Sladden Engineering

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January 20, 2022

Project No. 644-20039
22-01-006

Dedeaux Properties
100 Wilshire Blvd., Suite 250
Santa Monica, California 90401

Project: Proposed Industrial/Warehouse Buildings
APN 314-091-005
Seaton Avenue
Perris Area
Riverside County, California

Ref: Geotechnical Investigation report prepared by Sladden Engineering dated December 23, 2020; Project No. 644-20039, Report No. 20-12-093

In accordance with your request, we have reviewed the most recent development plans for the subject property (APN 314-091-005) located between Seaton Avenue and Beck Street just north of Perry Street in the Perris area of Riverside County, California. The current plans (attached) indicate two industrial/warehouse buildings in lieu of the single industrial/warehouse building indicated on the initial plans. The proposed development, grading and building construction type remain consistent with the assumptions considered in the development of the recommendations provided within the above referenced report. It is our opinion that the recommendations provided within the referenced Geotechnical Investigation report remain applicable for use in the design and construction of the currently proposed project.

We appreciate the opportunity to provide continued service to you on this project. If there are any questions regarding this memo or the referenced report, please contact the undersigned.

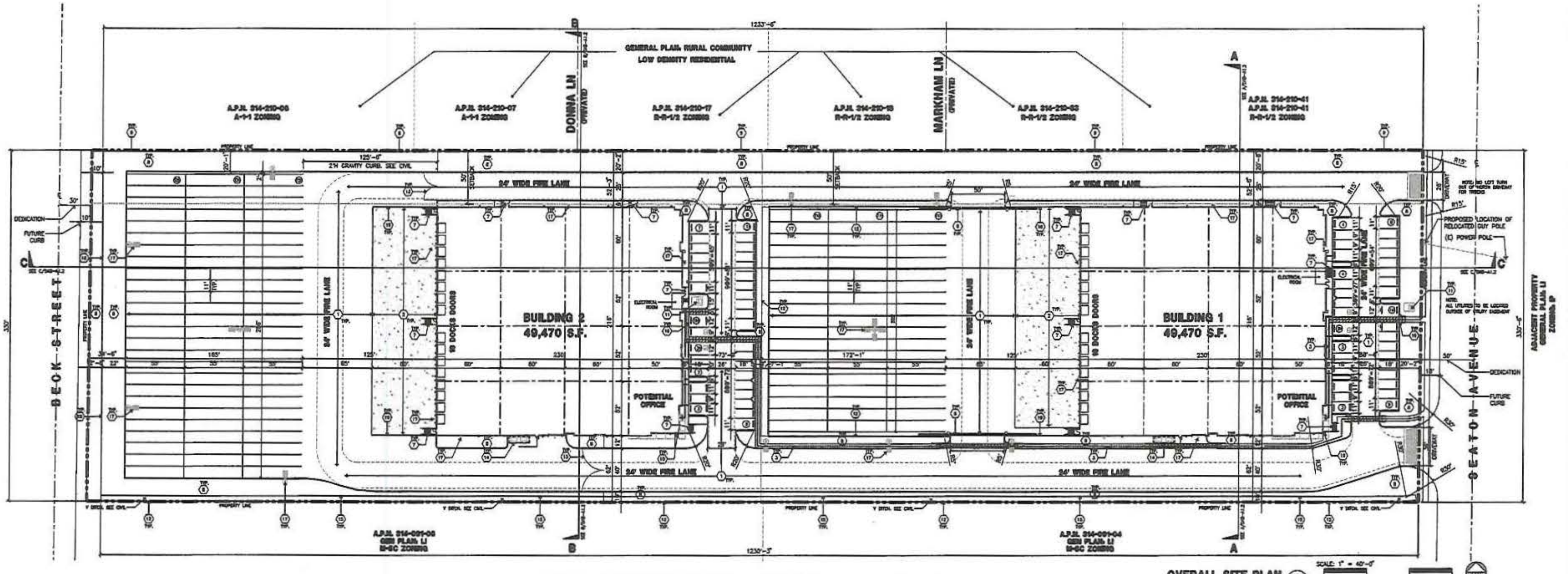
Respectfully submitted
SLADDEN ENGINEERING

Brett L. Anderson
Principal Engineer

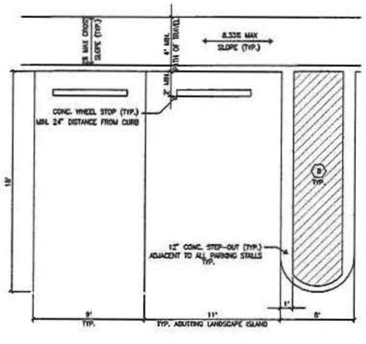
REGISTERED PROFESSIONAL ENGINEER
BRETT L. ANDERSON
No. C45389
CIVIL
ENGINEERING
STATE OF CALIFORNIA

Copies 2 / Dedeaux Properties

CAUTION: IF THIS SHEET IS NOT 30"X42" IT IS A REDUCED PRINT



OVERALL SITE PLAN (A)
scale: 1" = 40'-0"



TYPICAL PARKING STALL & ISLAND DETAIL (B)
scale: 1/4" = 1'-0"

PROPERTY OWNER

DEDEAUX PROPERTIES
100 WILSHIRE BLVD. SUITE 250
SANTA MONICA, CA 90401
CONTACT: BENJAMIN M. HORNING
PHONE: 323-981-8226

APPLICANT

EPD SOLUTIONS, INC.
2 PARK PLAZA SUITE 1120
IRVINE, CA 92614
CONTACT: BRANDON WOLFE
PHONE: 949-794-1191

ARCHITECT

HPA INC.
18831 BARDEEN AVE. STE 100
IRVINE, CA 92612
CONTACT: INKON KIM
PHONE: 949-862-2122

CIVIL

GOODMAN & ASSOCIATES
2070 SKY VIEW DRIVE
COLTON CA 92324
CONTACT: DOUG GOODMAN
PHONE: 909-889-3181

LANDSCAPE

HUNTER LANDSCAPE INC.
711 FEE ANA STREET
PLACENTIA, CA 92870
CONTACT: TOM HAYES
PHONE: 714-986-2400

ADDRESS OF THE PROPERTY

TBD – NORTH OF PERRY ST., EAST OF BECK STREET, WEST OF SEATON AVE.

ASSESSOR'S PARCEL NUMBER

314-091-05

LAND USE DESIGNATION

LI (LIGHT INDUSTRIAL)

ZONING

I-P (INDUSTRIAL PARK)
M-SC (MANUFACTURING-SERVICE COMMERCIAL)

LEGAL DESCRIPTION

THE NORTH ½ OF THE SOUTH ½ OF THE NE ¼ OF THE SE ¼ OF SECTION 2, TOWNSHIP 4 SOUTH, RANGE 4 WEST IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA.

UTILITIES

WATER:	EASTERN MUNICIPAL WATER DISTRICT (SERVICE AVAILABLE)
TELEPHONE:	VERIZON
GAS:	SO CAL. GAS COMPANY
ELECTRIC:	SO. CALIFORNIA EDISON (SERVICE AVAILABLE)
SEWER:	EASTERN MUNICIPAL WATER DISTRICT
FIRE PROTECTION:	RIVERSIDE COUNTY FIRE DEPARTMENT

SCHOOL DISTRICT

VAL VERDE UNIFIED SCHOOL DISTRICT

GEOLOGY/HYDROLOGY

LIQUEFACTION ZONE: NO
GEO HAZARDS: NO
SPECIAL STUDIES ZONE: NO
OVERFLOW: NO
INUNDATION: NO
FLOOD HAZARD ZONE: NO

FEMA FLOOD ZONE

FEMA FLOOD MAP 06065C141
0G DATED AUGUST 28, 2008

SCOPE OF WORK

PERMIT FOR PLOT PLAN (210022) AND TENTATIVE PARCEL MAP (38147): NEW CONSTRUCTION OF (2) 49,470 SF INDUSTRIAL WAREHOUSE BUILDINGS, ON-SITE IMPROVEMENTS, AND STREET IMPROVEMENTS.

PROJECT DATA

	BLDG.1	BLDG.2	Total
SITE AREA (GROSS)			
In s.f.	[illegible]	[illegible]	[illegible]
In acres	[illegible]	[illegible]	[illegible]
SITE AREA (NET)			
In acres	[illegible]	[illegible]	[illegible]
BUILDING AREA			
Office - 1st floor	2,000 s.f.	2,000 s.f.	[illegible]
Warehouse	[illegible]	[illegible]	[illegible]
TOTAL	49,470 s.f.	49,470 s.f.	[illegible]
COVERAGE	24%	24%	24% s.f.
AUTO PARKING REQUIRED			
Office: 1/250 s.f.	10 stalls	10 stalls	20 stalls
Whse: 1/2000 s.f.	24 stalls	24 stalls	48 stalls
TOTAL	34 stalls	34 stalls	68 stalls
AUTO PARKING PROVIDED			
Standard (9' x 18')	27 stalls	23 stalls	[illegible]
Accessible Standard (9'x18')	1 stalls	1 stalls	2 stalls
Accessible Van (12'x18')	1 stalls	1 stalls	[illegible]
EV Standard (9'x18')	1 stalls	1 stalls	[illegible]
EV Van (12'x18')	1 stalls	1 stalls	2 stalls
Clean Air/Vanpool/EV (9'x18')	2 stalls	[illegible]	[illegible]
Total	34 stalls	[illegible]	[illegible]
TRAILER PARKING PROVIDED			
Trailer (11' x 53')	[illegible]	[illegible]	131 stalls
LANDSCAPE REQUIREMENT			
Percentage - 10%			
LANDSCAPE PROVIDED			
In percentage -	15.6%	17.5%	16.6%
In s.f. -	31,655 s.f.	36,357 s.f.	68,012 s.f.
SETBACKS			
Building	Parking/Landscape		
Front / Street - 25'	25'		
Side/Rear - 0'	0		
ZONING ORDINANCE FOR COUNTY			
Zoning Designation - Industrial Park (IP)			
MAXIMUM BUILDING HEIGHT ALLOWED			
[illegible] feet			
FLOOR AREA RATIO			
FAR = [illegible]			

LANDSCAPE CALCULATION EXHIBIT

	BLDG.1	BLDG.2	Total
SITE AREA			
In s.f.	203,245 s.f.	207,235 s.f.	410,675 s.f.
LANDSCAPE PROVIDED			
In s.f.	31,655 s.f.	36,357 s.f.	68,012 s.f.
PERCENTAGE PROVIDED			
In percentage	15.6%	17.5%	16.6%

VICINITY MAP

SITE LEGEND

▨	LANDSCAPED AREA
☐	AC. PAVING – SEE "C" DRWGS. FOR THICKNESS
▨	CONCRETE PAVING SEE "C" DRWGS. FOR THICKNESS
☐	STANDARD PARKING STALL (9' X 18')
▨	HANDICAP PARKING STALL (9' X 18')
━ ▪ ▪ ━	PROPERTY LINE
━━━	ADA PATH OF TRAVEL

SITE PLAN KEYNOTES

1. HEAVY BROOM FINISH CONC. PAVEMENT.
2. ASPHALT CONCRETE (AC) PAVING.
3. CONCRETE WALKWAY
4. DRIVEWAY APRONS TO BE CONSTRUCTED PER "L" DRAWINGS.
5. 5'-6"X5'-6"X4" MIN. THICK CONCRETE EXTERIOR LANDING PAD TYP. AT ALL EXTERIOR MAN DOORS TO LANDSCAPED AREAS. FINISH TO BE MEDIUM BROOM FINISH. SLOPE TO BE 1/4" : 12" MAX. PROVIDE WALK TO PUBLIC WAY OR DRIVE WAY W/ 1:20 MAX. AS REQ. BY CITY INSPECTOR.
6. 8' H PROVIDE METAL, MANUAL OPERATED GATES W/ KNOX-PAD LOCK PER FIRE DEPARTMENT STANDARDS PER DRIVEWAY. SEE 4/DAB-4.1
7. EXTERIOR CONC. STAIR.
8. LANDSCAPE. SEE "L" DWGS.
9. 10'H CONCRETE TILT-UP SCREEN WALL. SEE 1/DAB-4.1
10. BIKE RACK. SEE 6/DAB-4.1
11. APPROXIMATE LOCATION OF TRANSFORMER.
12. 8'H WROUGHT IRON FENCE. SEE 3/DAB-4.1
13. DOUBLE SWING GATE. SEE 6/DAB-4.1
14. TRASH ENCLOSURE PER COUNTY STANDARD.
15. RETAINING WALL. SEE 1/DAB-4.1
16. FUTURE EV CHARGING STATION LOCATION
17. SITE LIGHTING. SEE ELECTRICAL DWGS
18. 8'H CONCRETE TILT-UP SCREEN WALL. SEE 1/DAB-4.1
19. 10'H CONCRETE WING WALL. SEE 1/DAB-4.1

HPA
architecture

hpa, inc.
18831 bardeen avenue, - ste. #100
irvine, ca
92612
tel: 949-863-1770
fax: 949-863-0851
email: hpa@hparchs.com

Owner:

DEDEAUX PROPERTIES
100 Wilshire Blvd Suite 250
Santa Monica, CA 90401

tel: (323) 981-8226

Project:
SEATON AVE.
&
PERRY STREET

COUNTY OF RIVERSIDE, CA

Consultants:

CIVIL	Goodman & Associates
STRUCTURAL	-
MECHANICAL	-
PLUMBING	-
ELECTRICAL	-
LANDSCAPE	Hunter Landscape
FIRE PROTECTION	-
SOILS ENGINEER	-

Title:	OVERALL SITE PLAN
Project Number:	20423
Drawn by:	KT
Date:	10/15/2021
Revision:	
1ST SUBMITTAL	04/12/2021
2ND SUBMITTAL	07/06/2021
3RD SUBMITTAL	09/08/2021
Sheet:	PLOT PLAN NO. 210022

DAB-A1.1

GEOTECHNICAL INVESTIGATION
PROPOSED WAREHOUSE BUILDING
APN 314-091-005
SEATON AVENUE
PERRIS AREA
RIVERSIDE COUNTY, CALIFORNIA

-Prepared By-

Sladden Engineering

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December 23, 2020

Project No. 644-20039
20-12-093

Dedeaux Properties
P.O. Box 82706
Goleta, California 93118-2706

Subject: Geotechnical Investigation

Project: Proposed Warehouse Building
APN 314-091-005 - Seaton Avenue
Perris Area
Riverside County, California

Sladden Engineering is pleased to present the results of our geotechnical investigation performed for the new warehouse/industrial building proposed for the subject site located on the west side of Seaton Avenue approximately 340 feet north of Perry Street in the Perris area of Riverside County, California. Our services were completed in accordance with our proposal for geotechnical engineering services dated October 16, 2020 and your authorization to proceed with the work. The purpose of our investigation was to explore the subsurface conditions at the site to provide recommendations for foundation design and site preparation. Evaluation of environmental issues and hazardous wastes was not included within the scope of services provided.

The opinions, recommendations and design criteria presented in this report are based on our field exploration program, laboratory testing and engineering analyses. Based on the results of our investigation, it is our professional opinion that the proposed project should be feasible from a geotechnical perspective provided that the recommendations presented in this report are implemented into design and carried out during construction.

We appreciate the opportunity to provide service to you on this project. If you have any questions regarding this report, please contact the undersigned.

Respectfully submitted,
SLADDEN ENGINEERING

James W. Minor III
Senior Geologist

JAMES W. MINOR III
No. 9735

Brett L. Anderson
Principal Engineer

BRETT L. ANDERSON
No. C45389
CIVIL ENGINEERING

SER/jm

Copies: 4/Addressee

GEOTECHNICAL INVESTIGATION
PROPOSED WAREHOUSE BUILDING
NWC HARVILL AVENUE & RIDER STREET
PERRIS, CALIFORNIA

December 23, 2020

TABLE OF CONTENTS

INTRODUCTION

This report presents the results of the geotechnical investigation performed by Sladden Engineering (Sladden) for the new warehouse/industrial building proposed for the subject site located on the west side of Seaton Avenue approximately 340 feet north of Perry Street in the Perris area of Riverside County, California. The site is situated at approximately 33.8496 degrees North latitude and 117.2639 degrees West longitude. The approximate location of the site is indicated on the Site Location Map (Figure 1).

Our investigation was conducted in order to evaluate the engineering properties of the subsurface materials, to evaluate their *in-situ* characteristics, and to provide engineering recommendations and design criteria for site preparation, foundation design and the design of various site improvements. This study also includes a review of published and unpublished geotechnical and geological literature regarding seismicity at and near the subject site.

PROJECT DESCRIPTION

Based on the supplied plans (HPA Architects, 2020), it is our understanding that the proposed project will consist of constructing a new 113,200 square foot (SF) 2-story warehouse building on the subject property. In addition, the project includes 25 loading dock doors, 100 trailer parking spaces and 100 standard parking spaces and 38,940 sf landscaped area. Sladden anticipates that the proposed project will also include exterior concrete flatwork, underground utilities and various other site improvements. For our analyses we expect that the structure will be of relatively lightweight steel-frame or reinforced concrete tilt-up construction and will be supported on conventional shallow spread footings and concrete slabs-on-grade.

Based on the relatively level nature of the site, Sladden expects that grading will be limited to minor cuts and fills in order to accomplish the desired pad elevation and provide adequate gradients for site drainage. This does not include the removal and/or recompaction of the artificial fill soil and primary foundation bearing soil within the building envelope.

Structural foundation loads were not available at the time of this report. Based on our experience with relatively lightweight steel-frame structures, we expect that isolated column loads will be less than 50 kips and continuous wall loads will be less than 5.0 kips per linear foot. If these assumed loads vary significantly from the actual loads, we should be consulted to verify the applicability of the recommendations provided.

SCOPE OF SERVICES

The purpose of our investigation was to determine specific engineering characteristics of the surface and near surface soil in order to develop foundation design criteria and recommendations for site preparation. Exploration of the site was achieved by drilling nine (9) exploratory boreholes to depths ranging between approximately 5 to 16.5 feet below the existing ground surface (bgs). Specifically, our site characterization consisted of the following tasks:

- Site reconnaissance to assess the existing surface conditions on and adjacent to the site.
- The excavation of nine (9) exploratory boreholes to depths ranging between approximately 5 and 16.5 feet bgs in order to characterize the subsurface soil conditions. Representative samples of the soil were classified in the field and retained for laboratory testing and engineering analyses.
- The performance of laboratory testing on selected samples to evaluate their engineering characteristics.
- The review of available geologic literature and discuss potential geologic hazards.
- The performance of engineering analyses to develop recommendations for foundation design and site preparation.
- The preparation of this report summarizing our work at the site.

SITE CONDITIONS

The subject site is located on the west side of Seaton Avenue approximately 340 feet north of Perry Street in the Perris area of Riverside County, California. The site is formally identified by the County of Riverside as APN 314-091-005 and occupies approximately 9.80 acres. At the time of our investigation, the subject site was undeveloped with various shrubs and trees scattered throughout the site. Bedrock outcrops were visible in various locations on the subject site. The site is bounded by Seaton Avenue to the east, on the north by residential structures, on the west by Beck Street and by industrial/commercial property to the south.

In general the site vicinity is relatively level with no discernible trends in surface gradients. According to the USGS 7.5′ Steele Peak Quadrangle map (USGS, 2018), the site is situated at an elevation of approximately 1,550 feet above mean sea level (MSL).

No natural ponding water or surface seepage was observed at or near the site during our field investigation conducted on December 8, 2020. Site drainage appears to be controlled via sheet flow and surface infiltration.

GEOLOGIC SETTING

The project site is located in the Peninsular Ranges Physiographic Province of California. The Peninsular Ranges are mountainous areas that extend from the western edge of the continental borderland to the Salton Trough and from the Transverse Ranges Physiographic Province in the north to the tip of Baja California in the south. The Peninsular Ranges Physiographic province is characterized by elongated, northwest-southeast trending mountain ranges and valleys and is truncated at its northern margin by the east-west grain of the Transverse Ranges. Mountainous areas of the Peninsular Ranges Physiographic Province generally consist of Igneous, metasedimentary and metavolcanic rocks. However, plutonic rocks of the Southern California Batholith are the dominant basement rock exposed (Jahns, 1954).

The site has been mapped by Rodgers (1965) to be immediately underlain by Mesozoic granitic bedrock (gr). The geologic setting for the site and site vicinity is illustrated on the Regional Geologic Map, Figure 2.

SUBSURFACE CONDITIONS

The subsurface conditions at the site were investigated by drilling nine (9) exploratory boreholes on the project site to depths between 5 and 51 feet below the existing ground surface (bgs). The approximate locations of the boreholes are indicated on the Exploratory Location Plan (Figure 3). The boreholes were advanced using a truck-mounted Mobile B-61 drill rig equipped with 8-inch outside diameter hollow stem augers. A representative of Sladden was present to log the materials encountered and retrieve samples for laboratory testing and engineering analysis.

During our field investigation, artificial fill/disturbed soil consisting primarily of silty sand (SM) was encountered to a depth of approximately 1-foot bgs. Underlying the artificial fill soil, native alluvial horizons were encountered overlying shallow seated granitic bedrock. In general, alluvial materials consist of dry to slightly moist, medium dense to dense silty sand (SM) with minor portions of sand (SP). Mesozoic granitic bedrock appeared light gray, moderately hard, moderately strong, highly weathered and broke down into a silty sand (SM) soil type.

The final logs represent our interpretation of the contents of the field logs, and the results of the laboratory observations and tests of the field samples. The final logs are included in Appendix A of this report. The stratification lines represent the approximate boundaries between soil types although the transitions may be gradual.

Groundwater was not encountered during our field investigation conducted on December 8, 2020. Based on our exploratory bores and our review of groundwater level data (CDWR, 2020), groundwater levels in the site vicinity have been recorded in excess of 50 feet bgs. Accordingly, groundwater should not be a factor during construction of the proposed project.

SEISMICITY AND FAULTING

The southwestern United States is a tectonically active and structurally complex region, dominated by northwest trending dextral faults. Faults in the region are often part of complex fault systems composed of numerous subparallel faults that splay or step from main fault traces. Strong seismic shaking could be produced by any of these faults during the design life of the proposed project.

Sladden considers the most significant geologic hazard to the project to be the potential for moderate to severe seismic shaking that is likely to occur during the design life of the project. The proposed project is located in the highly seismic Southern California region within the influence of several fault systems that are considered to be active or potentially active. An active fault is defined by the State of California as a "sufficiently active and well defined fault" that has exhibited surface displacement within the Holocene epoch (about the last 11,000 years). A potentially active fault is defined by the State as a fault with a history of movement within Pleistocene time (between 11,000 and 1.6 million years ago).

Based on our research, the site is not currently located within any State of California designated fault zone (CDOC, 2017). Table 1 lists the closest known potentially active faults that was generated in part using the EQFAULT computer program (Blake, 2000), as modified using the fault parameters from The Revised 2002 California Probabilistic Seismic Hazard Maps (Cao et al, 2003). This table does not identify the probability of reactivation or the on-site effects from earthquakes occurring on any other faults in the region.

TABLE 1
CLOSEST KNOWN ACTIVE FAULTS

Fault Name	Distance (Km)	Maximum Event
San Jacinto – San Jacinto Valley	14.8	6.9
San Jacinto – San Bernardino	18.6	6.7
Elsinore – Glen Ivy	22.4	6.8
Elsinore – Temecula	24.3	6.8
Chino – Central Ave. (Elsinore)	28.2	6.7
San Andreas – San Bernardino	33.0	7.5
San Andreas – Southern	33.0	7.2
San Jacinto – Anza	34.3	7.2

GROUND MOTION PARAMETERS

Sladden has reviewed the 2019 California Building Code (CBC) and ASCE7-16 and developed ground motion parameters for the subject site. The project Seismic Design Report is summarized in the following table and included within Appendix C. The project Structural Engineer should verify that all design parameters provided are applicable for the subject project.

TABLE 2
GROUND MOTION PARAMETERS

Latitude / Longitude	33.8496/ -117.2639
Risk Category	II
Site Class	B (Rock)
Code Reference Documents	ASCE 7-16; Chapter 11 & 21

Description	Type	Map Based
MCE$_R$ Ground Motion (0.2 second period)	S_S	1.500
MCE$_R$ Ground Motion (1.0 second period)	S_1	0.563
Site-Modified Spectral Acceleration Value	S_{MS}	1.350
Site-Modified Spectral Acceleration Value	S_{M1}	0.450
Numeric Seismic Design Value at 0.2 second SA	S_{DS}	0.900
Numeric Seismic Design Value at 1.0 second SA	S_{D1}	0.300
Site Amplification Factor at 0.2 second	F_a	0.9
Site Amplification Factor at 1.0 second	F_v	0.8
Site Peak Ground Acceleration	PGA_M	0.450

GEOLOGIC HAZARDS

The subject site is located in an active seismic area and will likely experience strong seismic shaking during the design life of the proposed project. In general, the intensity of ground shaking will depend on several factors including: the distance to the earthquake focus, the earthquake magnitude, the response characteristics of the underlying materials, and the quality and type of construction. Geologic hazards and their relationship to the site are discussed below.

I. Surface Rupture. Surface rupture is expected to occur along preexisting, known active fault traces. However, surface rupture could potentially splay or step from known active faults or rupture along unidentified traces. Based on our review of Rogers (1965), CDOC (2020) RCPR (2020) and Jennings (1994) known active faults are not mapped on the site. In addition, no signs of active surface faulting were observed during our review of non-stereo digitized photographs of the site and site vicinity (Google, 2020). Finally, no signs of active surface fault rupture or secondary seismic effects (lateral spreading, lurching etc.) were identified on-site during our field investigation. Therefore, it is our opinion that risks associated with primary surface ground rupture should be considered "low".

II. Ground Shaking. The site has been subjected to past ground shaking by faults that traverse through the region. Strong seismic shaking from nearby active faults is expected to produce strong seismic shaking during the design life of the proposed project. The site modified peak ground acceleration is estimated to be 0.450g.

III. Liquefaction. Liquefaction is the process in which loose, saturated granular soil loses strength as a result of cyclic loading. The strength loss is a result of a decrease in granular sand volume and a positive increase in pore pressures. Generally, liquefaction can occur if all of the following conditions apply; liquefaction-susceptible soil, groundwater within a depth of 50 feet or less, and strong seismic shaking.

Based on the of the underlying granitic bedrock materials, it is our professional opinion that risks associated with liquefaction should be considered "negligible".

IV. Tsunamis and Seiches. Because the site is situated at an inland location and is not immediately adjacent to any impounded bodies of water, risk associated with tsunamis and seiches are considered "negligible".

V. Slope Failure, Landsliding, Rock Falls. The site is located on relatively flat ground and not immediately adjacent to any slopes or hillsides. Therefore, it is our professional opinion that risks associated with slope instability should be considered "negligible".

VI. Expansive Soil. Expansion Index testing of select samples was performed to evaluate expansive potential of the materials underlying the site. Based the results of our laboratory testing (EI=33), the materials underlying the site are considered to have a "low" expansion potential. Expansion potential should be reevaluated after grading.

VII. Static Settlement. Static settlement resulting from the anticipated foundation loads should be acceptable provided that the recommendations included in this report are considered in foundation design and construction. The ultimate static settlement is estimated to be less than 1 inch when using the recommended allowable bearing pressures. As a practical matter, differential static settlement between footings can be assumed as one-half of the total static settlement.

VIII. Subsidence. Land subsidence can occur in valleys where aquifer systems have been subjected to extensive groundwater pumping, such that groundwater pumping exceeds groundwater recharge. Generally, pore water reduction can result in a rearrangement of skeletal grains and could result in elastic (recoverable) or inelastic (unrecoverable) deformation of an aquifer system.

Locally, no fissures or other surficial evidence of subsidence were observed at or near the subject site. However, site specific effects resulting from long term regional subsidence is beyond the scope of our investigation.

IX. Flooding and Erosion. No signs of flooding or erosion were observed during our field investigation conducted on December 8, 2020. However, risks associated with flooding and erosion should be evaluated and mitigated by the project design Civil Engineer.

X. Debris Flows. Debris flows are viscous flows consisting of poorly sorted mixtures of sediment and water and are generally initiated on slopes steeper than approximately six horizontal to one vertical (6H:1V) (Boggs, 2001). Based on the flat nature of the site and the composition of the surface soil, we judge that risks associated with debris flows should be considered remote.

CONCLUSIONS

Based on the results of our geotechnical investigation, it is our opinion that the project should be feasible from a geotechnical perspective provided that the recommendations provided in this report are incorporated into design and carried out through construction. The main geotechnical concerns are the presence of artificial fill/disturbed soil, loose and potentially compressible condition of the near-surface soil and the presence of shallow seated bedrock that will be encountered during site grading, foundation construction and underground utility installation.

The near surface artificial fill soil and native soil is considered loose, potentially compressible and not suitable for support of shallow foundations or concrete slabs in the current condition. Because of the somewhat loose and potentially compressible condition of the near surface soil and the presence of shallow seated bedrock, remedial grading including overexcavation and recompaction is recommended for the proposed building areas. We recommend that remedial grading within the building areas include the over-excavation and re-compaction of the artificial fill and the primary foundation bearing soil. Specific recommendations for site preparation are presented in the Earthwork and Grading section of this report.

Caving did occur to varying degrees within each of our exploratory bores and the surface soil may be susceptible to caving within deeper excavations. All excavations should be constructed in accordance with the normal CalOSHA excavation criteria. Based in our observations of the materials encountered, we anticipate that the subsoil will conform to that described by CalOSHA as Type B or C. Soil conditions should be verified in the field by a "Competent person" employed by the Contractor.

The following recommendations present more detailed design criteria that have been developed based on our field exploration and laboratory testing.

EARTHWORK AND GRADING

All earthwork including excavation, backfill and preparation of the subgrade soil, should be performed in accordance with the geotechnical recommendations presented in this report and portions of the local regulatory requirements, as applicable. All earthwork should be performed under the observation and testing of a qualified soil engineer. The following geotechnical engineering recommendations for the proposed project are based on observations from the field investigation program, laboratory testing and geotechnical engineering analysis.

a. Stripping. Areas to be graded should be cleared of any, vegetation, associated root systems, subsurface improvements and debris. All areas scheduled to receive fill should be cleared of old fills and any irreducible matter. The strippings should be removed off site, or stockpiled for later use in landscape areas. Voids left by obstructions should be properly backfilled in accordance with the compaction recommendations of this report.

b. Preparation of New Building Areas. In order to achieve firm and uniform bearing conditions and to mitigate potential soil/bedrock transition related differential settlements, we recommend over-excavation and re-compaction throughout the building areas. All near surface soil and bedrock should be removed and compacted in place so that at least 90 percent relative compaction is attained to a depth of at least 3 feet below existing grade or 2 feet below the bottom of the footings, whichever is deeper. Remedial grading should extend laterally, a minimum of five feet beyond the building perimeter. The soil exposed by over-excavation should be scarified, moisture conditioned to near optimum moisture content, and compacted to at least 90 percent relative compaction prior to fill placement. Specialized grading equipment may be required to accomplish bedrock removal.

c. Compaction. Soil to be used as engineered fill should be free of organic material, debris, and other unsuitable material, and should not contain irreducible matter (cobbles) greater than eight (8) inches in maximum dimension. All fill materials should be placed in thin lifts, not exceeding six inches in a loose condition. If import fill is required, the material should be of a low to non-expansive nature and should meet the following criteria:

Plastic Index	Less than 12
Liquid Limit	Less than 35
Percent Soil Passing #200 Sieve	Between 15% and 35%
Maximum Aggregate Size	6 inches

The subgrade soil and all fill soil should be compacted with acceptable compaction equipment, to at least 90 percent relative compaction. The exposed subgrade should be observed by a representative of Sladden Engineering prior to fill placement. Compaction testing should be performed on all lifts in order to verify proper placement of the fill materials. Table 2 provides a summary of the excavation and compaction recommendations.

TABLE 3
SUMMARY OF RECOMMENDATIONS

*Remedial Grading	Over-excavation and re-compaction within the building envelopes and extending laterally 5 feet beyond the building limits and to a minimum of 3 feet below existing grade or 2 feet below the bottom of the footings, whichever is deeper.
Native / Import Engineered Fill	Place in thin lifts not exceeding 6 inches in a loose condition, compact to a minimum of 90 percent relative compaction.
Asphalt Concrete Sections	Compact the top 12 inches to at least 95 percent relative compaction within 2 percent of optimum moisture content.

*Actual depth may vary and should be determined by a representative of Sladden Engineering in the field during construction.

d. Shrinkage and Subsidence. Volumetric shrinkage of the material that is excavated and replaced as controlled compacted fill should be anticipated. We estimate that this shrinkage could vary from 10 to 15 percent. Subsidence of the surfaces that are scarified and compacted should be between 1 and 2 tenths of a foot. This will vary depending upon the type of equipment used, the moisture content of the soil at the time of grading and the actual degree of compaction attained. Some bulking of the bedrock materials should be expected but additional losses resulting from the removal of oversized material may also occur.

FOUNDATIONS: CONVENTIONAL SHALLOW SPREAD FOOTINGS

The proposed warehouse building may be supported upon conventional shallow spread footings. Footings should extend at least 18 inches beneath lowest adjacent grade. Isolated square or rectangular footings should be at least two feet square and continuous footings should be at least 12 inches wide. Continuous footings may be designed using an allowable bearing pressure of 1800 pounds per square foot (psf) and isolated pad footings may be designed using an allowable bearing pressure of 2000 psf. Allowable increases of approximately 200 psf for each additional 1 foot of width and 250 psf for each additional 6 inches in depth may be used, if desired. The maximum allowable bearing pressure should be 3000 psf. The allowable bearing pressures are applicable to dead and frequently applied live loads. The allowable bearing pressures may be increased by 1/3 to resist wind and seismic loading. Care should be taken to see that bearing or subgrade soil is not allowed to become saturated from the ponding of rainwater or irrigation. Drainage from the building area should be rapid and complete.

All footing excavations should be observed by a representative of the project geotechnical consultant to verify adequate embedment depths prior to placement of forms, steel reinforcement or concrete. The excavations should be trimmed neat, level and square. All loose, disturbed, sloughed or moisture-softened soil and/or any construction debris should be removed prior to concrete placement. Excavated soil generated from footing and/or utility trenches should not be stockpiled within the building envelope or in areas of exterior concrete flatwork.

LATERAL DESIGN

Resistance to lateral loads can be provided by a combination of friction acting at the base of the slabs or foundations and passive earth pressure along the sides of the foundations. A coefficient of friction of 0.40 between soil and concrete may be used with consideration to dead load forces only. A passive earth pressure of 250 pounds per square foot, per foot of depth, may be used for the sides of footings that are placed against properly compacted native or approved non-expansive import soil. Passive earth pressure should be ignored within the upper 1 foot except where confined (such as beneath a floor slab).

SLABS-ON-GRADE

In order to reduce the risk of heave, cracking and settlement, concrete slabs-on-grade should be placed on properly compacted fill as outlined in the previous sections of this report. The slab subgrades should remain near optimum moisture content and should not be permitted to dry prior to concrete placement. All slab subgrades should be firm and unyielding. Disturbed soil should be removed and then replaced and compacted to a minimum of 90 percent relative compaction.

Slab thickness and reinforcement should be determined by the Structural Engineer. All slab reinforcement should be supported on concrete chairs to ensure that reinforcement is placed at slab mid-height. We recommend a minimum floor slab thickness of 4.0 inches in office areas and 6.0 inches in warehouse areas and minimum reinforcement of #3 bars at 18 inches on center.

Slabs with moisture sensitive surfaces should be underlain with a moisture/vapor retarder consisting of a polyvinyl chloride membrane such as 10-mil Visqueen, or equivalent. All laps within the membrane should be sealed and at least 2 inches of clean sand should be placed below and over the membrane to promote uniform curing of the concrete and reduce the potential for punctures.

RETAINING WALLS

Minor retaining walls may be required to accomplish the proposed construction. Cantilever retaining walls may be designed using "active" pressures. Active pressures may be estimated using an equivalent fluid weight of 40 pcf for native backfill soil with level drained backfill conditions. At rest pressures should be utilized when considering restrained walls. An equivalent fluid weight of 60 pcf is recommended for restrained walls with level drained backfill conditions.

ONSITE PAVEMENT DESIGN

Asphalt concrete pavements should be designed in accordance with the Caltrans Highway Design Manual based on R-Value and Traffic Index. The R-Value of the near surface soil was determined to be 30 by expansion pressure and 21 by exudation pressure. On-site soil and any imported soil should be tested after grading for R-Value prior to establishing final pavement design sections. For preliminary pavement design, Traffic Indices (TI) of 5.0 and 6.5 were used for the light duty and heavy duty pavements, respectively. We assumed Asphalt Concrete (AC) over Class II Aggregate Base (AB). The preliminary flexible pavement layer thickness is as follows:

RECOMMENDED ASPHALT PAVEMENT SECTION LAYER THICKNESS

Pavement Material	Recommended Thickness	
	TI = 5.0	TI = 6.5
Asphalt Concrete Surface Course	3 inches	4 inches
Class II Aggregate Base Course	6 inches	8 inches
Compacted Subgrade Soil	12 inches	12 inches

Asphalt concrete should conform to the latest edition of the Standard Specifications for Public Works Construction ("Greenbook" or Caltrans). Class II aggregate base should conform to Greenbook or Caltrans Standard Specifications, latest edition. The aggregate base course should be compacted to at least 95 percent of the maximum dry density as determined by ASTM Method D 1557.

Asphalt concrete should conform to Sections 203 and 302 of the latest edition of the Standard Specifications for Public Works Construction ("Greenbook"). Class II aggregate base should conform to Section 26 of the Caltrans Standard Specifications, latest edition. The aggregate base course should be compacted to at least 95 percent of the maximum dry density as determined by ASTM Method D 1557.

We expect that concrete pavement may also be considered for on-site pavement areas. A concrete pavement section of 7.0 inches of Portland Cement Concrete (PCC) on 4.0 inches of aggregate base material on compact native soil should be adequate for the on-site concrete pavement subject to truck traffic. In areas limited to light auto parking, the concrete pavement section may be reduced to 5.0 inches of PCC on compact native soil. Properly spaced and constructed control joints including expansion joints and contraction joints should be incorporated into concrete pavement design to accommodate temperature and shrinkage related cracking. Joint spacing and joint patterns should be established based upon Portland Cement Association (PCA) and American Concrete Institute (ACI) guidelines.

CORROSION SERIES

The soluble sulfate concentrations of the surface soil were determined to be 20 parts per million (ppm). The soil is considered to have a "negligible" corrosive potential with respect to concrete. The use of Type V cement and special sulfate resistant concrete mixes may be necessary. However, the soluble sulfate concentration should be reevaluated after the grading and compaction work is completed. Soluble sulfate content of the surface soil should be reevaluated after grading and appropriate concrete mix designs should be established based upon post-grading test results.

The Ph levels of the surface soil was 8.9. Based on soluble chloride concentration testing (50 ppm) the soil is generally considered non-corrosive with respect to normal grade steel. The minimum resistivity of the surface soil was found to be 2,400 ohm-cm that suggests the site soil is considered to be "moderately" corrosive with respect to ferrous metal installations. A corrosion expert should be consulted regarding appropriate corrosion protection measures for corrosion sensitive installations.

UTILITY TRENCH BACKFILL

All utility trench backfill should be compacted to a minimum of 90 percent relative compaction. Trench backfill materials should be placed in lifts no greater than six inches in a loose condition, moisture conditioned (or air-dried) as necessary to achieve near optimum moisture conditions, and then mechanically compacted in place to a minimum relative compaction of 90 percent. A representative of the project geotechnical consultant should test the backfill to verify adequate compaction.

DRAINAGE

All final grades should be provided with positive gradients away from foundations to provide rapid removal of surface water runoff to an adequate discharge point. No water should be allowed to be pond on or immediately adjacent to foundation elements. In order to reduce water infiltration into the subgrade soil, surface water should be directed away from foundations to an adequate discharge point.

LIMITATIONS

The findings and recommendations presented in this report are based upon an interpolation of the soil conditions between the exploratory bore locations and extrapolation of these conditions throughout the proposed building area. Should conditions encountered during grading appear different than those indicated in this report, this office should be notified.

The use of this report by other parties or for other projects is not authorized. The recommendations of this report are contingent upon monitoring of the grading operation by a representative of Sladden Engineering. All recommendations are considered to be tentative pending our review of the grading operation and additional testing, if indicated. If others are employed to perform any soil testing, this office should be notified prior to such testing in order to coordinate any required site visits by our representative and to assure indemnification of Sladden Engineering.

We recommend that a pre-job conference be held on the site prior to the initiation of site grading. The purpose of this meeting will be to assure a complete understanding of the recommendations presented in this report as they apply to the actual grading performed.

ADDITIONAL SERVICES

Once completed, final project plans and specifications should be reviewed by us prior to construction to confirm that the full intent of the recommendations presented herein have been applied to design and construction. Following the review of plans and specifications, observation should be performed by the Soil Engineer during construction to document that foundation elements are founded on/or penetrate into the recommended soil, and that suitable backfill soil is placed upon competent materials and properly compacted at the recommended moisture content.

Tests and observations should be performed during grading by the Soil Engineer or his representative in order to verify that the grading is being performed in accordance with the project specifications. Field density testing shall be performed in accordance with acceptable ASTM test methods. The minimum acceptable degree of compaction should be 90 percent for subgrade soil and 95 percent for Class II aggregate base as obtained by the ASTM D1557 test method. Where testing indicates insufficient density, additional compactive effort shall be applied until retesting indicates satisfactory compaction.

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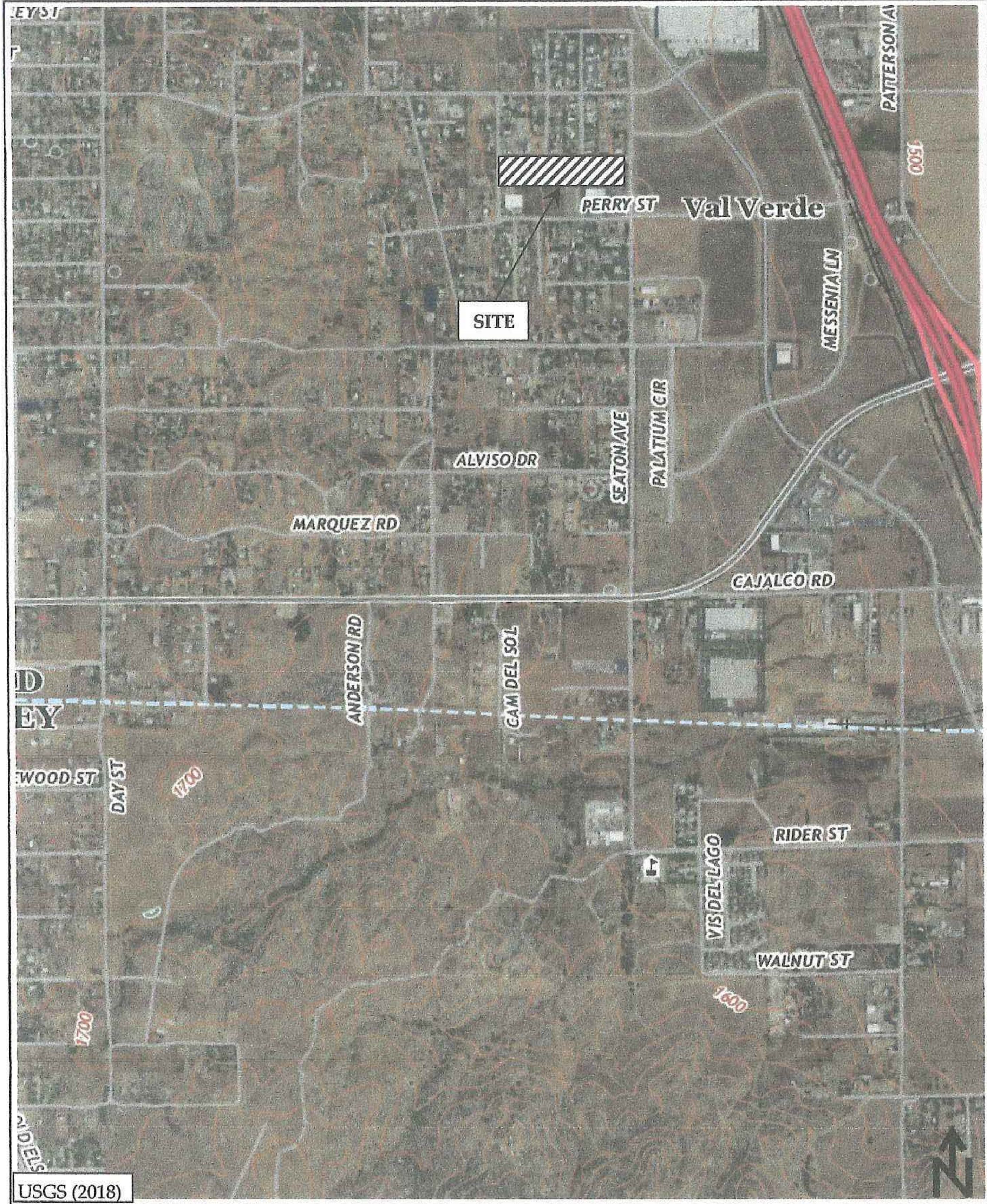
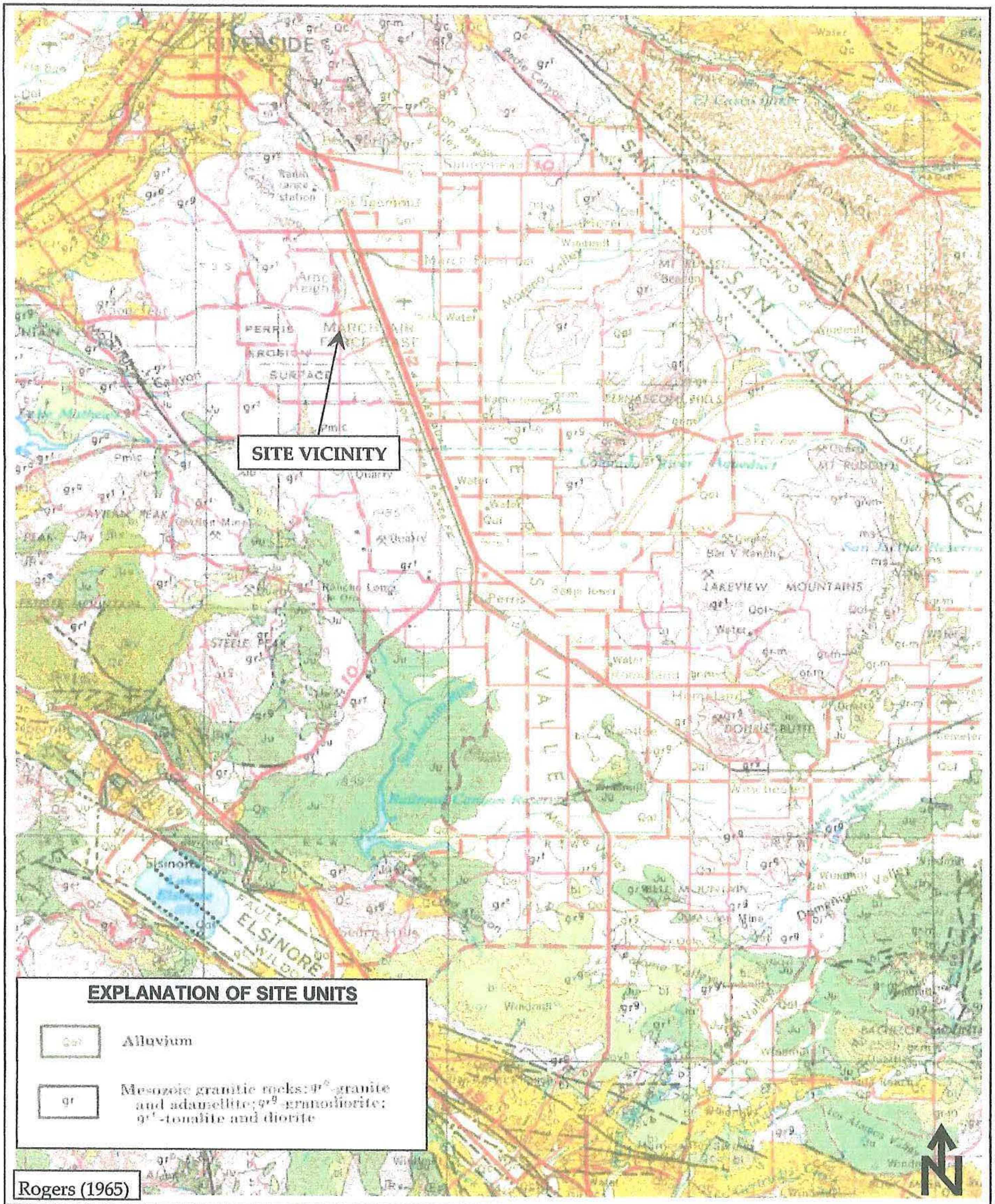
FIGURES

SITE LOCATION MAP
REGIONAL GEOLOGIC MAP
EXPLORATION LOCATION PLAN



USGS (2018)

	SITE LOCATION MAP		FIGURE
Sladden Engineering	Project Number:	644-20039	1
	Report Number:	20-12-093	
	Date:	December 23, 2020	



Rogers (1965)

Sladden Engineering

REGIONAL GEOLOGIC MAP

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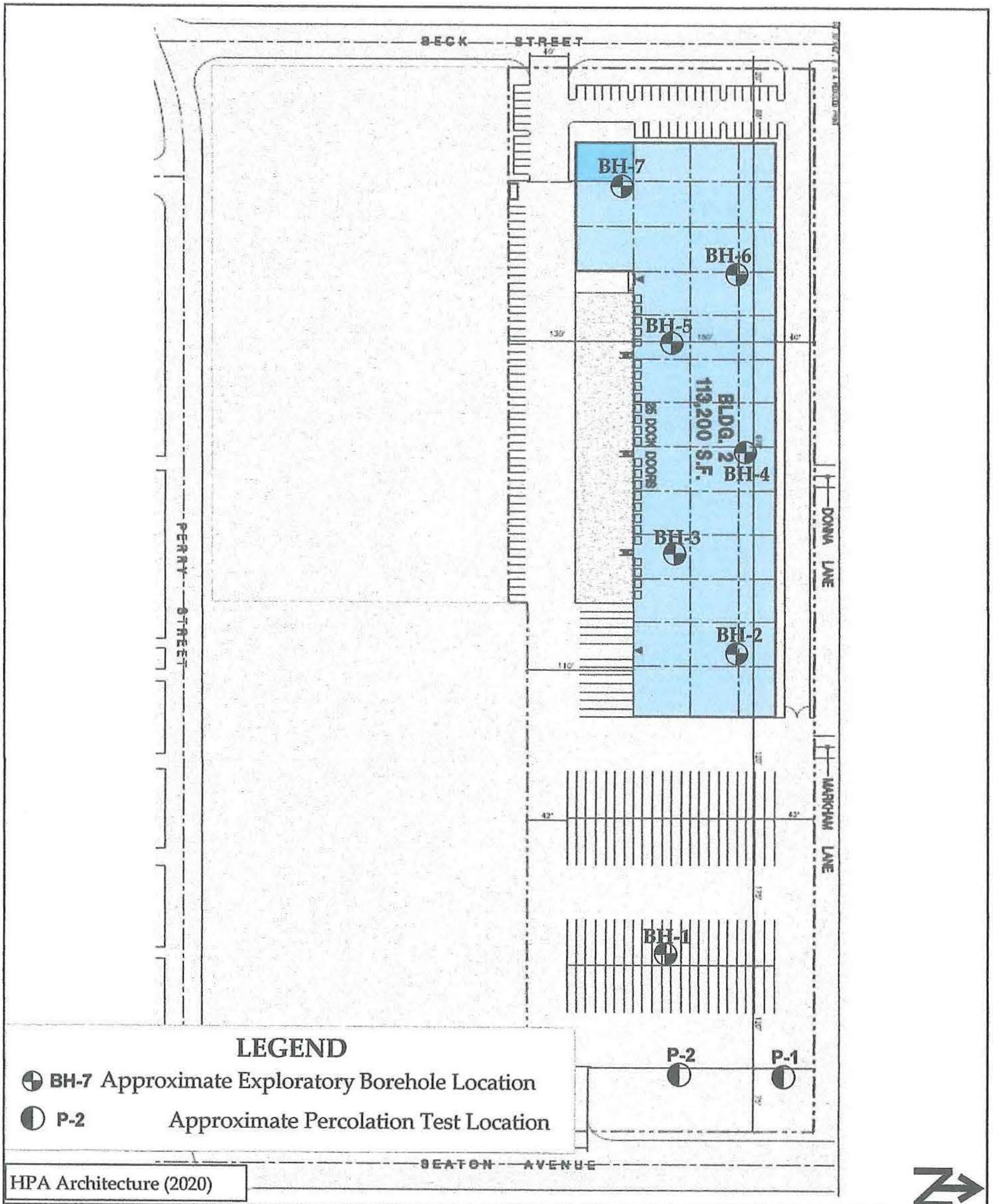
FIGURE

2



HPA Architecture (2020)

Sladden Engineering

EXPLORATION LOCATION PLAN

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FIGURE

3

APPENDIX A

FIELD EXPLORATION

APPENDIX A

FIELD EXPLORATION

For our field investigation nine (9) exploratory bores were excavated on December 8, 2020 utilizing a truck mounted hollow stem auger rig (Mobile B-61). Continuous logs of the materials encountered were made by a representative of Sladden Engineering. Materials encountered in the boreholes were classified in accordance with the Unified Soil Classification System which is presented in this appendix.

Representative undisturbed samples were obtained within our borings by driving a thin-walled steel penetration sampler (California split spoon sampler) or a Standard Penetration Test (SPT) sampler with a 140 pound automatic-trip hammer dropping approximately 30 inches (ASTM D1586). The number of blows required to drive the samplers 18 inches was recorded in 6-inch increments and blowcounts are indicated on the boring logs.

The California samplers are 3.0 inches in diameter, carrying brass sample rings having inner diameters of 2.5 inches. The standard penetration samplers are 2.0 inches in diameter with an inner diameter of 1.5 inches. Undisturbed samples were removed from the sampler and placed in moisture sealed containers in order to preserve the natural soil moisture content. Bulk samples were obtained from the excavation spoils and samples were then transported to our laboratory for further observations and testing.

SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	12/8/2020
Elevation:	1550 Ft (MSL)	Boring No:	BH-1

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); brown, dry, fine-to coarse-grained with trace of gravel (Fill/Disturbed).
							4		
■	4/8/16			45.2	6.6	112.0	6		Silty Sand (SM); yellowish brown, slightly moist, medium dense, fine-to coarse-grained with trace of gravel (Qal).
							8	▨	
■	13/19/22			11.2	7.2		10	▨	Granitic Bedrock (gr); light gray, moderately hard, moderately strong, highly weathered, breaks down into silty sand (SM) soil type.
							12		
							14		Terminated at ~11.5 Feet bgs No Groundwater or Seepage Encountered Bedrock Encountered at ~8.0 Feet bgs
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

Completion Notes:

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SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	12/8/2020
Elevation:	1550 Ft (MSL)	Boring No:	BH-2

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
									Silty Sand (SM); brown, dry, fine-to coarse-grained with trace of gravel (Fill/Disturbed).
		1	38				2		Silty Sand (SM); yellowish brown, slightly moist, fine-to coarse-grained with trace of gravel (Qal).
							4	▨	
■	18/32/50-6"			13.4	4.1			▨	
							6	▨	
							8	▨	
■	13/24/23			13.5	5.9			▨	
▨	37/50-3"			6.8	5.3	131.7	10	▨	Granitic Bedrock (gr); light gray, moderately hard, moderately strong, highly weathered, breaks down into silty sand (SM) soil type.
							12	▨	
							14	▨	
■	26/50-6"			14.0	8.0			▨	
							16	▨	
							18		Terminated at ~16.5 Feet bgs No Groundwater or Seepage Encountered Bedrock Encountered at ~4.0 Feet bgs
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

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SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	12/8/2020
Elevation:	1550 Ft (MSL)	Boring No:	BH-3

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
									Silty Sand (SM); brown, dry, fine-to coarse-grained with trace of gravel (Fill/Disturbed).
▇	12/12/13			36.3	5.1	121.1	2		
							4		Silty Sand (SM); yellowish brown, slightly moist, medium dense, fine-to coarse-grained with trace of gravel (Qal).
▮	4/5/7			37.2	5.6		6		
▇	20/26/29			18.7	9.9	133.4	8	▨	Granitic Bedrock (gr); light gray, moderately hard, moderately strong, highly weathered, breaks down into silty sand (SM) soil type.
							10	▨	
							12		
							14		Terminated at ~10.0 Feet bgs No Groundwater or Seepage Encountered Bedrock Encountered at ~7.0 Feet bgs
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
							50		

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BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	12/8/2020
Elevation:	1550 Ft (MSL)	Boring No:	BH-4

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
									Silty Sand (SM); brown, dry, fine-to coarse-grained with trace of gravel (Fill/Distubed).
▮	3/6/12			14.2	6.0		2		
							4	▨	Granitic Bedrock (gr); light gray, moderately hard, moderately strong, highly weathered, breaks down into silty sand (SM) soil type.
▨	21/50-6"			12.2	6.2	133.2	6	▨	
							8		Terminated at ~6.5 Feet bgs No Groundwater or Seepage Encountered Bedrock Encountered at ~3.0 Feet bgs
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
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BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	12/8/2020
Elevation:	1550 Ft (MSL)	Boring No:	BH-5

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); brown, dry, fine-to coarse-grained with trace of gravel (Fill/Distubed).
■	3/5/8			29.6	4.7	112.4	4		Silty Sand (SM); yellowish brown, slightly moist, loose, fine-to coarse-grained with trace of gravel (Qal).
■	7/12/28			16.8	3.5		6	▨	Granitic Bedrock (gr); light gray, moderately hard, moderately strong, highly weathered, breaks down into silty sand (SM) soil type.
							8		
							10		Terminated at ~6.5 Feet bgs No Groundwater or Seepage Encountered Bedrock Encountered at ~5.0 Feet bgs
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
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BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	12/8/2020
Elevation:	1550 Ft (MSL)	Boring No:	BH-6

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
									Silty Sand (SM); brown, dry, fine to coarse grainedw/ gravel (Fill).
■	27/50-4"			10.6	3.9		2 4	▨	Granitic Bedrock (gr); light gray, moderately hard, moderately strong, highly weathered, breaks down into silty sand (SM) soil type.
							6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50		Terminated at ~5.0 Feet bgs No Groundwater or Seepage Encountered Bedrock Encountered at ~1.0 Feet bgs

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SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	12/8/2020
Elevation:	1550 Ft (MSL)	Boring No:	BH-7

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
									Silty Sand (SM); brown, dry, fine to coarse grainedw/ gravel (Fill).
▮	10/12/17			9.8	2.4		2 4	▨	Granitic Bedrock (gr); light gray, moderately hard, moderately strong, highly weathered, breaks down into silty sand (SM) soil type.
							6 8		Terminated at ~5.0 Feet bgs No Groundwater or Seepage Encountered Bedrock Encountered at ~1.5 Feet bgs
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
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							48		
							50		

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SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	12/8/2020
Elevation:	1550 Ft (MSL)	Boring No:	P-1

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
									Silty Sand (SM); brown, dry, fine-to coarse-grained with trace of gravel (Fill/Disturbed).
							2		Silty Sand (SM); yellowish brown, slightly moist, fine-to coarse-grained with trace of gravel (Qal).
							4		
							6		Terminated at ~5.0 Feet bgs No Groundwater or Seepage Encountered No Bedrock Encountered Cased to Facilitate Percolation Testing
							8		
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
							32		
							34		
							36		
							38		
							40		
							42		
							44		
							46		
							48		
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SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	12/8/2020
Elevation:	1550 Ft (MSL)	Boring No:	P-2

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							2		Silty Sand (SM); brown, dry, fine-to coarse-grained with trace of gravel (Fill/Disturbed).
							4		Silty Sand (SM); yellowish brown, slightly moist, fine-to coarse-grained with trace of gravel (Qal).
							6		Terminated at ~5.0 Feet bgs No Groundwater or Seepage Encountered No Bedrock Encountered Cased to Facilitate Percolation Testing
							8		
							10		
							12		
							14		
							16		
							18		
							20		
							22		
							24		
							26		
							28		
							30		
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APPENDIX B

LABORATORY TESTING

APPENDIX B

LABORATORY TESTING

Representative bulk and relatively undisturbed soil samples were obtained in the field and returned to our laboratory for additional observations and testing. Laboratory testing was generally performed in two phases. The first phase consisted of testing in order to determine the compaction of the existing natural soil and the general engineering classifications of the soil underlying the site. This testing was performed in order to estimate the engineering characteristics of the soil and to serve as a basis for selecting samples for the second phase of testing. The second phase consisted of soil mechanics testing. This testing including consolidation, shear strength and expansion testing was performed in order to provide a means of developing specific design recommendations based on the mechanical properties of the soil.

CLASSIFICATION AND COMPACTION TESTING

Unit Weight and Moisture Content Determinations: Each undisturbed sample was weighed and measured in order to determine its unit weight. A small portion of each sample was then subjected to testing in order to determine its moisture content. This was used in order to determine the dry density of the soil in its natural condition. The results of this testing are shown on the Boring Logs.

Maximum Density-Optimum Moisture Determinations: Representative soil types were selected for maximum density determinations. This testing was performed in accordance with the ASTM Standard D1557-91, Test Method A. The results of this testing are presented graphically in this appendix. The maximum densities are compared to the field densities of the soil in order to determine the existing relative compaction to the soil. This is shown on the Boring Logs, and is useful in estimating the strength and compressibility of the soil.

Classification Testing: Soil samples were selected for classification testing. This testing consists of mechanical grain size analyses. This provides information for developing classifications for the soil in accordance with the Unified Soil Classification System which is presented in the preceding appendix. This classification system categorizes the soil into groups having similar engineering characteristics. The results of this testing is very useful in detecting variations in the soil and in selecting samples for further testing.

SOIL MECHANIC'S TESTING

Expansion Testing: One (1) bulk sample was selected for Expansion testing. Expansion testing was performed in accordance with the UBC Standard 18-2. This testing consists of remolding 4-inch diameter by 1-inch thick test specimens to a moisture content and dry density corresponding to approximately 50 percent saturation. The samples are subjected to a surcharge of 144 pounds per square foot and allowed to reach equilibrium. At that point the specimens are inundated with distilled water. The linear expansion is then measured until complete.

Direct Shear Tests: One (1) bulk sample was selected for Direct Shear testing. This test measures the shear strength of the soil under various normal pressures and is used to develop parameters for foundation design and lateral design. Tests were performed using a recompacted test specimen that was saturated prior to tests. Tests were performed using a strain controlled test apparatus with normal pressures ranging from 800 to 2300 pounds per square foot.

Consolidation: One (1) relatively undisturbed sample was selected for consolidation testing. For this test, a one-inch thick test specimen was subjected to vertical loads varying from 575 psf to 11520 psf applied progressively. The consolidation at each load increment was recorded prior to placement of each subsequent load. Testing was performed in accordance with ASTM Test Method D-2435.

Corrosion Series Testing: The soluble sulfate concentrations of the surface soil were determined in accordance with California Test Method Number (CA) 417. The pH and Minimum Resistivity were determined in accordance with CA 643. The soluble chloride concentrations were determined in accordance with CA 422.

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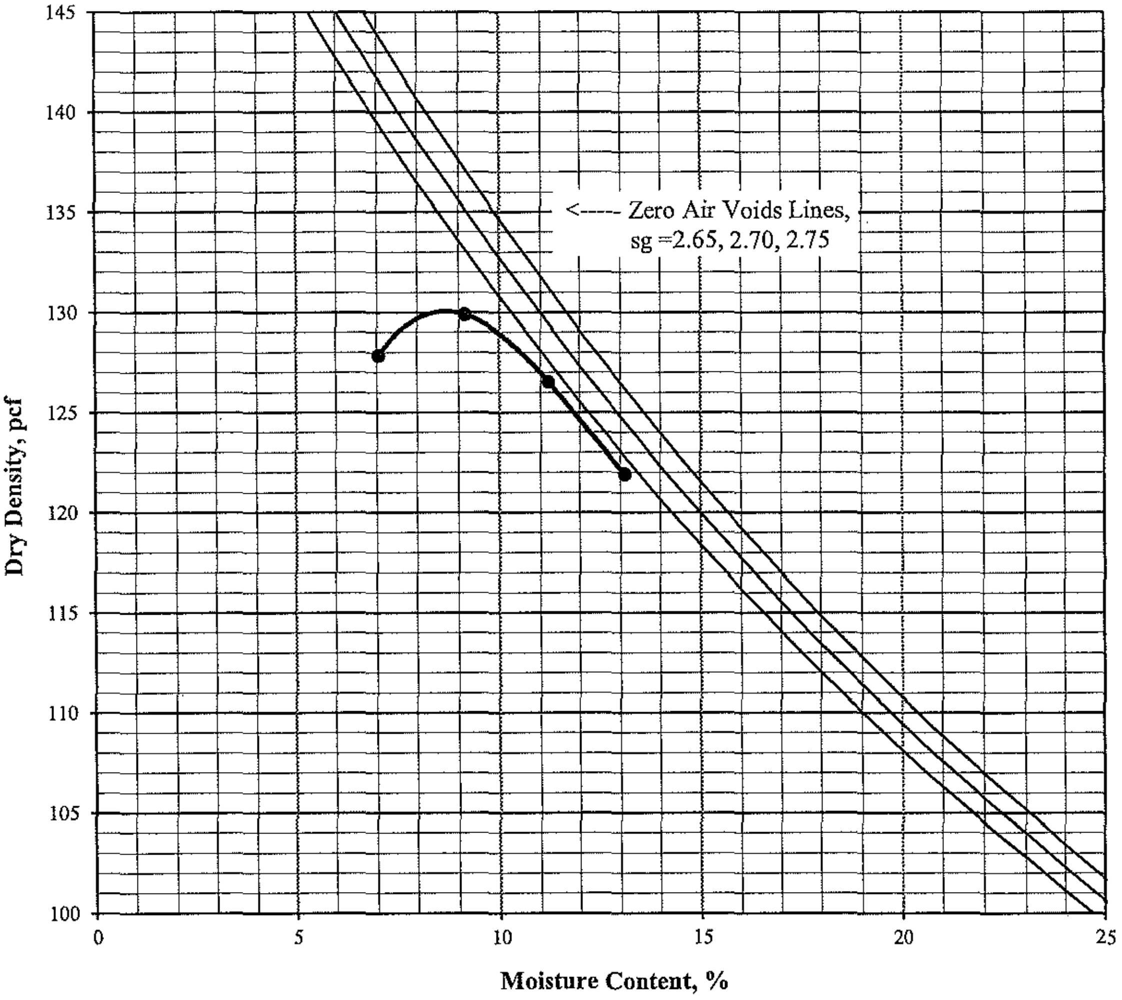
Maximum Density/Optimum Moisture

ASTM D698/D1557

Project Number:	644-20039	December 21, 2020
Project Name:	Seaton Avenue & Perry Street	
Lab ID Number:	LN6-20587	ASTM D-1557 A
Sample Location:	BH-2 Bulk 1 @ 0-5'	Rammer Type: Machine
Description:	Dark Brown Silty Sand (SM)	

Maximum Density: **130 pcf**
Optimum Moisture: **9.5%**

Sieve Size	% Retained
3/4"	
3/8"	
#4	1.1



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Expansion Index

ASTM D 4829

December 21, 2020

Job Number:	644-20039
Job Name:	Seaton Avenue & Perry Street
Lab ID Number:	LN6-20587
Sample ID:	BH-2 Bulk 1 @ 0-5'
Soil Description:	Dark Brown Silty Sand (SM)

Wt of Soil + Ring:	591.8
Weight of Ring:	192.0
Wt of Wet Soil:	399.8
Percent Moisture:	7.4%
Sample Height, in	0.95
Wet Density, pcf:	127.9
Dry Denstiy, pcf:	119.1

% Saturation:	48.2

Expansion **Rack # 2**

Date/Time	12/16/2020	2:50 PM
Initial Reading	0.0000	
Final Reading	0.0383	

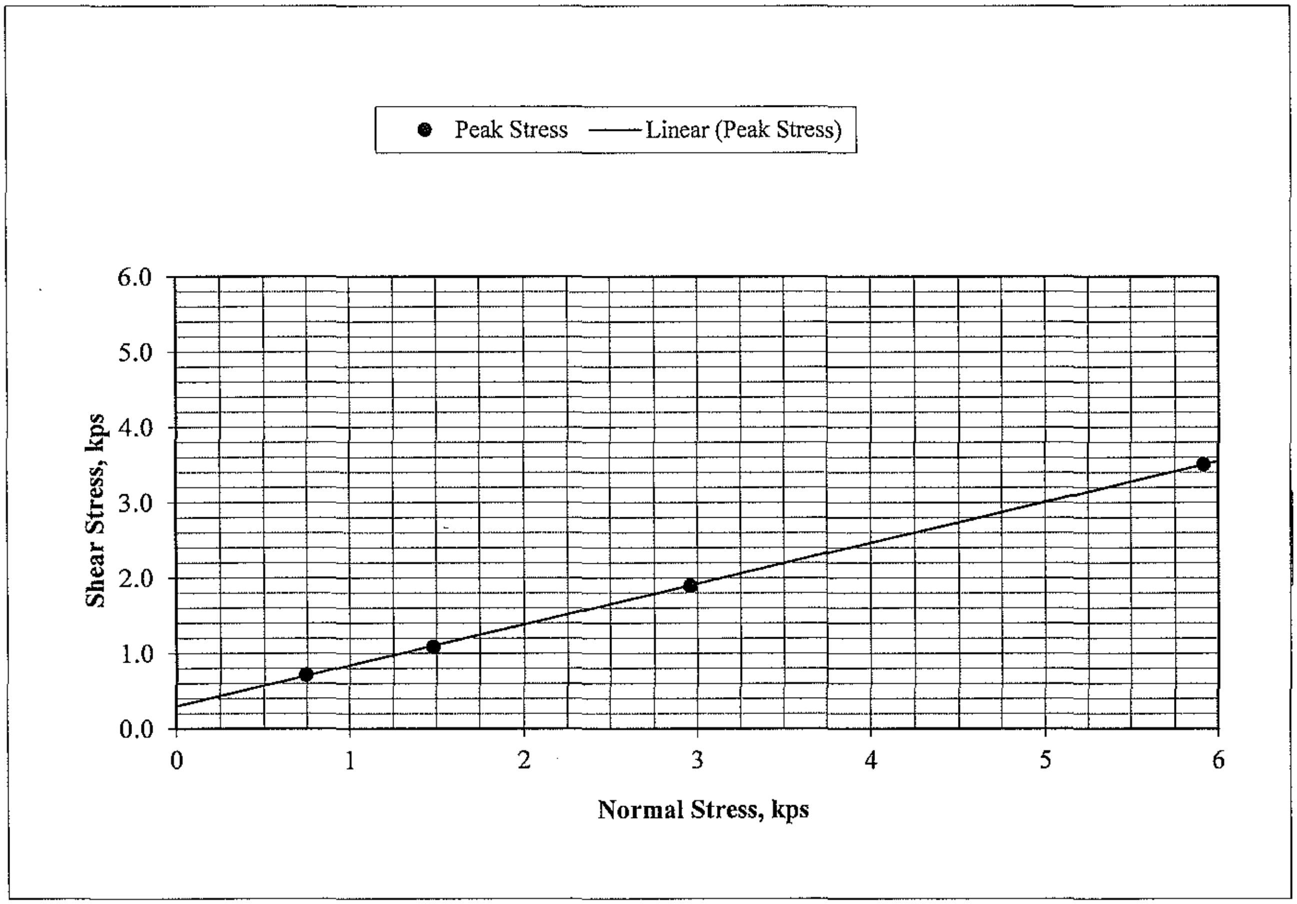
Expansion Index **38**

(Final - Initial) x 1000

Direct Shear ASTM D 3080-04
(modified for unconsolidated condition)

Job Number:	644-20039		December 21, 2020
Job Name	Seaton Avenue & Perry Street	Initial Dry Density:	117.1 pcf
Lab ID No.	LN6-20587	Initial Mosture Content:	9.4 %
Sample ID	BH-2 Bulk 1 @ 0-5'	Peak Friction Angle (Ø):	28°
Classification	Dark Brown Silty Sand (SM)	Cohesion (c):	300 psf
Sample Type	Remolded @ 90% of Maximum Density		

Test Results	1	2	3	4	Average
Moisture Content, %	15.5	15.5	15.5	15.5	15.5
Saturation, %	95.5	95.5	95.5	95.5	95.5
Normal Stress, kps	0.739	1.479	2.958	5.916	
Peak Stress, kps	0.719	1.090	1.897	3.510	



Job Number: 644-20039
Job Name: Seaton Avenue & Perry Street
Date: 12/21/2020

Moisture Adjustment		Remolded Shear Weight	
Wt of Soil:	1,000	Max Dry Density:	130.0
Moist As Is:	5.0	Optimum Moisture:	9.5
Moist Wanted:	9.5		
ml of Water to Add:	42.9	Wt Soil per Ring, g:	154.1

UBC

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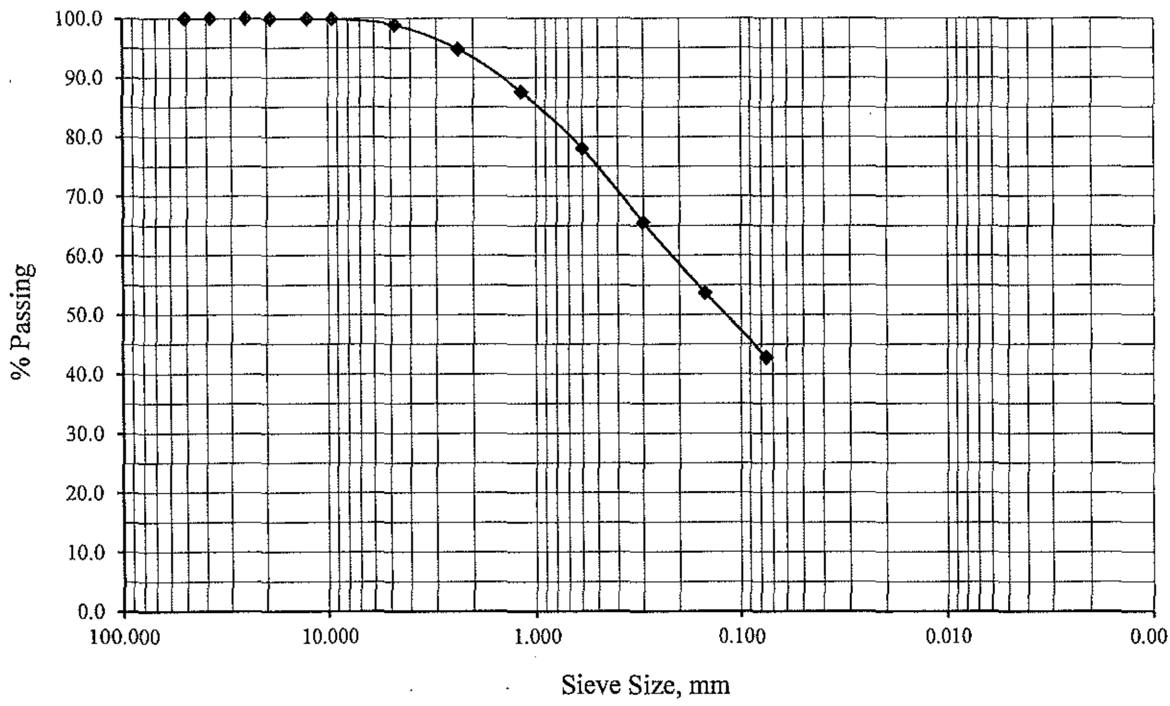
Gradation

ASTM C117 & C136

Project Number: 644-20039 December 21, 2020
Project Name: Seaton Avenue & Perry Street
Lab ID Number: LN6-20587
Sample ID: BH-2 Bulk 1 @ 0-5' Soil Classification: SM

Sieve Size, in	Sieve Size, mm	Percent Passing
2"	50.8	100.0
1 1/2"	38.1	100.0
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	99.9
3/8"	9.53	99.9
#4	4.75	98.9
#8	2.36	94.8
#16	1.18	87.6
#30	0.60	78.0
#50	0.30	65.6
#100	0.15	53.7
#200	0.075	42.8



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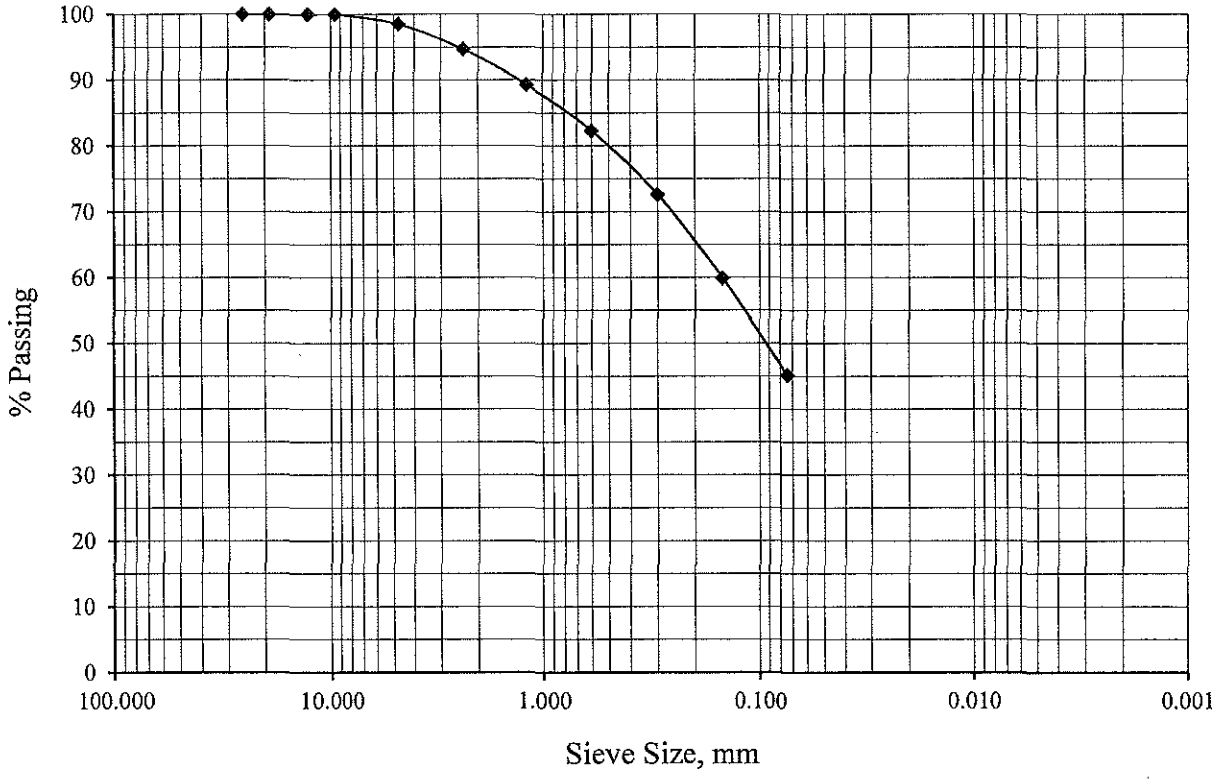
Gradation

ASTM C117 & C136

Project Number:	644-20039	December 21, 2020
Project Name:	Seaton Avenue & Perry Street	
Lab ID Number:	LN6-20587	
Sample ID:	BH-1 R-1 @ 5'	Soil Classification: SM

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	98.5
#8	2.36	94.7
#16	1.18	89.3
#30	0.60	82.3
#50	0.30	72.6
#100	0.15	59.9
#200	0.074	45.2



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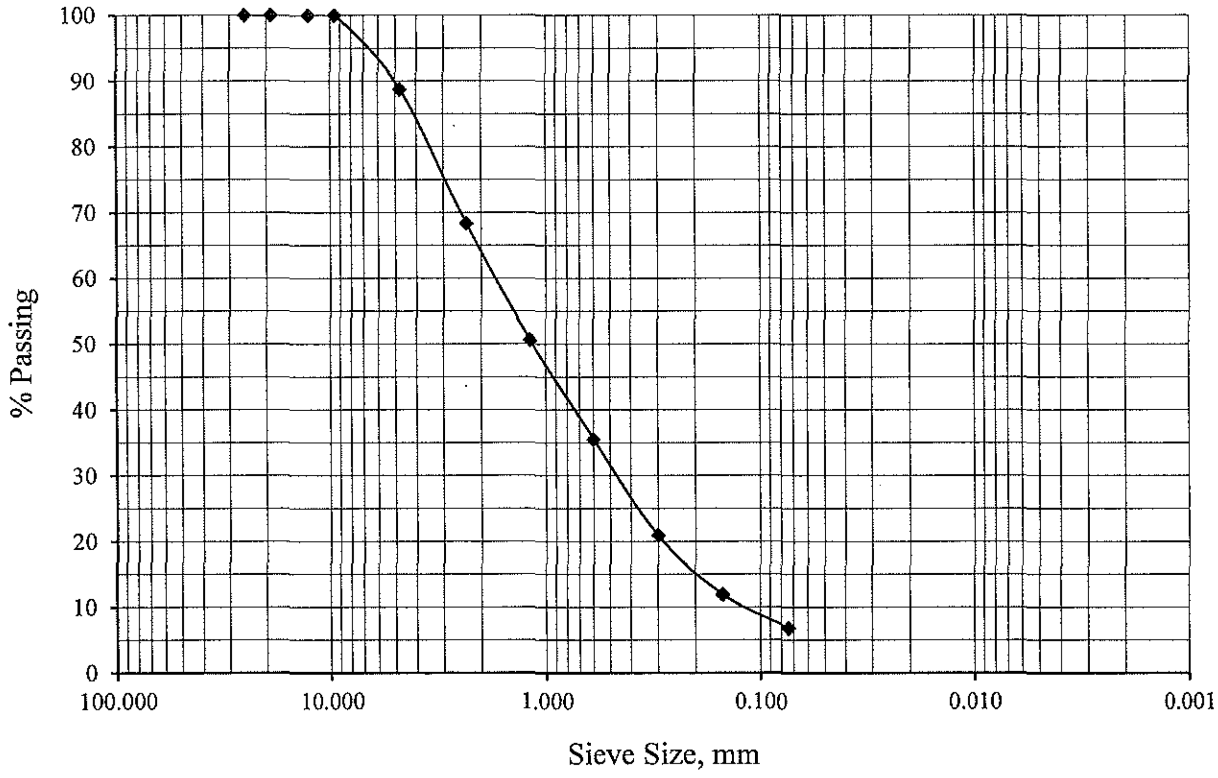
Gradation

ASTM C117 & C136

Project Number: 644-20039 December 21, 2020
Project Name: Seaton Avenue & Perry Street
Lab ID Number: LN6-20587
Sample ID: BH-2 R-3 @ 10' Soil Classification: SP-SM

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	88.8
#8	2.36	68.3
#16	1.18	50.6
#30	0.60	35.5
#50	0.30	20.9
#100	0.15	11.9
#200	0.074	6.8

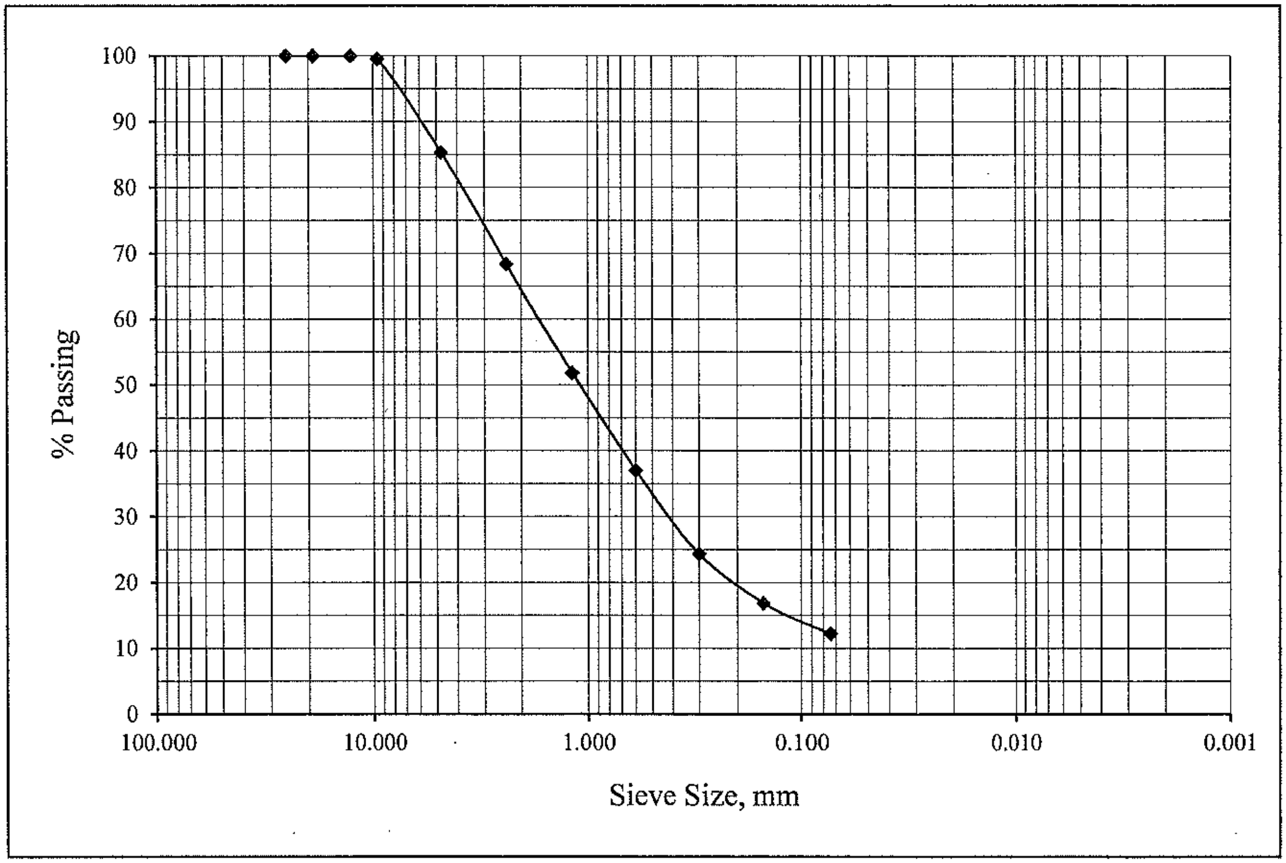


Gradation

ASTM C117 & C136

Project Number: 644-20039 December 21, 2020
Project Name: Seaton Avenue & Perry Street
Lab ID Number: LN6-20587
Sample ID: BH-4 R-2 @ 5' Soil Classification: SM

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	99.5
#4	4.75	85.3
#8	2.36	68.4
#16	1.18	51.9
#30	0.60	37.0
#50	0.30	24.4
#100	0.15	16.9
#200	0.074	12.2



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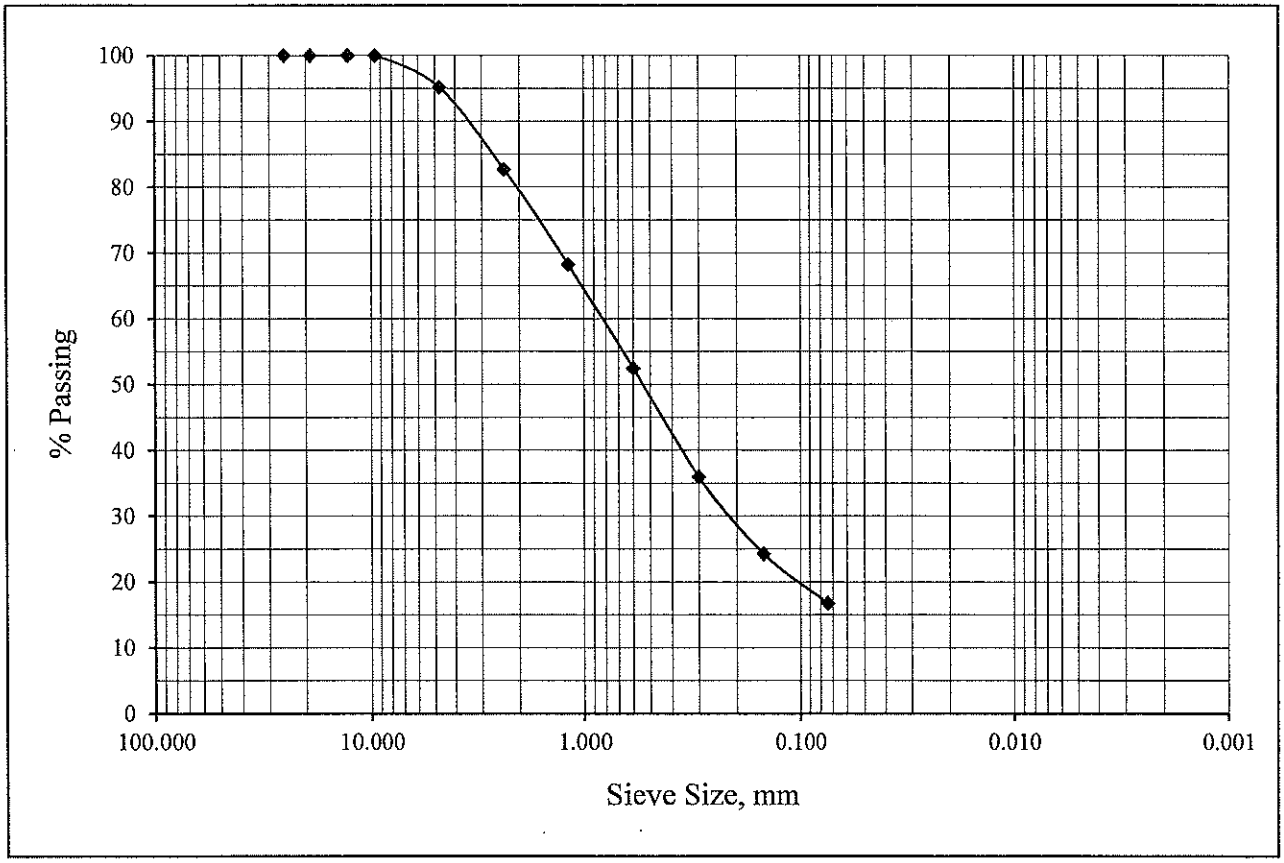
Gradation

ASTM C117 & C136

Project Number: 644-20039 December 21, 2020
Project Name: Seaton Avenue & Perry Street
Lab ID Number: LN6-20587
Sample ID: BH-5 S-2 @ 5' Soil Classification: SM

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	95.2
#8	2.36	82.7
#16	1.18	68.2
#30	0.60	52.5
#50	0.30	35.9
#100	0.15	24.3
#200	0.074	16.8



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One Dimensional Consolidation

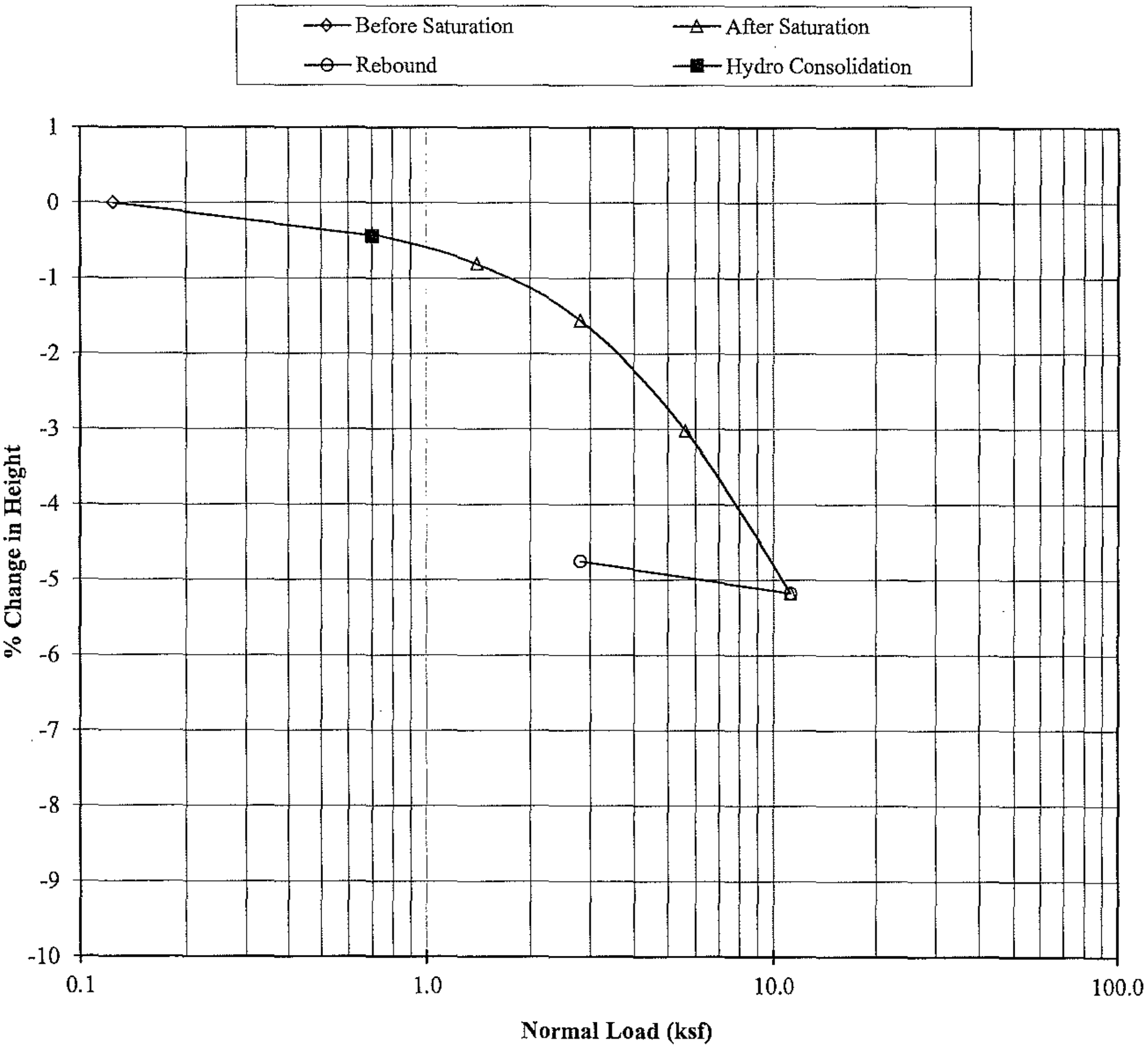
ASTM D2435 & D5333

December 21, 2020

Job Number: 644-20039
Job Name: Seaton Avenue & Perry Street
Lab ID Number: LN6-20587
Sample ID: BH-1 R-1 @ 5'
Soil Description: Dark Brown Silty Sand (SM)

Initial Dry Density, pcf: 105.4
Initial Moisture, %: 6.6
Initial Void Ratio: 0.582
Specific Gravity: 2.67

% Change in Height vs Normal Presssure Diagram



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RESISTANCE '*R*' VALUE AND EXPANSION PRESSURE

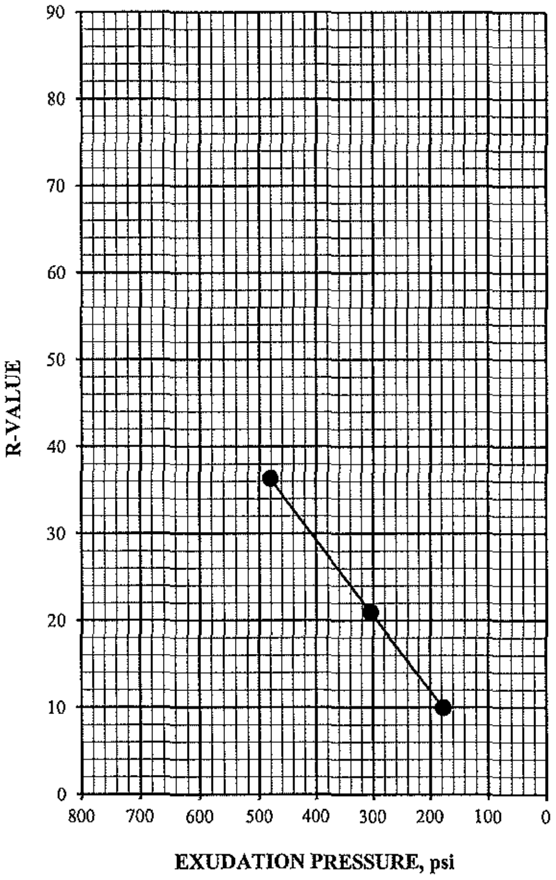
CTM 301

December 21, 2020

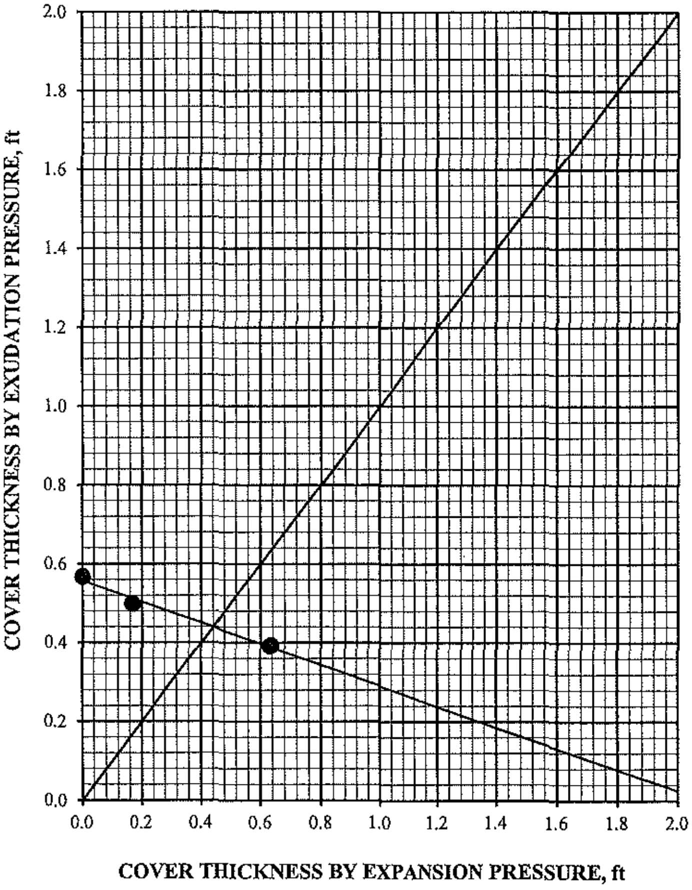
Project Number: 644-20039
Project Name: Seaton Avenue & Perry Street
Lab ID Number: LN6-20587
Sample ID: BH-2 Bulk 1 @ 0-5'
Sample Description: Dark Brown Silty Sand (SM)
Specified Traffic Index: 5.0

Dry Density @ 300 psi Exudation Pressure: 123.3-pcf
%Moisture @ 300 psi Exudation Pressure: 12.1%
R-Value - Exudation Pressure: 21
R-Value - Expansion Pressure: 30
R-Value @ Equilibrium: 21

EXUDATION PRESSURE CHART



EXPANSION PRESSURE CHART



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45090 Golf Center Pkwy, Suite F, Indio CA 92201 (760) 863-0713 Fax (760) 863-0847
450 Egan Avenue, Beaumont, CA 92223 (951) 845-7743 Fax (951) 845-8863

Date: December 21, 2020

Account No.: 644-20039

Customer: Dedeaux Properties

Location: Seaton Avenue & Perry Street, Perris Area

Analytical Report

Corrosion Series

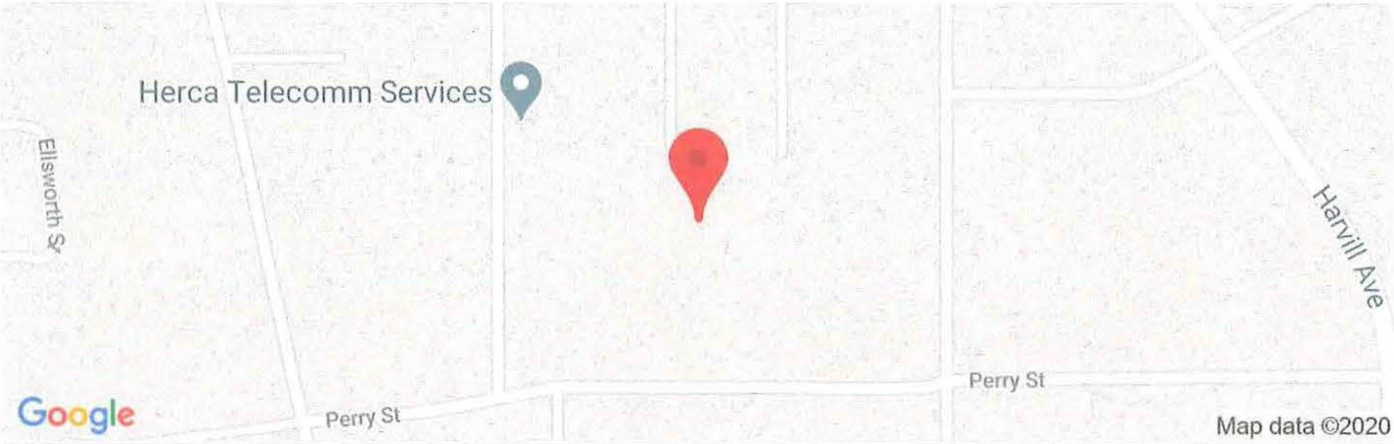
	pH per CA 643	Soluble Sulfates per CA 417 ppm	Soluble Chloride per CA 422 ppm	Min. Resistivity per CA 643 ohm-cm
BH-2 @ 0-5'	8.9	20	50	2400

APPENDIX C

SEISMIC DESIGN MAP AND REPORT

OSHPD

Latitude, Longitude: 33.8496, -117.2639



Date	12/21/2020, 1:49:23 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	B - Rock

Type	Value	Description
S_S	1.5	MCE_R ground motion. (for 0.2 second period)
S_1	0.563	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.35	Site-modified spectral acceleration value
S_{M1}	0.45	Site-modified spectral acceleration value
S_{DS}	0.9	Numeric seismic design value at 0.2 second SA
S_{D1}	0.3	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
F_a	0.9	Site amplification factor at 0.2 second
F_v	0.8	Site amplification factor at 1.0 second
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	0.9	Site amplification factor at PGA
PGA_M	0.45	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.52	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.623	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.563	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.615	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.937	Mapped value of the risk coefficient at short periods
C_{R1}	0.915	Mapped value of the risk coefficient at a period of 1 s

DISCLAIMER