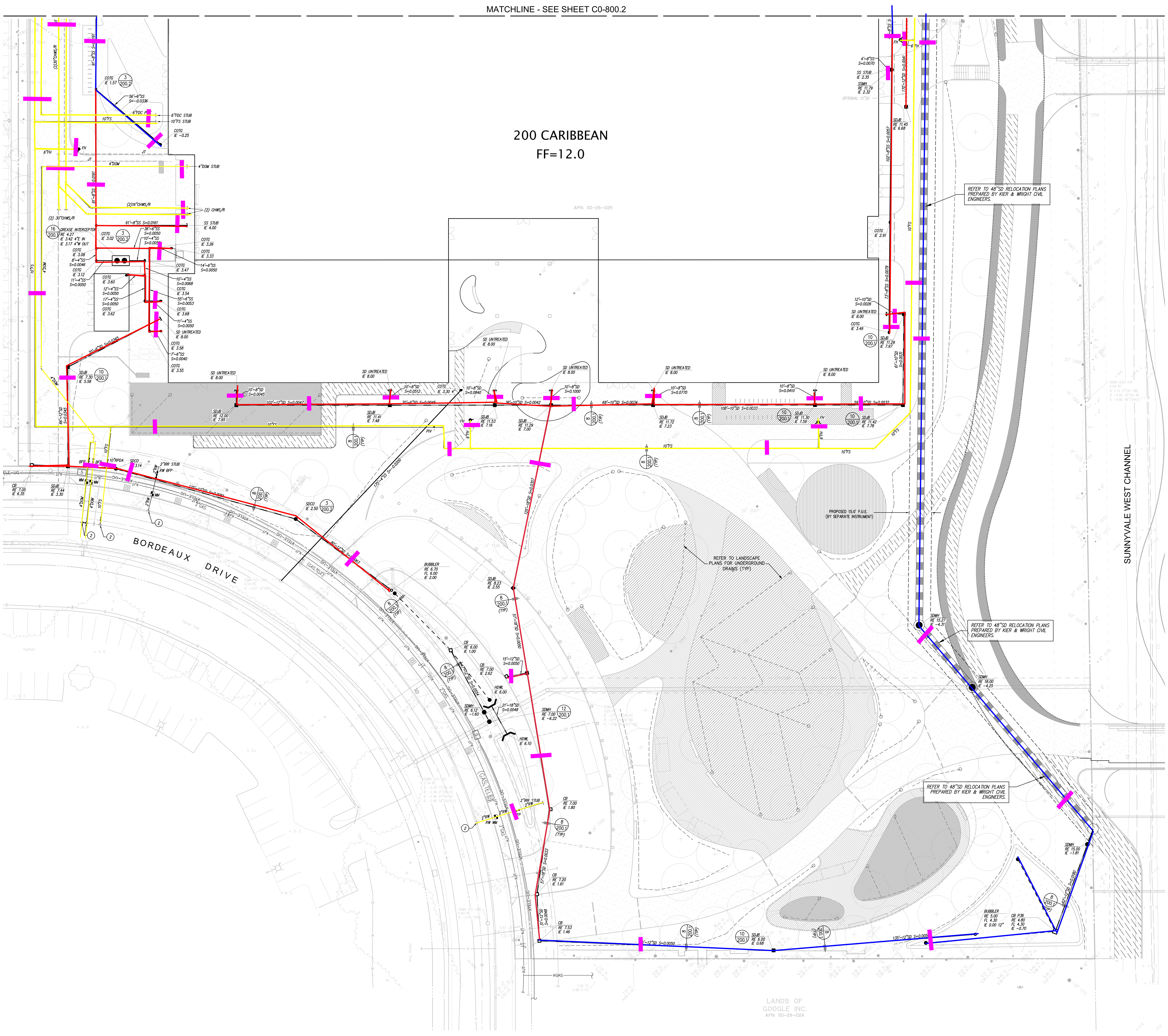
BAR SCALE

SHEET NAME

UTILITY PLAN

PROJECT NO A17048-2
DOB NO
SCALE AS SHOWN
ISSUE ADDENDUM C
DATE 02.22.2019

SHEET NO C0-800.2



Scale 1" = 20'

KEY NOTES

1. BACKFLOW PREVENTORS ARE TO BE LOCATED ON PRIVATE PROPERTY OUTSIDE OF ANY PUBLIC EASEMENTS
2. CONNECT TO EXISTING WATERLINE PER CITY OF SUNNYVALE STANDARDS AND SPECIFICATIONS.
3. INSTALL 4" WIDE SLOPED S300 K POWERDRAIN BY ACO, REFER TO LANDSCAPE PLANS FOR GRATE TYPE.

LEGEND

XJT	EXISTING JOINT TRENCH
XTELE-UG	EXISTING UNDERGROUND TELEPHONE SERVICE
XGAS	EXISTING GAS SERVICE
EX FO	EXISTING FIBER OPTIC SERVICE

2 02/22/2019 ADDENDUM C
1 12/07/2018 95% CDS SITE CIVIL

SEAL

NOT FOR CONSTRUCTION

KEY PLAN

BAR SCALE

SHEET NAME

UTILITY PLAN

PROJECT NO A17048-2

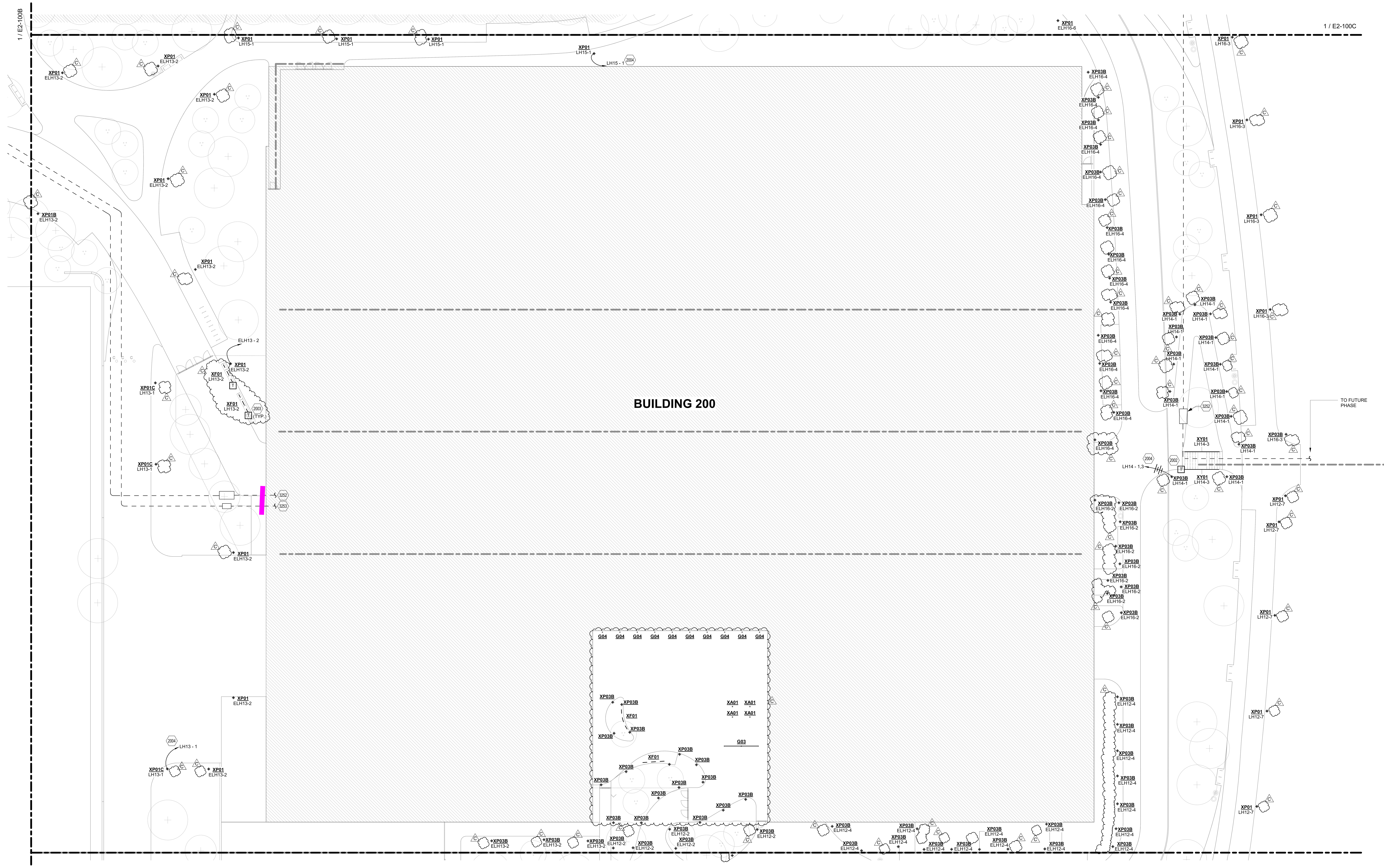
SHEET NO C0-800.3

DOB NO

SCALE AS SHOWN

ISSUE ADDENDUM C

DATE 02.22.2019



1 ELECTRICAL SITE SECTOR PLAN - AREA B2
1" = 20'-0"

GENERAL NOTES

1. ALL SITE LIGHTING CONDUCTORS SHALL BE #10 AWG.

NUMBERED NOTES

2002 AT THIS LOCATION, PROVIDE ONE (1) WATERTIGHT NEMA 4 ENCLOSURE, KLIK USA #LPNEMA4ENCL. EACH ENCLOSURE SHALL HOUSE ONE (1) 100 WATT DIMMABLE DRIVER, KLIK USA #LP100WPRITRNDM TO CONTROL TYPE XY01 LED HANDRAIL. COORDINATE LOCATION AND MOUNTING WITH ARCHITECT.

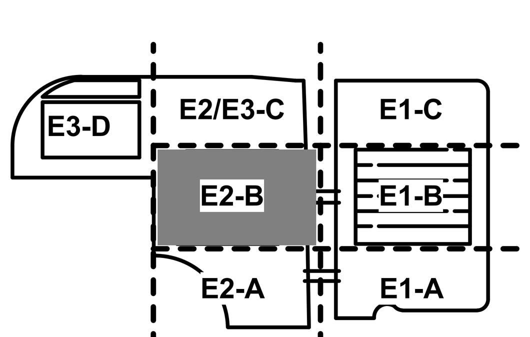
2003 LED DRIVER FOR TYPE XF01 BENCH LIGHTS SHALL BE UNIVERAL PRIMARY VOLTAGE, 100 WATT, LOW PROFILE, QTRAN SLV100-124V-FC. DRIVER SHALL MOUNT TO UNDERSIDE OF BENCH. COORDINATE LOCATION AND MOUNTING WITH LANDSCAPE ARCHITECT.

2004 ROUTE CIRCUITS VIA ENLIGHTED DIGITAL LIGHTING CONTROL SYSTEM FOR TIMECLOCK CONTROL OF EXTERIOR LIGHTING.

3252 (N) UNDERGROUND VAULT FOR NORMAL 12KV POWER DISTRIBUTION. 4'-6" X 8'-6" X 4'-6" WITH SPRING ASSIST HINGED COVERS.

3253 (N) UNDERGROUND VAULT FOR EMERGENCY POWER DISTRIBUTION. 3'-0" X 5'-0" X 3'-0" WITH LIFT OFF COVERS.

KEY PLAN - SITE



CARIBBEAN 200

SEAL

NOT FOR CONSTRUCTION

KEY

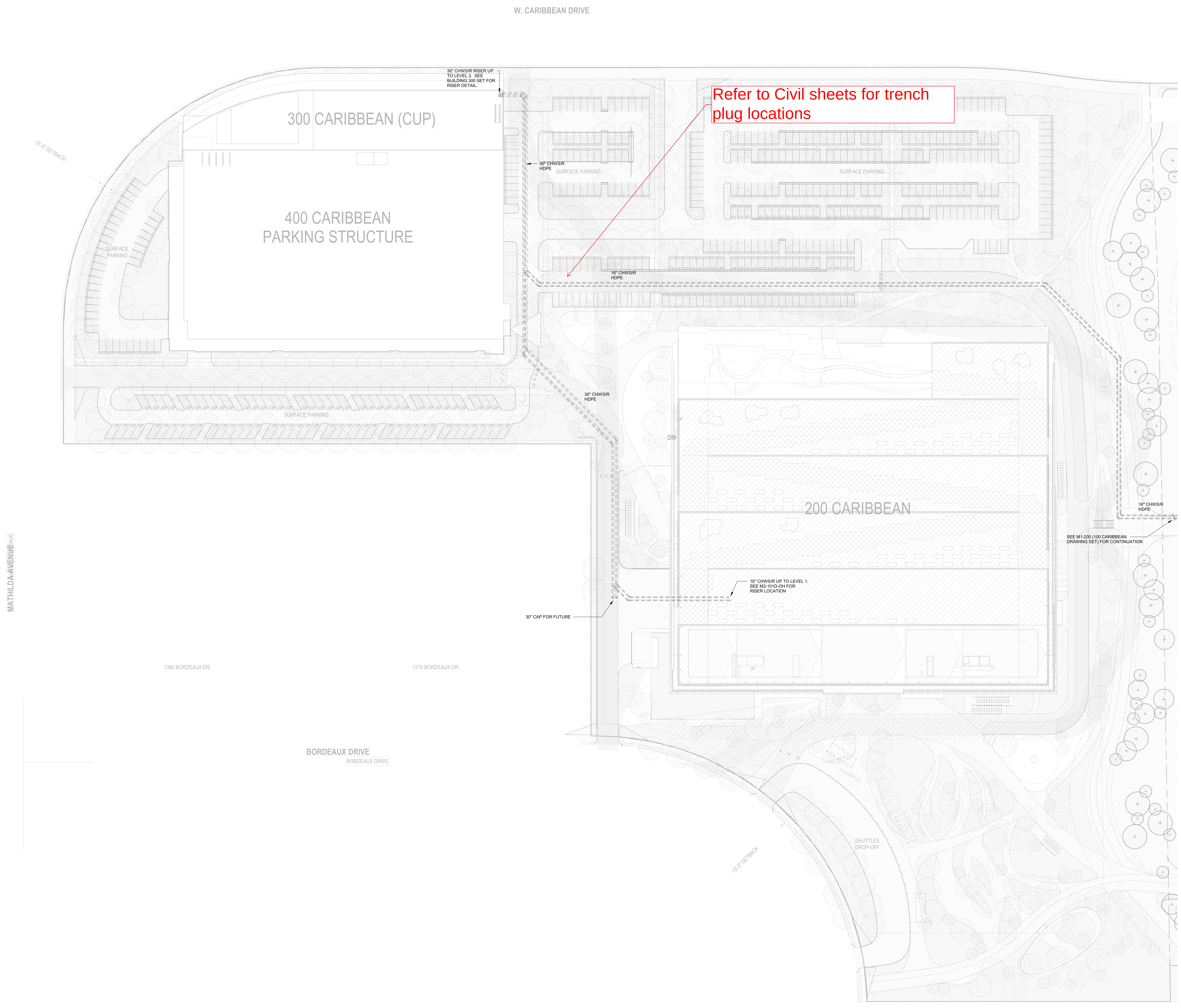
BAR

SHEET NAME

ELECTRICAL SITE PLAN - AREA B

PROJECT NO 2018-051
DOB NO
SCALE 1" = 20'-0"
ISSUE BLDG PERMIT SUBMITTAL
DATE 12.21.2018

SHEET NO E2-100B



1 UNDERGROUND PIPING PLAN

SCALE: 1" = 40'-0"

CARIBBEAN CAMPUS

200 W CARIBBEAN DRIVE
SUNNYVALE, CA

CLIENT	GOOGLE 1600 AMPHITHEATRE PARKWAY MOUNTAINVIEW, CA T +1 650 253 0000
DEVELOPMENT MANAGER	SARES - REGIS 901 MARINERS ISLAND BLVD, SUITE 700 SAN MATEO, CA 94404 T +1 949 756 5959
DESIGN CONSULTANT	BJARKE INGELS GROUP 61 BROADWAY, SUITE 3300 NEW YORK, NY 10006, USA T +1 347 549 4141
ARCHITECT OF RECORD / DESIGN BUILD CONTRACTOR	DEVCON CONSTRUCTION INC 690 GIBRALTAR DRIVE MILPITAS, CA 95035 T +1 408 942 8200
CIVIL ENGINEER	KIER & WRIGHT 3350 SCOTT BOULEVARD, BUILDING 22 SANTA CLARA, CA 95054 T +1 408 727 6665
LANDSCAPE ARCHITECT	OLIN 150 SOUTH INDEPENDENCE MALL WEST PHILADELPHIA, PA 19106 T +1 215 440 0030
STRUCTURAL ENGINEER	KPFF 45 FREMONT STREET, 28TH FLOOR SAN FRANCISCO, CA 94105 T +1 415 989 1004
INTERIOR ARCHITECT	CLIVE WILKINSON ARCHITECTS 6116 WASHINGTON BOULEVARD CULVER CITY, CA 90232 T +1 310 358 2200
MECHANICAL | PLUMBING | ELECTRICAL	POINT ENERGY INNOVATIONS 220 MONTGOMERY STREET, SUITE 321 SAN FRANCISCO, CA94104 T +1 415 663 6340
LIGHTING DESIGN CONSULTANT	BOLD 5455 WILSHIRE BLVD, SUITE 1210 LOS ANGELAS, CA 90036 T +1 213 412 3180
FOOD SERVICE DESIGNER	RICCA DESIGN STUDIO 5325 S. VALENTIA WAY GREENWOOD VILLAGE, CO 80111 T +1 303 221 0500
BRAND DESIGN	EGG OFFICE 2673 S. LA CIENEGA BLVD LOS ANGELES, CA 90034 T +1 310 425 8942
CURTAIN WALL CONSULTANT	CURTAIN WAL DESIGN CONSULTING 12 GEARY BLVD. #503 SAN FRANCISCO, CA 94108 T +1 925 906 9255
CURTAIN WALL DESIGN/BUILD CONTRACTOR	ENCLOS 14870 CENTRAL AVENUE CHINO, CA 91710 T +1 909 597 2037
WATERPROOFING CONSULTANT	ALLANA BUICK & BERS, LLC. 990 COMMERCIAL STREET PALO ALTO, CA 94303 T +1 415 543 5600
FACADE MAINTENANCE	HIGHLINE CONSULTING, INC. 4361 TECHNOLOGY DR. UNIT D LIVERMORE, CA 94551 T +1 925 245 841
MECHANICAL DESIGN/BUILD ENGINEER	ACCO ENGINEERED SYSTEMS 1133 ALADDIN AVE. SAN LEANDRO, CA 94577 T +1 510 346 4300
ELECTRICAL DESIGN/BUILD ENGINEERS	ROSENDIN ELECTRIC 880 MABURY RD. SAN JOSE, CA 95133 T +1 408 286 2800 SILVERMAN & LIGHT 1201 Park Ave # 100 Emeryville, CA 94608 T +1 510 655 1200
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TELECOM DESIGN ENGINEER	TEECOM 1333 BROADWAY, STE-601 OAKLAND, CA 94612 T +1 (510) 337 2800
STRUCTURAL BRACING ENGINEER	COREBRACE 5789 WEST WELLS PARK ROAD WEST JORDAN, UT 84081 (801) 280-4934

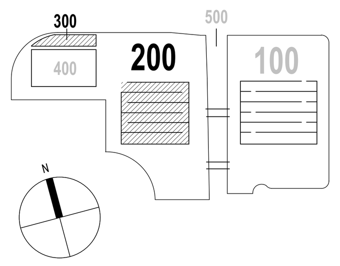
NO	DATE	REVISION
C	02.08.2019	ADDENDUM C

SEAL

REGISTERED PROFESSIONAL ENGINEER
CRAIG A. SILVEY
No. M031857
EXP. 09/30/19
MECHANICAL
STATE OF CALIFORNIA

NOT FOR CONSTRUCTION

KEY



BAR

SHEET NAME

UNDERGROUND PIPING PLAN

PROJECT NO
622905

DOB NO

SCALE
1" = 40'-0"

ISSUE
BLDG PERMIT SUBMITTAL

DATE
12.07.2018

SHEET NO

M2-200

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SHEET NOTES:

1. SEE CIVIL DRAWINGS FOR CONTINUATION.
2. PROVIDE HEAT TRACE AND INSULATION ON GREASE WASTE MAIN.

1 PLUMBING LEVEL 1 FLOOR PLAN UNDERGROUND
1/16" = 1'-0"

LEVEL 01
T.O.F.F 18'-6" = 0'-0"

Caribbean Campus

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NO	DATE	REVISION
C	02.08.2019	Addendum C

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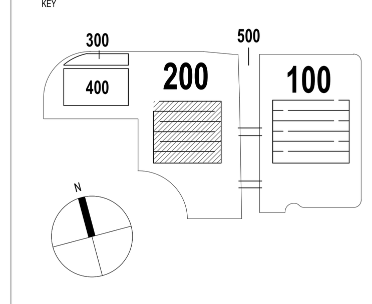

BAR

SHEET NAME

PLUMBING LEVEL 1 FLOOR PLAN UNDERGROUND

PROJECT NO
17-185

DOB NO

SCALE
1/16" = 1'-0"

ISSUE
BLDG PERMIT SUBMITTAL

DATE
12.21.2018

SHEET NO
P2-210

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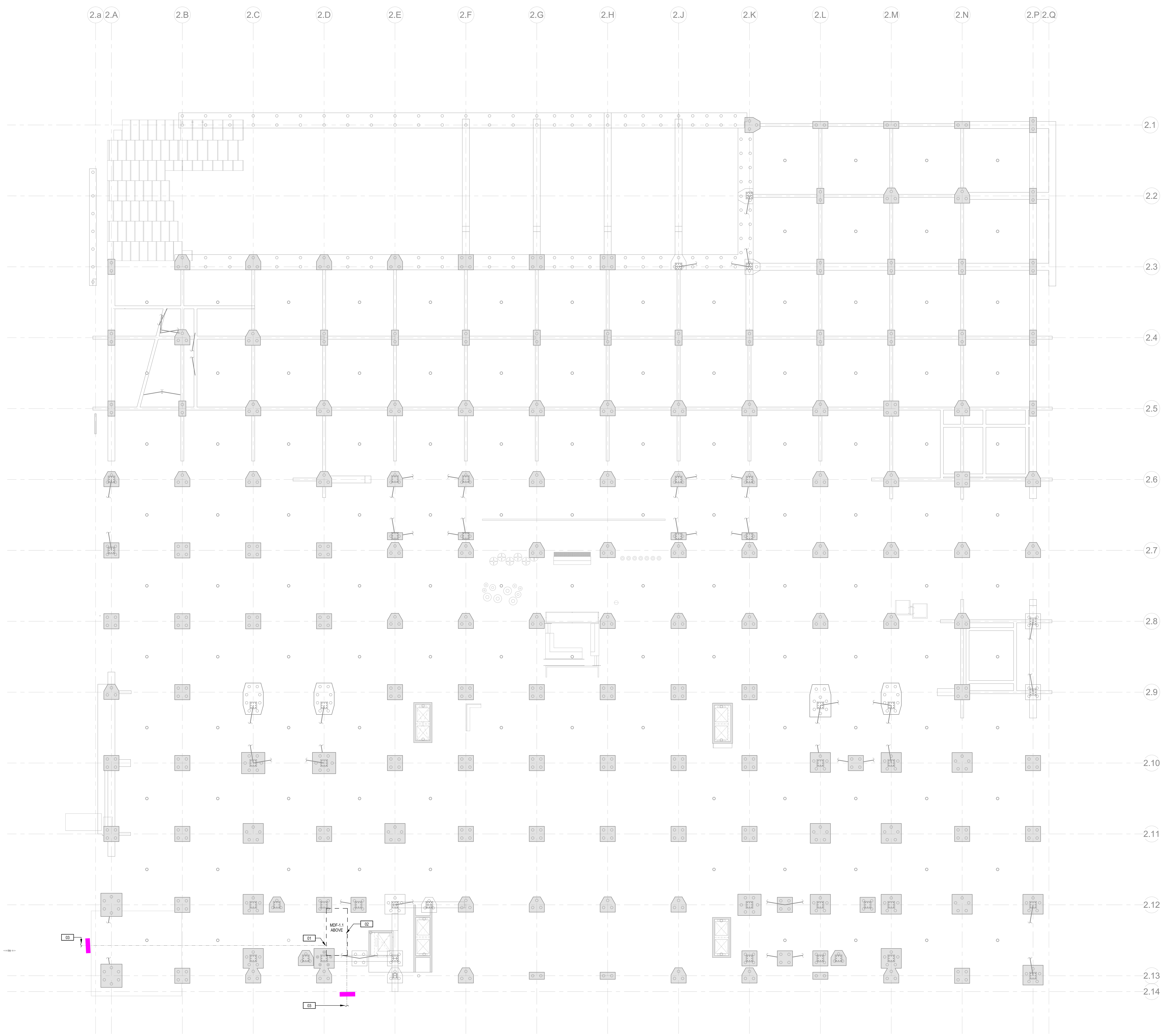

GENERAL NOTES

1. REFER TO SHEET T2 - 001 FOR ABBREVIATIONS, GENERAL NOTES, AND SYMBOL DEFINITIONS.
2. REFER TO SHEET T2 - 002 FOR PRIMARY PATHWAY REQUIREMENTS AND DEFINITIONS.

NUMBERED NOTES

01	OSP CONDUITS ROUTING FROM WEST SIDE OF THE BUILDING. REFER TO THE MDF-1.1 ENLARGED ROOM PLANS FOR STUB-UP LOCATION. REFER TO THE PATHWAYS RISER DIAGRAM FOR CONDUIT SIZE AND QUANTITY. PROVIDE A MINIMUM OF 36" BEND RADIUS FOR THE 90-DEGREE TRANSITION INTO THE MDF ROOM. FIELD COORDINATE ROUTE WITH BUILDING'S FOOTINGS AND OTHER UNDERGROUND UTILITIES. C
02	OSP CONDUITS ROUTING FROM SOUTH SIDE OF THE BUILDING. REFER TO THE MDF-1.1 ENLARGED ROOM PLANS FOR STUB-UP LOCATION. REFER TO THE PATHWAYS RISER DIAGRAM FOR CONDUIT SIZE AND QUANTITY. PROVIDE A MINIMUM OF 36" BEND RADIUS FOR THE 90-DEGREE TRANSITION INTO THE MDF ROOM. FIELD COORDINATE ROUTE WITH BUILDING'S FOOTINGS AND OTHER UNDERGROUND UTILITIES. C
03	REFER TO THE ELECTRICAL SITE PLAN FOR ROUTE CONTINUATION AND CONNECTION TO THE TELECOMMUNICATIONS SITE PATHWAYS INFRASTRUCTURE.

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NO	DATE	REVISION
C	02.08.2019	ADDENDUM C

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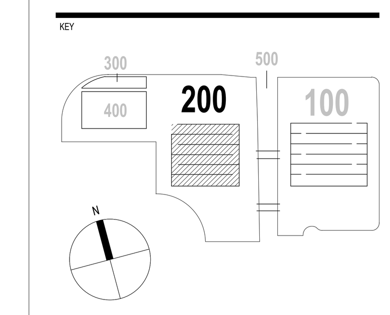
KEY



BAR

SHEET NAME

OVERALL UNDERSLAB PLAN

PROJECT NO
18367

DOB NO

SCALE
1/16" = 1'-0"

ISSUE
BLDG PERMIT SUBMITTAL

DATE
12.21.2018

SHEET NO
T2 - 200

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APPENDIX B – DRY CONDUIT SEALANT DETAILS

Polywater® Duct Sealant (FST-250)

Instructions for Use

FST-kit contents:
Foam Base Cartridge (in protective pouch)
Mixing Nozzles (in protective pouch/kit bag)
Positioning Rod
Foam Strips
Pair Protective Gloves
HP Cleaning Wipe

UL Recognized Sealant

See alternate Saturated Dam Method for specialty applications such as running water, vertical conduit, or other complex/unusual geometries.

Installation Tips

- *Conduit cleaning and preparation is key to a good seal.*
- *Rapid injection will produce better mixing.*
- *For large ducts, use multiple injections. See Quantity Recommendation. (Page 3)*
- *Mixing nozzle is reusable 7-10 minutes after injection.*


Clean duct with wire brush, solvent wipe.

1.) If conduit has loose debris or rust, use a wire brush to remove all loose material. Abrade the surfaces with sand paper or steel wool to increase the effectiveness of the FST Sealant.

Clean cable(s) and duct with Type HP cleaning wipe (cat. # HP-P158ID) as provided in the kit. This will remove contaminants and any organic residue.


Separate cable(s) then wrap with foam strip.

2.) Create a foam dam by loosely wrapping foam strip around cable(s) so that it fills the space between the cable(s) and duct. It should be slightly wider than duct and compress slightly when inserted. (If more than one cable, separate cables with foam strip.)

Tail end of foam strip should be at top of wrap. Foam strip will slow any existing water flow and contain the FST Sealant. Cut foam to size as necessary.


Insert foam 5 inches

3.) Using the positioning rod, push foam 5 inches (125 mm) into duct. Make sure there are no voids in the foam dam for FST Sealant to flow through.


Separate cable(s) with foam

4.) Wrap the second foam strip around cable. (If more than one cable, separate cables with foam strip.) Tail end of foam strip should be at top of wrap. Push second foam strip into the duct until the edge is flush with the duct entrance.


Prepare cartridge

5.) Remove Foam Cartridge from pouch. NOTE: Do not remove cartridge from protective foil until ready to use. Wear impermeable gloves and eye protection. **Holding cartridge upright**, remove nut and plug. (Plug can be saved for re-use of cartridge.) Attach mixing nozzle and tighten nut back into place. **Nut must be replaced or mixing nozzle will detach from cartridge and material may spill.**


TOOL-250 contains FST-250

6.) Use a **heavy-duty**, high-ratio caulking tool for best performance, (Cat. # TOOL-250). Dispense and discard the first liquid to run through the nozzle (about 1 squirt with the application tool). This initial material will not be well mixed or have the proper ratio of material.


Dispense Foam Sealant

7.) Insert mixing nozzle into top wrap of foam dam so that tip extends into space between foam strips. Inject sealant above cables for better coverage. Use desired amount of foam sealant (see Table 1).

Rapid injection will produce better mixing.

For large ducts, use multiple injections.


Rising Foam

8.) Remove cartridge with the static mixer attached. Sealant may seep between the crevices of the foam dam as it expands. After cure, excess foam may be trimmed and removed.

Sealant will expand fully in 2 to 5 minutes.

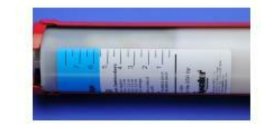
Sealant will harden (set) in 10-15 minutes.

Mixing nozzle is reusable 7-10 minutes after injection.

Duct Size, O.D. Inches/mm	Quantity Liquid Foam Sealant	
	0% Cable Fill	20% Cable Fill
2/50	1.5 cm *(1 injection)*	1 cm *(1 injection)*
3/75	3 cm *(1 injection)*	2.5 cm *(1 injection)*
4/100	2 + 2.5 cm *(2 injections)*	2 + 2 cm *(2 injections)*
5/125	3 + 4 cm *(2 injections)*	3 + 3 cm *(2 injections)*
6/150	3 + 3 + 4 cm *(3 injections)*	4 + 4 cm *(2 injections)*
8/200	4 + 4.5 + 4 + 4.5 cm *(4 injections)*	3 + 4 + 3 + 4 cm *(4 injections)*

Table 1

There are approximately 8.5 cm per FST-250 Cartridge. Use side markings to measure quantity by difference.



Use as a starting point only, actual required quantity will vary.

To seal large ducts (4 inch diameter or larger), inject the FST in parts. After each injection, ***wait 5 minutes*** for sealant to rise. Inject each portion as recommended. Excess material may squirt from the foam dam after adding the final portion.

For small ducts (1-1/2 inch diameter or smaller) the FST-MINI is recommended.


Use screwdriver to check for voids

9.) After sealant has fully set and cured, use the positioning rod or a screwdriver to check for voids in the FST Seal. Foam seal should be solid throughout the duct. If any holes or voids are detected in the inspection, use a screwdriver to cut into top of foam and enlarge a path for new material. Attach a new mixing nozzle and inject sealant directly into the void area.

Dispose of any excess material in accordance with local and national regulations.

Storage: FST Foam is sensitive to sun, water and heat. To keep the FST Foam up to a month after initial use, place the partial used cartridge into the foil bag and tape it shut. Place the foil bag in a dry cool dark place until ready to use.

FST Foam Seal Application and Use

Polywater® Foam Sealant FST cures to a strong, rigid closed-cell structure. It has excellent wetting and adhesion to metal, concrete and plastic surfaces. It holds 20 feet (6 meters) water-head, and acts as a barrier to smoke and air. It provides superior resistance to water, acids, greases and bases and most organic compounds. Performance and test results can be found in the FST Tech Data Sheet and Lab Reports.

Large voids

Seal should be inspected after installation. If voids or holes are discovered, additional FST Sealant may be added at any time. It will bond very well to existing, cured material. Use a screwdriver to cut into top of foam and enlarge a path for new material. Attach a new mixing nozzle and inject sealant directly into the void area. Dam the fill area if larger than 2 inches (50 mm).

Urethane safety

Irritating and toxic smoke and vapors may form during combustion of cured FST Foam Sealant. Hazardous or irritating decomposition products include oxides of carbon, oxides of nitrogen and hydrogen cyanide. If possible, remove cured sealant prior to any torch cutting operations. The Sealant can usually be removed from the conduit using chisel style tool or pick. If burning the sealant material cannot be avoided, provide appropriate ventilation/respiratory protection against decomposition products during flame cutting operations.

Cable Compatibility

FST Foam is compatible with cable jacket materials. The foam is an inert solid that will not attack the jacket material.

Web Support

Standard Installation Video

Saturated Foam Method Installation Video

Quantity Calculator

APC R.M. #: 87001-010 (2/13)

Makers of Polywater® and Dyna-Blue® Cable Lubricants and Pull-Planner™ Software
American Polywater Corporation
11222 60th St. North
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U.S.A.
USA 1-800-328-9384
TEL 1-651-430-2270
FAX 1-651-430-3634
http://www.polywater.com(URL) support@polywater.com(e-mail)

Clogged/leaking cartridge

The small orifices in the cartridge tip may become clogged. Poke through and loosen hard material or crust with a wire. Material may be used as directed once the clog is cleared. If the back plugs are leaking, do not use cartridge.

Re-use and Clean-up

Cartridge can be reused for several weeks after initial use. Remove mixing nozzle and visually ensure that orifices are not blocked. Seal with replaceable plug and nut. When ready to use, remove end cap assembly and check to make sure orifices are clear of any hardened sealant. Attach a new, unused mixing nozzle, tighten nut and insert used cartridge into ratchet application tool.

Unreacted material may be cleaned from surfaces with a solvent wipe such as Polywater's Type HP Cleaner/Degreaser. Part A, amber resin will react with water if surfaces are washed with soap and water solution. Once reacted, material has strong adhesion, and may be scraped or cut from surface. For skin contamination, wash thoroughly with soap and water. See MSDS for further information.

Water in duct

FST Sealant will cure if the duct contains less than 10% water. If water is relatively clean and not flowing, the foam dam will work as a good block. FST Sealant will incorporate any excess water into the body of the cured foam seal. Too much water and/or contamination will weaken the seal.

For flowing water, use the saturated foam method. See alternative instructions or watch video.

Removal

FST Sealant produces a good, water-tight seal intended for permanent use. It can be mechanically removed with some effort. Use best practices and comply with the NEC by de-energizing equipment before any seal removal is attempted. Use a long screwdriver (7 inches/15 cms) to puncture holes ¼ to ¾ inch (0.5 to 2 cm) throughout the seal. With a hammer, push the screwdriver through the foam, twist it to enlarge cavity, and pull out. Go around the inside duct diameter to remove plug. Once the foam is weakened, material can be chipped away, and the cable should break free. At this time the cable can be removed or the remaining FST Foam can be detached from the cable.

Cold Weather Use

FST Sealant can be used in temperatures down to 35°F (2°C). Reaction is slower, but the sealant will completely foam and cure with time. At cold temperatures, the Foam Sealant (FST) becomes slightly viscous and flows through the mixing nozzle at a slower rate. Cure times are as follows:

	40° F (4° C)	70° F (21° C)
Foaming, Expansion Complete	8 - 9 Minutes	4 – 5 Minutes
Hard, Non-sticky Skin Formation	12 – 15 Minutes	7 – 9 Minutes

To decrease cure time in cold temperatures, keep FST Sealant cartridges warm prior to use.

PROJECT NAME
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NO	DATE	REVISION
D	03.22.2019	PERMIT SUBMITTAL
C	02.08.2019	ADDENDUM C
	12.21.2018	50% CD
	10.26.2018	100% DD
	06.29.2018	50% DD
	03.29.2018	50%DD SKIN BID
	03.09.2018	50% DD BID
	03.02.2018	50% DD

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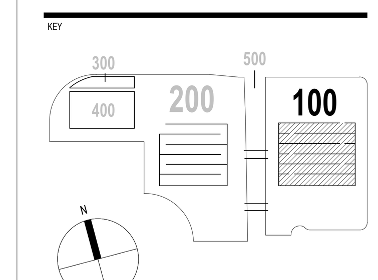
KEY



BAR

SHEET NAME

ELECTRICAL DETAILS

PROJECT NO
PROJECT NUMBER
DOB NO
SCALE
ISSUE
PERMIT SUBMITTAL
DATE
03/22/19

SHEET NO
E1-703

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