PREPARED FOR:

CALLANDER ASSOCIATES
12150 TRIBUTARY POINT DRIVE, SUITE 140
GOLD RIVER, CALIFORNIA 95670

CALA

PREPARED BY:

GEOCON CONSULTANTS, INC.
3160 GOLD VALLEY DRIVE, SUITE 800
RANCHO CORDOVA, CALIFORNIA 95742

GEOCON

GEOCON PROJECT NO. S2115-05-01

APRIL 2022

Project No. S2115-05-01
April 15, 2022

VIA ELECTRONIC MAIL

Daniel C. Miller
Senior Associate, PLA, LEED AP
Callander Associates
12150 Tributary Point Drive, Suite 140
Gold River, California 95670

Subject: GEOTECHNICAL INVESTIGATION
MCKINLEY PARK RENOVATION
424 EAST 9TH STREET
STOCKTON, CALIFORNIA

Mr. Miller:

In accordance with your authorization of our proposal (Geocon Proposal No. LS-20-183, dated August 26, 2020), we performed a geotechnical investigation for the subject project located at 424 East 9th Street in Stockton, California.

The accompanying report presents our findings, conclusions, and recommendations for the project as presently proposed. In our opinion, no adverse geotechnical conditions were encountered that would preclude development at the site provided recommendations of this report are incorporated into the design and construction of the project.

Please contact us if you have any questions regarding this report or if we may be of further service.

Respectfully Submitted,

GEOCON CONSULTANTS, INC.

Brenda P. Fernandez, EIT
Senior Staff Engineer

Jeremy J. Zorne, PE, GE
Senior Engineer

REGISTERED PROFESSIONAL ENGINEER JEREMY J. ZORNE No. 2636 GEOTECHNICAL STATE OF CALIFORNIA

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GEOTECHNICAL INVESTIGATION

1.0 PURPOSE AND SCOPE

This report presents the results of our geotechnical investigation for the proposed improvements for McKinley Park located on the southwest corner of East 8th Street and South San Joaquin Street in Stockton, California. The approximate site location is depicted on the Vicinity Map, Figure 1.

The purpose of our geotechnical investigation was to observe and sample the subsurface conditions encountered at the site and provide conclusions and recommendations relative to the geotechnical aspects of site improvements as presently proposed.

To prepare this report, we:

- Performed a limited geologic literature review to aid in evaluating the geologic and seismic conditions present at the site. A list of referenced material is included in Section 9.0 of this report.
- Reviewed available conceptual plans to select exploratory boring locations.
- Performed a site reconnaissance to review project limits, determine exploration equipment access, and mark out the proposed exploration locations.
- Notified subscribing utility companies via Underground Service Alert (USA) a minimum of two working days (as required by law) prior to performing excavations at the site.
- Paid required fees and obtained a soil boring permit from San Joaquin County Environmental Health Department (SJCEHD).
- Performed seven (7) exploratory borings (B1 through B7) with a truck-mounted drill rig equipped with 6-inch diameter solid-flight augers or a hand-auger to depths ranging from approximately 2 to 21½ feet.
- Obtained representative samples from the exploratory borings.
- Logged the borings in general accordance with the Unified Soil Classification System (USCS).
- Upon completion, backfilled the exploratory borings with neat cement grout or soil cuttings in accordance with SJCEHD permit requirements.
- Performed laboratory tests to evaluate pertinent geotechnical parameters.
- Prepared this report summarizing our findings, conclusions, and recommendations regarding the geotechnical aspects of site improvements as presently proposed.

Approximate locations of the exploratory borings are shown on the Site Plan, Figure 2 and Proposed Development Plan, Figure 3. Details of our field exploration program including exploratory boring logs are presented in Appendix A. Details of our laboratory testing program and test results are summarized in Appendix B.

2.0 SITE AND PROJECT DESCRIPTION

The approximate 22-acre existing McKinley Park currently includes a community center building, two asphalt-paved parking lots, two softball fields, one handball court/wall, one basketball court, two restroom buildings, one maintenance/storage building, one park personnel building, an L-shaped, 153,200-gallon pool and pool house building enclosed by a chain-link fence, four tennis courts enclosed by a chain-link fence, and concrete pathways throughout. Site-specific topography/survey information was not available for our review as of the date of this report. Based on satellite imagery topographic information (Google Earth Pro, August 3, 2019), the site elevations range from approximately 8 to 11 feet above mean seal level (MSL). The current site configuration is shown on the Site Plan, Figure 2.

The project consists of renovating portions of the existing park. Planned renovations will include removal and reconstruction of the existing restroom and storage building located east of the pool; renovations to the existing pool, pool house, and mechanical/electrical basement room (located below the pool deck); constructing two new picnic shade shelters, a play area, and two futsal courts; removal of the existing tennis courts and replacing with a ballfield; renovating the existing basketball court to two basketball courts; converting two existing softball fields to two soccer fields; renovating existing paths and constructing additional walkway paths; replacing the existing path lighting and constructing additional lighting; constructing a new parking lot adjacent to South San Joaquin Street; existing parking lot resurfacing; and landscaping and irrigation system modification.

The proposed restroom and storage buildings will be supported on conventional shallow foundations with interior concrete slabs-on-grade. Shade structures will likely be supported on cast-in-drilled-hole (CIDH) concrete piers. Pavements will likely consist of asphalt concrete (AC) and/or rigid Portland cement concrete (PCC) pavement. We anticipate that site grading will include cuts and fills on the order of 5 feet or less. Some underground utilities may require deeper excavations. Approximate locations and features of the proposed improvements are shown on the Proposed Development Plan, Figure 3.

3.0 SOIL AND GEOLOGIC CONDITIONS

We identified soil and geologic conditions by observing exploratory borings and reviewing the referenced geologic literature (Section 9.0). Soil descriptions below include the USCS symbol where applicable. Site geology generally consists of alluvial soil mapped as Modesto Formation (Wagner, D.L., 1991).

3.1 Existing Pavement Sections

Table 3.1 summarizes the pavement section material thicknesses listed in order from top down, encountered in our borings.

TABLE 3.1
SUMMARY OF EXISTING PAVEMENT SECTIONS

Boring Number[1] – Location	Concrete (inches)	AB[2] (inches)	HMA[3] (inches)
B6 – Pool Deck	4.25	4	--
B7 – Tennis Courts	6	--	3

Notes: *1. Approximate locations shown on the Site Plan, Figure 2*
2. AB = Aggregate Base
3. HMA = Hot Mix Asphalt

3.2 Fill

We encountered fill in five of our borings (B2, B3, and B5 through B7) to depths ranging from approximately 1 to 6½ feet. The fill generally consists of lean clay with sand (CL), sandy lean clay (CL), and clayey sand (SC) with debris (wood fragments, rock/concrete fragments, metal rod/pipe, etc.). Since we do not know the compaction and placement history of the fill, removal, screening, and re-compaction will be required during site grading. Specific recommendations are provided in this report.

3.3 Alluvium (Modesto Formation)

We encountered alluvium mapped as Modesto Formation in five of our exploratory borings (B1 through B5) to the maximum explored depth of approximately 21½ feet. The alluvium generally consists of layers of very stiff to hard lean clay (CL), lean clay with sand (CL), and sandy lean clay (CL).

Soil conditions described in the previous paragraphs are generalized. The exploratory boring logs included in Appendix A detail soil type, color, moisture, consistency, and USCS classification of the soils encountered at specific locations and elevations.

4.0 GROUNDWATER

We did not encounter groundwater in our exploratory borings (B1 through B7) performed on April 16, 2021 to a maximum depth of 21½ feet.

We reviewed available depth-to-groundwater data on the California Department of Water Resources (DWR) *Sustainable Groundwater Management Act (SGMA) Data Viewer* (https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#gwlevels). The SGMA Data Viewer website indicates that depth to groundwater at the site ranges from approximately 30 feet to 40 feet (Spring 2020).

It should be noted that fluctuations in the level of groundwater may occur due to variations in precipitation, temperature, and other factors. Depth to groundwater can also vary significantly due to localized pumping, irrigation practices, and seasonal fluctuations. Therefore, it is possible that groundwater may be higher or lower than the levels observed during our investigation.

5.0 GEOLOGIC HAZARDS

5.1 Regional Active Faults

Based on our research, analyses, and observations, the site is not located on any known "active" earthquake fault trace. In addition, the site is not contained within an Alquist-Priolo Earthquake Fault Zone. Therefore, we consider the potential for ground rupture due to onsite active faulting to be low. In order to determine the distance of known active faults within 30 miles of the site, we used the 2013 Caltrans Fault Database KML overlay file for Google Earth. Principal references used within the 2013 Caltrans Fault Database are Jennings and Bryant Fault Activity Map of California (2010) and Working Group on California Earthquake Predictions (WGCEP), Uniform California Earthquake Rupture Forecast Version 3. Results are summarized in Table 5.1.

TABLE 5.1
REGIONAL ACTIVE FAULTS

Fault Name	Approximate Distance from Site (miles)	Maximum Moment Magnitude, M_W
Great Valley 06 (Orestimba)	18.5	6.7
Great Valley 06 (Midland)	19.3	6.8
Greenville (No) 2011	26.4	6.9
Las Positas	27.1	6.4

5.2 Ground Shaking

We used the United States Geological Survey (USGS) *Unified Hazard Tool* (https://earthquake.usgs.gov/hazards/interactive/) to determine the deaggregated seismic source parameters including controlling magnitude and fault distance. The USGS estimated modal magnitude is 6.3 and the estimated Peak Ground Acceleration (PGA) for the Maximum Considered Earthquake (MCE) with a 2,475-year return period is 0.42g.

While listing PGA is useful for comparison of potential effects of fault activity in a region, other considerations are important in seismic design, including frequency and duration of motion and soil conditions underlying the site.

5.3 Liquefaction

Liquefaction is a phenomenon in which loose, saturated, cohesionless soil deposits located beneath the groundwater table lose strength when subjected to intense and prolonged ground shaking. The seismic excitation increases pore water pressure creating a buoyant effect of the loose soil. When liquefaction occurs, building foundations may sink or tilt and differential ground settlement may occur. Other effects may include sand boils (ground loss) and lateral spreading if the liquefiable soil is located adjacent to a steep free face. The areas that have the greatest potential for liquefaction are those in which the water table is less than 50 feet below ground surface and the soils are predominately clean, poorly graded sand deposits of loose to medium-dense relative density.

The site is not located in a currently established State of California Seismic Hazard Zone for liquefaction. Based on the subsurface conditions encountered at the site, including groundwater depths on the order of 30 to 40 feet and medium dense granular and very stiff to hard cohesive soils, liquefaction potential at the site is expected to be low during seismic events. Mitigation and specific design measures with respect to liquefaction is not necessary for the project.

5.4 Expansive Soil

Laboratory Plasticity Index (PI) and Expansion Index (EI) tests on near surface soil samples indicate moderate plasticity and corresponding medium expansion potential (Appendix B). Mitigation and specific design measures with respect to expansive soil are provided in this report.

5.5 Soil Corrosion Screening

We performed pH, resistivity, chloride, and sulfate tests on one sample to generally evaluate the corrosion potential of the soil with respect to proposed subsurface structures. These tests were performed in accordance with California Test Method (CTM) Nos. 643, 422, and 417. The results are presented in Table 5.5A and should be considered for design of underground structures.

TABLE 5.5A
SOIL CORROSION PARAMETER TEST RESULTS
(CALIFORNIA TEST METHODS 643, 417, AND 422)

Sample No.	Sample Depth (ft.)	pH	Minimum Resistivity (ohm-cm)	Chloride (ppm)	Sulfate (ppm)
B4-Bulk	0 – 5	7.0	1,150	16.1	0.2

Soil with a low pH (higher acidity) is considered corrosive as it can react with lime in cement to leach out soluble reaction products and result in a more porous and weaker concrete. Per Caltrans Corrosion Guidelines (Caltrans 2018), soil with a pH of 5.5 or lower may be corrosive to concrete or steel in contact with the ground.

Soil resistivity is the measure of the soil's ability to transmit electric current. Corrosion of buried ferrous metal is proportional to the resistivity of the soil. A lower resistivity indicates a higher propensity for transmitting electric currents that can cause corrosion of buried ferrous metal items. In general, the higher the resistivity, the lower the rate for corrosion. Per Caltrans Corrosion Guidelines (Caltrans 2018), resistivity serves as an indicator parameter for the possible presence of soluble salts and it is not included as a parameter to define a corrosive area for structures. A minimum resistivity value for soil less than 1,100 ohm-cm may indicate the presence of high quantities of soluble salts and a higher propensity for corrosion.

Based on the laboratory minimum resistivity test results and Caltrans criteria, soil at the locations tested does not have a higher propensity for corrosion.

Table 5.5B presents a summary of concrete requirements set forth by the California Building Code (CBC) Section 1904 and American Concrete Institute (ACI) 318 for possible chloride exposure. Chlorides can break down the protective oxide layer on steel surfaces resulting in corrosion. Sources of chloride include, but are not limited to, deicing chemicals, salt, brackish water, seawater, or spray from these sources.

TABLE 5.5B
REQUIREMENTS FOR CONCRETE EXPOSED TO CHLORIDE-CONTAINING SOLUTIONS
(AFTER ACI 318 TABLES 19.3.1.1 and 19.3.2.1)

Chloride Severity	Exposure Class	Condition	Maximum Water to Cement Ratio by Weight	Minimum Compressive Strength (psi)
Not Applicable	C0	Concrete dry or protected from moisture	N/A	2,500
Moderate	C1	Concrete exposed to moisture but not to external sources of chlorides	N/A	2,500
Severe	C2	Concrete exposed to moisture and an external source of chlorides	0.40	5,000

The appropriate Chloride Severity/Exposure Class should be determined by the project designer based on the specific conditions at the location of the proposed structure. Further guidance is provided in ACI 318.

Table 5.5C presents a summary of concrete requirements set forth by CBC Section 1904 and ACI 318 for sulfate exposure. Similar to chlorides, sulfates can break down the protective oxide layer on steel leading to corrosion. Sulfates can also react with lime in cement to soften and crack concrete.

TABLE 5.5C
REQUIREMENTS FOR CONCRETE EXPOSED TO SULFATE-CONTAINING SOLUTIONS
(AFTER ACI 318 TABLES 19.3.1.1 and 19.3.2.1)

Sulfate Severity	Exposure Class	Water-Soluble Sulfate (SO_4) Content		Cement Type (ASTM C 150)	Maximum Water to Cement Ratio by Weight[1]	Minimum Compressive Strength (psi)
		Percent By Mass	Parts Per Million (ppm)			
Not Applicable	S0	$SO_4 < 0.10$	$SO_4 < 1,000$	No Type Restriction	N/A	2,500
Moderate	S1	$0.10 \leq SO_4 < 0.20$	$1,000 \leq SO_4 < 2,000$	II	0.50	4,000
Severe	S2	$0.20 \leq SO_4 \leq 2.00$	$2,000 \leq SO_4 \leq 20,000$	V	0.45	4,500
Very Severe	S3	$SO_4 > 2.00$	$SO_4 > 20,000$	V+Pozzolan or Slag	0.45	4,500

Notes:
1. Maximum water to cement ratio limits are different for lightweight concrete, see ACI 318 for details.

Based on the laboratory test results, the Sulfate Severity is classified as "Not Applicable" and the Exposure Class is S0. The concrete mix design(s) should be developed accordingly. The presence of water-soluble sulfates is not a visually discernible characteristic; therefore, other soil samples from the site could yield different concentrations. Additionally, over time landscaping activities (i.e., addition of fertilizers and other soil nutrients) may affect the concentration.

Geocon does not practice in the field of corrosion engineering and the above information is provided as screening criteria only. If corrosion sensitive improvements are planned, we recommend that further evaluations by a corrosion engineer be performed to incorporate the necessary precautions to avoid premature corrosion on buried metal pipes and metal or concrete structures in direct contact with the soils.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 General

6.1.1 No soil or geologic conditions were encountered during our investigation that would preclude development of the site as planned, provided the recommendations contained in this report are incorporated into the design and construction of the project.

6.1.2 The primary geotechnical constraints identified in our investigation are the presence of (1) expansive near-surface soils and (2) undocumented fill within existing developed areas of the site. Mitigation recommendations for these constraints are provided in this report.

6.1.3 Conclusions and recommendations provided in this report are based on our review of referenced literature, analysis of data obtained from our field exploration, laboratory testing program, and our understanding of the proposed development at this time. We should review the project plans as they develop further, provide engineering consultation as needed during final design, and perform geotechnical observation and testing services during construction.

6.2 Seismic Site Class / Seismic Design Criteria

6.2.1 Seismic design of the structures should be performed in accordance with the provisions of the 2019 California Building Code (CBC) which is based on the American Society of Civil Engineers (ASCE)/Structural Engineering Institute (SEI) publication: *ASCE/SEI 7-16, Minimum Design Loads and Associated Criteria for Buildings and Other Structures* (ASCE/SEI, 2017). We used the *Structural Engineers Association of California* (SEAOC) and *Office of Statewide Health Planning and Development* (OSHPD) web application *Seismic Design Maps* (https://seismicmaps.org/) to evaluate site-specific seismic design parameters in accordance with ASCE 7-16.

For seismic design purposes, sites are classified as Site Class "A" through "F" as follows:

- Site Class A – Hard Rock;
- Site Class B – Rock;
- Site Class C – Very Dense Soil and Soft Rock;
- Site Class D – Stiff Soil;
- Site Class E – Soft Clay Soil; and
- Site Class F – Soils Requiring Site Response Analysis.

Based on the subsurface conditions at the site and measured penetration resistance in our borings, the Site Classification is Site Class "D – Stiff Soil" per Table 20.3-1 of ASCE/SEI 7-16. For the purposes of evaluating code-based seismic parameters for design, we assumed a seismic Risk Category II (per the CBC) for the project. Results are summarized in Table 6.2.1.

TABLE 6.2.1
ASCE 7-16 SEISMIC DESIGN PARAMETERS
SITE CLASS “D” – STIFF SOIL

Parameter	Value	ASCE 7-16 Reference
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	**0.740g**	Figure 22-1
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	**0.287g**	Figure 22-2
Site Coefficient, F_A	**1.208**	Table 11.4-1
Site Coefficient, F_V	**2.026***	Table 11.4-2
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	**0.894g**	Eq. 11.4-1
Site Class Modified MCE_R Spectral Response Acceleration (1 sec), S_{M1}	**0.581g***	Eq. 11.4-2
5% Damped Design Spectral Response Acceleration (short), S_{DS}	**0.596g**	Eq. 11.4-3
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	**0.388g***	Eq. 11.4-4
Long Period Transition Period, T_L	**12 seconds**	Figs. 22-14 through 22-17
$T_S = S_{D1} / S_{DS}$	**0.651 seconds**	Chapter 11

* Per Section 11.4.8 of ASCE/SEI 7-16, a ground motion hazard analysis (GMHA) shall be performed for projects on Site Class “D” sites with long-period spectral acceleration (S_1) greater than or equal to 0.2g, which is true for this site. However, Section 11.4.8 also provides exceptions which indicate that the ground motion hazard analysis may be waived provided the exceptions are followed. Using the code-based values presented in the table above, in lieu of performing a ground motion hazard analysis, requires that the exceptions outlined in ASCE 7-16 Section 11.4.8 be followed.

Specifically for this site/project, Exception No. 2 would apply which states that a GMHA is not required for: *Structures on Site Class D sites with S_1 greater than or equal to 0.2, provided the value of the seismic response coefficient C_s is determined by Eq. (12.8-2) for values of $T \leq 1.5T_s$ and taken as equal to 1.5 times the value computed in accordance with either Eq. (12.8-3) for $T_L \geq T > 1.5T_s$ or Eq. (12.8-4) for $T > T_L$.*

6.2.2 Table 6.2.2 presents additional seismic design parameters for projects with Seismic Design Categories of D through F in accordance with ASCE 7-16 for the mapped maximum considered geometric mean (MCE_G).

TABLE 6.2.2
ASCE 7-16 SITE ACCELERATION DESIGN PARAMETERS

Parameter	Value	ASCE 7-16 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	**0.309g**	Figure 22-7
Site Coefficient, F_{PGA}	**1.291**	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	**0.399g**	Section 11.8.3 (Eq. 11.8-1)

6.2.3 Conformance to the criteria presented in Tables 6.2.1 and 6.2.2 for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a maximum level earthquake occurs. The primary goal of seismic design is to protect life and not to avoid structural damage, since such design may be economically prohibitive.

6.3 Soil Excavation Characteristics

6.3.1 In our opinion, grading and excavations at the site may be accomplished with standard to moderate effort using heavy-duty grading/excavation equipment. We do not anticipate project excavations to generate oversized rock material (greater than 6 inches in dimension) although some debris may be encountered in areas of existing fill or after existing structure demolition.

6.3.2 Temporary excavation slopes must meet Cal-OSHA requirements as appropriate. Excavation sloping, benching, the use of trench shields, and the placement of trench spoils should conform to the latest applicable Cal-OSHA standards. The contractor should have a Cal-OSHA-approved “competent person” onsite during excavation to evaluate trench conditions and to make appropriate recommendations where necessary. It is the contractor’s responsibility to provide sufficient and safe excavation support as well as protecting nearby utilities, structures, and other improvements which may be damaged by earth movements.

6.3.3 The excavation support recommendations provided by Cal-OSHA are generally geared towards protecting human life and not necessarily towards preventing damage to nearby structures or surface improvements. The contractor should be responsible for using the proper active shoring systems or sloping to prevent damage to any structure or improvements near underground excavations.

6.3.4 If grading occurs during or after the wet season (typically winter and spring), or in periods of precipitation, in-place and excavated soils will likely be wet. Earthwork contractors should be aware of moisture sensitivity of the near-surface granular soils and potential compaction/workability difficulties.

6.3.5 Earthwork operations in these conditions will likely be difficult with low productivity. Often, a period of at least one month of warm and dry weather is necessary to allow the site to dry sufficiently so that heavy grading equipment can operate effectively. Conversely, during dry summer and fall months, dry clay soils may require additional grading effort (discing, mixing, or other means) to attain proper moisture conditioning.

6.3.6 Based on laboratory testing, in-situ moisture content of site soils ranges from about 11% to 25%, which on average is higher than optimum moisture content, which is approximately 12.5%. Due to the fine-grained nature of the soils and measured in-situ moisture contents above optimum, additional drying efforts to attain moisture contents suitable for compaction should be anticipated regardless of the time of year. Mitigation alternatives may include aerating/drying the exposed soils (assuming favorable weather conditions), or chemical treatment (e.g., lime treatment). Unstable excavation bottoms may require overexcavating 12 to 18 inches and placing geotextile fabric/geogrid covered with aggregate, for stabilization. We can provide specific recommendations during construction, based on conditions encountered.

6.4 Materials for Fill

6.4.1 Excavated soils generated from cut operations at the site are suitable for use as fill in structural areas provided they do not contain deleterious matter, organic material, or cementations larger than 6 inches in maximum dimension.

6.4.2 Import soil for general use (if needed) should be similar to onsite, native soils (e.g. similar plasticity and grain size distribution characteristics). Import soil should be free of organic material and construction debris, and not contain rock/cementations larger than 6 inches in greatest dimension.

6.4.3 Low-expansive import fill (LEF) material should be primarily granular with a “very low” expansion potential (Expansion Index less than 20), a Plasticity Index less than 15, be free of organic material and construction debris, and not contain rock/cementations larger than 6 inches in greatest dimension. LEF may also consist of lime-treated native soils. If lime-treatment is selected, additional laboratory testing will be required to determine the percentage of lime required to meet the intent of our low-expansive fill recommendations. For planning purposes, typical lime application rates for soil stabilization range from 3 to 5 percent.

6.4.4 Environmental characteristics and corrosion potential of import soil materials should also be considered. Proposed import materials should be sampled, tested, and approved by Geocon prior to its transportation to the site.

6.5 Grading

6.5.1 All earthwork operations should be observed and all fills tested for recommended compaction and moisture content by a representative of Geocon.

6.5.2 References to relative compaction and optimum moisture content in this report are based on the latest American Society for Testing and Materials (ASTM) D1557 Test Procedure. Structural areas should be considered the areas extending a minimum of 5 feet beyond the outside dimensions of structures, including footings or overhangs carrying structural loads.

6.5.3 Prior to commencing grading, a pre-construction conference with representatives of the client, grading contractor and Geocon should be held at the site. Site preparation, soil handling and/or the grading plans should be discussed at the pre-construction conference.

6.5.4 Site preparation should begin with complete removal of existing restroom and storage structures and foundations, tennis and basketball court pavements, AB, underground utilities, debris, and organic-rich topsoil. The grading contractor should perform a reasonable search for existing abandoned improvements at the site (typically performed in conjunction with site preparation). Although not discernable from our borings, the concrete pavement may include reinforcing steel which may increase removal and handling difficulty. Excavations or depressions resulting from site clearing operations, or other existing excavations or depressions, should be restored with engineered fill in accordance with the recommendations of this report.

6.5.5 At the time of our investigation, site vegetation primarily consisted of grass and trees. Surface vegetation consisting of grasses and other similar vegetation should be removed by stripping to a sufficient depth to remove organic-rich topsoil. We estimate required stripping depths will range from approximately 2 to 3 inches. The actual stripping depth should be determined based on site conditions prior to grading. Material generated during stripping is not suitable for use within 5 feet of building pads or within pavement areas but may be placed in landscaped or non-structural areas or exported from the site.

6.5.6 Within areas to be developed, any existing trees and associated root systems should be removed. Roots larger than 1 inch in diameter should be completely removed. Smaller roots may be left in-place as conditions warrant and at the discretion of our field representative.

6.5.7 After demolition and site preparation, within proposed new building areas (new building footprint plus a 5-foot overbuild), any existing fill should be completely removed to expose undisturbed native soils. Existing fill removal in concrete flatwork or pavement areas is not specifically required provided the minimum recommended relative compaction and stability are achieved in the top 12 inches of the fill for pavement and flatwork areas.

6.5.8 Over excavation bottoms, cut areas, areas to receive fill, or areas left at-grade should be scarified 12 inches, uniformly moisture-conditioned at least 2% over optimum moisture content and compacted to at least 90% relative compaction. Scarification and recompaction operations should be performed in the presence of a Geocon representative to evaluate performance of the subgrade under compaction equipment loading and to identify any loose or unstable soil conditions that could require additional excavation.

6.5.9 Engineered fill consisting of onsite native sources and/or import fill material should be compacted in horizontal lifts not exceeding 8 inches (loose thickness) and brought to final design elevations. Each lift should be moisture-conditioned at least 2% above optimum moisture content and compacted to at least 90% relative compaction. The top 12 inches of building pads, whether completely at-grade, by excavation, or filling should be uniformly moisture-conditioned at least 2% above optimum moisture content and compacted to at least 90% relative compaction.

6.5.10 Due to the presence of expansive clay soils at the site, the upper 12 inches of building pads should consist of LEF meeting the requirements of Section 6.4.3 of this report. The LEF should be moisture-conditioned at or above optimum moisture content and compacted to at least 90% relative compaction. If lime-treatment is desired for expansive soil stabilization, additional laboratory testing will be required to determine the typical lime application rates (ranging from 3 to 5 percent).

6.5.11 The top 12 inches of final vehicular pavement and concrete flatwork subgrade, whether completed at-grade, by excavation, or by filling, should be uniformly moisture-conditioned at least 2% above optimum moisture content and compacted to at least 95% relative compaction for flexible pavement areas and 90% relative compaction for concrete flatwork areas. Finished subgrade should be finished to a smooth, unyielding surface. We further recommend proof-rolling the subgrade with a loaded water truck (or similar equipment with high contact pressure) to verify the stability of the subgrade prior to placing AB. The subgrade must be stable in addition to meeting the minimum relative compaction.

6.5.12 Underground utility trenches within structural areas should be backfilled with properly compacted material. Pipe bedding, shading, and trench backfill should conform to the requirements of the appropriate utility authority. Material excavated from trenches should be adequate for use as general backfill above shading provided it does not contain deleterious matter, vegetation, or cementations larger than 6 inches in maximum dimension. Trench backfill should be placed in loose lifts not exceeding 8 inches, moisture-conditioned at least 2% above optimum and compacted to at least 90% relative compaction. Compaction should be performed by mechanical means only; jetting of trench backfill is not recommended.

6.6 Foundations – Restroom and Storage Buildings

6.6.1 Provided the building pads are graded in accordance with the recommendations of this report, the proposed buildings may be supported on conventional shallow foundations bearing on undisturbed, natural soil or engineered fill. The top 12 inches of building pads should be comprised of LEF meeting the requirements of Paragraph 6.4.3 of this report.

6.6.2 To reduce potential for moisture variations beneath the buildings, foundations should consist of continuous perimeter footings with isolated interior spread footings or continuous footings. Perimeter footings should be continuous around the entire perimeter of the structures without breaks or discontinuities. Continuous footings should be at least 12 inches wide and spread footings should be at least 24 inches square. All footings should be embedded at least 18 inches below lowest adjacent pad grade.

6.6.3 Underground utilities running parallel to footings should not be constructed in the zone of influence of footings. The zone of influence may be taken to be the area beneath the footing and within a 1:1 plane extending out and down from the bottom of the footing.

6.6.4 Foundations proportioned as recommended above and bearing within native alluvial or engineered fill may be designed for a net allowable soil bearing capacity of 2,000 pounds per square foot (psf) for combined dead plus live loads. This value may be increased by one-third to evaluate all loads, including wind or seismic forces.

6.6.5 Foundations designed in accordance with the recommendations above should experience total settlements of less than 1 inch and differential settlements of approximately ½ inch over a distance of approximately 30 feet. The majority of the settlement will be immediate and will occur as the loads are applied during construction.

6.6.6 Allowable passive pressure used to resist lateral movement of footings may be assumed to be equal to a fluid weighing 300 pounds per cubic foot (pcf). The allowable coefficient of friction to resist sliding of footings is 0.3 for concrete against soil. Combined passive resistance and friction may be utilized for footing design provided that the frictional resistance is reduced by 50%.

6.6.7 Continuous footings should be reinforced with at least two No. 4 reinforcement bars, one each placed near the top and bottom of the footing to allow footings to span isolated soil irregularities. The reinforcement recommended above is for soil characteristics only and is not intended to replace reinforcement required for structural considerations. The project structural engineer should evaluate the need for additional reinforcement.

6.6.8 A Geocon representative should observe foundation excavations prior to placing reinforcing steel or concrete to observe that the exposed soil conditions are consistent with those anticipated. If unanticipated soil conditions are encountered, foundation modifications may be required.

6.7 Interior Slabs-on-Grade

6.7.1 Conventional interior concrete slabs-on-grade are suitable for the building pads provided the upper 12 inches of the building pads consist of LEF meeting the requirements of Section 6.4.3 of this report. This recommendation is based on the assumption that slabs will be at least 5 inches thick, and be supported on a minimum 4-inch-thick rock section. *The 4-inch-thick rock section is in addition to the 12 inches of LEF*. If a thinner or thicker slab or rock section is planned, we should be consulted to provide revised recommendations.

6.7.2 Slab thickness and reinforcement should be determined by the structural engineer based on anticipated loading. However, due to the expansive soil conditions, we recommend that consideration be given to using slabs that are at least 5 inches thick and reinforced with No. 4 reinforcing bars placed 12 inches on center in both horizontal directions

6.7.3 If the near-surface soils of building pads become dry prior to constructing the slab-on-grade, the building pads should be re-moistened by soaking or sprinkling such that the upper 12 inches of soil is at least 2% above optimum moisture content at least 24 hours before concrete placement. Our representative should verify moisture conditions prior to slab-on-grade construction.

6.8 Slab-on-Grade Moisture Protection Considerations

6.8.1 Migration of moisture through concrete slabs or moisture otherwise released from slabs is not a geotechnical issue. However, for the convenience of the owner and design team, we are providing the following general suggestions for consideration by the owner, architect, structural engineer, and contractor. The suggested procedures may reduce the potential for moisture-related floor covering failures on concrete slabs-on-grade, but moisture problems may still occur even if the procedures are followed. If more detailed recommendations are desired, we recommend consulting a specialist in this field.

6.8.2 In areas where floor coverings are planned, a minimum 10-mil-thick vapor barrier meeting ASTM E1745-97 Class C requirements may be placed directly below the slab, without a sand cushion provided the slab-on-grade concrete water-cement ratio is 0.45 or less. To reduce the potential for punctures, a higher quality vapor barrier (15 mil, Class A or B) may be used. The vapor barrier, if used, should extend to the edges of the slab and should be sealed at all seams and penetrations.

6.8.3 At least 4 inches of ½- or ¾-inch crushed rock, with no more than 5 percent passing the No. 200 sieve, may be placed below the vapor barrier to serve as a capillary break.

6.8.4 The concrete water/cement ratio should be as low as possible. The water/cement ratio should not exceed 0.45 for concrete placed directly on the vapor barrier. Midrange plasticizers could be used to facilitate concrete placement and workability.

6.8.5 Proper finishing, curing, and moisture vapor emission testing should be performed in accordance with the latest guidelines provided by the American Concrete Institute, Portland Cement Association, and ASTM.

6.9 Foundations – Shade Structures

6.9.1 Proposed shade structure foundations will likely consist of CIDH concrete piers. CIDH piers should have a minimum diameter of 12 inches, a minimum embedment depth of 6 feet, and be designed using an allowable unit skin friction of 500 pounds per square foot (psf) to resist vertical downward loads. An allowable unit skin friction of 350 psf plus the weight of the pier may be used to resist uplift loads. Due to the presence of expansive clay soil throughout the site, skin friction in the upper 2 feet of the pier should be neglected in determining the downward and upward pier capacities. The allowable downward capacity and allowable uplift capacity may be increased by one-third when considering transient wind or seismic loads. Piers should have a minimum center-to-center spacing of at least three pier diameters.

6.9.2 Allowable passive pressure used to resist lateral movement of the piers may be assumed to be equal to a fluid weighing 300 pounds per cubic foot (pcf) with a maximum earth pressure of 3,000 psf. The allowable passive pressure may be applied over two pier diameters for isolated piers with a minimum center-to-center spacing of at least three pier diameters. The allowable passive pressure assumes a horizontal surface extending at least 5 feet or three times the surface generating the passive pressure, whichever is greater. The upper 2 feet should not be included in the design for lateral resistance.

6.9.3 The bottom of pier excavations should be cleaned of loose cuttings prior to the placement of steel and concrete. Experience indicates that backspinning the auger does not remove loose material, and a flat cleanout plate is necessary.

6.9.4 Suction effects created during auger withdrawal from the piers (during construction) can induce caving in fine-grained/clay soils. The contractor should be aware and prepared to mitigate for these potential caving conditions during construction.

6.9.5 A Geocon representative should be present during pier drilling to confirm that subsurface conditions encountered are consistent with those expected. If unexpected conditions are encountered, foundation modifications may be required.

6.10 Retaining Walls

6.10.1 Design of retaining walls and buried structures may be based on the lateral earth pressures (equivalent fluid pressure) summarized in Table 6.10.1.

TABLE 6.10.1
RECOMMENDED LATERAL EARTH PRESSURES

Condition	Equivalent Fluid Density
Active	45 pcf
At-Rest	65 pcf
Seismic[1]	Not Applicable

1. Based on research by Lew, et al. 2010, the seismic increment of earth pressure may be neglected if the maximum peak ground acceleration (PGA) at the site is 0.4 g or less. The Site Class Modified MCE_G Peak Ground Acceleration (PGA_M) for this site is 0.39g; therefore, the seismic increment of earth pressure may be neglected.

6.10.2 Unrestrained walls be designed using the active case. Unrestrained walls are those that are allowed to rotate more than 0.001H (where H is the height of the wall). Walls restrained from movement (such as basement walls) should be designed using the at-rest case. The soil pressures above assume that the backfill material within an area bounded by the wall and a 1:1 plane extending upward from the base of the wall will be composed of the existing onsite soils.

6.10.3 Retaining wall foundations with a minimum depth of 18 inches may be designed using the allowable bearing capacity provided in Section 6.6.4 of this report. To resist lateral movement of retaining wall foundations, an allowable passive earth pressure equivalent to a fluid density of 300 pcf for footings or shear keys poured neat against properly compacted engineered fill soils or undisturbed natural soils. This allowable passive pressure is based on the assumption that a horizontal surface extends at least 5 feet or three times the depth of the footing or shear key, whichever is greater, beyond the face of the retaining wall foundation. If this surface is not protected by floor slabs or pavement, the upper 12 inches of material should not be included in the design for lateral resistance. An allowable friction coefficient of 0.3 may be used for resistance to sliding between soil and concrete. Combined passive resistance and friction may be utilized for design provided that the frictional resistance is reduced by 50%.

6.10.4 Retaining walls greater than 2 feet tall (retained height) should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces and should be waterproofed as required by the project architect. Positive drainage for retaining walls should consist of a vertical layer of permeable material positioned between the retaining wall and the soil backfill. The permeable material may be composed of a composite drainage geosynthetic or a natural permeable material such as crushed gravel at least 12 inches thick and capped with at least 12 inches of native soil. A geosynthetic filter fabric should be placed between the gravel and the soil backfill. Provisions for removal of collected water should be provided for either system by installing a perforated drainage pipe along the bottom of the permeable material, which leads to suitable drainage facilities.

6.10.5 The recommendations presented above are generally applicable to the design of rigid concrete or masonry retaining walls with a level backfill and having a maximum retained height of 10 feet. In the event that walls higher than 10 feet or other types of walls are planned, Geocon should be consulted for additional recommendations.

6.11 Concrete Sidewalks and Flatwork

6.11.1 Sidewalk, curb, and gutter within City right-of-way should be designed and constructed in accordance with the latest City of Stockton standards and details as applicable.

6.11.2 Due to the presence of expansive near-surface soils, onsite exterior flatwork will likely experience seasonal movement. Therefore, some cracking and/or vertical offset should be anticipated. We are providing the following recommendations to reduce distress to concrete flatwork. Recommendations include moisture conditioning subgrade soils, using low-expansive fill underlayment, providing thickened edges or deepened cut-off curbs (turned-down edges) adjacent to landscaped areas, and providing adequate construction and control joints. It should be noted that even with implementation of these measures, minor slab movement or cracking could still occur.

- Concrete flatwork, excluding concrete pavements subject to wheel loads, should be at least 4 inches thick and underlain by at least 6 inches of low-expansive fill (LEF). LEF may consist of Class 2 AB or soil meeting the requirements of Section 6.4.3 of this report. LEF should be compacted in accordance with the recommendations of this report. In addition, doweling could be provided at joints to reduce the potential for vertical offset.
- Concrete flatwork should include thickened edges, at least 12 inches wide, or similar moisture cut-off provisions that extend the full depth of the LEF or AB underlayment.
- The upper 12 inches of subgrade soil in exterior flatwork areas should be uniformly moisture-conditioned at least 2% above optimum moisture content and compacted to at least 90% relative compaction prior to placing LEF.
- Crack control and construction joints should be provided in accordance with ACI and/or PCA guidelines. Construction joints that abut building foundations should include a felt strip, or approved equivalent, that extends the full depth of the exterior slab. Exterior slabs should be structurally independent of building foundations except at doorways where doweling should be provided to reduce vertical offset.

6.12 Pavement - Hot Mix Asphalt

6.12.1 We performed Resistance-Value (R-Value) testing on a representative bulk soil sample from the proposed paved parking area. Our testing resulted in an R-Value of 9 (Appendix B). Table 6.12.1 provides alternative pavement sections based on the design methods of Caltrans' *Highway Design Manual* using a design subgrade R-value of 5.

TABLE 6.12.1
FLEXIBLE PAVEMENT SECTIONS

	Parking Areas Traffic Index = 5.0	Driveways, Light Truck Traffic, Fire Truck Areas Traffic Index = 6.0
HMA, inches	3.0	3.5
AB, inches	10.0	12.5
Total Section, inches	13.0	16.0

6.12.2 The recommended pavement section is based on the following assumptions:

1. Pavement subgrade soil has an R-Value of at least 5.
2. Class 2 AB has a minimum R-Value of 78 and meets the requirements of Section 26 of Caltrans' *Standard Specifications*.
3. Class 2 AB and the top 6 inches of subgrade are compacted to 95% or higher relative compaction at or near optimum moisture content.
4. Pavement subgrade should be compacted in accordance with the recommendations presented in this report.
5. HMA should conform to Section 39 of Caltrans' latest *Standard Specifications*.
6. Periodic maintenance of HMA pavements is performed

6.12.3 To reduce the potential for water from landscaped areas migrating under pavement into the AB, consideration should be given to using full-depth curbs in areas where pavement abuts irrigated landscaping. The full-depth curbs should extend at least 6 inches or more into the soil subgrade beneath the AB. Alternatively, modified drop-inlets that contain weep-holes may be used to encourage accumulated water to drain from beneath the pavement.

6.12.4 Asphalt pavement section recommendations for driveways and parking areas are based on the design procedures of Caltrans' *Highway Design Manual* (Design Manual), Chapter 600. It should be noted that most rational pavement design procedures are based on projected street or highway traffic conditions and, hence, may not be representative of vehicular loading that occurs in parking lots and driveways. Pavement proximity to landscape irrigation, reduced traffic speed and short turning radii increase the potential for pavement distress to occur in parking lots even though the volume of traffic is significantly less than that of an adjacent street. The Design Manual indicates that the resulting pavement sections for parking lots are "minimized to keep initial costs down but are reasonable because additional AC surfacing can be added later, if needed, and generally without incurring traffic hazards or traffic handling problems." It is generally not economically feasible to design and construct the entire parking lot and driveways for the unique loading conditions previously described. Periodic maintenance of the pavement in these areas, therefore, should be anticipated.

6.13 Pavement - Rigid Concrete

6.13.1 If rigid PCC pavement is used in automobile and light-truck traffic areas, we recommend that the concrete be at least 6 inches thick. PCC pavement should be underlain by at least 8 inches of Class 2 AB meeting the requirements of Section 26 of Caltrans' *Standard Specifications* and compacted to at least 95% relative compaction. Subgrade soils should be prepared and compacted in accordance with the recommendations of this report.

6.13.2 PCC should have a minimum 28-day compressive strength of 3,500 pounds per square inch (psi). Adequate construction and crack control joints should be used to control cracking inherent in concrete construction. It would be advantageous to provide minimal reinforcement, such as No. 3 steel bars placed 18 inches on center in both horizontal directions to help control cracking.

6.13.3 In general, we recommend that concrete pavements be designed, constructed, and maintained in accordance with industry standards such as those provided by the American Concrete Pavement Association.

6.14 Site Drainage and Moisture Protection

6.14.1 Adequate site drainage is critical to reduce the potential for differential soil movement, soil expansion, erosion and subsurface seepage. Under no circumstances should water be allowed to pond adjacent to building foundations. The site should be graded and maintained such that surface drainage is directed away from structures in accordance with the 2019 CBC or other applicable standards. In addition, surface drainage should be directed away from the top of slopes into swales or other controlled drainage devices.

6.14.2 Underground utilities should be leak free. Utility and irrigation lines should be checked periodically for leaks, and detected leaks should be repaired promptly. Detrimental soil movement could occur if water is allowed to infiltrate the soil for prolonged periods of time.

6.14.3 Landscaping planters adjacent to paved areas are not recommended due to the potential for surface or irrigation water to infiltrate the pavement's subgrade and base course. We recommend use of area drains to collect excess irrigation water and transmit it to drainage structures or impervious above-grade planter boxes. In addition, where landscaping is planned adjacent to the pavement or flatwork, we recommend construction of a cutoff wall (deepened curb) along the edge of the pavement/flatwork that extends at least 4 inches into the soil subgrade below the bottom of the base material.

6.14.4 The soil conditions at the site (low-permeability clays) are not conducive to water infiltration devices such as vegetated swales. However, Low Impact Development (LID) devices can be installed to reduce velocity and the amount of water entering the storm drain system. The LID devices should be properly constructed to prevent water infiltration into the surrounding soil. If water infiltrates the expansive soils, distress may be caused to adjacent pavements, flatwork, or structures. Vegetated swales and basin areas (if used) should be lined with an impermeable liner (e.g. high-density polyethylene, HDPE, with a thickness of about 12 mil or equivalent polyvinyl chloride liner) to reduce infiltration.

6.14.5 We recommend that roof drains be connected to water-tight subdrains that direct the water to the storm drain system. However, we understand that LID and Leadership in Engineering and Environmental Design (LEED) requests disconnecting the roof drains to help obtain certification. The water from the roof drains should be directed away from buildings. Consideration should be given to draining roofs to lined planter boxes or placing liners below the proposed landscape areas to prevent infiltration of the water. Geocon can be contacted for additional recommendations.

6.14.6 We recommend implementing measures to reduce infiltrating irrigation water near buildings, flatwork, or pavements. Such measures may include:

- Selecting drought-tolerant plants that require little or no irrigation, especially within 3 feet of buildings, slabs-on-grade, or pavements.
- Using drip irrigation or low-output sprinklers.
- Using automatic timers for irrigation systems.
- Using appropriately spaced area drains.

The project landscape architect should consider incorporating these measures into the landscaping plans.

6.14.7 Experience has shown that even with these provisions, subsurface seepage may develop in areas where no such water conditions existed prior to site development. This is particularly true where a substantial increase in surface water infiltration has resulted from an increase in landscape irrigation.

7.0 FURTHER GEOTECHNICAL SERVICES

7.1 Plan and Specification Review

7.1.1 We should review the foundation and grading plans prior to final design submittal to assess whether our recommendations have been properly incorporated and evaluate if additional analysis and/or recommendations are required.

7.2 Testing and Observation Services

7.2.1 The recommendations provided in this report are based on the assumption that we will continue as Geotechnical Engineer of Record (GER) throughout the construction phase and provide construction observation and testing services. Providing these services during construction are important in order to maintain continuity of geotechnical interpretation and confirm that field conditions encountered are similar to those anticipated during design. If we are not retained for these services, we cannot assume any responsibility for other's interpretation of our recommendations or the future performance of the project.

8.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, we should be notified so that supplemental recommendations can be given.

This report is issued with the understanding that it is the responsibility of the owner or their representative to ensure that the information and recommendations contained herein are brought to the attention of the design team for the project and incorporated into the plans and specifications and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

The recommendations contained in this report are preliminary until verified during construction by representatives of our firm. Changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. Additionally, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated partially or wholly by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

Our professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices used in the site area at this time. No warranty is provided, express or implied.

9.0 REFERENCES

1. American Concrete Institute, ACI 318-05, *Building Code Requirements for Structural Concrete and Commentary*, 2005.

2. American Society of Civil Engineers. *ASCE 7-16 Minimum Design Loads for Buildings and Other Structures,* Sections 11.4 and 21.4, 2006.

3. California Building Standards Commission, *2019 California Building Code*, based on *2018 International Building Code*, International Code Council.

4. California Department of Transportation, *Highway Design Manual, Chapter 600*, updated December 20, 2004.

5. California Department of Transportation, *Standard Specifications, Section 26*, 2010.

6. Callander Associates, *McKinley Park Renovation Concept Plan*, December 10, 2019.

7. Caltrans Fault Database, 2013, Google Earth Application (KML File): http://dap3.dot.ca.gov/ARS_Online/technical.php, accessed May 17, 2021.

8. Jennings, C.W. (compiler), *Fault Activity Map of California and Adjacent Areas*, California Division of Mines and Geology, 1994.

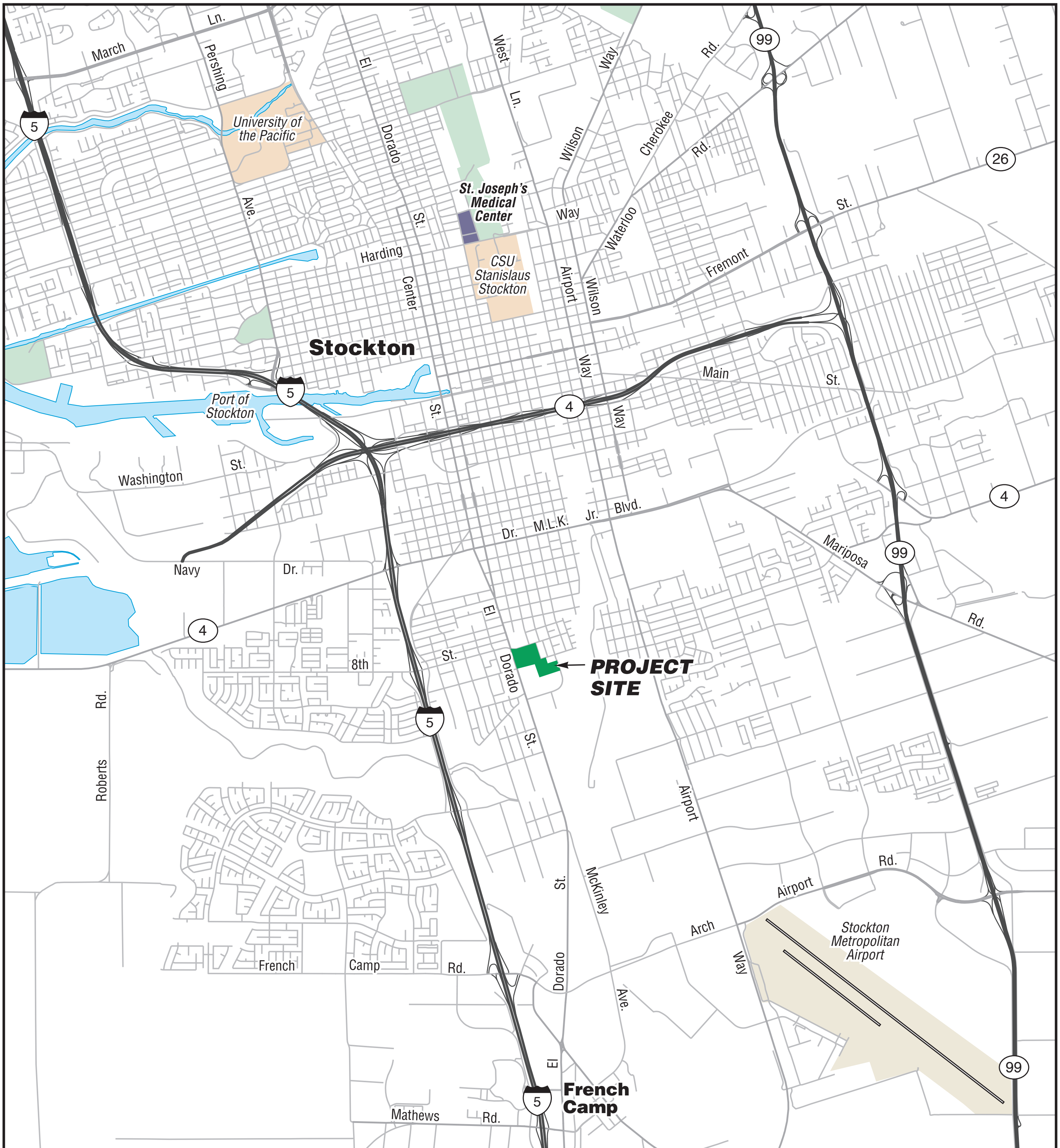
9. Portland Cement Association, *Concrete Floors on Ground*, 2001.

10. Structural Engineers Association of California (SEAOC) and Office of Statewide Health Planning and Development (OSHPD), Seismic Design Maps, https://seismicmaps.org/, accessed May 17, 2021.

11. United States Geological Survey, *Unified Hazard Tool*, https://earthquake.usgs.gov/hazards/interactive/, May 17, 2021.

12. Wagner, D.L., Bortugno, E.J., and McJunkin, R.D. (compilers), *Geologic Map of the San Francisco-San Jose Quadrangle, California, 1:250,000,* California Division of Mines and Geology, 1991.

13. Unpublished reports, aerial photographs, and maps on file with Geocon.



GEOCON CONSULTANTS, INC.

3160 GOLD VALLEY DR – SUITE 800 – RANCHO CORDOVA, CA 95742
PHONE 916.852.9118 – FAX 916.852.9132

McKinley Park Renovation

424 East 9th Street
Stockton, California

VICINITY MAP

S2115-05-01	April 2022	Figure 1

LEGEND:

Approximate Site Boundary

B1 ⊗ Approximate Boring Location

0 140

Scale in Feet

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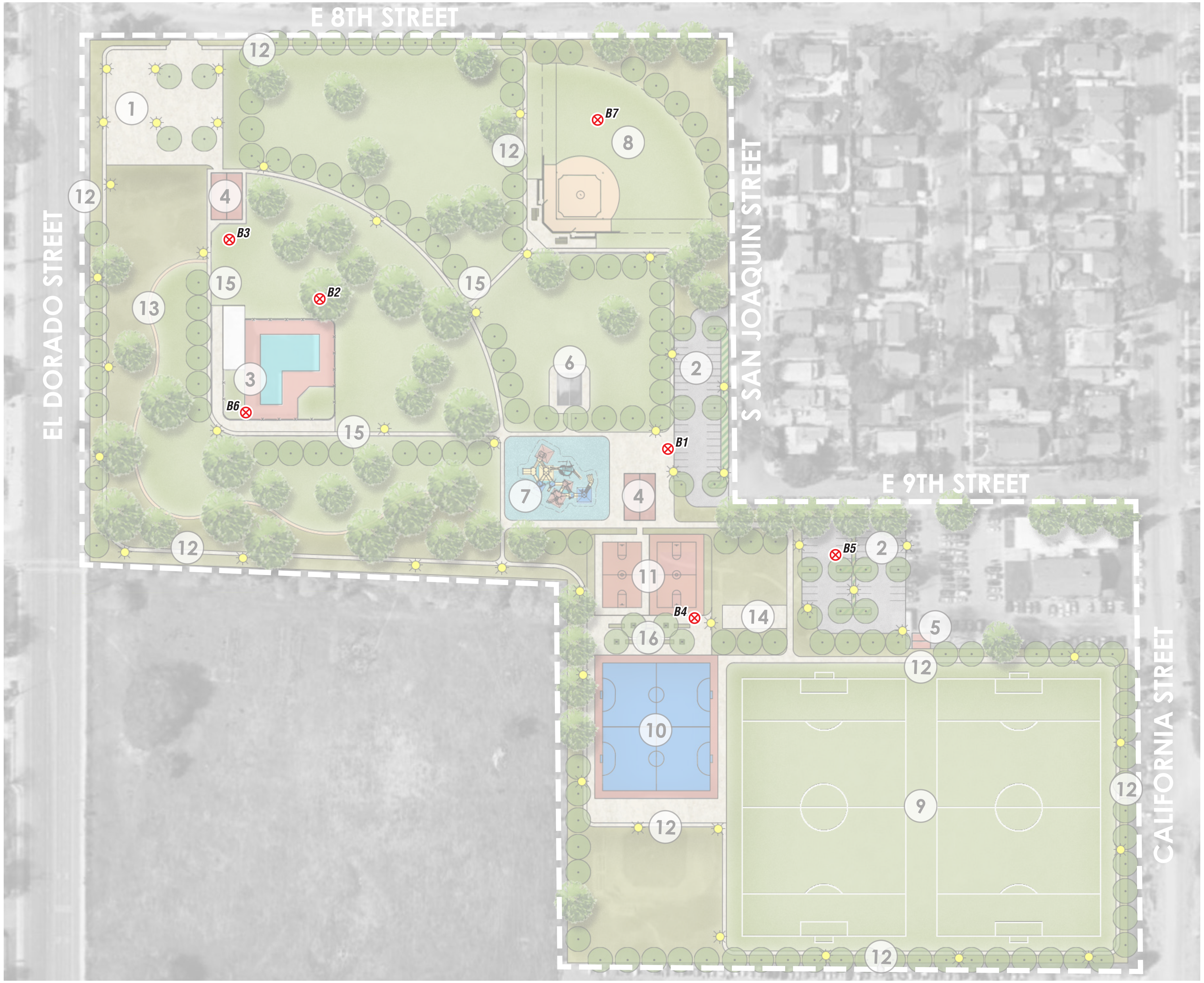
3160 GOLD VALLEY DR – SUITE 800 – RANCHO CORDOVA, CA 95742
PHONE 916.852.9118 – FAX 916.852.9132

McKinley Park Renovation

424 East 9th Street
Stockton, California

SITE PLAN

S2115-05-01	April 2022	Figure 2



Ref: McKinley Park Renovation Concept Plan, 12/10/2019

KEY NOTE LEGEND

1. Resurfaced Existing Parking Lot
2. Parking Lot
3. Reconstructed Pool & Pool House
4. Picnic Shade Shelter
5. Restroom
6. Existing Restroom
7. Playground
8. Little League Field, 60' Bases
9. Soccerfields, 330'x210'
10. Futsal Courts
11. Basketball Courts
12. New Perimeter Path
13. DG Jogging Path
14. Existing Handball Court/Wall
15. New Path
16. Seating Area

LEGEND:

B1 ⊗ Approximate Boring Location

0 140

Scale in Feet

GEOCON
CONSULTANTS, INC.
3160 GOLD VALLEY DR – SUITE 800 – RANCHO CORDOVA, CA 95742
PHONE 916.852.9118 – FAX 916.852.9132

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Stockton, California

PROPOSED DEVELOPMENT PLAN

S2115-05-01	April 2022	Figure 3

APPENDIX A

APPENDIX A

FIELD EXPLORATION

We performed our geotechnical field exploration on April 16, 2021. Our field exploration program consisted of drilling seven (7) exploratory borings (B1 through B7) at the approximate locations depicted on the Site Plan, Figure 2 and Proposed Development Plan, Figure 3.

Borings B1 through B5 were performed using a truck-mounted CME 75 drill rig equipped with 6-inch diameter solid-flight augers. Soil sampling was performed using an automatic 140-pound hammer with a 30-inch drop. We obtained samples using a 3-inch OD split-spoon (California Modified) sampler and a 2 ½ inch OD Standard Penetration Test (SPT) sampler. We recorded the number of blows required to drive the sampler the last 12 inches (or portion thereof) of the 18-inch sampling interval on the boring logs. Upon completion, the borings were backfilled with neat cement grout and/or soil cuttings.

Borings B6 and B7 were performed using an 8-inch-diameter core drill and a hang-auger. Upon completion, the borings were backfill with soil cuttings and capped with concrete.

We visually examined, classified, and logged the subsurface conditions in the exploratory borings in general accordance with the American Society for Testing and Materials (ASTM) Practice for Description and Identification of Soils (Visual-Manual Procedure D2488-90). This system uses the Unified Soil Classification System (USCS) for soil designations. The logs depict soil and geologic conditions encountered and depths at which we obtained samples. The logs also include our interpretation of the conditions between sampling intervals. Therefore, the logs contain both observed and interpreted data. We determined the lines designating the interface between soil materials on the logs using visual observations, drill rig penetration rates, excavation characteristics, and other factors. The transition between materials may be abrupt or gradual. Where applicable, we revised the field logs based on subsequent laboratory testing. Logs of exploratory borings are presented herein.

UNIFIED SOIL CLASSIFICATION

MAJOR DIVISIONS					TYPICAL NAMES
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	**GRAVELS** MORE THAN HALF COARSE FRACTION IS LARGER THAN NO.4 SIEVE SIZE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW		WELL GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
			GP		POORLY GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
		GRAVELS WITH OVER 12% FINES	GM		SILTY GRAVELS, SILTY GRAVELS WITH SAND
			GC		CLAYEY GRAVELS, CLAYEY GRAVELS WITH SAND
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO.4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW		WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
			SP		POORLY GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
		SANDS WITH OVER 12% FINES	SM		SILTY SANDS WITH OR WITHOUT GRAVEL
			SC		CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	**SILTS AND CLAYS** LIQUID LIMIT 50% OR LESS		ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTS WITH SANDS AND GRAVELS
			CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, CLAYS WITH SANDS AND GRAVELS, LEAN CLAYS
			OL		ORGANIC SILTS OR CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH		INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH		ORGANIC CLAYS OR CLAYS OF MEDIUM TO HIGH PLASTICITY
	HIGHLY ORGANIC SOILS		PT		PEAT AND OTHER HIGHLY ORGANIC SOILS

BORING/TRENCH LOG LEGEND

- No Recovery
- Shelby Tube Sample
- Bulk Sample
- SPT Sample
- Modified California Sample
- Groundwater Level (At Completion)
- Groundwater Level (Seepage)

PENETRATION RESISTANCE

SAND AND GRAVEL			SILT AND CLAY			
RELATIVE DENSITY	BLOWS PER FOOT (SPT)*	BLOWS PER FOOT (MOD-CAL)*	CONSISTENCY	BLOWS PER FOOT (SPT)*	BLOWS PER FOOT (MOD-CAL)*	COMPRESSIVE STRENGTH (tsf)
VERY LOOSE	0 - 4	0 - 6	VERY SOFT	0 - 2	0 - 3	0 - 0.25
LOOSE	5 - 10	7 - 16	SOFT	3 - 4	4 - 6	0.25 - 0.50
MEDIUM DENSE	11 - 30	17 - 48	MEDIUM STIFF	5 - 8	7 - 13	0.50 - 1.0
DENSE	31 - 50	49 - 79	STIFF	9 - 15	14 - 24	1.0 - 2.0
VERY DENSE	OVER 50	OVER 79	VERY STIFF	16 - 30	25 - 48	2.0 - 4.0
			HARD	OVER 30	OVER 48	OVER 4.0

*NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE LAST 12 INCHES OF AN 18-INCH DRIVE

MOISTURE DESCRIPTIONS

FIELD TEST	APPROX. DEGREE OF SATURATION, S (%)	DESCRIPTION
NO INDICATION OF MOISTURE; DRY TO THE TOUCH	S<25	DRY
SLIGHT INDICATION OF MOISTURE	25≤S<50	DAMP
INDICATION OF MOISTURE; NO VISIBLE WATER	50≤S<75	MOIST
MINOR VISIBLE FREE WATER	75≤S<100	WET
VISIBLE FREE WATER	100	SATURATED

QUANTITY DESCRIPTIONS

APPROX. ESTIMATED PERCENT	DESCRIPTION
<5%	TRACE
5 - 10%	FEW
11 - 25%	LITTLE
26 - 50%	SOME
>50%	MOSTLY

GRAVEL/COBBLE/BOULDER DESCRIPTIONS

CRITERIA	DESCRIPTION
PASS THROUGH A 3-INCH SIEVE AND BE RETAINED ON A NO. 4 SIEVE (#4 TO 3")	GRAVEL
PASS A 12-INCH SQUARE OPENING AND BE RETAINED ON A 3-INCH SIEVE (3"-12")	COBBLE
WILL NOT PASS A 12-INCH SQUARE OPENING (>12")	BOULDER

LABORATORY TEST KEY

- CP – COMPACTION CURVE (ASTM D1557)
- CR – CORROSION ANALYSIS (CTM 422, 643, 417)
- DS – DIRECT SHEAR (ASTM D3080)
- EI – EXPANSION INDEX (ASTM D4829)
- GSA – GRAIN SIZE ANALYSIS (ASTM D422)
- MC – MOISTURE CONTENT (ASTM D2216)
- PI – PLASTICITY INDEX (ASTM D4318)
- R – R-VALUE (CTM 301)
- SE – SAND EQUIVALENT (CTM 217)
- TXCU – CONSOLIDATED UNDRAINED TRIAXIAL (ASTM D4767)
- TXUU – UNCONSOLIDATED UNDRAINED TRIAXIAL (ASTM D2850)
- UC – UNCONFINED COMPRESSIVE STRENGTH (ASTM D2166)

BEDDING SPACING DESCRIPTIONS

THICKNESS/SPACING	DESCRIPTOR
GREATER THAN 10 FEET	MASSIVE
3 TO 10 FEET	VERY THICKLY BEDDED
1 TO 3 FEET	THICKLY BEDDED
3 5/8-INCH TO 1 FOOT	MODERATELY BEDDED
1 1/4-INCH TO 3 5/8-INCH	THINLY BEDDED
3/8-INCH TO 1 1/4-INCH	VERY THINLY BEDDED
LESS THAN 3/8-INCH	LAMINATED

STRUCTURE DESCRIPTIONS

CRITERIA	DESCRIPTION
ALTERNATING LAYERS OF VARYING MATERIAL OR COLOR WITH LAYERS AT LEAST 1/4-INCH THICK	STRATIFIED
ALTERNATING LAYERS OF VARYING MATERIAL OR COLOR WITH LAYERS LESS THAN 1/4-INCH THICK	LAMINATED
BREAKS ALONG DEFINITE PLANES OF FRACTURE WITH LITTLE RESISTANCE TO FRACTURING	FISSURED
FRACTURE PLANES APPEAR POLISHED OR GLOSSY, SOMETIMES STRIATED	SLICKENSIDED
COHESIVE SOIL THAT CAN BE BROKEN DOWN INTO SMALLER ANGULAR LUMPS WHICH RESIST FURTHER BREAKDOWN	BLOCKY
INCLUSION OF SMALL POCKETS OF DIFFERENT SOIL, SUCH AS SMALL LENSES OF SAND SCATTERED THROUGH A MASS OF CLAY	LENSED
SAME COLOR AND MATERIAL THROUGHOUT	HOMOGENOUS

CEMENTATION/INDURATION DESCRIPTIONS

FIELD TEST	DESCRIPTION
CRUMBLES OR BREAKS WITH HANDLING OR LITTLE FINGER PRESSURE	WEAKLY CEMENTED/INDURATED
CRUMBLES OR BREAKS WITH CONSIDERABLE FINGER PRESSURE	MODERATELY CEMENTED/INDURATED
WILL NOT CRUMBLE OR BREAK WITH FINGER PRESSURE	STRONGLY CEMENTED/INDURATED

IGNEOUS/METAMORPHIC ROCK STRENGTH DESCRIPTIONS

FIELD TEST	DESCRIPTION
MATERIAL CRUMBLES WITH BARE HAND	WEAK
MATERIAL CRUMBLES UNDER BLOWS FROM GEOLOGY HAMMER	MODERATELY WEAK
1/8-INCH INDENTATIONS WITH SHARP END FROM GEOLOGY HAMMER	MODERATELY STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH **ONE** BLOW FROM GEOLOGY HAMMER	STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH **COUPLE** BLOWS FROM GEOLOGY HAMMER	VERY STRONG
HAND-HELD SPECIMEN CAN BE BROKEN WITH **MANY** BLOWS FROM GEOLOGY HAMMER	EXTREMELY STRONG

IGNEOUS/METAMORPHIC ROCK WEATHERING DESCRIPTIONS

DEGREE OF DECOMPOSITION	FIELD RECOGNITION	ENGINEERING PROPERTIES
SOIL	DISCOLORED, CHANGED TO SOIL, FABRIC DESTROYED	EASY TO DIG
COMPLETELY WEATHERED	DISCOLORED, CHANGED TO SOIL, FABRIC MAINLY PRESERVED	EXCAVATED BY HAND OR RIPPING (Saprolite)
HIGHLY WEATHERED	DISCOLORED, HIGHLY FRACTURED, FABRIC ALTERED AROUND FRACTURES	EXCAVATED BY HAND OR RIPPING, WITH SLIGHT DIFFICULTY
MODERATELY WEATHERED	DISCOLORED, FRACTURES, INTACT ROCK-NOTICEABLY WEAKER THAN FRESH ROCK	EXCAVATED WITH DIFFICULTY WITHOUT EXPLOSIVES
SLIGHTLY WEATHERED	MAY BE DISCOLORED, SOME FRACTURES, INTACT ROCK-NOT NOTICEABLY WEAKER THAN FRESH ROCK	REQUIRES EXPLOSIVES FOR EXCAVATION, WITH PERMEABLE JOINTS AND FRACTURES
FRESH	NO DISCOLORATION, OR LOSS OF STRENGTH	REQUIRES EXPLOSIVES

IGNEOUS/METAMORPHIC ROCK JOINT/FRACTURE DESCRIPTIONS

FIELD TEST	DESCRIPTION
NO OBSERVED FRACTURES	UNFRACTURED/UNJOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT 1 TO 3 FOOT INTERVALS	SLIGHTLY FRACTURED/JOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT 4-INCH TO 1 FOOT INTERVALS	MODERATELY FRACTURED/JOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT 1-INCH TO 4-INCH INTERVALS WITH SCATTERED FRAGMENTED INTERVALS	INTENSELY FRACTURED/JOINTED
MAJORITY OF JOINTS/FRACTURES SPACED AT LESS THAN 1-INCH INTERVALS; MOSTLY RECOVERED AS CHIPS AND FRAGMENTS	VERY INTENSELY FRACTURED/JOINTED

GEOCON
CONSULTANTS, INC.
3160 GOLD VALLEY DR – SUITE 800 – RANCHO CORDOVA, CA 95742
PHONE 916.852.9118 – FAX 916.852.9132

KEY TO LOGS

Figure A1

PROJECT NO. **S2115-05-01** PROJECT NAME **McKinley Park Renovation**

BORING B1

ELEV. (MSL.) ___________ DATE COMPLETED **4/16/2021**

ENG./GEO. **V. Guardado** DRILLER **V&W Drilling, Inc.**

EQUIPMENT **Truck-mounted CME75 w/ 6" SFA** HAMMER TYPE **Automatic | 140lb**

DEPTH IN FEET	SAMPLE INTERVAL & RECOVERY	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)	ADDITIONAL TESTS
0	B1-Bulk			CL	**ALLUVIUM** Hard, moist, dark brown, Lean CLAY with sand, PP>4.5 tsf				EI, PI, #200 wash
1									
2	B1-1.5, B1-2.0					23	101.0	13.9	
3					- tan to light brown, weakly cemented, PP>4.5 tsf				
4	B1-3.5, B1-4.0					29	96.4	17.2	
5					- trace rootlet voids, PP>4.5 tsf				
6	B1-5.5, B1-6.0					35			
7									
8	B1-8.0, B1-8.5				- very stiff, PP=3.5 tsf	25			
9									
10					- hard, olive brown with some orange and black mottling, PP>4.5 tsf				
11	B1-10.5, B1-11.0					37			
12									
13									
14									
15					- light brown with orange mottling, PP>4.5 tsf				
16	B1-15.5, B1-16.0					29			
17									
18									
19									
20	B1-20.0, B1-20.5				- very stiff, grayish brown with light orange mottling, PP=3.0 tsf				
21	B1-21.0					26			
					BORING TERMINATED AT 21.5 FEET GROUNDWATER NOT ENCOUNTERED BACKFILLED WITH NEAT CEMENT GROUT				

Figure A2, Log of Boring, page 1 of 1

IN PROGRESS S2115-05-01 MCKINLEY PARK RENOVATION.GPJ 05/17/21

GEOCON

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **S2115-05-01** PROJECT NAME **McKinley Park Renovation**

BORING B2

ELEV. (MSL.) ____________ DATE COMPLETED **4/16/2021**

ENG./GEO. **V. Guardado** DRILLER **V&W Drilling, Inc.**

EQUIPMENT **Truck-mounted CME75 w/ 6" SFA** HAMMER TYPE **Automatic | 140lb**

DEPTH IN FEET	SAMPLE INTERVAL & RECOVERY	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)	ADDITIONAL TESTS
0	B2-Bulk			CL	**FILL** Very stiff, moist, light brown with black, orange, and white mottling, Lean CLAY with sand, trace roots, PP=3.5 tsf				EI, PI, #200 wash
1									
2	B2-1.5 B2-2.0					13	95.2	23.5	
3									
4	B2-3.5 B2-4.0					13	96.7	24.6	
5					- dark orange, dark olive, oxidized, bark/wood fragments, weakly cemented				
6	B2-5.5 B2-6.0					24			
7				CL	**ALLUVIUM** Very stiff to hard, moist, tan to light brown, Lean CLAY, trace mica, PP=4.0 tsf				
8	B2-7.5 B2-8.0				- very stiff, trace silt, trace to few sand, trace rootlet voids, PP=3.75 tsf	25			
9									
10					- brown to reddish brown, few to little medium to coarse sand				
11	B2-10.5 B2-11.0				- grayish brown with black mottling, fine sand, PP=2.25 tsf	18			
12									
13									
14									
15					- with orange and black mottling, PP=3.0 tsf				
16	B2-15.5 B2-16.0					20			
17									
18									
19									
20	B2-20.0				- hard, with orange and gray mottling, PP>4.5 tsf				
21	B2-20.5 B2-21.0					38			
					BORING TERMINATED AT 21.5 FEET GROUNDWATER NOT ENCOUNTERED BACKFILLED WITH NEAT CEMENT GROUT				

Figure A3, Log of Boring, page 1 of 1

GEOCON

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

PROJECT NO. **S2115-05-01** PROJECT NAME **McKinley Park Renovation**

BORING B3

ELEV. (MSL.) ___________ DATE COMPLETED **4/16/2021**

ENG./GEO. **V. Guardado** DRILLER **V&W Drilling, Inc.**

EQUIPMENT **Truck-mounted CME75 w/ 6" SFA** HAMMER TYPE **Automatic | 140lb**

DEPTH IN FEET	SAMPLE INTERVAL & RECOVERY	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)	ADDITIONAL TESTS
0	B3-Bulk			CL	**FILL** Very stiff to hard, moist, brown, reddish brown, and black with black mottling, Sandy lean CLAY, trace rock/concrete fragments, PP>4.5 tsf				
1									
2	B3-1.5 B3-2.0					18	94.3	17.6	
3									
4	B3-3.5 B3-4.0					31	96.0	16.6	
5				CL	**ALLUVIUM** Very stiff, moist, light brown with black and orange mottlig, Lean CLAY, few fine sand				
6	B3-5.5 B3-6.0					28			
7									
8	B3-7.5 B3-8.0				- hard, PP>4.5 tsf	33			#200 wash
9									
10	B3-10.0 B3-10.5				- very stiff, trace to little fine sand, PP=3.75 tsf				
11	B3-11.0					25			
12									
13									
14									
15					- brown, PP=3.0 tsf				
16	B3-15.5 B3-16.0					31			
					BORING TERMINATED AT 16.5 FEET GROUNDWATER NOT ENCOUNTERED BACKFILLED WITH NEAT CEMENT GROUT				

Figure A4, Log of Boring, page 1 of 1

IN PROGRESS S2115-05-01 MCKINLEY PARK RENOVATION.GPJ 05/17/21

GEOCON

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

PROJECT NO. **S2115-05-01** PROJECT NAME **McKinley Park Renovation**

BORING B4

ELEV. (MSL.) ___________ DATE COMPLETED **4/16/2021**

ENG./GEO. **V. Guardado** DRILLER **V&W Drilling, Inc.**

EQUIPMENT **Truck-mounted CME75 w/ 6" SFA** HAMMER TYPE **Automatic | 140lb**

DEPTH IN FEET	SAMPLE INTERVAL & RECOVERY	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)	ADDITIONAL TESTS
0	B4-Bulk			CL	**ALLUVIUM** Very stiff, moist, dark brown, Sandy lean CLAY, trace rootlets, PP=2.75 tsf				CP, CR
1	B4-1.5								
2	B4-2.0					13	95.8	12.2	
3	B4-3.0								
	B4-3.5				- hard, tan to light brown, few to little fine sand, weakly cemented, PP>4.5 tsf		98.2	11.0	
4	B4-4.0					28			
5	B4-5.0				- weakly cemented, PP>4.5 tsf				
	B4-5.5					50/6"			
6									
7	B4-7.0				- brown to reddish brown, weakly cemented, PP>4.5 tsf	50/6"			
8									
9									
10	B4-10.5				- trace mica and rootlet voids, PP>4.5 tsf				
11	B4-11.0					34			

BORING TERMINATED AT 11.5 FEET
GROUNDWATER NOT ENCOUNTERED
BACKFILLED WITH NEAT CEMENT GROUT

Figure A5, Log of Boring, page 1 of 1

GEOCON

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

BORING B5

ELEV. (MSL.) ____________ DATE COMPLETED **4/16/2021**

ENG./GEO. **V. Guardado** DRILLER **V&W Drilling, Inc.**

EQUIPMENT **Truck-mounted CME75 w/ 6" SFA** HAMMER TYPE **Automatic | 140lb**

DEPTH IN FEET	SAMPLE INTERVAL & RECOVERY	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)	ADDITIONAL TESTS
0	B5-Bulk			CL	**FILL** Very stiff, moist, grayish brown, Lean CLAY with sand				R, PI, #200 wash
1				CL	**ALLUVIUM** Hard, moist, dark brown, Lean CLAY with sand, PP>4.5 tsf				
2	B5-1.5 B5-2.0					27	108.8	16.6	
3									

BORING TERMINATED AT 3 FEET
GROUNDWATER NOT ENCOUNTERED
BACKFILLED WITH SOIL CUTTINGS

Figure A6, Log of Boring, page 1 of 1

GEOCON

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. **S2115-05-01** PROJECT NAME **McKinley Park Renovation**

BORING B6

ELEV. (MSL.) ____ DATE COMPLETED **4/16/2021**

ENG./GEO. **J. Hoover** DRILLER **Geocon**

EQUIPMENT **8" diameter Core Drill and Hand-auger** HAMMER TYPE **N/A**

DEPTH IN FEET	SAMPLE INTERVAL & RECOVERY	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)	ADDITIONAL TESTS
0					**CONCRETE** 4.25 inches				
1	B6-Bulk			SC	**AGGREGATE BASE (AB)** 4 inches				
2					**FILL** Medium dense, moist, light to reddish brown, Clayey SAND				
					REFUSAL AT 2 FEET ON 1" METAL ROD/PIPE BACKFILLED WITH SOIL CUTTINGS CAPPED WITH CONCRETE				

Figure A7, Log of Boring, page 1 of 1

GEOCON

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

PROJECT NO. **S2115-05-01** PROJECT NAME **McKinley Park Renovation**

BORING B7

ELEV. (MSL.) ____________ DATE COMPLETED **4/16/2021**

ENG./GEO. **J. Hoover** DRILLER **Geocon**

EQUIPMENT **8" diameter Core Drill and Hand-auger** HAMMER TYPE **N/A**

DEPTH IN FEET	SAMPLE INTERVAL & RECOVERY	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)	ADDITIONAL TESTS
0					**CONCRETE** 6 inches				
					HOT MIX ASPHALT (HMA) 3 inches				
1	B7-Bulk			SC	**FILL** Medium dense, moist, brown with black, Clayey SAND, coarse sand				PI, #200 wash
2									
3					- dark brown				
					CORE TERMINATED AT 3 FEET BACKFILLED WITH SOIL CUTTINGS CAPPED WITH CONCRETE				

IN PROGRESS S2115-05-01 MCKINLEY PARK RENOVATION.GPJ 05/17/21

GEOCON

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

APPENDIX B

APPENDIX B

LABORATORY TESTING PROGRAM

Laboratory tests were performed in accordance with generally accepted test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. Selected soil samples were tested for their in-place dry density and moisture content, plasticity characteristics, fines content, corrosion potential, expansion potential, R-Value, and moisture-density relationship. The results of the laboratory tests are presented on the following pages.

TABLE B1
EXPANSION INDEX TEST RESULTS
ASTM D4829

Sample Number	Depth (feet)	Moisture Content (%)		Expansion Index	Classification*
		Before Test	After Test		
B1-Bulk	0 – 5	12.7	29.1	79	Medium
B2-Bulk	0 – 5	14.6	31.1	77	Medium

**Expansion Potential Classification per ASTM D4829.*

TABLE B2
R-VALUE TEST RESULTS
ASTM D2844

Sample Number	Depth (feet)	Soil Classification	R-Value
B5-Bulk	0 – 3	Lean CLAY with sand (CL)	9

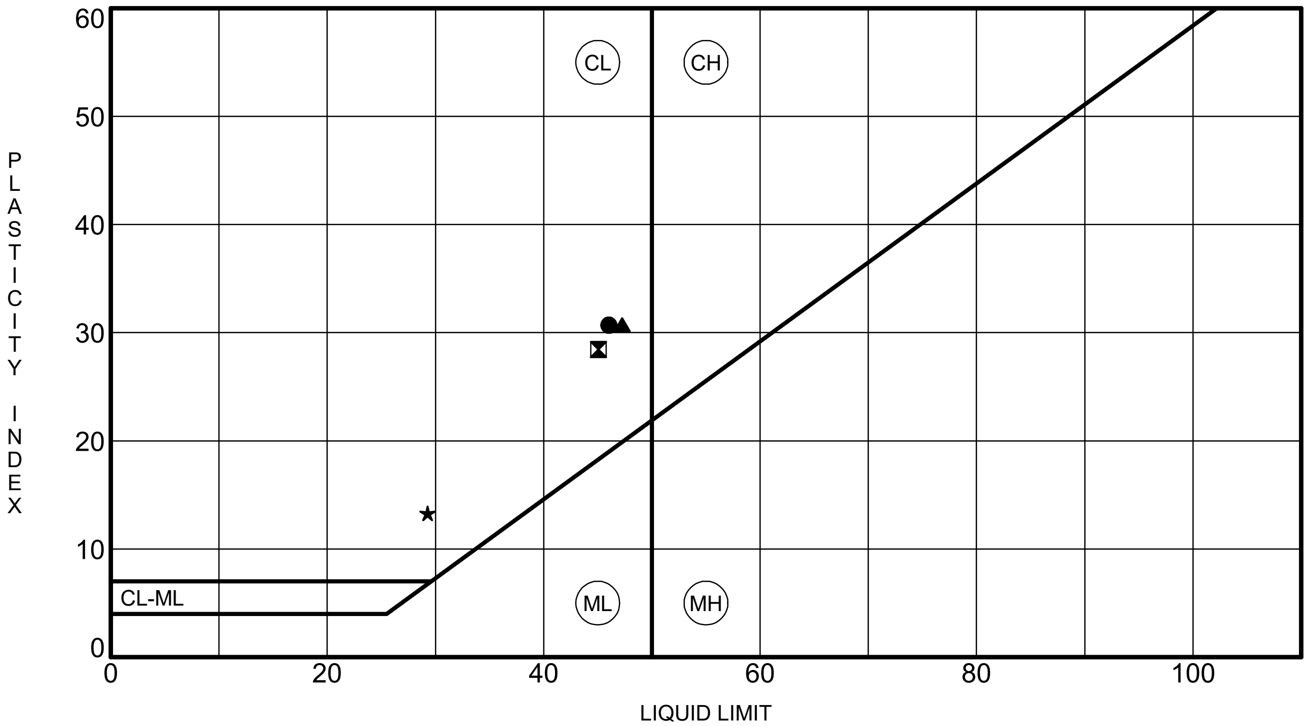
Sample ID	Depth (feet)	Liquid Limit	Plastic Limit	Plasticity Index	Expansion Index	%<#200 Sieve	Water Content (%)	Dry Density (pcf)
B1-Bulk	0-5	46	15	31	79	74.4		
B1-1.5	1.5						13.9	101.0
B1-3.5	3.5						17.2	96.4
B2-Bulk	0-5	45	17	28	77	77.9		
B2-2	2						23.5	95.2
B2-3.5	3.5						24.6	96.7
B3-1.5	1.5						17.6	94.3
B3-3.5	3.5						16.6	96.0
B3-8	8					92.9		
B4-2	2						12.2	95.8
B4-3.5	3.5						11.0	98.2
B5-Bulk	0-3	47	17	30		74.2		
B5-2	2						16.6	108.8
B7-Bulk	1-3	29	16	13		49.2		

US LAB SUMMARY GEOTECH 2 WITH EI COLUMN S2115-05-01 MCKINLEY PARK RENOVATION.GPJ US LAB.GDT 5/14/21

GEOCON
Geocon Consultants, Inc.
3160 Gold Valley Drive, Suite 800
Rancho Cordova, CA 95742
Telephone: 916-852-9118

Summary of Laboratory Results

Project: McKinley Park Renovation
Location: Stockton, CA
Number: S2115-05-01
Figure: B1



	Sample No.	Liquid Limit	Plastic Limit	Plasticity Index	% Pass #200 Sieve	Unified Soil Classification Description	Preparation Method
●	**B1-Bulk**	**46**	**15**	**31**	**74.4**	**LEAN CLAY with SAND(CL)**	**dry**
⧗	**B2-Bulk**	**45**	**17**	**28**	**77.9**	**LEAN CLAY with SAND(CL)**	**dry**
▲	**B5-Bulk**	**47**	**17**	**30**	**74.2**	**LEAN CLAY with SAND(CL)**	**dry**
★	**B7-Bulk**	**29**	**16**	**13**	**49.2**	**CLAYEY SAND(SC)**	**dry**

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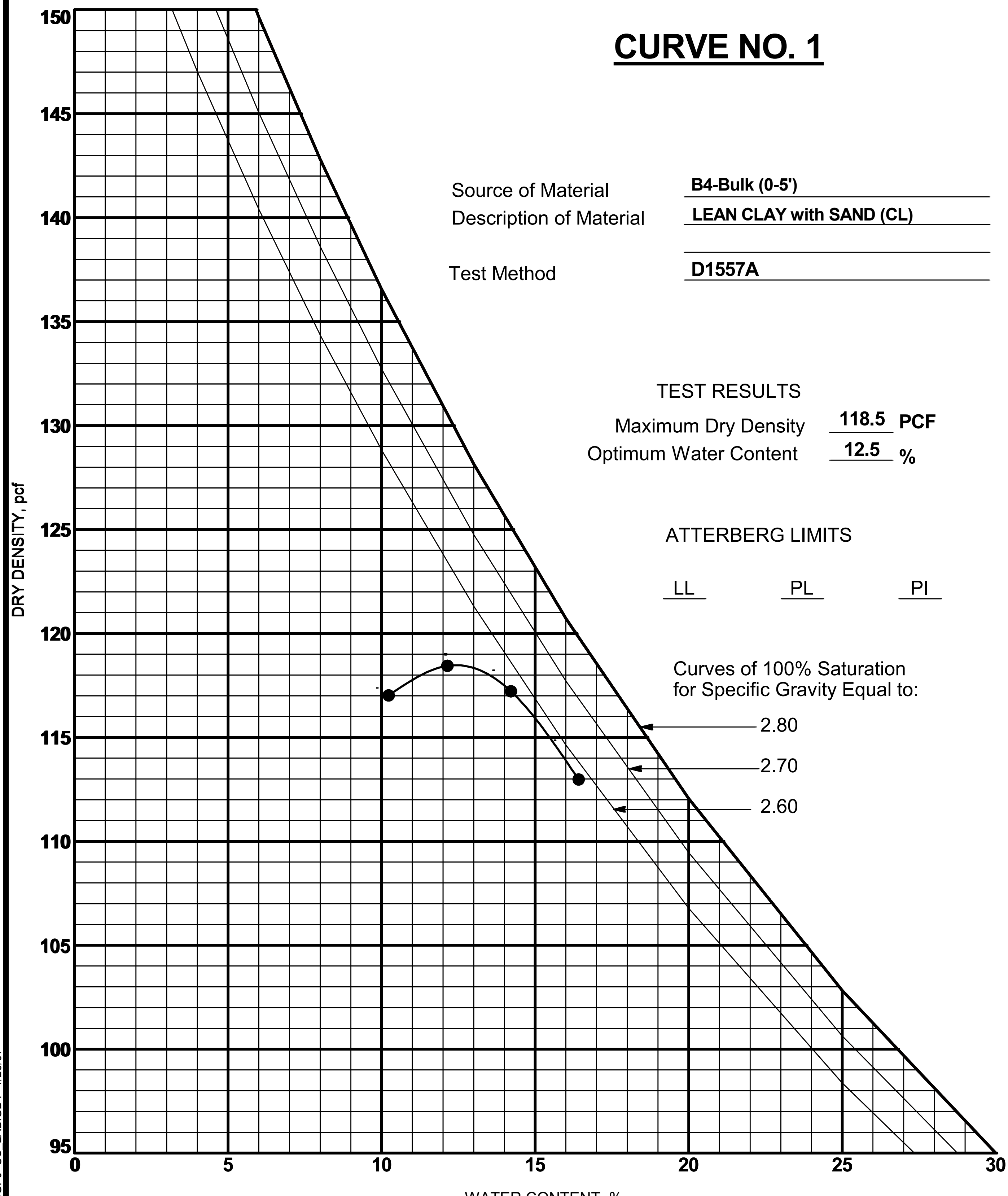
Geocon Consultants
3160 Gold Valley Drive, Suite 800
Rancho Cordova, CA 95742
Telephone:

ATTERBERG LIMITS (ASTM D4318)

Project: McKinley Park Renovation
Location: Stockton, CA
Number: S2115-05-01
Figure: B2 Date:



CURVE NO. 1

Source of Material	B4-Bulk (0-5')
Description of Material	LEAN CLAY with SAND (CL)
Test Method	D1557A

TEST RESULTS

Maximum Dry Density 118.5 PCF

Optimum Water Content 12.5 %

ATTERBERG LIMITS

LL	PL	PI

Geocon Consultants, Inc.
3160 Gold Valley Drive, Suite 800
Rancho Cordova, CA 95742
Telephone: (916) 852-9118
Fax: (916) 852-9132

GEOCON

MOISTURE-DENSITY RELATIONSHIP

Project: McKinley Park Renovation

Location: Stockton, CA

Number: S2115-05-01

Figure: B3